

# **International Development Organizations and Agricultural Development in Taiwan, 1945-1975**

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## **Introduction**

In 1973, one of the last American commissioners of the Sino-US Joint Commission on the Rural Reconstruction of China, Bruce H. Billings, wrote in his final report on the legacy of the Commission: “Because the Taiwan story is largely a success story, I believe that professionals in the development business should spend time studying the development history of the island ...”<sup>1</sup> The success story was the “Taiwan miracle.” Since the end of the Chinese Civil War in 1949, Taiwan transformed itself from a former Japanese colony primarily exporting rice and sugar to a “developed” nation with a seven billion USD gross domestic product (GDP) in 1972. Over the course of twenty years, starting in 1950, nominal GDP rose an astonishing 2700%.<sup>2</sup> A large reason for this rapid growth was the development project initiated by the United States and international organizations and carried out by the “professionals in the development business.”<sup>3</sup>

Although this paper is a history of Taiwanese agricultural development from 1950 to 1970, Taiwan is also a lens through which the global dissemination of international agricultural development beginning with the end of World War II and culminating in the Green Revolution of the 1970s can be observed. International development as enacted by the U.S. and international organizations in Taiwan should be considered the first part of a “globalization” of a

specific set of development practices and methodologies. These practices, after having been successfully adapted to grow Taiwan's agricultural economy, then became further disseminated internationally by Taiwan. In part due to its rapid agricultural development, Taiwan successfully transitioned from a former colonial economy to a globally-integrated world economy in a process that would decades later inspire social scientists to term Taiwan one of the famed "Asian tigers." The narrative of postwar economic development in the former colonial world of East and Southeast Asia is one that has been overshadowed in the historiography by the Cold War narrative of the grand conflict between U.S., Soviet, and Chinese aligned states. This paper aims to shift the focus in postwar East Asia to equally a different, but no less important aspect, the transition from former colonial economies to the rise of globally integrated and interdependent economic powers.

This paper approaches the broad concept of "globalization" by focusing on a specific aspect of our world—agriculture, or if framed as an issue, how to feed people—and then looks at the transnational dissemination of agricultural development practice. I hope to avoid the pitfalls sometimes created by other narratives that subsume globalization—for example, operating under the assumption that there exists an inevitable progression towards opening borders and diminishing state power. Instead, I argue that while the scholarly literature has been rich on development in agriculture on a country-by-country or unilateral basis, the transnational aspects have not been given due investigation. In the existing development literature, many of the models assumed a hub-and-spokes model, with the United States as the hub "transmitting" development to developing nations globally like spokes on a wheel. However, as I will demonstrate in Taiwan, the transmission of practice and knowledge is more complicated. While Taiwan, in the early 1950s was a recipient of U.S. technical knowledge, by the 1960s it had

regular exchanges and conferences with Japan, Israel, Spain, and the Philippines, among others. By 1970, Taiwan had become a transmitter of agricultural practice. It had begun funding and sending agricultural knowledge missions to Africa in places such as the Cote d'Ivoire, where Taiwanese agricultural experts demonstrated irrigation techniques. Then Taiwan formed multinational development networks in East and Southeast Asia with Japan, the Philippines, South Korea, Thailand, and Vietnam in the form of cooperative research institutions. By tracing the networks of exchanges between Taiwan and the world, I argue that globalization is the proper framework to explain the rise of the science of technology in international agricultural development and, more generally, economic development.

This paper will follow three parts that roughly trace the “globalization” process of agricultural development in this narrative. In the United States, agencies tasked with international development took shape and began their mission of enabling food self-sufficiency in Taiwan. In Taiwan, the Joint Council for Rural Reconstruction serves as the lens to examine how agricultural development practice occurred. Finally, the paper follows Taiwanese agricultural development globally as Taiwan led agricultural instruction missions to Africa and established multinational institutions such as the Asian Vegetable Research and Development Center.

### **The United States: International Development and the Cold War**

Early U.S. assistance to China was under the umbrella of postwar reconstruction. The Economic Cooperation Administration (ECA) at this point was taking over the mission of the United Nations Relief and Rehabilitation Agency (UNRRA), which had begun postwar agricultural assistance in China immediately after the end of WW II in 1945. However, the long ongoing Chinese Civil War between the ruling Kuomintang regime under Chiang Kai-shek and

the Chinese Communist Party under Mao Zedong came to a breaking point. By 1949, Chiang ordered a retreat of the Kuomintang government with two million of its soldiers and officials to the island of Taiwan.

