Agro-tech in Malaysia and Literature Review Knowledge Sharing from Agro-Technology Using Nations

Qurat-ul-ain Mastoi, Istikoma, Abdul Rahman Ahmad Dahlan
Kulliyah of Information Technology, International Islamic University MALAYSIA
quratulain.mastoi@hotmail.com, jannahnaty@yahoo.com, arad@iium.edu.my

Abstract— This paper demonstrates agriculture-technology in Malaysia and includes a literature review for some other countries. This study compares the Agro technology transformation program in several countries; Taiwan, South Korea, Thailand, Israel and Malaysia. How are they improving their economy, though agriculture? The concept of advanced technologies in agronomic systems has been given a significant role in the improvement of agricultural creations e.g. sustainable agriculture, livestock production and Crop yield, in order to maintain food security. This paper illustrates what kind of enhancement needs to heighten the Malaysia economy through agronomy, sharing a knowledge of agricultural technology and exploring the reasons why the agriculture economy is back on the policy agenda of Malaysia.

Keywords — Agriculture, agro, agronomy, boost, countries, economy, enhancement, modern, technology.

1. INTRODUCTION

Agriculture is the backbone of many economies which is fundamental to the socioeconomic development of a nation because it is a major element and factor in national development (Ahmed, 1993). The main challenges are standard of living, adequate food, shelter, a healthy and secured environment, clean water, and first and most basic to human life and survival is food security [1]. Agriculture plays a crucial role in social and economic activities of countries, for instance, poverty reduction [2].Technological change has given a new shape to agriculture in the last 100 years. Previous research suggests that agricultural growth reduces poverty because most of the poor live in rural areas and they are highly dependent on agriculture for living expenses [3].

Agriculture has been considered the hallmark of the first stage of development of any country. The aim of the paper is to learn how agriculture technology boosts the economy of the country and in this paper we compare several countries for instance, Taiwan, South Korea, Thailand, and Israel with the Malaysia agricultural transformation program. Likewise, as food constitutes such a high expenditure by the poor it is also delightful to imagine that lower food prices, would be poverty reducing [4]. The adoption of modern agro-technology gives tremendous benefit to boost national food security, boost earnings and foreign exchange earnings, through exports and encourage industrialization all around the world and increase the number of farmers [5].

Taiwan is using biotechnology to boost their agriculture economy. The rapid growth in Korean agricultural technologies includes areas such as breeding, biotechnology, soil and agricultural mechanization, nutrition management, and post-harvest management. South Korea's agribusiness had numerous innate issues. South Korea has been an uneven nation with just 22 % arable area and less precipitation than most other neighboring rice-developing nations [6]. Israel is internationally known for its advanced agriculture technology. Thailand has about 208,000 square kilometers of farmland. About 10 % of this is devoted to energy crops, but this amount is growing fast. To grow yields, the ministry plans to advance land-use efficiency while sustaining the level of energy crops. Thailand is using the latest technology for harvesting crops and for the growth of agriculture. In retrospect, Malaysia has marvelous strengths in agriculture, large scale production of industrial crops like oil palm and rubber as well as selected crops, and livestock, but current Malaysia needs to advance in agro-tech like other countries.

2. AGRICULTURE IN TAIWAN

Taiwan is a little island with a populace of just 23 million, yet it acts as a stellar part in the international high-technology industry and was rated as the world's 25th-largest economy in 2009.

According to the Council of Agriculture in Taiwan in 2014 it stated that the foundation of the national organization of agrarian science and engineering expects to support advancing Taiwan's farming inventive quality chain [17], with a specific end goal to lessen the immediate effect exchange liberalization has on Taiwan agribusiness. COA proposed inventive ideas planned to change the current generation approaches to "new value chain Agriculture" as its key destination.

