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## Abstract

*The historical discourse on the factors that influenced technological changes in agriculture in the postcolonial world is widely questioned today. This paper attempts to open a new discourse on the historical factors that influenced technological changes in agriculture in third-world countries. It critically reviews both primary and secondary historical sources to derive the basic argument of the thesis and to test the research hypothesis regarding the effectiveness of the existing theoretical underpinning (the population-food race) in order to determine its sufficiency to interpret technological changes in agriculture that took place in the postcolonial world. In the larger view, this study views postcolonial technological changes in agriculture as a new form of western ethnocentric imperialism, from colonial to economic, with liberal economic values and principles. From a minor perspective, US geopolitical and military concerns are recognized as supporting this new, postcolonial economic imperialism, particularly as a tool against communist imperialism. The paper recognizes the thus-far-accepted theoretical foundation (the population-food race) to be inadequate for interpreting technological changes in agriculture in third-world countries. Finally, this paper's review of historical information supports a view that technological change was a revolutionary attempt by western countries to promote postcolonial economic imperialism. Thus, visible factors such as the population-food race are not closely related to the reality, while invisible factors such as US foreign policy and geopolitical and military concerns, global corporate capital, and global institutional setups provide supporting evidence for the new form of imperialism—economic—in the postcolonial world.*

*Keywords: agriculture, economic imperialism, ethnocentric imperialism, food-population race, postcolonial world, technological change, third-world countries*

## 1. Introduction

Agricultural historians have generally used two terms in the literature to describe changes in agrarian structures: revolutionary change and evolutionary change (Rasmussen, 1962). Any gradual or prolonged change in agrarian structures is recognized as evolutionary, whereas any radical change is recognized as revolutionary. World agricultural history has marked both revolutionary and evolutionary changes in agrarian structures in different regions with different objectives, mostly ostensibly noble – to feed the hungry. The term “technological change”, particularly as used in the 19<sup>th</sup> and 20<sup>th</sup> centuries, attempts to define a universal change or transformation of agrarian structures from a global perspective.

Technological change in postcolonial agriculture is considered the most influential contribution of developed countries, particularly the United States, replacing the traditional

or indigenous agrarian structures in third-world countries with Western scientific work (Latham, 2011). It is noteworthy that the technological change that is mostly referred to as the Green Revolution (GR) was central to the revolutionary 20th-century changes in agriculture in terms of technology and thus to social and cultural practices, as well as to the adapting of chemistry to agriculture to dramatically increase farm yields. The changing agricultural technologies and the resulting changed social and cultural practices in third-world countries have been praised and criticized over the last fifty years. Studies have mostly emphasized the scientific and technical aspects of the changes. Specifically, there is a theoretical and empirical debate in the literature on the extent to which technological change in agriculture enhanced the well-being of humankind, particularly in third-world countries. This is attributable to the multiple concerns over these changes, agricultural and social sustainability and equity in particular.

Scholars criticize the consequent environmental damage attributable to the disappearance of genetic diversity, the exhaustion of fertilizers and petrochemicals, soil salinization from irrigation, and the dangers of pest outbreaks caused by mono-cropping (Perkins, 1990). It is assumed that the world cereal yield growth rates have declined because of the increasing environmental constraints on world food production (Dyson, 1999). Social sustainability is questioned when compared against the worsened social inequality in agrarian societies, the disappearance of marginal farmers, the downgraded status of female agriculturalists, and the tragic irony of increased hunger amid enhanced productivity (Perkins, 1990). Additionally, scholars have specifically reported the lack of harmony between the historical origins of these technological changes in agriculture and their theoretical underpinnings in the postcolonial world. Therefore, the overall philosophy of technological change in agriculture is often criticized and questioned in spite of its ostensibly noble purpose – feeding the world's hungry.