After the Korean War, U.S. policy began to aggressively contain communism. The fall of China to Mao and the Chinese Communist Party became a threat for East Asian security. China was no longer just a post-war reconstruction project; it became a major regional security concern. Policy makers in the U.S. began to increase funding to Chiang's regime, now fully withdrawn to Taiwan, but still claiming sovereignty over the whole of China, both military and non-military. From 1949 to 1965, Taiwan received over an estimated \$1.5 billion United States Dollars (USD) in non-military aid, after which Taiwan was classified a "developed" nation and aid was halted. Agricultural assistance formed a large portion of non-military aid to Taiwan, around six to eight million USD per year over this fifteen year period, and although the goals of sending aid were largely to support an active anti-communist ally in East Asia, the actual administration and disbursement of funds was handled by agricultural development experts who were not involved in high-level anti-communist Cold War policies.<sup>4</sup>

William John Green, who served as the American commissioner of the Joint Commission for the Rural Reconstruction of China, exemplified the development expert who would comprise the international development community. Green was trained in agronomy and agricultural economics at many of the rising American agricultural research universities at the time: Oklahoma State University, Texas A&M, and the U.S. Department of Agriculture Graduate School. He began his career in the Agricultural Adjustment Administration and Farm Security Administration, working in Washington D.C. and in the farming regions of America, where he functioned as a bureaucrat and manager. His stint abroad began with the UNRRA, which was

primarily tasked with agricultural rehabilitation in postwar China.<sup>5</sup> After three years in China, where he once coincidentally ran into Zhou Enlai, he worked with U.S. Special Technical and Economic Missions to Peru, Burma, and Bolivia.<sup>6</sup> Finally, in 1957, he took the commissioner position at the Joint Commission for the Rural Reconstruction of China (JCRR), having served a total of over ten years abroad in four different countries.

In addition to scientist-turned-bureaucrat, like Green, American philanthropic organizations such as the Rockefeller and Ford Foundations began to expand their agricultural development programs. Efforts by the Rockefeller Foundation (RF) to battle hunger abroad dated well before World War II, but after the war, these efforts grew in terms of dollars spent and geographical extent. The RF lured agricultural scientists to lead sections of their foreign agriculture efforts. One such scientist, Robert F. Chandler, a former professor of foreign soils at Cornell University, joined the RF as an assistant director of the Division of Agriculture.<sup>7</sup> As part of his duties, he toured Asia, including Japan, South Korea, Taiwan, and the Philippines with other RF officials to determine where to spend RF funds to help promote agricultural development projects. In 1959, he became director of the newly founded International Rice Research Institute (IRRI), a multinational research institute in Los Banos, Philippines, dedicated to finding varieties of rice that would flourish in south global climates.<sup>8</sup> After over ten years at IRRI, in 1972 he helped found the Asian Vegetable Research and Development Center headquartered in Taipei where he remained until his retirement.

Green and Chandler were two of many officials and scientists who worked in Taiwan and the rest of the developing world. As the U.S. became more deeply involved in the Cold War and increasingly utilized food as a means of battling communism, it further engendered a global network of international agricultural experts who had served all over Asia, Europe, Africa, and

Latin America. Although the U.S. served as the primary player pushing agricultural development initially, the developing nations that were targets of agricultural development soon became immersed in this growing network with other developing nations as well. Taiwan was no exception, and its agricultural development history reflected one of many narratives that took place in the third world.

### **Taipei: Agricultural Development through State Cooperation and Science & Technology**

Once we move away from Washington and into Taipei, the capital and seat of Chiang's Kuomintang regime, a different story emerges, distinctly outside of the Cold War "bubble" in Washington. The majority of decision making in Taiwan's development history flowed from the JCRR, whose mission was primarily agricultural. As consultant W.I. Myers clarified in a 1962 memorandum to the JCRR:

The economic development of Taiwan requires a further increase in industry adapted to local conditions and a continuous strengthening of the agricultural base of the economy. Important as industry is in providing employment as well as essential goods and services, it cannot achieve economic development alone. The experience of the United States, Japan and other countries shows clearly that sustained economic development also requires a productive agriculture in order to insure adequate food at reasonable prices, raw materials for industrial processing and exports to provide essential foreign exchange.<sup>9</sup>

The justification for agricultural development was that it was a precursor for basic social stability prior to rapid industrialization. Planners recognized that being able to provide sufficient nutrition for the majority of Taiwan's population would need to be addressed before sustained economic growth, as was the case with the development histories of other industrialized nations. It is also important to note that even at this point planners were looking to take advantage of the growing global market by using agricultural goods as exports. Indeed Myers acknowledged growing an agriculture industry would bring "needed employment, reduced imports of many

essential commodities and contributed an expanding volume of exports to reduce the unfavorable balance of payments.”<sup>10</sup> In the early postwar period, American planners were already concerned with a turn to a global outlook.