In recent years, biotechnology has been applied in agriculture and other fields and has gradually been taken seriously worldwide (Sun 2006; Lee 2008). In the future, agricultural biotechnology will have a far reaching impact on increasing food production, protecting the natural environment and the Earth's resources, improving the quality of human life in Tai-

- *Qurat-ul-ain Mastoi is currently pursuing master degree program in Information communication Technology in International Islamic University, Malaysia, PH-+60172674846. E-mail:quratulain.mastoi@hotmail.com*
- *Istikoma is currently pursuing master degree program in Information communication Technology in International Islamic University, Malaysia, PH-+601128545667. E-mail: jannahnaty@yahoo.com.*
- *Abdul Rahman Ahmad Dahlan is currently Lecturer in Information communication Technology in International Islamic University, Malaysia, PH-+60192202032. E-mail:arad@iium.edu.my.*

wan, and enhancing the well-being of farmers [7]. According to the council of agriculture, they start projects under Taiwan Agricultural Technology Foresight 2025 to boost the agriculture sector economy [8].

In 2012, Taiwan's aggregate horticultural creation was worth NT$466.82 billion (US$15.77 billion), representing 1.90 percent of the country's GDP. The main focus of the island's agriculture has moved from traditional farming of staple crops to the creation of customer arranged and higher-esteem items picked for their business sector potential [9]. The ample daylight and precipitation means it is conceivable to reap rice up to three times each year. All fruits and vegetables are additionally planted in a good way; Taiwan is portrayed by its differing qualities as well as by their stated, astounding, high dietary quality and high volume. Kaohsiung is accordingly overall situated to meet these needs.

2.1. Pingtung Agricultural Biotechnology Park

In 2003 to foster the development of agricultural technology, COA has been promoting the development of science parks in a move to transform Taiwan into an Asia-Pacific center for agricultural biotechnology and sub-tropical floriculture. PABP is the only science park in Taiwan dedicated to agricultural biotechnology. PABP occupies a total land area of 233 hectares and provides one-stop services including various governmental support, R&D funding, factory licensing, and international marketing aid. At end-2013, there were 78 park tenants in PABP categorized into six agro-bio clusters, namely (a) functional foods and bio-cosmetics(b) aquaculture(c) breeding livestock and animal vaccine(d) green energy automatic control facility for agro-use (e) bio-fertilizer and bio-pesticide(f) biotechnical service[10].

2.2. Benefits of Agro-technology in Taiwan

The development work began six years back with a progressed rice seed treatment test in nursery boxes. What makes the Taiwan model unique is that Bayer has Organized Taiwan Provincial Farmers' Association's agro-concoction plant to present Prophet Rice for sound seedling engineering. Bayer treats the rice seed in little boxes where they grow and develop into seedlings, which are then sold to agriculturists. The results have been astonishing. The main solution is not only decreasing pesticide, but also reduces farming time as well. Also the engineering has expanded yields by 8% over customary methodologies [11]. Taiwan Agriculture Land Information Service helps the government with land planning. Since it was opened free in 2006, the framework has additionally encouraged the improvement of accuracy cultivating. Agriculturists have the capacity to evaluate farmland accessibility utilizing information on soil properties, trimming suitability, watering system offices, area use zoning, and the achievability of farmland union. To keep horticultural specialists advised of paramount news and data, the COA has built a portable data stage that conveys opportune notices about plant malady warnings and regular disaster endowments. The cultivating area has additionally ended up progressively dependent on an online administration created in 2009 to give separation meeting on agrarian systems. Going ahead, the government arrangements to utilize distributed computing engineering to guarantee nourishment wellbeing and give a continuous database of rural creation and business sector costs [9].

3. Agriculture in South Korea

South Korea's economy is highly dependent on export as it supports a relatively rich society of 48 million people. The country's rough mountains leave moderately little arable area region. Rice dominates crop production and has long been the staple food, and Korea has turned progressively to nourishment imports to fulfill customers' requests for more prominent sustenance assortment, lower costs, and accommodation [12]. South Korea is top ten markets for U.S. agricultural exports, and the country's market for consumer-ready food items shows great promise. The rapid enhancement in agricultural technologies includes areas such as, breeding, biotechnology, soil and nutrition management, agricultural mechanization, and post-harvest management. Korean agriculture fell down in 1994, when South Korea joined the WTO and the Agreement on Agriculture, which effectually forced the regime to eliminate quotas and duties [13].