From this perspective, this paper critically reviews the historical factors that influenced postcolonial technological changes in agriculture around the world. The paper attempts to modify theories and understandings and to expand fundamental knowledge regarding the worldwide agricultural revolution by observing the historical changes in agriculture. Thus, the paper is organized as follows: the first section is devoted to outlining the topic and the problem; the second section evaluates the theoretical and empirical underpinnings of

technological changes in agriculture and the attempts to rationalize these changes in the postcolonial world; the third section critically investigates the foreign relations and economic concerns of the United States regarding technological changes in agriculture that took place in the postcolonial developed countries; the fourth section is devoted to examining the country-specific factors that promoted technological diffusion in the 20<sup>th</sup> century in the third world, with special emphasis on Mexico and India; and the final section summarizes the main argument of this paper – the factors that influenced technological changes in the postcolonial world – to modify the theories and broaden the understanding of the research subject. In each section, we have critically examined how the major changes in agriculture took place, why the current technological arrangements took place in certain forms in third-world countries, and the extent to which they aid us in understanding the contemporary problems in agriculture in third-world countries. The paper reviews both primary and secondary historical sources to derive the basic argument of the thesis and to test the research hypothesis regarding the effectiveness of the existing theoretical underpinning (the population-food race) in order to determine its sufficiency to interpret technological changes in agriculture that took place in agriculture around the world.

## **2. The Theoretical and Empirical Origins of Technological Changes in Agriculture and their Rationale**

It is essential to question the underlying theories and justifications of the postcolonial technological changes in agriculture, particularly in third-world countries. The theoretical origin of technological changes that took place in the 19<sup>th</sup> and 20<sup>th</sup> centuries was essentially rooted in the population theory expressed by Thomas Malthus in 1798 in his prominent work “An Essay on the Principles of Population”. The theory emphasizes that the world population will increase geometrically but that the available food resources will increase only arithmetically. The world population doubled from 1 billion to 2 billion from 1800 to 1930 (The United Nations Population Division, 2002), leading scientists to strongly attend to the Malthusian population trap or to support neo-Malthusian fears. From the early 1900s to World War I, scientists first identified diseases as possible threats to mankind based on an assumed relationship between population growth and resource scarcity. According to the Princeton demographer Kirk (1944), there were high fertility and mortality rates in third-world countries in the early 1940; only small numbers of people survived into adulthood because of diseases. Specifically, diseases such as yellow fever, typhus, hookworm, and

malaria were greatly acknowledged in world medical research beginning in the early 1900s. Because western scientific works did not address the high fertility and mortality rates in third-world countries in the early 1900s, advanced medical research and improved worldwide sanitation eventually led to unprecedented population increases in the third world.

However, the public health protection and population redistribution methods undertaken by developed countries were later recognized as unethical because they led to a rapid increase in the world population without any prospects for feeding everyone. Second, developed countries, particularly the United States, turned their focus on agriculture in third-world countries based on the prominent social theory – the technological change or transformation mostly referred to as the GR in the postcolonial world – in order to increase the world food supply. They specifically used theoretical insights such as the neo-Malthusian fears to stimulate technological change in agriculture in these countries, and they radically changed the traditional agricultural structures by applying Western scientific advances to agricultural problems.

It is very important to understand that the postcolonial problems with agriculture in third-world countries that were highlighted by the United States and other industrialized countries were interpreted from a Western point of view. Specifically, these nations viewed agriculture in third-world countries as static, normatively consistent, or structurally homogenous (Gusfield, 1967; Altieri, 1987) and recognized these elements as growth-retarding factors in the capitalist system (Kloppenber, 2006). In essence, Western countries took the subsistence nature of third-world agriculture as a core issue of low farm productivity and assumed clear, imminent global starvation with the population explosion. According to a speech by US President Harry S. Truman on January 20, 1949, the economic lives of people in third-world countries were primitive and stagnant, and food was inadequate (Latham, 2011). This new emphasis on third-world agriculture in the early postcolonial period bring to mind certain questions:

To what extent does this argument coincide with the technological changes in agriculture that took place in Europe during the early period of the capitalist system?

Other than the technological changes that were applied, were there any alternative measures that could have been applied to increase farm productivity?

The first question arises in framing or applying the universal theory of technological change that will also be used to define social change in European nations, America and other industrialized countries from the 15<sup>th</sup> to the early 20<sup>th</sup> centuries to postcolonial third-world countries, which provide quite a different context.

