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BEYOND HIGHER AGRICULTURAL EDUCATION IN THE ASEAN
REGION: FROM ACADEMIC ISOLATION TO THE OUTREACH OF
RURAL DWELLERS

By

麗雅

Silvia Medina

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指導教授: 周祝瑛

Advisor: Chuing Prudence Chou, PhD.

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“For us humans, then, eating is never a ‘purely biological’ activity... the foods eaten have stories associated with the pasts of those who eat them; the techniques employed to find, process, prepare, serve and consume the foods are all culturally variable, with histories of their own. Nor is the food simply eaten; its consumption is always conditioned by meaning. These meanings are symbolic...they also have histories”.

(Mintz, 1996)

Abstract

The Association of South-East Asian Nations, although heterogeneous, is a community created in order to cultivate common goals that will strengthen the region to face a world that is getting more and more competitive by the day, and to improve its own capacities to reach a high economic, social and political development. Agriculture, is a vital part of the ASEAN economy, and is likely to remain so for the time being. That is why a change of higher agricultural education will play a critical role in the socio-economic development and stability of ASEAN. The researcher is particularly interested in enquiring if the changes that are taking place within the field of agriculture match the academic approaches of higher agricultural education. In doing so, a secondary approach has been utilized by examining existing agricultural policies, laws and agreements in the region, in combination of some existing programs within higher education institutions. In addition, an expert case study has been conducted to show case an in depth and practical analysis for this study. The study finds out that the current paradigm shift of higher agricultural education within ASEAN is not taking a uniform route, as it must spread to regional level, in order to reach development sustainability, economic growth and farmer empowerment.

Keywords: higher agricultural education, ASEAN, Agriculture knowledge system reform

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List of acronyms

ADB: Asian Development Bank

ASCC: ASEAN Socio-Cultural Community

AoA: Agreement on Agriculture

ASEAN: Association of South- East Asia Nations

CGIAR: Consultative Group on International Agricultural Research

HAI: Higher Agricultural Institutes

HAE: Higher Agricultural Education

HEI: Higher Education Institutes

IRRI: International Rice Research Institute

NRM: Natural Resources Management

OECD: Organization for Economic Cooperation and Development

R&D: Research and Development

TNC's: Trans-National Companies

UNESCO: United Nations Educational, Scientific and Cultural Organization

WTO: World Trade Organization

WWII: World War II

Chapter 1: Introduction

Background

The Association of South-East Asia Nations is a regional organization of countries with ten members: Brunei, Myanmar, Singapore, Cambodia, Indonesia, Laos, Malaysia, the Philippines, Thailand and Vietnam. Although heterogeneous, this community was created in order to cultivate common goals that will strengthen the region to face a world that is getting more and more competitive by the day, and to improve its own capacities to reach a high economic, social and political development (ASEAN, 2009).

In the recent past years, growth in the ASEAN region has been stable at high levels. For instance, for the period between 1984 and 2007, the average of growth for nine of the countries has been 5.93%, whilst the average growth for most members of the Organization for Economic Cooperation and Development (OECD), was only 2.77% (Siddique, 2011). Between 2011 and 2015, the OECD predicts an average growth of 6.1% taking into account the positive performance of six countries such as: Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam (OECD, 2010).

Still, the Association of South-East Asia Nations ASEAN remains largely an agrarian region with 40-70% of its labor force engaged in agriculture with many of its regions still under-developed in aspects of infrastructure, services (health care and education), science and technology (ASEAN, 2009). In fact, while the percentage of rural Asians who are poor has decreased substantially during the last decades, more than one third of rural population still lives in extreme poverty (Asian Development

Bank, 2011).

Agriculture is therefore a vital part of the ASEAN economy, and is likely to remain so for the time being. Its ongoing viability however depends on having a well-qualified workforce at all levels of the agricultural cycle. It is no doubt that agricultural knowledge systems play a central role in this development because it increases economic opportunities for farmers, food security for the general population and contributes generously to environmental sustainability (ASEAN, 2009). However, for many years, the conventional approach to agriculture contributed to a negative image and created the perception that a career in agriculture is not attractive. This is now changing because even commercial agricultural sectors have an entrusted interest in promoting careers in the field in order to address the constraint of low work force (Patley, Quarter 2008), and at the same time drives a new path enabling an agriculture responding to a sustainable development.

From this perspective, the researcher relies on the definition established by the United Nations Educational, Scientific and Cultural Organization (UNESCO) for “sustainable agriculture”:

[A]n integrated system of plant and animal production practices having site-specific application that will over the long-term:

- Satisfy human food and fiber needs.
- Enhance environmental quality and the natural resource base upon which the agricultural economy depends.
- Make the most efficient use of non-renewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls.
- Sustain the economic viability of farm operations.
- Enhance the quality of life for farmers and society as a whole.

Source: Farm Bill 1990 (Title XVI, Subtitle A, Sec. 1603) (UNESCO, 2010)

The world community is finally recognizing the meaning of the emerging bio-economy for world food and energy security, and how this development in our agricultural system can be achieved more sustainably. It is not an exaggeration to observe that the world's stability depends on reliable supplies and stable prices for food and bio-energy, on the preservation of natural resources strengthening all economic activities, and on a radical change of the current model of way of life contributing to rural development, in the long term (Board on Agriculture and Natural Resources, 2009).

On the search of a new path for improvement, the Asian Development Bank notes that there are three important goals- growth, poverty reduction and environmental sustainability that are now part of government policies and strategies in the region (ADB, 2000). In the specific case of the ASEAN, the ASEAN Socio-Cultural Community (ASCC) aims to focus on the following commitments: “(a) Human Development; (b) Social Welfare and Protection; (c) Social Justice and Rights; (d) Ensuring Environmental Sustainability (e) Building the ASEAN Identity; and (f) Narrowing the Development Gap” (ASEAN, 2009, p. 15). Therefore, this research will focus on two of the goals of ASCC, which are ‘human development through education’ and ‘ensuring environmental sustainability’. Moreover, in addition to multilateral commitments such as the Millennium Development Goals, there is also an ASEAN contribution to the implementation of the UN Decade on Education for Sustainable Development 2005-2014. ASEAN promotes “sustainable development through environmental education and public participation” it has a strategic objective of “establishing with the rhythm and harmony of nature, with citizens who are environmentally literate, imbued with the environmental ethic, and willing and

capable to ensure the sustainable development of the region through environmental education” (ASEAN, 2009, p. 17)

Therefore, it is essential to link human resources capacity building and environment sustainability, which also impacts food security, food safety, the general fight against poverty, and integrate the review and improvement of traditional agriculture methods, research on new technologies and building human resource capacity through formal or non-formal education (Villareal, 2002).