Korea took the Land Grant College system from USA in 1947, which established the National Agricultural Development Institute responsible for agricultural research-extension-education. This is a concept of transferring educational function to the Ministry of Education in 1949. Strong bonding between research and extension resulted in the rapid transport of farming technologies to farmers. Korea was able to achieve self-sufficiency in rice with its Green Revolution in a short period of time. Seed yield and supply system were also assisted by IBRD and advanced nations [15]. The purpose was to increase the agricultural productivity and to improve agricultural products' quality [14]. Two major weaknesses existed in the South Korean economy. Initially is its overwhelming dependence on transported fossil energies (oil and gas). South Korea is the second biggest merchant of condensed common gas (LNG), generally from Malaysia and Indonesia.

3.1. Agro- Technology of South Korea

The KOPIA (Korea Project on International Agriculture), which is controlled by the Rural Development Administration (RDA), was propelled in 2009 to help coordinate such farming undertakings in a more precise manner. The RDA secured KOPIA focuses in 2009 in six countries (Vietnam, Myanmar, Uzbekistan, Kenya, Brazil, and Paraguay), and after a year set up focuses in four different countries (the Democratic Republic of the Congo, Algeria, Cambodia, and the Philippines). The spirit of the project is based on customized support. As one RDA expert explained, "At first, each member nation proposes three technological fields they want to develop. Korea then invites experts from each of these fields to offer a 10-week training session at related research centers. Through this process, the two parties come up with a list of goals to accomplish and establish a direction in which to perform the projects."[15]

3.2. Major Crops of South Korea

Rice is the most essential yield in South Korea as noted by Donald S. Macdonald, nonetheless, climbing pay levels and area qualities have made it costly to create. Rice accounted for around 90 percent of aggregate grain generation and in excess of 40 percent of ranch salary. Other crops which contribute in

agriculture economy are barley, wheat, corn and soybeans.

4. Agriculture in Thailand

Thailand's agriculture has long has been called "backbone". Thailand is considered as an agrarian state. The entire area of the state is 513,115 square kilometers, of which 41 percent or 21,196,571 hectares is devoted to farming. The latest study indicates that soil under cultivation includes 51% for rice production, 24% of field crops, and 17% of fruit trees and perennial crops. For the last four decades, agricultural production has increased significantly. However, increased production largely was due to the expansion of cultivated land through forest encroachment rather than increasing the yield per unit area. To boost yields, the ministry plans to better soil-use efficiency while keeping the degree of energy crop. Moreover, the Ministry of Thailand is considering doubling the amount of irrigated acres in the state. Husbandry is a big economic sector in Thailand, generating big amounts of agricultural and wood residues, sugar, Rice, palm oil, and forest related industries are the major potential biomass energy sources.

4.1. Technology usage for Agriculture in Thailand

Rice Combine Harvester. Rice combine harvesters are used in the serious implanting areas, from the lower part of the northern region down to the central plain region. It allows 2 to 3 crops per year. The future role of rice combine harvester in Thailand was considered to be based on economic, social and agricultural production systems [16].

Grain Dryer. A farmer does not dry his own paddy but sells it to the miller or the collector right away. The high moisture rice is immediately transported to the rice mill or the local collector. Most millers and collectors at that time had no mechanical dryer, with drying the high moisture rice depending mostly on sun drying. This change created a large volume of high moisture paddy in a short period, beyond the handling capability of the millers [16].

Biomass energy. Biomass conversion technologies for power generation can be classified into three categories: traditional, state-of-the-art, and emerging technologies. Most of the existing technologies employed in Thai industries are traditional technologies which have been used for a long time without any technological barrier. System (boiler) efficiencies range from 50 per cent to above 80 per cent and have minimal environmental features to meet current environmental standards. [17].

Solar energy applications including in the food industry. According to the Solar Map carried out by the Department of Energy Development and Promotion (DEDP) and Silpakorn University in 1999, most areas in Thailand received maximum energy from the sunlight in April to May, ranging from 20-24 MJ/m2/day. The Northern region and part of the central region of Thailand annually received the most intensive energy with an average of 20 MJ/m2 /day. The solar water heating industry has been commercially established, with more than ten manufacturers in the market. During 2002-2006, it is expected that solar water heaters can be installed for 10,000 households, 20 hotels and 20 hospitals. Promotion will be made on the use of solar dryers for 50 factories in the vegetable/food drying industry to reduce fuel oil or electricity consumption in the industry [16].