In this regard, it is noteworthy that the agricultural revolution and radical changes in the agrarian structure in mediaeval Europe led to capitalist agricultural development initially, and subsequently to the Industrial Revolution that took place in the region. Scholars generally agree that there were few qualitative differences among the agriculture structures in Africa, Asia, and Europe before 1492 AC, the proto-capitalism era (Blaut, 1992; Dodgshon, 1992; Palan, 1992), and that all regions were moving towards capitalism on their own. However, a significant uprising among the European population in the late 16<sup>th</sup> century caused a breakthrough in agriculture owing to the increased demand for food (Postan, 1975). In this period, price and wage changes in agriculture were common (Brenner, 1976). Brenner (1976) argues that the relationship between the features of local class and social-property relations in agriculture determined the increasing commerce and population and served as a breakthrough in the direction of capitalist agriculture.

With the autonomous demographic development in Europe and the development of urbanization and trade beginning in the early 15<sup>th</sup> century, a capitalist agriculture emerged in Europe with market demand and supply providing the theoretical underpinnings (Brenner, 1976). Specifically, with Europe's conquering America in 1492, the concept of world capitalism took on an ethnocentric basis whereby capitalist systems were judged based on the values and principles of European and other Western cultures. This indicates that the changes in the agricultural structure in Europe, which were in line with economic pressures (market demand and supply), were evolutionary and influenced the evolution of capitalism. The specific features of the agricultural evolution in the region were the massive changes in land tenure structure, the organization of farm production, and the techniques employed in farming and agricultural productivity. Some argue that the origins of capitalism formed commercial links and associated social change rather than development within Europe from the 15<sup>th</sup> to the 20<sup>th</sup> centuries. However, the increase in real income resulted in increased demand for finished products, which stimulated industrial development in the region. The emergence of new large-scale industries in Europe led first to drastic changes in the region's

material industries. It further influenced the expansion of the capitalist agricultural structure in the region and the world at large. Specifically, the dissolution of feudalism associated with agriculture was one of the key features of the changes in the agricultural sector.

At this juncture, European countries realized the need to expand the capitalist system around the world in order to balance demand and supply. Thus, these countries first conquered African and Asian nations and established the colonial system. According to Washbrook (1988), colonization is the outcome of historical capitalist development in South Asia. For example, the South Asian region came under Western imperialism in the 15<sup>th</sup> century; Ceylon was under Portuguese, Dutch, and British rule since 1505. Subsequently, the European nations changed the regional agrarian structures in order to increase their own raw material supplies. Thus, colonization could be recognized as a strategy of European colonists to integrate Asian and African countries into the ethnocentric world capitalist system, first for the materials, and then for the market. Europe was able to maintain this pattern of industrialization because of the integration of the material industries in the colonies; however, colonization undermined the industries of the colonies (Alvares, 1992).

These facts indicate that the agricultural changes in Europe beginning in the 15<sup>th</sup> century targeted capitalist agricultural development at first, subsequently leading to industrial development in the region using the accumulated capital from the initial agricultural development in the second stage of capitalist development in Europe. In the third and fourth stages, the need to expand the capitalist system into other regions of the world received attention. This was done in order to fulfil the need for new materials to support industrial development in Europe and to expand the market owing to the disequilibrium in demand and supply with the world's changed social structures. These facts show that the basic justification for technological changes in agriculture - the food-population race - in the postcolonial third world is quite different from the rationale for agricultural change in Europe that prevailed since the 15<sup>th</sup> century.

The second question arises based on what alternatives were available in order to change the agrarian structures and thereby address the future food problem in the third world, other than the set of technological changes that were imposed upon these systems. In this connection, the historical experience of the land reforms adopted by Japan in the early post-World War

II period provides a unique example of how to increase farmers' agricultural and disposable income by reducing the social and economic disparities among different farming strata. The reform essentially altered agricultural property distribution, specifically the agricultural land-tenure structure, by transforming tenant land into owner-cultivated land. The influence of this reform was reflected in a number of different indicators. For instance, the average tenanted land decreased from 2,368,233 to 524,683 Cho during the period of 1945 to 1950. At the same time, the proportions of tenanted land and of the number of tenant farmers decreased from 45.9% to 10.1% and from 28.4% to 5.1%, respectively. The reform tightened the legal regulations concerning the terms and conditions of tenancy, stipulated the minimum tenancy period, and stipulated the tenant farmers' right to compensation for their investments in the cultivated land.

