

Political Economy of GMO Foods

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Over the last several decades, the growth in the development, cultivation, and consumption of genetically modified organism (GMO) foods has been dramatic in some areas of the world while strongly resisted in others. This paper discusses how some major multinational corporations and international political organizations have influenced this pattern of growth and how recent developments in Guatemala, India, and the United States are raising new questions about the political economy of GMO foods, in general, that may impact the future direction of the production and use of these foods around the world.

INTRODUCTION

Since the original pioneering work by Adam Smith (1776) and David Ricardo (1817), Political Economy, as a broadly-based, interdisciplinary area of study, has provided many valuable insights into how changes in the international production of goods or services and trade relations influence both the creation and distribution of wealth as well as their impact on human conditions in a wide variety of ways. In this paper, this perspective is specifically used to provide a lens to examine how technical developments in the field of genetic engineering (GE) have allowed a number of major multinational firms with interests in agrichemicals and/or agricultural biotechnology to begin producing and distributing genetically modified organisms (GMO) foods on a world-wide basis over the last several decades and the controversy that this has development has generated.

The paper begins by examining the growth in the development and use of GMO foods during this time, which has been dramatic in some areas of the world while facing strong resistance in others as well as the current public policy positions that several international, regional, and national organizations have taken in regard to the potential value and concerns associated with GMO foods. This general examination is followed by a specific discussion of some on-going developments in Guatemala, India and the USA that suggest continued growth in the use of GMO foods may face different challenges moving forward, particularly in the court of public opinion as it relates to the role of major corporations and their control over the world-wide food system.

WHAT ARE GMOs

Unlike relatively slow, traditional trial-and-error crossbreeding hybridization methods within a species that have been used for centuries, genetically modified organisms (GMOs) are created much more quickly and precisely by a process called genetic engineering (GE), whereby genetic material from one species is artificially manipulated in a laboratory and then introduced into another species to develop new

strains of plant, animal, bacteria, and viral life that do not occur in nature (World Health Organization, 2015; The Non-GMO Project, 2015).

While the initial work on GMOs was done on bacteria, over time its greatest commercial use has certainly proven to be with foods. Specifically, the first GMO patent was granted in 1980 to a General Electric genetics engineer for a bacterium with an appetite for crude oil that could be used to control oil spills. Shortly thereafter, in 1982 the USA Food and Drug Administration (FDA) approved the first GMO drug called Humulin, which is a genetically engineered form of Insulin (Woolsey, 2013). A little over a decade later, in 1994, the FDA approved the first commercially available food product, a strain of tomatoes called Flavr Savr, which was developed by Calgene with the intent of providing greater shelf life. While this particular GMO food product was not very well received and was withdrawn in 1997 (Wineup, 2013), it was soon followed by many other food products (e.g., soy and corn) that are currently commercially available throughout the USA today (Fernandez-Cornejo, 2014).

Historically, the mid-1990 marked the beginning of the dramatic growth of commercially available GMO food products, particularly in the USA, which is also the number one GMO food producer in the world (Fernandez-Cornejo, Wechsler, Livingston, & Mitchell, 2014). Indeed, the growth of these products has been nothing short of phenomenal as evidenced by data provided by the USA Department of Agriculture (USDA). They reported that by 2013, 93% of the soy acres, 90% of the corn acres, and 90% of the cotton acres planted in the USA were with GMO products (Fernandez-Cornejo, Wechsler, Livingston, & Mitchell, 2014). As a result, with the exception of organically grown foods, it is hard to find many foods in any USA grocery store today that are completely free of GMO food content.