Established in 1948, just prior to the Kuo Ming Tang (Taiwanese nationalist political party) (KMT) retreat to Taiwan, the JCRR was established under joint administration from both Chinese and American officials. Two American commissioners and three Chinese commissioners were at the top of the JCRR hierarchy. The JCRR operated outside of the formal Republic of China (ROC) government bureaucracy, which already had a Provincial Department of Agriculture and Forestry (PDAF) under the Ministry of Economic Affairs for agricultural administration. Although the JCRR was a commission and not a government bureau, it still wielded significant influence as a result of its access to American funds and expertise. As JCRR commissioner Bruce Billings stated:

I believe this organization [the JCRR] is unique and has never been duplicated in any other country. The organization is outside the civil service structure and is virtually autonomous in its operations in the field of agriculture. There is no Department of Agriculture in the government of the Republic of China. Their role is largely filled by the Joint Commission.<sup>11</sup>

The ROC Ministry of Economic Affairs (MOEA) and other ministries involved in economic development recognized the independence and policy-making ability of the JCRR. Requests, for example, to borrow JCRR officials for foreign missions or to use American ECA/ICA/USAID funds were directed through the JCRR. The JCRR’s power over the purse gave it significant influence in the ROC government. It even operated with significant independence from USAID in Washington. The American JCRR commissioner from 1957 to 1962, William John Green, stated in his report:

Sometimes a staff member of the US/AID mission is not fully aware of the nature and functions of JCRR and regards it as an end-use agency or as merely a division of the

mission instead of an autonomous semi-independent bi-national agency with authority to approve and disburse funds for projects relating to agricultural development and rural improvement. Fortunately, these cases are very rare.<sup>12</sup>

Great emphasis was placed on the JCRR's mission of cooperation with the ROC, and USAID officials usually respected this mission. Chinese commissioners of the Joint Commission approved all major policy decisions of the JCRR, and often the interests of the Joint Commission were not entirely in line with the interests of USAID. With the tremendous power wielded by the JCRR stemming from its power of the purse and relative independence, it accomplished agricultural development through four primary functions:

- 1) cooperating with local farmers and marketing associations to implement incremental institutional changes and grassroots education
- 2) recruiting American and international agricultural scientists to help development projects in Taiwan
- 3) facilitating training and educational exchange of Taiwanese agricultural students and academics
- 4) loaning or granting American foreign aid funds to support applied scientific research

In 1949, immediately after the transition of the KMT from mainland China to the island of Taiwan, the focus for the JCRR was fertilizer supply. Under the pre-war economy of Taiwan, the island's agriculture was a part of a larger Japanese colonial economic network. Since the Treaty of Shimonoseki of 1895 that ended the Sino-Japanese war, China ceded Taiwan (or Formosa, as it was known at the time) to Japan. Taiwan primarily exported sugar and rice to the rest of the Japanese empire, and was first import chemical fertilizers from Japan in 1902, which was crucial for rice productivity.<sup>13</sup> World War II disrupted the import of chemical fertilizers and impacted rice production yields under Kuomintang control. While under UNRRA

administration, resuming imports of fertilizer became a top priority for postwar rehabilitation. In 1946, rice production yields were at near historic lows, bottoming around thirty-five kilograms per hectare (kg/hectare). In the years 1946 and 1947, 136,300 metric tons of fertilizer acquired by UNRRA in Taiwan resulted in an increase from 630,000 metric tons of rice to 1.06 million, an almost forty percent increase in yield.<sup>14</sup> In 1949, when the JCRR took over, the majority of Economic Cooperation Administration (ECA) funds were directed for acquiring fertilizer.

The means of fertilizer distribution and financing were the first of the new practices the JCRR would implement in Taiwan. The JCRR would provide oversight to the distribution of fertilizer, but could not micromanage the amounts. Instead, fertilizer was distributed to the Provincial Government Food Bureau, and from there to local level farmers' cooperatives. To ensure that fertilizer was being efficiently distributed and properly utilized, the JCRR employed inspectors, who were usually young, recent Taiwan college graduates proficient in speaking the local Taiwanese dialect or Japanese, the languages most farmers would have understood. These inspectors surveyed villages judging the reactions to the reception of fertilizer.<sup>15</sup> This system later developed to employ permanent "extension workers," predominantly comprised of "farm advisers" who were responsible for educating approximately one thousand farm families in agricultural practice. Each township usually had one or two farm advisers, who reported directly to district (xian 縣) extension supervisors. Specialist training came from the ROC Provincial Department of Agriculture and Forestry (PDAF), agricultural universities, and research institutes.<sup>16</sup> By 1957, Taiwan had begun to introduce the "community development programs" that had been implemented by U.S. development experts in places such as India.<sup>17</sup> Through grassroots interactions with farmers on the village level and cooperation with the pre-existing farmers' associations/cooperatives, the JCRR began to make incremental changes in the existing

agricultural institutions.