The land reform had a vital effect upon the distribution of both the agricultural and the disposable incomes of farm families and on improving agricultural productivity through new investment in agricultural land and technologies. Specifically, the equalization of land ownership contributed to raising ex-tenant farmers' income levels and changing the average propensity to consume. For instance, the average tenant farmer's disposable income increased from Yen 103,200 in 1934–36 to Yen 147,600 in 1951–54, a 43% increase. Moreover, the reform led to reduced agricultural labour use, particularly by providing farm household heads with opportunities away from the farm. Increased incomes were reported particularly among small-scale farmers, which eventually reduced the gap between different scales of farming with respect to both farm and disposable incomes. This historical experience provides important evidence for the alternatives that third-world countries had in the early postcolonial period, particularly in eliminating structural rigidities in food supply and in improving farmers' well-being.

Two important questions that can be raised in this connection are the non-consideration of structural realities such as the agricultural land rigidities that were specific to each third-world country in the early postcolonial period when imposing technological changes in agriculture and the introduction of common technologies that were not adaptable to the natural and sociocultural features of each country.



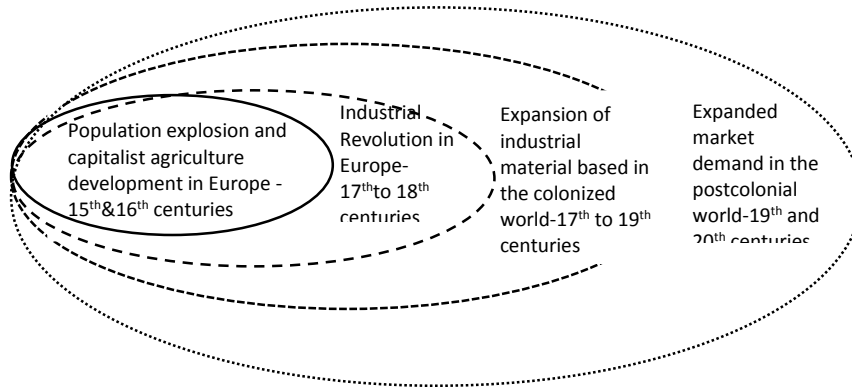


Figure 1: An outline of worldwide ethnocentric capitalist agricultural development (15<sup>th</sup> century to the 20<sup>th</sup> century)

### 3. The Relationship between US Foreign Policy and Economic Concerns regarding Postcolonial Technological Changes in Agriculture

As was concluded in the previous section, it is important to understand what factors enabled and promoted postcolonial technological changes in the agriculture sector in order to see that the existing historical discourse is not sufficient for explaining the factors behind these changes. After World War II, Western colonial imperialism collapsed in most Asian, African, and Latin American third-world countries. Specifically, the imperialist countries in Europe were severely affected by World War II. Thus, the US had to direct and accelerate any continued postcolonial Western power in order to avoid emerging challenges, particularly from communist imperialism.

A review of the primary literature on early technological changes provides the geopolitical background to the factors that promoted these changes in the third world. One of the important primary documents that discusses the background of worldwide technological change since the 1940s is a report prepared by the Rockefeller Foundation in 1951. The report provides important facts on the relationship between the US and technological changes in agriculture, particularly in third-world countries. It emphasizes food supply as one of the most acute and pressing problems, adversely affecting more than just global tension and unrest. This was recognized by President Truman's (1947) Point Four Program, which aimed to improve food production in underdeveloped countries (Paterson, 1973). In particular, the report emphasized the need for new ways to gain the support of the people in the previously colonized countries because they were conflicted about accepting Western values and principles following their extremely negative experiences with the political and racial discrimination with which they had lived. Thus, focusing on the basic needs of the

people in the third world, particularly food, was recommended in order to convert people from communist imperialism or stop them from following in that direction. The report assumed that higher standards of living resulting from the technological changes in agriculture would reduce birth rates; developing agriculture in third-world countries was recognized as a first step that could eventually address the key issue – population growth and food supply - effectively.

However, this influential report did not recognize the structural complexity and diversity of third-world societies from social, cultural, and religious perspectives. According to the report, and the views of Western powers, agriculture was nothing more than applying the principles of biology and other natural sciences to the art of growing food (The Rockefeller Foundation, 1951). It is evident that agriculture in most third-world countries experienced different levels of structural change during the colonial period in order to improve the material supply rate to Western industries (Harry S. Truman Library and Museum, 1951). This is one of the main reasons for the acute food shortages and the rapid population growth in colonized countries: colonization changed the self-sufficient agricultural structures (multi-crop systems) into monoculture systems in most third-world countries in order to fulfil the increasing demand for materials and food in Western countries. Furthermore, the changes in social structures brought about by Western colonization led to the abolition of self-controlling systems of birth patterns. Some scientists argue that multi-crop farming is the most appropriate and sustainable method of feeding people in third-world countries in tropical and subtropical regions.