First, as established Deborah Eade in 1997, human resource as a form of capital is not new, but it has only recently been incorporated into the stream of economic and development thought. She further emphasizes that the main component of overall development efforts must be capacity building, particularly investments in human capital (Eade, 1997). In line with this paper, this refers to the building of capacities of people who actually depend on, as well as drive the agriculture sector.

Secondly, living through a world of globalization, agricultural crisis and other failures nowadays, are considered as not problems of an individual country, rather these are considered as regional- globalized problems. The role of agricultural universities and institutes is therefore very important and goes beyond solving the problems faced by the people engaged in agricultural activities. Suitable and necessary modifications in the course curriculum, research programming and extension activities related to agricultural education should be made to address these globalized problems (Chakrabati, 2010).

Furthermore, as basic education, higher education is also important in order to specialize. As Hoffman once mentioned:

[T]here are few countries in the world that can afford the establishment and maintenance of specialized educational and research centers covering the entire range of disciplines directly and indirectly concerned with agricultural and rural development. Poorer countries and those with varied ecological conditions have to depend to a large extent on opportunities for specializing training abroad (IRRI, 1985, p. 5)

For example, the first of the Consultative Group on International Agricultural Research (CGIAR) center was the International Rice Research Institute (IRRI) in the Philippines. The goal of the IRRI is to improve the well being of present and future generations of rice farmers and consumers, particularly those with low incomes, by generating and disseminating rice-related knowledge and technology. It is important to remind that Member states of the Association of Southeast Asian Nations (ASEAN) play a major role in the global rice market. Over the next decade, the ASEAN region is projected to account for 53% of net exports, 14% of net imports, 29% of harvested area, 25% of total production, and 22% of total rice consumption (Wailes & Chavez, 2012). Rice is the major food staple in ASEAN countries and thus plays a significant role in the food security concerns of the region. Moreover, with an expected increase in population in the next 20 years, rice production must be increased to 690 million tons (Van Nguyen, 2008). IRRI's contributions to the development and implementation of hybrid rice, a new rice plant type, perennial upland rice, sharing of rice genetic resources, training farmers to save seed, and many

other activities will go a long way in reaching the goal of having sufficient rice in Asia for the future (Whigham, 2003).

Additionally, on the continent, the contribution the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) and other institutions in fostering postgraduate and special training programs open to students from various countries has been outstanding, and the trend to broaden the institutional base by making use of first-class facilities in a large range of universities and colleges in the region is to be encouraged (IRRI, 1985). Specifically, the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA), an intergovernmental organization under the Southeast Asian Ministers of Education Organization (SEAMEO), has been supporting the development of capabilities of institutions for sustainable and inclusive agriculture and rural development in Southeast Agricultural education and can be said is at the crossroads in the world and in Asia (Patley, Quarter 2008). Even though, SEARCA is not a formal higher-education institution, it plays the role of advisor of different universities' agriculture programs in the region and contributes through trainings and providing extension programs to professionals in order to spread an up-to-date knowledge in tone with the current needs of Society.

Research motivation

The motivation of this study is based upon several reasons as it is intended to work on the linkage between higher- education, agriculture and global issues. First, the recent farmer's protests movement in Colombia was the starting point of selecting this research topic within others. Colombia, a developing country like many others in

Southeast Asia, has its farmers as some of the most vulnerable members of society for decades. This group of people is paying the consequences for the country's fast-changing economy. In Colombia, sixty percent of rural people live in extreme poverty and are now directly affected by seventeen free- trade agreements signed with foreign countries or regions. For instance, the most controversial are being the ones signed with the European Union (EU) and most recently with the United- States (US). The EU and the US, with capabilities such as extension techniques, technological advancement and production performance, possess almost unrivaled agricultural sectors. These free trade arrangements are making it almost impossible to compete with cheaper imports from these developed regions erected as global specialists on agriculture (Joseph, 2013).

Secondly, the researcher is interested in analyzing the different notions of “development”, with one focused on production performance following neoliberal policies; and the other, related with social development (fairness and wellness for rural sector) from the sustainable agricultural perspective. Farmer's movements in Colombia are related with international issues, as agriculture is directly affected by the current neoliberal policy agenda, which includes the reduction of trade barriers and deregulate national economies, resulting to a more complex and globalized agro-food system, and promoting the involvement of transnational corporations in the sector, competing with middle-small land farmers in the global sphere (Tonts & Siddique, 2011). Moreover, despite certain different heritages and cultures, Latin American and South-East Asian agrarian structures have lot of similarities, like the basic objective of peasants in these countries is: survival. Here the farmer cultivates a small piece of land which is either his own, rented from land- lord or money- lender,

to meet his and his family's minimal needs (Economics Concepts, 2012). Again, in these countries farmers get nominal and sub-standard wages by working as tenants. Such peasants can hardly aspire for profits, which depend upon climatic conditions or market conditions.

Opposite to Europe and US farmers, who are totally integrated in the agriculture production-supply chain and having high earnings through extensive agriculture, the farmers in South- East Asian countries and most of the countries in Latin America are born in debt, grow in debt and die in debt. This is the most common and natural destiny of the farmers. These poor tillers depend in most cases, upon animal and human power, rather than tools and machinery. They use excrement rather than chemical fertilizers. They are bound to use the traditional seeds and crops rather than experimental cultivations. Here the farmers do not have any insurance laws, unemployment allowances or social security measures. In Latin America, in South-East Asia and Africa, agrarian structures are not only part of production system but also a basic feature of the entire economic social and political organization of rural life (Economics Concepts, 2012). That is why this research, even if focused on ASEAN region, would also inspire and contribute to Latin- American development improvements in this important field.