After learning from mistakes of immediate postwar rehabilitation in the mainland, the JCRR implemented new financing practices for the acquisition of fertilizer. The KMT government had previously offered a system of fertilizer in exchange for rice, a system that helped provide a steady supply for military rations. However, farmers unable to part with rice instead had to seek loans at exorbitant interest rates. The JCRR sought to rectify this problem by offering direct financing. The JCRR used ECA funds to subsidize interest on loans made to farmers who used them to purchase fertilizer. Interest rates were kept deliberately low and repayment terms were generous compared to private lending options. This type of financing made fertilizer affordable for farmers, and more importantly, allowed farmers with little capital to invest in future yields. By 1949, effective fertilizer distribution resulted in a production of 1.2 million tons of rice, and by 1952 fertilizer usage resulted in a two million ton yield, well surpassing the highest prewar output level of 1.4 million tons in 1935.<sup>18</sup>

By the 1960s, technical training to farmers in fertilizer use, increased fertilizer supplies, and subsidized financing for farmers provided the blueprint for a vibrant and stable food and fertilizer supply. In 1967, production yields increased in Taiwan to three million total tons of rice, or 176 kg/hectare, marking nearly a five hundred percent increase from 1946. The yields had vastly exceeded expectations held by American scientists on rice cultivation. The success of the three-fold fertilizer approach to rice production led to the establishment of the Food and Fertilizer Center, and the dissemination of this fertilizer strategy to other nations in the East and Southeast Asia region, which will be discussed below in the following chapter.

Fertilizers were not the only means development planners used to increase production yields. As new practices were implemented, by 1960 the practices had come to emphasize a

larger-scale change in agriculture for Taiwan. The JCRR encouraged institutionally-driven agricultural science research. Planners distributed American funding in order to establish new research institutes that would develop technology domestically tailored for Taiwan's agricultural needs. This policy also entailed the development of Taiwan's university system to supply the research talent necessary for new research institutes as well as support from the KMT state bureaucracy to prioritize science and technology as a growth industry.

In one example of the dozens of new agricultural research institutes that emerged from the postwar development period, the Plant Protection Center was established in Taichung (Taizhong) in 1960. Although directly funded by the United Nations Development Program, the JCRR performed a crucial role in helping administer the establishment of the Plant Protection Center. The goal of the Center was to provide research to battle plant diseases and pests. It combined newly emerging subfields of the biological sciences—taxonomy, physiology, pathogenicity, and histo-pathology of microorganisms—with field trials in order to accomplish its goals. It employed field trials of chemical based pesticides as well as non-chemical, natural pest deterrents.<sup>19</sup> By combining science research with productivity yield goals, scientists were able to use academic research for applied industrial purposes.

In another example of the marriage of science and industry, the Taipei District Agricultural Improvement Station requested funding from the JCRR for a study on “Post-harvest Physiology, Handling and Storage Techniques for Fresh Vegetables and Fruits.” Science and technology was not just limited to improving productivity yields from crops. Development planners also ensured that science and research be applied to industrial operations—in this case, distribution. The report remarked that “Due to inadequate handling, transit, and storage of fresh vegetables, the losses during the handling and marketing stages in Taiwan are tremendous.

Inadequate handling and transit were also responsible for the poor quality and low market value of fresh fruits on the foreign markets as reported in the past.”<sup>20</sup> Benefits of distribution research were two-fold. Proper handling of vegetables during distribution would minimize direct losses due to damage and lack of refrigeration, and indirectly an increase in quality at distribution destinations would result in a higher market value for Taiwanese sourced vegetables. The proposed study would have researched post-harvest physiology of vegetables and fruits to discover new transport methods and practices to ensure that they would reach destinations at optimal ripeness and condition.<sup>21</sup> The application of research consequently was broadly applied to many aspects of the agriculture industry.

The JCRR saw dozens of funding requests on a monthly basis that were not just limited to traditional rice and sugar crops. In September of 1968, it received requests for research of a variety of agricultural related industries that reflected a vast diversification of the agriculture industry. This spectrum included breed selection for peanuts, farm mechanization, cropping patterns, fruit diseases and insects, forest management systems computer simulations, watershed management, tree breeding and bamboo research, kiln drying for hardwoods, fisheries development, and management of farmers associations.<sup>22</sup> By the late 1960s, development that had previously been focused on rice had expanded into tuna fisheries, highland timber, and tropical fruits.

Aside from this marriage of applied scientific research to agriculture, the JCRR also served another important purpose—facilitating professional exchange and educational development. The JCRR largely sought experts abroad when the appropriate expertise could not be found in Taiwan, or when domestic research institutes sought to bring in international experts for educational purposes. The majority of these experts were from “developed” nations—the

U.S., Japan, Germany, Israel, and etc. The exchange of personnel and training across so many different nations demonstrates the transnational nature of agricultural development of the time. Many of the agricultural experts who lectured or participated in conferences in Taiwan were also commonly invited to a half dozen other developing nations.