For instance, between the 15<sup>th</sup> and the early 20<sup>th</sup> centuries, when a few Western countries – Portugal, Holland, and Britain - ruled India and Sri Lanka, nearly everyone in these countries lived in rural areas and engaged primarily in subsistence agriculture in the early stage of the colonial period. However, colonial administrative efforts were directed more towards exporting cash crops than towards supplying staple foods such as rice, which eventually resulted in changes to the traditional social structures that had been associated with traditional agriculture. Thus, not only the Rockefeller Foundation report, but also various other works, failed to provide sufficient details on the root causes of the problems in the third world, reflecting the Foundation's affiliation with US geopolitical concerns that contradicted their justifications that the technological changes in agriculture were intended to meet the needs of the people in third-world countries.

Moreover, there is evidence on another form of postcolonial imperialism, economic imperialism, which was led by the US. After World War II, the US President, Franklin D. Roosevelt, emphasized the need for a new world economic order in order to face the post-war challenges, specifically to rebuild collapsed Europe (Kloppenber, 2006). President Truman emphasized, in his speech on the Point Four Program, the expansion of opportunities for Western capital investment in the third world (Latham, 2011). He emphasized that the security and sustainable prosperity of the US and other industrial nations could be maintained with complementary progress in the third world (Rockefeller, 1951). This statement particularly relates to Western dependence on materials for their industries. According to the report submitted by the Rockefeller Foundation in 1951, the greatest problem in “world economic policy and increased investment” was underdevelopment (Rockefeller, 1951). Thus, economic imperialism was designed to force third-world countries to open their resource bases and markets for the benefit of Western countries. According to Nelson Rockefeller (1951), the economies of third-world countries were of crucial importance to the US and other Western European countries because 57% of Western nations’ critical materials and 65% of Western nations’ strategic materials came from these third-world economies. In particular, President Truman realized the importance of raw materials and commerce for Western prosperity, and he appealed for the cooperation of American businesses, farmers, labour, and private capital (Paterson, 1972). This so-called cooperation could be recognized as a strategy of investing Western capital in the agricultural sector of third-world countries, where there were underutilized resources but also an agriculture that was symbolically important in terms of each country’s economic, social, cultural, and historical identity.

This new wave of economic imperialism was confirmed by the growing link of agriculture-related multinational corporations (MNCs) in the postcolonial third world, within the broader scheme of Western economic concerns in the technological changes in agriculture. Under the threat of communist ideology, Western capitalists recognized the traditional agricultural structures in third-world countries as primary barriers to expanding capitalist agriculture in the postcolonial world. Particularly, most MNCs were based on Western capital, and the majority of them were located in the US, Europe, and Japan (see Table 1). Although technological changes were theoretically justified as the solution to the population-food race and to the need to feed the world’s hungry, those who truly profited

from the process were the MNCs. For instance, by 2007, 42% of the global proprietary seed market was controlled by three MNCs based in the US: Monsanto (23%), DuPont (15%), and Land O'Lakes (4%); and 67% of the global proprietary seed market was controlled by 10 MNCs located in the US, Switzerland, France, Germany, Japan, and Denmark. The top 10 agrochemical MNCs controlled 82% of the global pesticide market. In terms of food and beverage and retail markets, 36% and 40% are, respectively, controlled by the top 10 MNCs in each stream. The majority of the MNCs are located in America and Europe, with a small number in Japan (see Table 1). In 2007, the sales of the top 100 food and beverage companies amounted to US\$ 966 billion (ETC Group, 2008). Thus, the influence of these corporations clearly extends to the world agricultural research agenda, trade agreements and agricultural policies, reversing of competitive markets, avoiding of regulatory controls, and so on.

Today, no international body such as the United Nations, controls or monitors these corporations (ETC Group, 2008). The liberal economic concepts advocated by the World Bank and the International Monetary Fund (IMF) since the 1980s and the establishment of the World Trade Organization (WTO) in 1995 can be further recognized as facilitating measures for the economic imperialism led by the US. These facts indicate the ultimate purpose of the Western influence in changing agricultural technology in the third world: developing a Western corporate agricultural value chain system in third-world countries for the economic prosperity of Western countries.