Finally, the field of agriculture in higher- education is as well connected with the former position of the researcher in the second biggest public university of Colombia- Universidad de Antioquia, at the International Affairs Office. There, the researcher had the opportunity to participate in the initiation of a PhD program in Agro-ecology in partnership with the Latin-American Scientific Society of Agro-

ecology (SOCLA) and the University of Berkeley in California, USA. This was a pioneer program on sustainable agriculture in the Latin-American region, with an interdisciplinary curriculum and four departments of the university contributing to it with scholars from different disciplines. It was a real challenge within the university as it was created against all the strict structures separating disciplines, and firm opposition from some of the scholars within the Agricultural Sciences Department itself. The students were also from different professional backgrounds and some of them received scholarships by SOCLA. SOCLA was born out of the “growing awareness of a group of professionals involved in research, education and extension about the need to design a new agriculture that enhances the environment, preserves local structures and associated biodiversity, promotes food sovereignty and the multiple functions of small farm agriculture” (Altieri, 2008, p. 2)

Research questions

The project objectives aim to answer the following questions

- 1) Are current agriculture higher-education institutions in ASEAN region preparing professionals responding to the current problems?
- 2) What are the current changes in agriculture pressuring higher- education institutions to adapt in order to prepare appropriated professionals?
- 3) How should agricultural education be improved to meet the current and future challenges so as to be responsive to individual and national needs? What are the changes agriculture’s higher education institutes have to make? What type of agricultural education does ASEAN need to meet current and future challenges?
- 4) How well equipped are present today HAE entities to shape programs for the professional and technical cadres that will lead the process of rural development?

Methodology

This study will have a qualitative approach based on a primary research and literature from different sources from the academia, national policies, and those provided by ASEAN, and other multilateral development institutions. First, institutional resources of international organizations working in the field of higher-education and sustainable agriculture will be analyzed. Information will be driven from academic resources such as articles or books concerning this topic. Secondly, an interview to Prof. Attachai from Chiang Mai University in Thailand will provide information concerning how higher agricultural education (HAE) institutions in the region are adapting to new challenges of the field of agriculture from a conventional agriculture to a sustainable one.

Therefore, the paper is organized as follows: chapter 1 consists of the introduction, justification and objectives. Chapter 2 is a detailed literature review of the transversal topics of the issue, and will have three sections: section one will concern a changing agriculture with an out-of-date higher agricultural education and section two will concern a required adjustment in higher agricultural education. Finally, Section three will concern a prominent role and linkage with the society: beyond university. Chapter 3 presents the data and the findings following an interview made to a professional and current Professor of agriculture in Chiang Mai University, relating it to the documental analysis of the Farmer's School in the region of ASEAN. Chapter 4 consists of research findings and recommendation on the subject. In chapter 5, the conclusion is presented and the research's implications and limitations will also be discussed.

Operational definition

It is necessary to clarify some terms that will be relevant to this research. First, Cambridge Dictionary defines “higher education” as: “education at a college or university where subjects are studied at an advanced level”. In this study, higher education would be used to distinguish the scope from basic and middle education, as the study’s main interest is in the advanced level of studies. Additionally, higher-education would be related to formal education, which is defined by Sarah E. Eaton in her Wordpress.com website as:

[o]rganized, guided by a formal curriculum, leads to a formally recognized credential such as a high school completion diploma or a degree, and is often guided and recognized by government at some level (Eaton, 2013, p. 1).

Secondly, “agricultural education” is a term possessing a variety of meanings. According to scholar Craig Anderson (1984), most of the times, agricultural education is synonymous to agricultural extension. This can include programs for training extension workers or, most commonly, field programs directed at small farmers. However, as many definitions can be given to this concept, the researcher will go through it based on the definition: “it consists of any and all organized programs whose purpose is education or training in agricultural subjects” (Anderson, 1984, p. 34)

Finally, the term of “sustainable agriculture” will be used in this analysis as the opposite of “extension agriculture”. The latter is having the goal of increasing profits without environmental and social concern. “Sustainable agriculture refers to the ability of farms to produce nutritious food without damaging soils, ecosystems or

human capital, and that reduces (or eliminates) reliance on external inputs such as chemical fertilizers and pesticides” (Curtis, 2012, p. 2). To UNESCO, sustainable agriculture means to “sustain the economic viability of farm operations, enhance the quality of life for farmers and society as a whole.” (UNESCO, 2010, p. 1)

Research limitations

Firstly, this project has a short time period to meet the researcher’s graduate work schedule. Secondly, this study is focused on ASEAN region, however as mentioned at the beginning, this geographical area is very diverse, and this research will not be able to capture all the constant changes in agriculture higher-education in all the member countries. This is because there are countries at different stages of development and so is agricultural higher- education in each of them. Thirdly, the researcher intended to make a field- trip to gather primary data from The Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) in the Philippines. Unfortunately, this was not possible, due to the lack of interest of the host organization. Consequently, the researcher had to create an alternative approach within a short-time span, to be able to analyze and prove the assumptions issued from the theory. Therefore, focus on a regional higher-education center, was replaced by a national higher-education institution. In other words, the researcher replaced SEARCA with Chiang Mai University (Thailand) as a case for this research.

Chapter 2- Literature review

The purpose of this paper is to discuss the role of higher agricultural education as one component to face current international needs in this field and also contributing to countries' development. In ASEAN countries, most of them are located within the so-called “developing” phase. Still, the complexity of agriculture requires an addition of inputs¹, all of which are important to support the agricultural development process (Anderson, 1984).

Section 1: A changing agriculture with an out-of-date higher agricultural education

Agriculture nowadays

The condition of agriculture is closely related with the choices of economic development in our present-day societies. The perceptions of the relative roles of agriculture and industry in economic development were strongly influenced by a number of theoretical and empirical contributions to the economic analysis of development. The existence of "surplus labor" in agriculture was well accepted during the 1950s. The presumed existence of surplus labor in agriculture meant that labor could be attracted from agriculture to industry without loss of agricultural production. The resulting profits in the capitalist industrial sector could be reinvested to increase capital and promote growth (Ayoola, 1996)

¹ Inputs are of two types: institutional support inputs are policies, procedures, and mechanisms, which are conducive to agricultural growth (extension education, adequate market channels, favorable pricing mechanisms). Production-oriented inputs are resources and practices contributing to production enhancement (water management).

1. Global policies shaping agriculture field (the World Trade Organization Agreement of Agriculture)

The emergence of the neoliberal policy agenda in the 80's and the following moves to reduce trade barriers and deregulate national economies are claimed to have facilitated the expansion of a more complex, globalized agro-food system (Tonts & Siddique, 2011). Both Mendras (1970) and Weis (2007) emphasized Eric Hobsbawm's argument that the "death of the peasantry was the most dramatic and far reaching social change" of the twentieth century, cutting "us off forever from the world of the past", as the "peasantry, which had formed the majority of the human race throughout recorded history, had been redundant by agricultural revolution" (Weis, 2007, p. 124). However, panoramas were different in industrialized countries and less-industrialized countries. While in the first ones, neoliberal policy reforms aimed to increase the farmer's level of exposure to competitive global forces for stimulating innovation to compete, and protective measures were gradually reduced; in the second ones, less-industrialized, neoliberal policy reforms were applied in responding to international aid and credit agencies. Policy emphasis was made on transforming a locally oriented agriculture to one that was "more globalized oriented" stimulating exports and attracting foreign capital (Tonts & Siddique, 2011).