Conference participation by agricultural scientists sponsored by the JCRR demonstrates a wide range of agriculturally-related pursuits. Applied research using cutting edge science and technology was the theme for international educational exchanges as well. In one interesting example, the Food and Agriculture Organization of the United Nations (UNFAO) and the International Atomic Energy Agency (IAEA), through a joint division between the two, hosted a meeting on the rising field of radiobiology. The JCRR sponsored one scientist, C.H. Huang, to participate in a November 1969 meeting of the FAO/IAEA at Knoxville, Tennessee, on “Use of Seeds as Biological Monitors for Neutron Irradiations.” The goal was to further study the use of neutrons for seed irradiation.<sup>23</sup>

In another example, the JCRR facilitated two Taiwan representatives to the Rural Youth in Agricultural and Rural Development conference held February 18 to March 15, 1969. Sponsored by the German Foundation for Developing Countries, in close collaboration with the UNFAO, the conference encouraged planning for “the design of nationally integrated programs suitable for a more massive mobilization of the resources of youth for agricultural and rural development.” Taiwan’s participation was just one of many developing countries, and while traveling to the conference, the JCRR also approved for the two delegates to stop at the Netherlands and Denmark to “observe their agricultural extension work which has been successfully carried out or strongly supported by the farmers’ cooperative organizations.”<sup>24</sup> The JCRR was also crucial for attracting internationally renowned agricultural experts to help

advise and train Taiwanese researchers. In January 1969, the JCRR received a request to recruit Dr. H.M. Munger, a horticultural expert, “for consultation on problems pertaining to vegetable production and breeding” in order to meet increasing demand for vegetables from local markets “due to the increased nutritional intake per capita in Taiwan as a result of the high living standard enjoyed by the people as a whole.”<sup>25</sup> Taiwan also recruited experts from Japan on a longer term basis under “technical cooperation programs.” Under this program, consultants on irrigation development and land and water resources conservation were brought into Taiwan in 1968 with JCRR financing.<sup>26</sup>

Taiwanese university students were also sent to the United States to train in the agricultural sciences, with help from the JCRR. In one instance, the chief of the Animal Industry Division at the JCRR, C.T. Lee, was highly involved in the training of exchange student I.K. Huang, who was enrolled in the Master’s program in agricultural sciences at Iowa State University. Lee corresponded with V.H. Nielson, a professor at Iowa State, concerning Huang’s progress and future. Nielson spoke highly of Huang’s progress and assured Lee that Huang would be able to continue his studies in agricultural science.<sup>27</sup>

Ultimately the three pronged approach of the JCRR resulted in a highly successful development story. Funneling American development aid to applied research, coordinating the inflow of international technical expertise, and encouraging the education of Taiwanese agricultural scientists abroad, the JCRR was able to successfully develop Taiwan’s economy through increasingly globalized means. In 1965, Taiwan was classified a “developed nation” and a “graduate of AID.”<sup>28</sup> Although this resulted in the cessation of USAID funding, the JCRR continued operating until 1972 to continue disbursing leftover AID funds and Republic of China (ROC) government funds that took the place of USAID funds. By the 1970s, the story of

Taiwan's economic growth had shifted from agriculture to industry. However, the industrial growth of Taiwan overshadows a less well known aspect of Taiwan's agriculture as it progressed in the 1960s. By 1970, Taiwan had transitioned from a target of development to a "developer" itself.

### **The Global: Taiwan and the World**

In the 1960s, Taiwan began to take a greater role in the international network of development. Taiwan had participated in educational conferences and professional exchanges as early as the 1950s with JCRR help. However, this changed significantly in the 1960s when Taiwanese experts were sent abroad with the exclusive purpose of educating other developing nations in agricultural techniques and methodology. The process of international aid was even co-opted by the ROC Ministry of Foreign Affairs as part of its diplomatic mission to vie for international recognition amidst the growing tensions over diplomatic recognition between the Republic of China and the increasingly powerful People's Republic of China in the mainland.

The shift of international development from the US as a developer to Taiwan entailed two types of "globalization." If we can consider the U.S. in the early postwar era as a "globalizing" agent, its dissemination model can be considered a hub-and-spokes model. In other words, the U.S. sat in the center as a hub and attempted development on a unilateral basis to international destinations like spokes on a wheel. By the 1970s, Taiwan also began to take a similar approach with itself as a hub in helping develop internationally, focusing especially on African nations. However, a second type of globalization began to occur as well. As the nations engaging in this new brand of applied science for agricultural development grew, Taiwan saw itself increasingly coordinating with other developing nations. The network here represents more of a meshed web network, where each "hub" is connected to dozens of other hubs. Both types of globalization

occurred simultaneously, but the latter resulted in far more versatile and long-lasting institutions of multinational cooperation and governance.