Table 1: Top 10 Global Multinational Agriculture Corporations (MNCs) and their Locations and Market Share

Seed companies(a)		Pesticide companies (b)		Fertilizer companies (c)		Food and beverage companies (d)		Global food retailers (e)	
Name of company	Market share	Name of company	Market share	Name of company	Net income (US\$ million)	Name of company	Market share	Name of company	Market share
Monsanto (USA)	23%	Bayer (Germany)	17%	Potashcrop (Canada)	1104	Nestle (Switzerland)	8%	Wal-Mart (USA)	10%
DuPont (USA)	15%	Syngenta (Switzerland)	18%	Yara (Norway)	1027	PepsiCo, Inc. (USA)	4%	Carrefour (France)	6%
Syngenta (Switzerland)	9%	BASF (Germany)	9%	Mosaic (USA)	944	Kraft Foods (USA)	4%	Tesco (UK)	4%
Groupe Limagrain (France)	6%	Dow Agrosience (USA)	9%	Israel Chemicals Ltd (Israel)	461	The Coca-Cola Company (USA)	3%	Schwarz Group (Germany)	3%
Land O'Lakes (USA)	4%	Monsanto (USA)	10%	Agrium (Canada)	441	Unilever (Netherland)	3%	Aldi (Germany)	3%
KWS AG (Germany)	3%	Dupont (USA)	5%	K+S Group (Germany)	303	Tyson Foods (USA)	3%	Kroger (USA)	3%

Bayer Crop Science (Germany)	2%	Makhteshim Agan (Israel)	4%	Sociedad Quimicay Minera (Chile)	165	Cargill (USA)	3%	Ahold (UK)	3%
Sakata (Japan)	2%	Nutarm (Australia)	4%			Mars (USA)	3%	Rewe Group (Germany)	3%
DLF-Trifolium (Denmark)	2%	Sumimoto Chemical (Japan)	4%			Archer Daniels Midland Company (USA)	3%	Metro Group (Germany)	3%
Takii (Japan)	2%	Arysta Litescience (Japan)	2%			Danone (France)	2%	Edeka (Germany)	2%
<b>Total</b>	<b>67%</b>	<b>Total</b>	<b>82%</b>	<b>Total</b>	<b>4445</b>	<b>Total</b>	<b>36%</b>	<b>Total</b>	<b>40%</b>

Source: (a) ETC group (2008); (b) Agro World Crop Protection News (2008); (c) Potash Corp (2007); (d) Leatherhood Food International (2008); (e) Planet Retailers (2007). All are as quoted in a report prepared by the ETC group.

Note: The locations of each MNC are in parentheses.

#### 4. Country-Specific Strategic Concerns regarding Technological Changes: the Mexican and Indian Experiences

Mexico and India are two states that are important in discussing the technological changes in agriculture because the scientific results of agricultural experiments in these countries provided the foundation for the GR in third-world countries. The backgrounds of three major initial technological change programs – Mexico in 1941, India in 1956 and the Philippines in 1962 – provide the necessary facts on the dominant political and military concerns of the US and other Western countries in the world’s capitalist system.

US efforts regarding the agricultural revolution in Mexico related to US political and foreign policy concerns about the threat of an emerging socialist or fascist state on its southern border. During the administration of Mexican President Lazaro Cardenas (1933–1941), radical agrarian reforms were implemented that entailed redistributing land and breaking up large estates (Alcantara, 1976). In 1938, the Cardenas administration seized the oil properties that had belonged to the US, British, and Dutch (Schuler, 1998). Thus, US foreign relations with Mexico worsened during this period, and organizations such as the Rockefeller Foundation were required to be extremely sensitive to the foreign policies of the US State Department in its implementation of agriculture programs in Mexico. The US President during this period, Franklin D. Roosevelt (1933–45), wanted neither a socialist nor a fascist state on the country’s southern border (Perkin, 1990).