ECONOMICS OF GMO FOODS

To appreciate the full economic scope of GMO foods, it is necessary to consider not only the consumption and cultivation of these foods, but also the production of the seeds that are used to grow these products. To this point, it is notable that along with being the largest GMO food consumer and cultivator in the world, the USA is also home to the two largest GMO seed producers, namely, Monsanto, which is headquartered in St. Louis, Missouri and DuPont, headquartered in Wilmington, Delaware. Following Monsanto and DuPont, by size, the other major GMO seed producers in the world include: Syngenta (Switzerland); Groupe Limagrain (France); Land'O Lakes (USA); KWS AG (Germany); Bayer Crop Science (Germany); Sakata (Japan); Takii (Japan); and DLF-Trifolium (Denmark). Recent data indicates that these top 10 GMO seed producers are not only all located in developed countries, but there has also been a significant consolidation of the market share of the largest producers from 37% in 1995 to 73% in 2013 (Sarich, 2013). Given the growth in GMO seed sales, the location of the major producers, and the market consolidation occurring in this industry, it is not surprising that political questions have been raised about how this industry is evolving and operating around the world.

POLITICS OF GMO FOODS

As noted above, the development and use of GMO seeds and foods has been welcomed in some areas of the world yet faced strong resistance in others. Before looking at some specific examples of international, regional, and national institutional positions on GMO foods, it may be helpful to note some of the general arguments in favor of and against these products. For example, on the positive side of the ledger, there is the argument that with the growing world population it is important to find new ways to more efficiently increase the food supply by growing more crops, which are both pest resistant and use less water, on less land. On the other hand, those concerned about GMO foods argue that the long-term impact of these products on individuals who consume them has yet to be demonstrated and so caution in their development and use is advised. Moreover, there are early indications that the use of some of these products has already led to some unintended consequences such as: the development of super weeds; the decline of the bee population; and the cross-pollinated of GMO plants with other plants.

As scientific evidence about the long-term impact of GMO foods continues to build, three general observations can be made. First, pre-assessed GMO food products in the USA have, to date, been shown to be generally safe for consumption. Second, when GMO products such as Flavr Savr tomatoes have not lived up to their initial claims, they have been taken off the market. Third, the long-term consequences of the use and consumption of GMO food products is still uncertain.

Despite the lack of long-term, conclusive scientific evidence about the safety and impact of GMO food products several major international, regional, and national bodies have nonetheless stated their positions on GMO foods. In doing so, these positions have fallen into roughly three camps. These camps are those who believe: reasonable assessment standards and processes are in place at this time to adequately evaluate the safety of GMO food products; those that feel while evidence is accumulating there are ways that future assessments can be improved upon; and those who believe there are reasons for concern. Below, a sample of some representative positions are provided as a way for readers to get a richer feel for the range of positions that are currently being taken.

Reasonable Standards and Processes are in Place

At this time, in the reasonable standards and processes are in place to adequately evaluate the safety of GMO food products camp, for example, we can look to the positions of the World Health Organization (WHO) and the U.S. Food and Drug Administration (FDA) as useful illustrations.

The World Health Organization (WHO) is primarily concerned about the safety of GMO food products as a public health issue. Accordingly, they have been working with member countries on ways to help them to effectively evaluate GMO foods on a number of dimensions through the work of the Codex Alimentarius Commission. At this time, the assessment dimensions include advice on the evaluation of: direct health effects; potential allergic reactions; components that might have nutritional or toxic properties; the stability of the inserted gene(s); nutritional effects associated with genetic modifications; and any unintended effects that could result from gene insertion. In addition, the WHO encourages countries to also evaluate potential environmental risks created by GMO food products such as the capability of the GMO to escape and potentially introduce new genes into wild populations. That said, while most countries can evaluate new GMO food products, they are not required to do so and in some countries there is no regulatory review requirement at all. Accordingly, while the WHO has not yet identified any major problems with pre-assessed GMO food products their role is primarily to provide counsel and guidance to member nations on how to insure that no safety or environmental problems emerge moving forward (World Health Organization, 2015).