First, by the 1960s, Taiwan began to become an actor in the globalization of agricultural development. Taiwan partook in the dissemination of agricultural practices abroad through foreign development “missions.” One early instance was the Chinese Technical Mission to Vietnam on Crop Improvement, which sent P.C. Ma, a 1929 Cornell Ph.D. graduate from China, as the Chief. There, Ma led development efforts on “breeding and seed multiplication, control of disease and insects and soil and fertilizer” until 1961, when the Food and Agriculture Organization invited him to become the new dean at the College of Agriculture in the University of Liberia.<sup>29</sup>

A more prominent example of this, the Vanguard program, sent Taiwanese agricultural experts to African nations such as the Ivory Coast. Missions demonstrated methods, for example, of field irrigation that were developed from Taiwanese agricultural experience. Many of these missions, including Vanguard, were organized under the umbrella of the ROC Ministry of Foreign Affairs, and were often tied with ROC foreign policy objectives. Historians like Hsiaopong Liu, for example, have argued that the Vanguard program was closely tied with nationalist aspirations to demonstrate Chinese technical superiority under the auspices of the U.S. soft-power war against communism in Africa.<sup>30</sup> In an attempt to battle the growing influence of communism and the presence of Soviet aid in Africa, the U.S. and its allies like Taiwan used agricultural development to maintain influence in the region and rival communist efforts. Taiwan also maintained ties with African nations for its own purposes by the early 1970s, with the growing controversy in the United Nations over the People’s Republic of China’s campaign to take the Republic of China’s seat.

With the encouragement of the United States and the United Nations, Taiwan had fostered close agricultural science ties with its nearby East and Southeast Asian nations. Japan was a popular source for Taiwanese scientists for conferences and to attract consultants. Other developing nations, such as the Philippines, Indonesia, and Vietnam, were undergoing the same agricultural development process and cooperated with Taiwan on a bilateral basis. The International Rice Research Institute (IRRI), a multinational research institute founded in 1961, engaged Taiwan over interest in cross-breeding the IRRI's disease resistant varieties of rice with Taiwan's "Taichung No.1" strain of dwarf rice. IRRI rice breeder Henry Beachell remarked the semi-dwarf hybrids that would result from the cross-breeding "may be widely adopted in Latin America." Other IRRI researchers with Beachell visiting Taiwan included an American agricultural economist, a Ceylonese soil expert, and a Taiwanese rice expert formerly of the JCRR.<sup>31</sup> The multinational IRRI employed agricultural experts from the U.S., Ceylon, and Taiwan and sought additional rice breeds from Taiwan for possible use in Latin America. The very composition and mission of IRRI was transnational in nature, a foreshadowing of Taiwan's own agricultural development future.

By the late 1960s, Taiwan began to take a larger role in multilateral, regional networks as technical cooperation began to appear. Two of these were formalized in multinational research institutes—the Food and Fertilizer Technology Center (FFTC) (liangshi feiliao jishu zhongxin 糧食肥料技術中心), established in 1971, and the Asian Vegetable Research and Development Center (AVRDC) (yazhou shucai yanjiu fazhan zhongxin 亞洲蔬菜研究發展中心), followed shortly thereafter in 1972. The FFTC and the AVRDC followed the model established by IRRI for multinational research, and many of the players that had helped establish IRRI were also

responsible for supporting the FFTC and AVRDC. Both organizations were funded by private U.S. philanthropic organizations, the Ford and Rockefeller Foundations, as well as the newly emerging Asian Development Bank (ADB). The idea for the AVRDC originated in USAID, which was crucial in obtaining funding, and USAID also was a founding member of the FFTC. The FFTC was suggested by Taiwan with coordination under eight member countries and assistance from the United Nations Food Administration Organization. Its mission clearly prioritized technical cooperation:

The purpose of the proposed Food and Fertilizer Technology Center is to promote, among the member countries of the Asian-Pacific Council, an exchange of technical information and experiences in the increase of food production through increased application of chemical fertilizers so as to enhance the production and marketing of food and fertilizers in the region as a vital link of economic cooperation among the member countries. Emphasis on fertilizer technology is the special feature of the Center because of the realization of the need for increased use of fertilizers as a direct and speedy way of uplifting food production in the Asian-Pacific region.<sup>32</sup>

Technical cooperation, in this case sharing knowledge and experience regarding production and marketing of food and fertilizers, became a multinational research endeavor.

Like the FFTC, the AVRDC was established for the purpose of multinational applied scientific research. USAID first conceived of the AVRDC project in order to supplement the “normal diet” of the average Asian citizen.<sup>33</sup> USAID was crucial in rallying funding from the Ford and Rockefeller Foundations for its initial funding. Also headquartered in Taiwan like the FFTC, the AVRDC was intended to host a research staff from a half dozen Asian nations—Taiwan, Vietnam, the Philippines, Japan, Korea, and Thailand—with financial support from the U.S., and the Asian Development Bank.<sup>34</sup> Its goal was purifying and multiplying vegetable varieties such as broccoli-rabe that would flourish in the subtropical climates of Southeast Asia, and then disseminating vegetable cultivation knowledge to member nations. The AVRDC operated under a \$1.5 million/year annual budget in its first five years, a substantial amount to

which most AVRDC member countries contributed funding.