Greenhouse dryer. Solar Drying Silpakorn Type Solar Greenhouse Dryer has a concrete floor, on which the solar radiation is absorbed. It was found that the dryer can be used to dry 240 kg of rattan with an initial moisture content of 60 % db to a final moisture content of 12% db in 5-7 days compared to 10-12 days needed by natural sun drying. The rattan in the dryer was completely protected from rain and it was of high quality in terms of color and texture [16].

5. Agriculture in Israel

Israel is highly advanced in Agro-tech and this country is using machinery for industry and for boosting the agricultural economy. Regarding geography, Israel has a lack of water and it is not natural for farming. More than a large portion of the area territory is desert, and the climate does not favor growth in agriculture. In Israel fresh water allocated for agriculture was reduced gradually in the meantime, the measure of suitable area accessible for cultivating (360,000 hectaresis 18% less than at present. Israeli agriculture is also unique in its investment in capital for extra water and land. Farmers use combinations of advanced irrigation technologies, for instance drip irrigation and cover technology in order to adapt specialized farming techniques to the local climate. Israeli farmers take advantage of heat rather than be a victim of it. [17]

5.1. Growing Crops in the Desert

The new wave of 'greening the desert' has been encouraging. Newly planted "modern" olive estates inundated by harsh water have attained every section of land, with oil yields that are six times higher than in conventional downpour encouraged forests elsewhere in the nation. Desert agriculture is already playing an indispensable role in Israel's food economy. Gaining from different nations, a vast scope of bone-dry soil, plants from Asia, Africa, Australia and the Americas have been trialed for nearby conditions, sometimes adjusting and commercializing them [17]

5.2. Major crops and livestock in Israel

Israel has the capacity to develop an extensive variety of products. Field crops in the nation incorporate wheat, sorghum and corn. Fruit and vegetables developed include citrus, avocados, kiwi fruit, guavas and mangoes, and grapes from plantations found on the Mediterranean seaside plain. Tomatoes, cucumbers, peppers and zucchini are grown commonly throughout the country; the melons are grown during the winter months in the valleys. Subtropical areas in the country produce bananas and dates, while in the northern hills apples, pears and cherries are grown. The majority of the Israel's milk utilization begins from dairy cultivates inside the nation with most groups comprising generally of Israel-Holsteins, a high-yielding, sickness safe breed [17]

5.3. The technology uses for Agriculture in Israel

Israel's agro-engineering industry is well-known for its inno-

vation, resulting in many useful technologies. Recent developments are described below: Special sensors have been developed to record and monitor plant growth-rate and determine growing needs. The use of these sensors results in significant savings in water and fertilizers, while improving production and quality. A new system for combined heating and dehumidification (CHD) was developed to artificially dry the air in closed greenhouses while maintaining the desired humidity and temperature. The energy efficiency of the system is very high and it reduces foliage damage due to bacterial infections. Precision Agriculture (PA) uses cutting-edge technologies, for instance Geographical Information Systems (GIS) to assess and understand infield variability, Satellites or aerial images, and Global Positioning Sensors (GPS). The Computerized Greenhouse Computer hardware and software have been developed in Israel, allowing automatic control of the greenhouse water and fertilizer and continuity of climate systems. Software is used for the most effective and advanced solutions, resulting in the automatic and sophisticated irrigation system in use today.

5.4. Israeli Farmer Changed World Agriculture

Decades ago, the Israeli-American scientist helped develop and spread an idea called micro-irrigation agriculture. The result: much more efficient use of a tight water supply in arid climates. The breakthrough, for which Dr. Hillel was awarded the 2012 World Food Prize, took root throughout the Mideast and parts of Africa. But it's seeing higher usage these days as more countries, from the U.S. to India to Mexico, face devastating droughts, many scientists say, because of climate change and vast population growth. Not only are growing numbers of places adopting these methods, but they're doing new and inventive things with them, such as using new types of tubing that can more easily get water into the soil. [18].