The U.S. Food and Drug Administration (FDA) regulates GMO foods as part of a coordinated effort with the Environmental Protection Agency (EPA) and the U.S. Department of Agriculture (USDA) based on a policy framework established in 1992 (Bashshur, 2013). This policy framework states that GMO foods will be evaluated based on the same standards and processes as naturally cross-bred foods. Specifically, that it is the responsibility of the new food producer to provide information to the agency on a voluntary, consultative basis about the safety and characteristics of new foods and once the FDA scientists are comfortable with the information they will approve the product for marketing (U.S. Food and Drug Administration, 2015).

Future Assessments Can Be Improved

In the, while evidence is accumulating there are ways that future assessments can be improved upon camp, we find the U.S. Department of Agriculture (USDA) and the American Medical Association (AMA) as informative examples.

The U.S. Department of Agriculture (USDA) studies and reports data on the experience of the three major stakeholders in agricultural biotechnology, namely, GMO food seed suppliers/technology providers, farmers, and consumers. Based on their research, they found that the amount of research and development by GMO seed suppliers/technology providers grew dramatically from 1985 until 2002, when the number of new field releases for testing GE varieties by the USDA reached its peak. Since that time, the number of new releases has held relatively steady at a fairly high level. In terms of farming,

three crops (i.e., soybeans, corn, and cotton) make up the majority of acres planted with GE crops. Despite increased use of GE crops, farmers still question their economic and environmental impacts, the evolution of weed resistance, and consumer acceptance. Meanwhile, despite the growing consumption of GE crops around the world, the reaction to them has been mixed with some consumers willing to pay more for non-GMO food products and others more for GMO food products (Fernandez-Cornejo, Wechsler, Livingston & Mitchell, 2014).

The American Medical Association (AMA) has a very clear Code of Medical Ethics that includes not only an emphasis on caring for patients, but also the duty to constantly study developments in the field and to work to promote better public health (American Medical Association, 2015). In 2012, the AMA House of Delegates met and debated what its policy should be on GMO foods going forward. Based on these deliberations it was voted that the AMA would support mandatory pre-market safety testing of new GMO products by the Food and Drug Administration (FDA), in lieu of the current practice of firms' voluntary consultation with the FDA, but they stopped short of endorsing mandatory food labeling because they do not consider GMO foods to be materially different from non-GMO foods (Eng, 2012).

There are Reasons for Concern

In the, there are reasons for concern camp, we find the United Nations (UN), and the European Union (EU) positions as instructive examples.

The United Nations (UN) position through its Food and Agriculture Organization (FAO) is that GMO food products are not necessarily bad, but they need to be considered on a case-by-case basis. That is to say, it needs to be recognized that the movement of GMO foods between two countries is a matter that should be worked out by the two nations (FOA, 2002). As to the cultivation of GMO foods, this is a matter that each nation also needs to determine for itself, but one that should be made with an eye toward how these products might impact the environment (FOA, 2002). On the issue of whether or not GMO food products have the potential to eliminate world hunger, their view is less sanguine than some others in that they believe these products can be part of a larger solution, but there are also other ways to increase crop yield that should likewise be considered (gmeducation, 2013).

The European Union (EU) view on GMO foods has long been in stark contrast to that expressed by proponents of these products, particularly in the USA. Since the 1980s, the EU regulatory environment, heavily influenced by consumer opinion within the EU, has been significantly stricter on potential health, safety, and environmental risks associated with technological innovations than in the USA (Lynch and Vogel, 2001). Reflecting this position, the EU has one of the strictest systems in the world regarding GMOs that requires extensive testing, labeling, traceability and monitoring of agricultural products. Indeed, for some time the EU was opposed to the growing of GMO foods altogether based on concerns about their possible connection to the rise of super weeds, infertility, allergies, and cancer. In 2011, the universal EU opposition was lifted, but individual countries were still allowed to ban or use them at their discretion. Today, GMO food products continue to be banned in several European countries with the only exception being Spain where they are grown extensively (Onusic, 2012).