Both the FFTC and AVRDC constituted early instances of multinational, regionally-based cooperation toward a common economic goal through applied scientific research. Although the FFTC and AVRDC followed the three-member Association of Southeast Asia and its successor, the Association of Southeast Asian Nations (more commonly known as ASEAN), the research institutions demonstrated a far more specific (and wider ranging) instance of regional cooperation. Technical experts worked together in Taiwan to complete common objectives whose results would be used by all member countries for the specific purpose of agricultural development. As a matter of international cooperation, these institutions represented significant advances in the history of globalization. If considering the globalizing narrative of the rise of transnational communities and international institutions, the FFTC and AVRDC were among the earliest postwar examples in East and Southeast Asia. The relevance of both of these organizations continues to present day. The FFTC retains its name and the AVRDC is now known as the World Vegetable Center, and both remain functioning NGOs that have continued their research methods for over three decades.

## **Conclusion**

This narrative of globalizing applied scientific research in the postwar era has significant implications for the histories of science, economic development, and globalization. The instance of U.S. development planners encouraging Taiwanese integration into an emerging global scientific community is one of immense success in the early postwar era. As the results of applied science research led to unforeseen sustained economic growth, the pattern of economic development via applied science came to be repeated in Taiwan, notably in manufacturing (first in consumer goods and later in technology), which became the predominant driver of Taiwan's

GDP growth in the 1980s and 1990s.

As agricultural science became globalized throughout East and Southeast Asia, it should not be surprising to consider the subsequent success of the so-called “Asian Tigers.” Japan and Korea experienced the same engagement with the global agricultural community, often in cooperation with U.S. development experts. Japan and Korea were founding members of the AVRDC and the FFTC, and the interchange among agricultural scientists within East Asia matched the trans-Pacific interchange with the U.S. or even Europe. Later it should be no surprise that Japan and Korea (joined by Hong Kong and Singapore) also incorporated applied science in their successful experiments with export-oriented economic growth.

The power of globalizing knowledge, first by means of unilateral and direct development planning, and later eclipsed by regional technical cooperation in formalized science research institutions, cannot be ignored in this narrative. The global science community grew to become increasingly transnational as agricultural experts crossed national borders on monthly bases. Much like the rise of international businessmen in the postwar era, international scientists traveled and trained globally. With the institutionalization of international research institutes, knowledge and practice were no longer confined by national borders. Nation-states interested in agricultural development were willing and eager to invest in multinational research institutes, even those headquartered abroad.

The FFTC and AVRDC succeeded because founding member nations were willing to contribute financial and human capital to further applied scientific goals. Truly international organizations, such as the Asian Development Bank and the UN Food Administration Organization came to become major drivers behind multinational cooperation in furthering regional and global goals. While globalization often cannot be forced as a framework for every

historical narrative, international agricultural development is perhaps one of the clearest examples where a previously national-scale enterprise become integrated into a more global network or community.

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## ENDNOTES:

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<sup>1</sup> Bruce Hadley Billings, "Bruce Hadley Billings Mimeograph: A Study of the Role of Science and Technology in Taiwan," 1973, p. 2, Box 1, Hoover Institution Archives.

<sup>2</sup> Nominal GDP in terms of Taiwan dollars (NTD) was 8.212 billion NTD in 1950 and 226.805 billion NTD in 1970. Toshiyuki Mizoguchi, "Estimates of Long-Term National Accounts Statistics of Taiwan, 1912-90." *The Developing Economies* 37: 1 (March 1999), p. 122.

<sup>3</sup> Bruce Hadley Billings, "Bruce Hadley Billings Mimeograph: A Study of the Role of Science and Technology in Taiwan," 1973, p. 2, Box 1, Hoover Institution Archives.

<sup>4</sup> Robert F. Chandler officer's diary, November 14, 1958, RG 12, Rockefeller Foundation Archives (RF), Rockefeller Archive Center (RAC), Sleepy Hollow, New York.

<sup>5</sup> "Summary of Personal Data," "William John Green Retires." William John Green Papers, Box 24, Hoover Institution Archives.

<sup>6</sup> Green's encounter with Zhou is an amusing one, because he was first arrested by the Chinese Communist Second Army. When the Chinese Communist general realized Green was an American representing the UN, he hosted a reception honoring Americans with makeshift banners wishing President Truman well and calling for Zhou to be sent to meet with Green's envoy. William John Green Diary, p. 123, and pp. 151-152. "China, 1945-1948." William John Green Papers, Box 19, Hoover Institution Archives.

<sup>7</sup> Robert F. Chandler oral history, July 29, 1966, Box 16, RG 13, RF, RAC.

<sup>8</sup> Ibid.

<sup>9</sup> Myers, W.I., "Report of Consultant W.I. Myers. Memorandum to JCRR on National Agricultural Problems on Taiwan, February 7, 1962." William John Green Papers, Box 24, Hoover Institution Archives.