Even if it is difficult to debate the intentions at the beginning, on the pathway the distortions caused by rich-country surpluses and subsidies, the declining earnings of farmers within commodity chains, the instabilities associated with rising imports dependence, the tropical commodities disaster and the bilateral policy restructuring of structural adjustment are affecting most developing countries today. Therefore, as

author Van der Ploeg mentions, the “imperial food regime” making reference to an unbalanced relationship of power (Van der Ploeg, 2008), emerged through “The WTO’s Agreement on Agriculture (AoA)” which came into effect in 1995 and constitutes a major landmark in the development of the global food economy as it sets in place, for the first time, multilateral rules restricting the sovereignty of governments to establish “a fair and market-oriented agricultural trading system”, even though the WTO website’s slogan proudly announces : “fairer markets for farmers” (Weis, 2007).

For example, a study conducted by the Food and Agriculture Organization (FAO) on the impact of AoA in fourteen developing countries in 2001 revealed that AoA’s liberalization policy considerably increased food importation in these countries, with many registering sudden increases in the value of their food imports in the years following their accession to the AoA. The food import bill more than doubled in countries that are significant food producers and exporters such as Brazil and India, and imports of food increased of about 50-100% in countries like Bangladesh, Pakistan and Thailand. In fact, many agricultural exporting countries in the 70’s and 80’s like the Philippines, have been transformed into net food importers, and increased then their trade deficit, as a result of import liberalization under AoA (Glipo, 2003).

If those countries are affected by a state’s capacity and local government’s constrain (Weis, 2007), then, who benefits from such agreement? This agreement in fact broadens the legal rights of agro- TNC’s. The WTO is essentially a set of shared rules about the degree to which governments can protect and subsidize domestic

economic activity, a judiciary to enforce commitments and a forum to periodically draw countries together to rework these rules. The rules are negotiated by sector and hence contain different specific commitments, but they are guided by common principles that essentially fall under one absolute objective: to launch and increase the rights of transnational capital in trade and investment by reducing some “unnecessary barriers to trade” and “discriminatory” trade practices of governments (Weis, 2007, p. 129) Even if at the beginning, developing countries were protected by the “special and differential treatment” (SDT), giving them particular rights in trade agreements, it was progressively attenuated in the WTO. These policies follow the “trickle-down theory”, one of the bases of the ‘conventional’ model of development: considering that a concentration of capital in private entrepreneurs, can spread the growth to all the levels of society, and show the perspective of WTO regarding “economic development” promotion through a liberalization of agriculture. This implies a big shift on how trade is understood, as it is no more related with something that needs to be managed to serve as developmental role, but has a view where liberalizing trade is in itself portrayed as development policy (Weis, 2007). Additionally, today despite the export- biased interests that developing countries bring to the negotiating table, the North-South power imbalance is such, that little attention is given to the developing countries claims, for example, the selective protectionism of rich countries against processed and semi-processed goods.

All of these raise some questions about the effects of globalization in the agriculture’s transformation. In industrialized countries, farmers are directly implied with corporate actors, these farmers have profoundly invested in technological advancements to improve the levels of productivity and efficiency (Tonts & Siddique,

2011) (Mendras, 1970). While in less-industrialized countries, there was a shift from consumption of local products to export oriented crops involving a reduction of agriculture diversity, and a focus of intensification and improved productivity depending on fertilizers, new seed varieties and innovative land management in order to “improve farmer’s income” (Tonts & Siddique, 2011, p. 103). However, these agriculture instruments depend on a production chain lead by transnational corporations, and under complex contracting arrangements, most of the time challenging the goal of *improving farmer’s income*.

The common point on these countries is that, there was an increase of involvement by transnational companies in the sector and the emergence of a vertically organized network: called a “food- supply chain” for production and consumption. On the bottom of this chain, are those in charge of producing food while distribution and sale are found in the hands of transnational corporations (TNC’s) and supermarkets (Marsden, Banks, & Bristow, 2000). Furthermore, these authors emphasize that, this are the current complex and rationally organized industrial chains within which, primary producers capture a decreasing proportion of total added value in food production.

For the ASEAN region, Siddique (2011) reports that, the ten member’s countries can be organized as follows: Singapore has an insignificant agricultural sector, data on indicators for Brunei and Myanmar are mainly missing. So the rest of the 7 members (henceforth “ASEAN 7”) are new industrializing countries, which tend to have an initial comparative advantage in the agricultural industry because of availability of low- skilled and cheap labor force. From 1984 to 2007 period, the

absolute share of agriculture to GDP increased by approximately 50% for the seven countries. While agriculture is progressing as an industry, it may be looked upon lowly or neglected by governments, as it is perceived to have less importance in terms of contribution to growth and wealth than the industrial sector. Thus, many governments chose to develop other industries instead of agricultural sector. Yet, some recent studies show that for developing countries in ASEAN, the agricultural sector development plays an important role, as it could increase both income and wealth for its people who may be less skilled, when compared to citizens in industrialized countries (Siddique, 2011).

In the case of countries as Vietnam and Thailand having most of their population working in the agriculture sector, it is encouraged to improve it with government efforts, so that they can improve the living standards of the majority of their people (Siddique, 2011). In comparison to the global level, in “ASEAN 7”, productivity in the sector has increased. This effect could be due to the dispersion of the Green Revolution across these countries and the increase of technology improvements. As a result of technology transfer, many of them have benefited from importing Green Revolution technologies² (Siddique, 2011). For instance the Cambodian Agricultural Research Institute has instituted reforms, central to Cambodia’s Green Revolution, using the technologies developed by the International Rice Research Institute (IRRI) in the Philippines (Siddique, 2011). This included the usage of high proportions of fertilizers, new rice varieties and enhanced irrigation. Hence Cambodia’s partnership with the Philippines portrays increased globalization through cooperation at a national

² Green Revolution: the application of this general package of enhanced seeds for high-input monocultures to the developing world was known as the “Green Revolution”

level for the rapid diffusion of technology in the agriculture sector. The result was an increase in productivity and lowering of the prices in general.