POLITICAL ECONOMY OF GMO FOODS

When the economics and politics of GMO foods are considered together, it becomes clear that given its leading position in the development of GMO seeds, the cultivation of GMO foods, the consumption of GMO foods, and the relatively lenient regulatory environment that the USA is the epicenter for the GMO industry. On the other hand, among the developed countries of the world, the source of greatest concern and resistance to GMO foods, particularly among consumers, is within the European Union. Meanwhile, in the developing countries of the world, the reaction to GMO foods has been generally muted with the exception of Peru and Kenya where they are banned.

Viewed from a high level perspective, it could be reasonably suggested that for the last several decades the debate about the pros and cons of genetically modified organisms (GMO) created through genetic engineering (GE), with the exception of consumers in the EU, has been largely confined to the

scientific and institutional communities. Specifically, in these communities, proponents of GMO foods have been trying to make the case that by creating new strains of food it will be possible to address growing levels of world hunger. On the other hand, opponents of GMO foods continue to express concerns about the unknown long-term consequences of consumption of these foods as well as their potential impact on the environment.

While this debate has been going on, with only a few exceptions, the result has been that the use of GMO foods has continued to grow throughout the world. Whether or not this growth will continue in its current form is an open question. If the debate continues to be primarily within the scientific and institutional communities, it seems likely that GMO industry may continue to grow, consolidate, and operate much as it has in the past. On the other hand, if the debate becomes more broadly-based through the inclusion of concerns by other important stakeholders such as farmers and consumers around sustainable growth (United Nations, 2012), particularly vis-à-vis the power of major multinational organizations and regulatory bodies to control the food supply, then the future shape of the GMO food industry may begin to look different moving forward (Woolsey, 2012). In the next section, some developments in Guatemala, India, and the USA provide examples of how concerns by farmers and consumers, in particular, are starting to raise questions that the GMO industry will need to address.

Monsanto in Guatemala

As noted earlier in this paper, Monsanto, a USA-based firm with recent revenues of USA \$15.2 billion (FinanceYahoo.com, 2015), is by far the largest GMO seed producer in the world. It was founded by John F. Queeny in 1901, a pharmaceutical salesman, to sell its first product, saccharin to Coca-Cola for use as an artificial sweetener in its drinks. Since its founding, this American multinational firm headquartered in St. Louis, Missouri, has evolved into an agrochemical and agricultural biotechnology giant. The growth of this firm over the years has been fueled by the sale of products such as aspirin, PCBs, polystyrene, a chemical herbicide called Roundup first introduced in 1976 as well as acquisitions (e.g., Calgene in 1997), mergers (e.g., most notably in 2000 to become part of Pharmacia) and then in 2002 as a result of a spin-off to become once again a free standing firm with its current agricultural and biotechnology focus (Monsanto Web Site, 2015a; Global Research, 2015).

Monsanto's controversial position in Guatemala can be traced back to the 2005 CAFTA-DR free trade agreement that included Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua and the United States. As part of this trade agreement, the signatories were obligated to pass a law like that in Guatemala called the "Law for the Protection of New Varieties" known more commonly in Guatemala as the "Monsanto Law", which was heavily criticized for its formidable seed-privatization provisions. In essence, this law offered producers of GMO seeds, like Monsanto, strict property rights to the original and harvested seeds of protected varieties without the producer's authorization. In doing so, the rights of plant breeders would become superior to the rights of Guatemalan citizens to freely use seeds. Moreover, anyone who violated the law would have been subject to a one-to-four year prison term and fines up to USA \$1,300 (RT USA, 2014).