6. AGRICULTURE IN MALAYSIA:

Malaysia is currently facing new challenges with respect to producing new findings that will help to boost the Malaysian agriculture and food sector to a higher level. Therefore, a great deal of effort is needed to ensure that the agriculture sector can elevate the economic development of Malaysia. In line with government efforts to further develop the agricultural industry, several high-impact agriculture projects such as TKPM (Permanent Food Production Parks), HIP-ZIA (High Impact Project-Aquaculture Industrial Zone), Agro-Politian and contract farming has been launched. Export for this industry has been recorded at almost more than 10 million US dollars in 2010. Based on the data gathered from the various countries, it has been shown that agriculture is the main factor in terms of strengthening economic development. According to [19], use of computers with Internet access is directly related to the educational level of the operator, off-farm business income, the presence of a spouse and the regional location of the farm, and this research is also supported by [20].

6.1. Benefits of Technology

According to [21], the fact that ICT usage, including website surfing, is helping the agricultural sector cannot be disputed. Website surfing enables agro-based entrepreneurs to seek related information, products and services. According to [22], websites provide farmers with the facilities to communicate with other farmers, extension officers and agencies across long distances. In addition, websites are the most popular online services for farmers, and are cheaper than telephone usage. Farmers are able to access information through ICT at any time, and this enables them to create networks with development agencies and other farmers, and eventually increase their chances to double their agricultural productivity [23], and according to [24],

A study conducted by [25] which focused on rice farmers' adoption of technology in the Mekong Delta was chosen as the backbone of this study discussion as the Mekong Delta is a very well-known and successful paddy area development in the region and it is a hope that similar success can be adopted in other areas in the region. Truong, T. N. C. [25], shows that there are some technologies that benefit both farmers and the industry. Technologies such as Integrated Pest Management (IPM), "three reductions-three gains", row seeding, harvesting by machine and rice dryers have been proven to increase paddy yields. The IPM strategy offers some advantages, such as input cost reduction (savings arising from reduced seed and pesticide use) and environmental protection. On the other hand, row seeding technology provides advantages relating to saving seeds, easing the crop handling process, and avoiding pest attacks; the technology is also easy to use.

6.2. Major Crops in Malaysia

Farming or product enhancement is carried out in Malaysia. Customarily, flat enhancement or the development of an expanding number of harvests rather than one or two noteworthy yields is the practice. Oil palm, elastic, cocoa and rice have been and keep on being the significant harvests from the private and open areas. Additionally, different yields, such as coconut, tropical soil grown foods, vegetables, blossoms, yearly products and so on are grown. [26].

6.3. Involvement of Ministries of Agriculture in Malaysia

Millions have been utilized to generate and facilitate researchers and companies to enhance the scientific knowledge and innovation for the betterment of the agriculture industries. The policy is also focusing on the method to increase productivity and competitiveness, deepen linkages with all sectors, conduct ventures into frontier areas and conserve and utilize natural resources on a sustainable basis. Some of the efforts being implemented are:

- The involvement of Ministries like MOSTI, MOA, Agro bank and also privatized bodies like Malaysian Biotech Corp has become important as loan and grant providers for agriculture research and development.
- MARDI has an advantage from the allocation for its research and development program as well as for Advanced Reproductive Biotechnology (ARB) Project, a spearhead for the Enhancement of Commercial Production of Quality Beef Cattle and Goats in the nation. The impact would be the total transformation in the general agriculture industry and specifically in livestock industry. Science funds and Techno funds have been awarded for the noble purpose [28].