The US had the same ideology – anti-communism – with regard to India. Overpopulation

and low living standards were the main concerns about India. By the 1950s, food production was 50 million tons, and per capita calorie consumption was 1,800 Kcal, which assumed a deficit of 5 million tons of food, 10% of India's agricultural production. Particularly, China's move to communist imperialism in 1949 posed a threat to the capitalist system in Asia, where Western nations had expected huge market potential in the latter half of the 20<sup>th</sup> century and the beginning of the 21<sup>st</sup>, and did not need a threat to the industrial material bases that Western countries had maintained since the colonial period. Thus, supporting India in terms of agriculture development was central to the US administration in order to avoid the threat of the spread of communist imperial power in Asia. The report "Notes on Indian Agriculture" submitted by Harrar, et al. (1952) made important suggestions in accordance with the program of Technical Cooperation Administration (TCA) (Point Four). Mr. Munshi, the Minister of Food and Agriculture in India, noted in 1952 that unless the food problem was solved within the next five years, at least South India would move to the communist imperial bloc (Harrar, et al., 1952). Some influential members of the Rockefeller Foundation – Weaver, Harrar and Mangelsdorf - stated that an infusion of Western agricultural knowledge into overpopulated India could overcome the massive problems the country faced. Thus, the Western anti-communist ideology was central to the technological changes in India.

## **5. Conclusion**

The theoretical orientation of the technological changes introduced in agriculture (the population-food race) in the 19<sup>th</sup> and 20<sup>th</sup> centuries is questioned in this paper because it obscures the reality that underlies the technological changes in agriculture that were introduced in developing countries. Following are the concluding points of this paper, which explain the invisible reality of these technological changes that were introduced to agriculture in the postcolonial third world.

First, in the grand scheme, technological changes in third-world countries' agriculture extended a new form of ethnocentric capitalist imperialism – economic imperialism – led by the US. Most of the discourses in the early post-World War II period centred on how to maintain the prosperity of the US and Western Europe based on the strategic importance of the resources of third-world countries. However, the third-world countries required certain complementary outcomes owing to the threat of communist ideology. This is why Nelson

Rockefeller, the chairman of the US International Development Advisory Board, emphasized in 1950 that the cost of conquering hunger would be lower than that of military control (Anderson, et al., 1991). The diffusion of Western scientific knowledge throughout the postcolonial world was very critical in achieving this goal. Specifically, the Bretton Wood Conference held in 1944 established a road map for the new world economic order by establishing the World Bank and the IMF. These institutional arrangements facilitated international capital flow with ethnocentric capitalist values and principles. The General Agreement on Tariff and Trade (GATT), the multilateral agreement that was signed in 1947, was the regulatory body for international trade. In some countries, the farmers recognized this imperialism, for example, the Philippines; International Rice Research Institute (IRRI) seeds were recognized as “seeds of imperialism” (Shiva, 2000). Hence, technological changes were part of a larger plan to promote ethnocentric capitalist imperialism in the postcolonial world by converting countries from independent to dependent agrarian structures.

Second, in the minor scheme, geopolitical and military concerns were the supporting factors that promoted this new economic imperialism against the threat of communist imperialism around the world. The ethnocentric evolution of capitalist agriculture from Europe to the world’s tropical and subtropical regions confirmed the need to maintain capitalist imperialism in order for Western nations to maintain their economic prosperity. The emergence of communist imperialism in the 19<sup>th</sup> century provided some challenging theoretical insights into the exploitation of resources by one part of the world of another and also challenged ethnocentric capitalism. This caused the Western world to redefine colonial imperialism and shift to a new, postcolonial form. Therefore, the US geopolitical and military concerns in the postcolonial world related to defending their economic imperialism. Third, the accepted theoretical foundation (the population-food race) is not sufficient for justifying the technological changes in agriculture in third-world countries because the suggested technological package aggravated the food problems in these countries. Recent global food statistics reflect that there is sufficient global food production, but many third-world countries report huge food shortages even following the technological changes. This paper views this problem in association with global corporate capitalism in terms of agricultural input and output markets and the changed agrarian structures in third-world countries.

Finally, this paper concludes that the historical discourse on technological changes in agriculture introduced to postcolonial third-world countries supports the contention that these technological changes were a new form of worldwide Western economic imperialism. The paper further considers that the visible factors, such as the population-food race, do not resemble reality but rather that invisible factors such as the geopolitical and military concerns of US foreign policy, global corporate capital, global institutional setups, etc. provide support for the new form of economic imperialism in the postcolonial world.

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