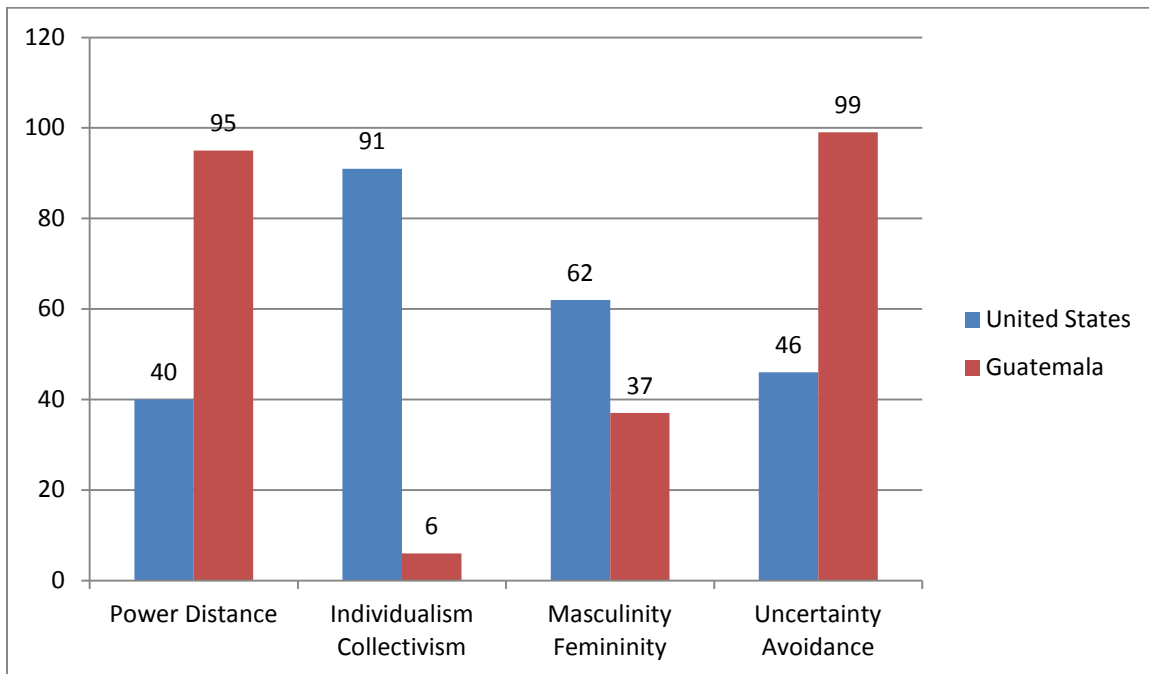
After the law was passed in June 2014, but before it would go into force in September 2014, the highest court in Guatemala suspended it (RT USA, 2014). Then, following ten days of wide-spread street protests by native Mayans, who represent over half the population, along with representatives from farmer organizations, trade unions and women's groups, the Guatemalan Congress repealed the law (Sandberg, 2014).

This development is interesting on several dimensions. First, it illustrates the possibility that local groups in a developing country are able to successfully challenge the interests of a major multinational GMO seed producer from a developed country in their efforts to establish their influence in another region of the world even when strong economic differences and political pressures are evident. Specifically, to put the economic conditions within the United States of America (USA) and Guatemala in perspective, it is instructive to know that in 2013 based on Gross Domestic Product adjusted for purchasing power parity (PPP) per capita the USA ranked 7th in the world at \$51,248, which the World Bank classifies as high-income, versus Guatemala at 120th with \$5,335, which the World Bank classifies

as middle-lower (Global Finance, 2015). As to political pressure, the fact that a free trade agreement was being used to create legislation in another country that would clearly benefit a major USA multinational corporation speaks for itself.

In addition, this development speaks to the power of national culture to influence the direction of work and life conditions within a country. Specifically, to gain some insight into how a USA-based company might experience operating challenges in Guatemala when it comes to the use of GMO seeds it is useful to compare several cultural dimensions of the two countries. Here, Hofstede’s (1980) study of work-related values is helpful. Specifically, on the four cultural dimensions where there is data available for both countries (Hofstede, Hofstede, & Minkov, 2010), clear differences are seen on all four dimensions of: power distance, masculinity-femininity, individualism-collectivism, and uncertainty avoidance (Hofstede Centre, 2015).