On the one hand, while this translates to a lower GDP contribution, it does not reduce its importance, as lower prices contribute to worse poverty -levels in developing countries. On the other hand, an important productivity increase can also be seen in agricultural exports from the seven countries. Through Green Revolution, these countries could increase productivity, export production and sustain themselves without relying too much on imports, which means more effective earnings to the country. In this panorama, the immediate benefits aim to accrue the small- holders access to capital, adopt new technologies and reduce prices, but in a large period of time, there are several negative consequences resulting in an unequal power relationship with unfair benefit's distribution (Shaw, 2011).

2. Agricultural production– distribution: dysfunction in ASEAN region

This section seeks to provide an overview and introduction to relevant issues related with agriculture in the region, analyzing the spatial complexity and different experiences of globalization within the ASEAN. Globalization is defined from an economic point of view, referring to its association with “internationalization”, defined here as the “ large and growing flows of trade and capital investment between countries” (Hirst&Thompson, 1996, p. 198) and “liberalization” or the removal of government tax-restrictions on trade to create an open world economy, through the AoA, already discussed. Jointly with technological advances, particularly in relation

to biotechnology, the globalization of agriculture describes processes of integration, linking suppliers and consumers within the agricultural sector around the world.

This creation of a global food production system facilitated by major transnational corporations, can be broadly characterized as the production of high-value goods such as fruit and horticultural produce for export from developing countries, with a return flow of low value products such as grains from the developed world, weakening like this the local food production and benefiting capital-intensive production systems (Robinson, 2004). Whilst this may describe the prevailing trends in developed countries during the ‘productivist’ phase of agriculture since the Second World War, factors including the reduction in protectionist state support and the rise of agro-environmental policies, along with burgeoning interest in organic produce and consumer safety, have led to the recognition of a ‘post-productivist’ phase in agriculture since the 1990s (Wilson, 2001). This concept of distinct ‘food regimes’ can serve as a framework to describe changing trends in food production, but has been criticized for its overly structuralist approach, failing to recognize the complexity of factors affecting agricultural policy at the individual nation level and the processes by which individual farmers adapt to new economic constraints and opportunities.

The introduction of private land ownership combined with commercial and plantation farming for external markets, transformed South East Asian rural livelihoods about a century ago. Today, similar forces of change with equally critical consequences are recognized. The presence of large-scale and vertically integrated food production or agribusiness has relegated the individual small-farmer at the end of the agro-food chain (Shaw, 2011). Shaw added that this kind of commodity chains extends beyond national borders and most of the time provides powerful transnational corporations

with access to national land, cheap labor under the support of governments in developing countries (Shaw, 2011). Agribusiness has the power to squeeze smaller growers through a gradual reduction of farm-gate prices, whilst at the same time raising product standards and overpricing its own corporate services. From a broad point of view, this corporate shift has moved from former ‘superficial’ trade-based linkages between countries, towards ‘deep’ international production-based intra-firm linkages (Goodman, 1997). During the 80’s and 90’s, leading European and US-registered TNC’s operating in Asia, such as Carrefour, Royal Ahold and Wal-Mart, accelerated their planned investments in the region, often increasing their shares in existing joint-ventures or buying out their Asian partners. Other such as Delhaize, Auchan and Tesco established their presence within the region’s rapidly modernizing system of agro-food processing and distribution (Shaw, 2011). The onset of the Asian economic crisis 1997-98 found such companies well placed to take advantage of major asset depreciation and operational cost reductions, resulting in a near doubling of their operational presence in Asia between 1995 and 2001. In addition, Asia registered highly vertically integrated, agro-food giants such as Charoen Pokphand Group (CP Group) of Thailand, the San Miguel conglomerate of the Philippines and the Salim Group of Indonesia are also major players within Southeast Asia, supplying both domestic and overseas markets.

From the discussion above, the conclusion that there is an uncertain future for agriculture within Southeast Asia is easily reached. Within the wider context, the challenges of continued population growth, increasing and evolving consumer demand for food supplies, and the prospect of severe and ongoing changes in world climates makes the position of agriculture even more critical, rather than presently

localized famines to be avoided. An analysis of the processes and impacts of an increasingly globalized economy with regard to agriculture, development and environment in the ASEAN is inevitably complicated by numerous factors, including the varied history, politics, societies and cultures of the region's states, their often unique environmental conditions and the vastly differing socio-economic circumstances which affect populations and ethnic minorities within each country (Callow & Clifton, 2011).

However, the study of the environmental impacts of globalization in the context of agriculture is relevant, and is the focus of the next section.

3. Changing Agricultural Technology Beside an Increasing Rural Environmental Awareness

An increasingly globalized agriculture sector as mentioned in the last section, is hugely affecting developing countries in ASEAN region, currently in the transition between subsistence- oriented agriculture to a commercially- oriented one (Callow & Clifton, 2011). Even though the consequences of land degradation effects of commercial agriculture: increase rates of forest clearance, resulting in a cycle of soil degradation, erosion and increasingly marginal agriculture environments, differ from one country to the other, the challenges are evident among the members of the ASEAN. Also, excessive use of irrigation water in areas of poor drainage induces to soil salinity, to the detriment of both crop productivity and, eventually, the suitability of the land for continued agriculture. Environmental degradation is caused by an interaction between human maneuvering and natural processes, but it is often the thoughtless result of human attempts to modify and control the environment, which

enhances the scale of degradation beyond the “normal” degree, associated with natural events. Moreover, the negative impacts on biodiversity are exacerbated by the use of herbicides and pesticides: technological answers allowing capital-driven practices to dominate ecosystem in expansive industrial farming.

Additionally, another key piece in the revolutionary transformation of agriculture is the most elemental input: the seed (Weis, 2007) which is why Shiva (1993) relates the commodification of the seed to a “final enclosure of the intellectual commons” (Shiva, 1993). From the mid-twentieth century, the development of enhanced seeds brought major yield gain, depending on heavy use of fertilizer, chemicals and irrigation. Modern seed enhancement at first resembled the greatest innovation of millennia to achieve the traditional objectives pursued by farmers: improvements in yields and nutrient content, hardiness, appearance and flavor, with yield being the primary focus (Weis, 2007). But as large TNC’s came to dominate the process of seed development and patenting, innovations including changing the genetic foundation of seeds were increasingly pursued with the aim of more completely transforming in commodity the seed- which by its biological nature, should no be commoditized- and induce dependence upon other inputs (Shiva, 1993).