<sup>10</sup> Ibid.

<sup>11</sup> Billings, "Bruce Hadley Billings Mimeograph: A Study of the Role of Science and Technology in Taiwan." p. 8.

<sup>12</sup> William John Green. "End of Tour Report," p. 5. William John Green Papers, Box 24, Hoover Institution Archives.

<sup>13</sup> Supervision over Fertilizer Distribution in Taiwan since 1949, United States. Economic Cooperation Administration miscellaneous records, XX679-10.V, Hoover Institution Archives.

<sup>14</sup> Ibid.

<sup>15</sup> Ibid.

<sup>16</sup> William John Green. "End of Tour Report," p. 1. William John Green Papers, Box 24, Hoover Institution Archives.

<sup>17</sup> William John Green. "End of Tour Report," p. 2. William John Green Papers, Box 24, Hoover Institution Archives. For more on community development, see Nick Cullather, *The Hungry World: America's Cold War Battle Against Poverty in Asia*. Cambridge, Massachusetts: Harvard University Press, 2010, p. 78.

<sup>18</sup> Ibid. "Food and Fertilizer Technology Center." Folder 1, Joint Commission On Rural Reconstruction in China (United States and China) Miscellaneous Records, Box 2, Hoover Institution Archives.

<sup>19</sup> "Plant Protection Center." Folder 2, Joint Commission On Rural Reconstruction in China (United States and China) Miscellaneous Records, Box 9, Hoover Institution Archives.

<sup>20</sup> "Studies on Post-harvest Physiology, Handling and Storage Techniques for Fresh Vegetables and Fruits." Folder 2, Joint Commission On Rural Reconstruction in China (United States and China) Miscellaneous Records, Box 5, Hoover Institution Archives.

<sup>21</sup> Ibid.

<sup>22</sup> Folder 1, Joint Commission On Rural Reconstruction in China (United States and China) Miscellaneous Records, Box 9, Hoover Institution Archives.

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<sup>23</sup> “Recommending approval for C.H. Huang to Attend the Meeting on the Use of Seeds as Biological Monitors for Neutron Irradiations at Knoxville, Tennessee.” Folder 23, Joint Commission On Rural Reconstruction in China (United States and China) Miscellaneous Records, Box 4, Hoover Institution Archives.

<sup>24</sup> “Rural Youth in Agricultural and Rural Development.” Folder 5, Joint Commission On Rural Reconstruction in China (United States and China) Miscellaneous Records, Box 2, Hoover Institution Archives.

<sup>25</sup> “Invitation of Dr. H.M. Munger for Consultation on Vegetable Production and Breeding.” Folder 5, Joint Commission On Rural Reconstruction in China (United States and China) Miscellaneous Records, Box 2, Hoover Institution Archives.

<sup>26</sup> “Continued Financing of Japanese Consultants on Comprehensive Irrigation Development Studies and Land and Water Resources Improvement and Conservation.” Folder 3, Joint Commission On Rural Reconstruction in China (United States and China) Miscellaneous Records, Box 5, Hoover Institution Archives.

<sup>27</sup> “Letter from V.H. Nielsen to C.T. Lee.” Folder 4, Joint Commission On Rural Reconstruction in China (United States and China) Miscellaneous Records, Box 2, Hoover Institution Archives.

<sup>28</sup> Billings, “Bruce Hadley Billings Mimeograph: A Study of the Role of Science and Technology in Taiwan.” p. 2.

<sup>29</sup> P.C. Ma to Robert F. Chandler, January 21, 1960, Folder 10, Box 2, Series 605 D, RG 1.2, RF, RAC; P.C. Ma to J.G. Harrar, August 15, 1961, Folder 10, Box 2, Series 605 D, RG 1.2, RF, RAC.

<sup>30</sup> Hsiaopong Liu, “The Making of an Artificial Power: American Money and ‘Chinese’ Technicians on African Soil, 1961-1971.” Ph.D. dissertation, The University of Chicago, 2006.

<sup>31</sup> “JCRR Newsreel,” Number 165 IO-62-0154-Bz, June 23, 1962. William John Green Papers, Box 24, Hoover Institution Archives.

<sup>32</sup> “Food Fertilizer and Technology Center.” Folder 1, Joint Commission On Rural Reconstruction in China (United States and China) Miscellaneous Records, Box 2, Hoover Institution Archives.

<sup>33</sup> “Address by Chairman T.H. Shen at the Opening Session of the Conference on the Establishment of the Asian Vegetable Development Center,” August 16, 1968, p. 175. Archive no. 36-16-006-023. Modern History Institute Archives at the Academia Sinica (中央研究院近史所檔案館), Taipei, Taiwan (MHI).

<sup>34</sup> “Conclusions of the Conference on the Establishment of the Asian Vegetable Development Center,” p. 166. Archive no. 36-16-006-023, MHI.