**FIGURE 1
COMPARISON OF UNITED STATES AND GUATEMALA
ON HOFSTEDE’S CULTURAL DIMENSIONS**



When you compare these two countries cultural profiles what emerges is a clear contrast between the USA, a country that values individual or organizational achievement and is willing to take risks to explore new ways to innovate and make change happen versus a very collectivist country that is both cautious about the adoption of new technological innovations and is generally willing to allow leaders to decide on what new opportunities should be explored. In the case of GMO seeds, however, the natural cultural tendencies of the population to follow their leaders directions was overwhelmed when that meant it would influence citizens control over one of their historical food crops, namely, corn (Sandberg, 2014).

Monsanto in India

Data from the World Bank (2015) shows that, in 2010, 51% of the population in India worked in agriculture versus 2% in the USA. This data reflects the fact that not only does about half of the Indian population work in agriculture, but that the agrarian economy of India is dominated by small farmers

versus the USA where only a relatively small percentage of the population works in agriculture and it is dominated by large farmers.

Farming is a stressful occupation full of significant challenges that have historically led this occupation, among other things, to have a relatively high rate of suicide compared to other occupations. We also know that India as a nation has for centuries had a relatively high rate of suicide compared to other nations and that the highest rates of suicide occur in the Southern farming states where small, indebted, cash-crop (e.g., cotton) farmers, in particular, have experienced significantly higher rates of suicide than the national norm (Kennedy & King, 2014). Indeed, from 1995 to 2013, a total of 296,438 Indian farmers have committed suicide (Sainath, 2014).

Monsanto's involvement in this national tragedy, according to Shiva (2014), can be traced back to the 1988 Seed Policy imposed by the World Bank that required India to deregulate the seed sector. This policy made Monsanto's entry into the Indian seed sector possible. A few years later, in 1995, Monsanto introduced their Bt Cotton Technology into India through a joint venture with the Indian company Mahyco. By 2013, 95% of the cotton seed in India was controlled by Monsanto.

Whether or not Monsanto's introduction of GMO cotton seeds into India is responsible for the continuing high rate of suicide among Indian farmers is an open question. In the opinion of Shiva (2014, p.1) "Monsanto's seed monopolies, the destruction of alternatives, the collection of superprofits in the form of royalties, and the increasing vulnerability of monocultures has created a context for debt, suicides and agrarian distress which is driving the farmers' suicide epidemic in India. This systematic control has been intensified with Bt cotton. That is why most suicides are in the cotton belt". In reply, Monsanto (2015b) argues on their website that there is no confirmed link between Indian farmer suicides and the use of GMO cotton. Rather, they attribute the primary causes of Indian farmer suicides to systematic and social issues among the farmers such as: unavailability of timely credit; cropping patterns; cotton price fluctuations; and farmer indebtedness. While the search for the truth behind these opposing positions continues, one thing is clear, namely, situations like this will put increasing pressure on GMO firms to justify or change their methods of operation in light of concerns in the court of public opinion.

GMO Foods in the USA

As noted above, given its leading position in the development of GMO seeds, the cultivation of GMO foods, the consumption of GMO foods, and the relatively lenient regulatory environment, today, the USA is the epicenter for the GMO industry. In addition, to date, the concerns of consumers and farmers in the USA about GMO foods have never escalated to the levels seen in the EU, Guatemala, or India. That said, concerns about GMO foods are not completely absent from the USA landscape and they may be growing in visibility as evidenced by: on-going efforts of consumer groups in the USA advocating for the labeling of GMO food products; an announcement by Whole Foods Market, an American-based supermarket chain on GMO food labeling; as well as an announcement on GMO labeling by Chipolte, an American-based international fast-food restaurant chain.