Consequently, this innovation is one of the main causes of soil degradation and poses a significant risk to agricultural production. Moreover, development for agriculture has impacted greatly in the ASEAN natural ecology and biodiversity of the region: large tracts of agricultural monoculture have replaced vast areas of native forests and woodlands (Callow & Clifton, 2011). Different types of development and, in particular the transition from traditional subsistence to globalized agricultural systems have altered both the rate and style of agricultural development, and

consequently the impact in biodiversity. During the latter part of the 20th Century, the area of agriculture has increased significantly in developing countries as the Philippines and Thailand. Whilst this suggest that rates of forest clearing have slowed somewhat in recent years, large areas of forest in countries such as Vietnam, Indonesia and Malaysia are rapidly cleared for agriculture (Callow & Clifton, 2011). A particularly good example of the changes of agricultural systems and the place of globalized agricultural systems in these developing countries is the oil palm plantation industry. While originally an African plant, the oil palm was introduced to Malaysia in the early 20th Century. The potential for the high-yielding and valuable crop to provide a stable and high income source for people drove the development of the oil-palm industry in Malaysia and Indonesia, which together accounted for 80 per cent of the world's oil palm output in 2005. The production of oil- palm occurs on a variety of farms, from small-scale, grower-owned and controlled plantations, through to larger-scale corporatized operations. The oil- palm returns large quantities of oil compared to other plants, with application to the fast food, cosmetics and biofuels industries. Because of the application of the products, and their importance in particular for the food industry, large global corporations are now buyers of oil palm products and control the market for the product. Additionally, the world demand for oils and biofuels in particular, have driven up the global price and consequently the Indonesian and Malaysian government have strongly encouraged the growth of this crop to respond to the global demand (Callow & Clifton, 2011). The significance of oil palm in Malaysia and Indonesia between 1990 and 2005 involved primary or secondary forests and the loss of their associated biodiversity. Forest clearance for

agriculture in the tropics has direct and severe impacts on biodiversity with many native species in danger of extinction (Callow & Clifton, 2011).

Finally, at the other end of the management continuum are the moves by some producers away from large-scale, homogenized globalized systems towards organic farming and “fair trade” markets. The organic sector therefore offers considerable potential to ameliorate some of the adverse environmental effects associated with ‘mainstream’ agriculture, whilst its own expansion has arisen through opportunities presented by a globalized system of agricultural production and consumption. Specifically, the benefits to biodiversity are associated with a reduction in chemical pesticides and inorganic fertilizers, sympathetic management of hedgerows and other non-cropped habitats, and the preservation of habitat heterogeneity through the encouragement of mixed farming practices, all of which have been shown to enhance populations of native plants, invertebrates, mammals and birds on organic farms in comparison to conventional farming (Hole, 2005).

Some policy responses to the threats outlined above can be shown in examples from outside the Asia- Pacific, which offer potential for adoption within the region. Within the European Union, policies on agro-environment whereby individual farmers can access funds designed to support environmentally sensitive modes of production have been progressively introduced and refined since the mid- 1980s. This reflects a changing emphasis from farmers as food producers to ‘custodians’ of the land, implying greater responsibility on the individual to maintain biodiversity (Callow & Clifton, 2011). Although, these serious environmental problems, there are ASEAN has not yet issued regional policies to manage them.

However, potential solutions for adjusting to this critical issue within the region can be also identified through examining higher agricultural education nowadays' challenges and required improvements. This will be the focus of the next section of this research.

Issues on higher agricultural education

1. Less professionals in this area

Although, the agriculture field has currently many challenges, the declining enrollment in agriculture degree programs is a worldwide phenomenon (Zamora, 2014). For example in the Philippines, from 2005- 2006, enrollment in SUCs (State University and Colleges) offering agriculture degree programs declined by almost 6,000 in 2008-2009 (Zamora, 2014). The decline in enrollment in agriculture is due to different reasons among which are: first, preconceptions of agriculture as a profession. Agriculture is then not an attractive profession. In fact even the children of those in the agriculture sector select other professions, even though many agriculture graduates can easily find employment, as agriculture related jobs still account to 19% of the job market in the Philippines (Zamora, 2014), still their initial salaries were not as competitive as other jobs. In ASEAN region, the wage of agricultural sector still lower than that of the industrial and even the services sectors. This gives the permanent impression among the youth that agriculture is a low paying job. As mentioned by Klank, cited in Zamora (2014), there is a need to push for an income parity policy of Science and Technology (DOST), and private companies, among others, as it was implemented in Japan, Europe, New Zealand, Canada, and the United States (Zamora, 2014).

Secondly, rapid urbanization of agricultural areas is also a cause of student's avoidance of agricultural careers. The conversion of agricultural land to non-agricultural uses, and the rising of employment opportunities in urban areas, resulted in rural migration with more youth heading to the cities for high paying employment. This has also shifted the interest of the youth to other more lucrative degree programs perceived to be required by modernizing societies such as computer science, engineering, and medicine. Moreover, this has also contributed to overload the job market.

Finally, in some ASEAN countries, the devolution of agricultural services to the local government units (LGUs) has also influenced this declining as in the Philippines. The implementation of the autonomy of local governments practically removed a large employment opportunity for agriculture graduates as agricultural technicians and extension workers in the municipalities and provinces. In many cases, agricultural technicians who have degrees in education, commerce or criminology are appointed as such because of political patronage. This further reduced the market for agriculture graduates. Even those who would like to pursue research, declined due to government under investments in agriculture Research Development and Education. On the other hand, the number of masters and doctorate students continued to increase mainly due to current highly competitive job markets requiring advanced degrees for higher positions and the man-power development program of Department of Science and Technology to meet the country's Science and Technology requirements (Zamora, 2014).

2. The current mismatch between the needs of the field and agriculture professionals in the region

The Asian Development Bank (ADB) in 2011 reports that the “employability of graduates” depends on the “external efficiency of higher education”, which refers to the fact that students are being prepared for fields in which there is clear demand, and when the skills and knowledge of graduates support well the workplace needs of employers. Low external efficiency is indicated by rising unemployment rates and by employer dissatisfaction with newly hired graduates. For ADB, it is clear that both issues—fields of study and relevance of preparation—need attention across Asia. A paradox of higher education particularly evident across Asia is that, even at a time when countries are producing a record number of graduates, employers complain of a shortage of qualified workers, and graduate unemployment continues to rise. There is then, a growing concern among employers that graduates’ knowledge and skills are not consistently aligned with labor market needs. Indeed, whether countries have too few or too many graduates, depends on what kind of graduates is being produced.