The Malaysian Agricultural Research and Development In-

stitute (Mardi) has presented another horticultural engineering project called Vertical Farming Technology to avoid soil disintegration and compound filtering. "This innovation can lessen water contamination and harm to the earth and the general population. The point of interest of this innovation is that the products can be planted in high thickness and it is most suitable for ambitious people owning little plots of ground. "The greenhouse structure is suitable for hill slopes without having to cut the land surface. The construction method and design can reduce damage to the soil as well as erosion," he said. Dr Sharif likewise said the innovation utilized shoddy composite materials and the expense of making one set was just Rm27. [27]

7. Discussion and Results

The world population is projected to reach 9 billion by 2050. Therefore, managing agricultural production systems on a sustainable basis is one of the most critical challenges for the future of humanity. Technological advancements must be used to provide farmers with tools and resources to make farming more sustainable. Based on our findings, we relate the situation in Taiwan, South Korea, Israel, Thailand and Malaysia. These countries are playing a vital role in the agriculture based economy. Agricultural GDP comprises the returns to land, labor and capital used in agriculture. It constitutes a good indicator of farm income trends assuming farmers own most of the land and capital, and supply most of the labor used in the sector. We analyze that Biotechnology application is one of the best means to accelerate the development of modern agriculture.

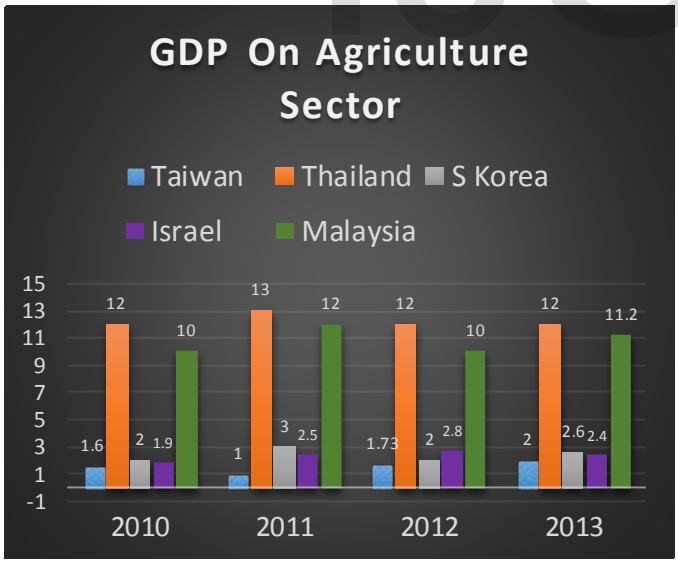

Fig 1: Illustrates countries gross domestic product in agriculture sector.

This chart shows analysis between countries gross domestic product in the agricultural sector is high in Thailand and Malaysia. Based on our findings Israel is using more technology than other countries, but its GDP is lower than Thailand and Malaysia. This paper provides information about Agra-tech in various countries while our finding shows Malaysia and Thailand are boosting agriculture, but they are using less technology than Israel. We found that climate change also plays a vital role in agriculture sector and Israel is facing problems in the land throughout; absence of water assets don't support cultivating. Just 20% of the area is commonly arable. Agriculture in Malaysia makes up twelve percent of the nation's GDP because the climate is good and the humidity in the air helps to boost agriculture but technology usage is less. On the other hand Thailand and Malaysia have the same amount of coastline but Thailand is using technology which is why it is higher than Malaysia. Moreover Taiwan and South Korea mainly focus on exporting and the industry sector due to the good natural resources and land is arable for agriculture. Taiwan is a relatively Small Island but they are using technology to boost agriculture. 58.8% of the area is covered in only forest and climate in Taiwan is tropical. Taiwan's total agricultural land is less than 3 million hectares: over 800,000 hectares of agricultural land is flat with advantageous natural conditions which are considered suitable for farming.

8. Conclusion

To summarize, Malaysia is playing a significant role in agriculture but due to the lack of technology it suffers problems in economy from agriculture. Malaysia imports rice from Thailand, India and some other countries. Malaysia has instituted the Malaysia 2020 plan to improve the agriculture from the traditional to the modernized forms of agriculture. Thailand and Malaysia are both countries with coast line but due to the usage of modernization and higher technology agriculture in Thailand is boost. Moreover, we found Israel is using higher technology in agriculture from other countries because of some land and climate difficulties agriculture cannot be increased,, but it shares in annual GDP of countries. Based on our findings we summarize even if land of the countries is arable or not technology is playing a crucial role to boost agriculture economy in these countries.

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