To date, in the USA, the major consumer GMO food concerns have been not only about whether or not GMO foods are good or bad, but also whether or not they are different. Moreover, if they are different, then whether or not consumers have the right to know what is in the food they are eating, so they can better evaluate the risks and benefits they have in making in their food choices. While grass roots organizations in the USA have been fighting for labeling GMO foods for some time, a right that has already been recognized in over 60 countries (Pollan, 2012), major USA seed producers like Monsanto as well as the USDA have resisted it. Given these competing interests, a number of state bills and ballot initiatives have moved forward to determine whether or not some form of GMO labeling is warranted. As a result, some form of mandatory labeling has been approved in Connecticut, Maine, and Vermont (Byrne, Pendell & Graff, 2014), but has failed to gain sufficient support for passage in highly charged votes such as that in California in 2012 called Proposition 37, where Monsanto and DuPont spent over \$12 million dollars to defeat the measure (Pollan, 2012). While the grass roots food movement versus big food has only experienced modest success in the formal political arena, nonetheless, the message of the consumers' right to know and their willingness to push back against what is perceived to be undue influence of major

agricultural corporations has been seen in the actions of some other corporations in the larger food system as seen below in the actions of Whole Foods Market and Chipolte Mexican Grill.

Whole Foods Market, a supermarket specializing in organic foods, joined the GMO labeling debate when they announced in 2013 that they would be the first supermarket chain to set a deadline for when all GMO foods in their inventory would be labeled. In their case, the deadline would be 2018. In making this announcement, the company explained that given the prevalence of GMO products in the market and the lack of labeling, it was a necessary step to support consumers' right to know. At the same time, they stated their intention to also step up support for certified organic agriculture that is GMO-free and to work with their suppliers to grow more non-GMO products (Polic, 2013).

Chipolte Mexican Grill, which was once partly owned by McDonalds, became involved in the labeling debate in 2015 when they announced that after years of work to develop a sufficient number of non-GMO suppliers that it would be the first "GMO-free" fast food restaurant in the world. While admitting that their pork and chicken products still come from animals that were grown with GMO feed, nonetheless, all the ingredients for their tortillas, rice, chips, salsa, and marinades used to cook its meats are GMO-free as is their corn. In addition, it has changed its cooking oil from soybean to GMO-free sunflower oil and rice barn oil. Their stated rationale for this movement was to provide a better way to do fast food in their rapidly growing chain of restaurants that reflects classical cooking techniques (Alesci & Gillespie, 2015).

DISCUSSION

As the above discussion illustrates, the growth of the GMO food industry, to date, indicates how economic incentives (Levitt & Dubner, 2009) for multinational corporations in the GMO food industry to increase their business combined with political interests of some international, regional, and national bodies has led to substantial growth of these products, but not one without controversy. From the perspective of Monsanto (Humphrey, 2015), this growth has been done in a way that reflects the organization's commitment to corporate social responsibility (CSR) (Carroll, 1991). At the same time, while those critical of Monsanto's methods, might agree that their approach has been one that incorporates concern for economic and legal correctness, it nonetheless falls short of a truly ethical or good citizen approach. As pro-GMO and anti-GMO proponents continue to press their positions, how this debate will impact on the next steps in the evolution of the GMO industry remains open. While many scenarios seem likely, one possibility is that the debate itself might evolve from one centered on more scientific and political issues to a more general concern that if GMOs can make the life of individuals better, then that can be accepted (Chu, 2012). What may not be so easy to resolve are the associated concerns about corporate control over the food system in the name of profits (Little, 2014).

SUMMARY

The growth of the GMO food industry over the last several decades has been both phenomenal and controversial. From a political economy perspective it provides an excellent example of how a major technological innovation can have far-reaching economic and political ramifications that reflect the varying interests of: multinational corporations; international, regional, and national institutions; consumers; and other stakeholders. At the same time, in the case of GMO foods, we find that beyond the particulars of the case, we see that the growth of this industry has also generated debate around such important issues as: the role of multinational organizations to control the world food supply; the rights of consumers to know what is in the food they eat; the power of developed countries to intervene in the daily life of developing countries; and what does it mean to have long-term sustainable growth.

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