According to a study by OECD on this specific region in 2009, there is generally a mismatch between skills acquisition and occupational needs in the region. Skills development of the labor force requires an supporting environment so that the provision of skills is balanced with the provision of opportunities to use these skills. Therefore, skills development should be integrated with employment promotion for both the formal and informal sector (OECD, 2009). Furthermore, poverty reduction in the region still challenges development. The target groups for poverty reduction/fighting against exclusion are: women, unemployed youth, people with disabilities, ethnic minorities, and people living in rural communities and depending

on agriculture. In the latest one, skills development activities refer to life-skills based on education; capacity- building in social sectors such as health; and training of disadvantaged groups in primary sectors such as agriculture, and entrepreneurship. Issues of integration of disadvantaged groups in the labor market through the provision of basic skills and training are a key priority for combating poverty but are insufficiently dealt with by educational institutions where resources have a greater focus on the most modern and formal sectors (OECD, 2009).

Therefore, the agricultural sector in the region was surpassed by the services sector, as in Indonesia, where it was the nation's largest employer in 2008. In 2010, agriculture sector decreased, but still employs 38.3% of Indonesia's labor force and still contributes 15.3% of GDP (OECD, 2009). Given the abundance of Indonesia's natural environment and the large external demand for various agricultural products, agriculture will continue to play an important role in the Indonesian economy even as the latter transitions to a more modern footing. In the case of this country, the government has identified two key concerns in the development of agriculture: food security and cash crops. As more workers leave this sector to find better-paying careers in industry and services, most agricultural production will continue to be dominated by unskilled, semi-skilled, or vocational labor. However, if government plans to intensify agriculture success, there will be a new, growing demand for skilled agricultural managers and a new class of specialist engineers, who can bring in innovations to improve efficiency and sustainability (The Economist, 2012)

Finally, even if ASEAN has already established some policies in order to control environmental degradation and promote a transition to a sustainable agriculture in the

region by emphasizing the role of education in this process (ASEAN Socio-cultural Blueprint (2009)), the general panorama still very weak. At the same time, as established by the Asian Development Bank (2011), while the contribution of higher education to economic development is generally accepted, the mechanisms through which those benefits are achieved are less well understood. The next section focuses on what are the specific means higher education can use to contribute to national development in agriculture (Asian Development Bank, 2011)

Section 2: A required adjustment in higher agricultural education

In this way, HEIs operate as incubators of innovation and creative thinking needed for an economically competitive society. As economic and social development increasingly depends on innovation, universities have a potentially important role in driving innovation and development. They can do so both through their role in carrying out research and development, and by training workers for the knowledge economy. However, as higher education systems across Asia look forward, they face critical challenges (Asian Development Bank, 2011) one of which will be studied in this research: Increasing the relevance of curriculum and instruction at a time when rapid change in labor market needs, is still a burden not addressed. This is related with the “ external efficiency” of HEI, mentioned earlier, and concerns the alignment and relevance of the education that students receive, to their subsequent work or study options.

Teaching an inter-disciplinary systems approach to agricultural and rural

development applies to training students at every level of agricultural education (secondary, intermediate and higher levels). A systems approach to agricultural education requires a team-teaching methodology using case studies, problem-solving approaches and practical, field-based exercises. The goals of education in agricultural systems can be achieved through different approaches, analyzed as follows.

A holistic view of agricultural education (interdisciplinary)

It is not simple to keep up with the evolving nature of the agricultural enterprise. It requires a much more dynamic approach to the curriculum and teaching than most colleges of agriculture have developed. Moreover, many of the colleges have not fully recognized that changes have also taken place (Board on Agriculture and Natural Resources, 2009) in their own educational institutions. The pool of potential candidates for the agricultural disciplines is no longer a relatively homogenous group of young people raised on the countryside. That number is diminishing, while the student population has increasingly diversely grown in terms of age, background, and culture.

The varied and broader student body is generally unaware of the multi-dimensional and challenging nature of the agricultural disciplines and the fascinating career opportunities open to them, despite evidence that many students have an interest in a variety of scientific, business, economic, environmental, and social issues related to food and agriculture. The problem is that educators have not helped students to make the connection between those issues and a degree in agriculture. Therefore, the study of agriculture, before restraint as a discipline and limited in many ways, is actually interlaced with other disciplines in the natural and social sciences, and with

agriculture professionals using similar approaches and systems as those in other fields. Agriculture now so comprehensively combines basic and applied aspects of the traditional STEM disciplines of Science, Technology, Engineering, and Mathematics that the acronym might rightly expand to become STEAM, joining agriculture with the other fundamental disciplines (Van Crowder, 1998). Van Crowder further emphasizes that throughout training, students need not only specialized courses which deal in-depth with specific technical subject-matter, but courses that help them think holistically, or in terms of integrated agricultural systems, so that they can understand the multi-dimensional nature of sustainable agricultural production (Van Crowder, 1998). This requires an inter-disciplinary systems approach to agricultural education. Training in the systems approach is essential for agricultural education because of the increasing complexity of agriculture, food and rural systems, and the problems of environmental protection and management, women farmers and household issues and the needs of small-scale farmers. Even conventional subject-matter teaching should take place within an inter-disciplinary framework of agricultural systems rather than as isolated subjects. Increasingly, education in agriculture needs to take the form of courses in agro-forestry, agro-ecology, and the socio-economics of integrated production systems. Moreover, local food production systems need to be studied in terms of the complexities of the larger economic and social context. A system's approach to agricultural education makes it possible to understand, evaluate and integrate the many disparate elements of production systems, into a unified study of how those systems work, and how they affect the biological, economic and social environments (Van Crowder, 1998).

However, there is not only a need to provide an interdisciplinary perspective into

which a wide range of different disciplinary components can be integrated but it is also essential to provide experiential, field-based learning activities.

An adoption of participatory approach methods

It is well known that many faculty members do not have experience in the broader food and agricultural enterprise (besides traditional production) that would enable them to give students a “real-world” interpretation of the ideas, concepts, and skill-sets they need to develop to be effective in the diverse agricultural workplace. Though, few academic institutions support faculty and students in gaining real-world experience as part of learning; neither are there sufficient resources for faculty to experiment with how to refashion the way they teach, or provide experiences that reflect the challenges that food and agriculture graduates will need in their future careers. Furthermore, the holistic view of the discipline, previously described, also makes reference to the need of students to be provided an overview of the agricultural and rural systems of their own specific countries.

Higher agricultural education must then be locally relevant, addressing local as well as global issues (Lashgarara, 2006). Additionally, HEI are witnessing major structural changes in the content and style of instructional delivery, from hierarchical, test-based, instructor-driven, passive-knowledge-transfer types of instruction to present-day-learner centered (Suvedi, 2009). In educational systems, therefore, the fundamental requirement for sustainable agriculture is for universities to evolve into “communities of participatory learners” (Rolling, 1997). The “Participatory approach” is a bottom up approach that utilizes the problem-solving or experimental learning methods, such as farmer-to-farmer exchanges, skills and

knowledge are gained by participating farmers. Participants are able to decide for themselves whether they pursue new production, management and or marketing practices. This is also related with the conception of Suleiman and Hall in 2004, about the changes needed, as one main idea is to change the focus on “improving farm productivity” to ‘improving farm and not farm income’.

An emphasis in extension education

Extension, as a non-formal educational input, can make important contributions to sustainable agricultural production and rural development. There is a critical need for well-trained extension workers in many developing countries. However, the extension methodology portion of the curricula and programs of study of many agricultural education institutions is inadequate and in need of review and revision. In many developing countries, small-scale family farms constitute the majority of the total number of agricultural holdings. A major challenge for extension is helping them advance in sustainable ways from subsistence agriculture to commercial agriculture. Agricultural education institutions, especially those at the intermediate technical level, have a key role in training extension workers so that they are oriented towards addressing the improvement of small-farmer agriculture, and in particular improving their food crop production and marketing capabilities. Nevertheless, there is a tendency among many institutions to place emphasis primarily on providing students with scientific and technical knowledge in the various agricultural disciplines. Consequently, too little attention is paid to providing the types of courses that are important for preparing students as agricultural extension workers, who can effectively communicate with diverse rural groups, as well as

support these groups in a process of collaborative problem-solving. In revising curricula for extension training, it is important to recognize that there has been a shift in thinking and in practice from expert-driven, technology-transfer extension approaches to collaborative learning approaches with participant groups.

Students studying extension need to see and work with applied technology on farms. Curricula should place less emphasis on theoretical models and more on practical application of research. Learning should emphasize inductive reasoning skills so that students can interpret problems and devise solutions. Furthermore, curricular revisions for training extension workers should take into account a number of rural development issues as the decline in public sector employment, the deterioration of the natural environment, population education, and the changes in the roles and responsibilities of women farmers (Van Crowder, 1998).

In many cases, the lack of relevance of extension education to the rural world is a problem for students graduating from agricultural institutions. The gap between the methods and content taught and the rural socio-cultural context causes difficulties for graduates in establishing good communication with rural people. As noted above, this is especially serious for those with an urban background who go into extension work. That is why, the participative- approach previously analyzed, shows the required complementarity between academic staff and students with members of the farming community, including the NGOs and agri-business firms to efficiently provide production services to farmers. The development of mechanisms and channels of communication, which facilitate the understanding and utilization of local agricultural knowledge, is of vital importance for the training of extension workers.

Periodic curriculum review and revision, with a focus on local development problems and solutions, are needed in order to keep the knowledge- base relevant and to ensure that there is not a "cultural gap" between extension workers and the ultimate beneficiaries: farmers and rural dwellers (Van Crowder, 1998).

The implications for extension education are clear: an improved effort needs to be made to better relate local knowledge systems to scientific farming methods. Teachers and students need to use applied, field-based practices when learning how to improve agricultural production. Therefore, Crowder believes that participatory teaching and learning strategies need then to be incorporated into all aspects of educational delivery (Van Crowder, 1998)

Section 3: A prominent role and linkage with the society: beyond university

A “community-based” higher agricultural education

Academic programs in agriculture tend to exist in isolation, with few connections between institutions or even in the same geographic area. Community and tribal colleges are increasingly producing large numbers of students and especially high percentages of members of traditionally underrepresented groups for four-year colleges, but there are currently few pathways for those students to pursue agricultural careers. Articulation agreements and transfer partnerships should be developed between two- and four-year institutions when appropriate—but connections should not be limited to those arrangements. Institutions may wish to develop multi- institution programs, share resources, allow easy exchange of faculty

and students, and generally work together to support and promote initiatives of common interest, regardless of an institution's official status as a land-grant institution (Board on Agriculture and Natural Resources, 2009)

To ensure to meet the needs of the agricultural industry and a more diverse customer population, teachers must think globally but be empowered locally. To best meet the needs of students, agriculture programs must become more "community-based." Teachers can empower themselves locally by bringing a wide range of community stakeholders together to determine the type of agricultural education program the community needs and wants for their students. Together the community and teacher decide what should be taught. This ensures community and school support for the agricultural education program and allows the teacher to focus on how to teach using materials such as the "Local Program Success Guide and the Agriculture Teacher's Manual", a well-known and model manual prepared and published in 1998 by the Future Farmers of America Organization (and oddly enough, sponsored by one of the biggest TNC's: Monsanto).

That is the reason why formal and non-formal higher agricultural education, have to work together. Ultimately, students need to be provided with more active learning roles within a farming systems perspective. During an undergraduate education, students should master a variety of transferable skills in addition to content knowledge. Employers value those skills at least as much as book learning. Providing students the opportunity to engage in a variety of experiences, such as those listed above helps to make content knowledge come alive while strengthening the so-called soft skills, important in the workplace. The ability to connect undergraduate education

and extension work is an opportunity unique to colleges of agriculture. It does not only expands the sphere of institutional and statewide outreach but provides a chance for undergraduate students to give back to their communities and become spokespeople for agriculture (Board on Agriculture and Natural Resources, 2009).

Students interested in pursuing agricultural careers must have access to instructions and materials about the global agricultural industry that continues to evolve. Teachers must stay abreast of agriculture worldwide and show how world issues relate to the student's home community, state, and country (Vaughn, 1999).

A scientific knowledge complemented by indigenous knowledge

Moreover, the problem with agricultural science and higher education is that there is a poor understanding of the nature of “indigenous” and rural people’s knowledge. For many people, what rural people know is assumed to be primitive and “unscientific”. An alternative view is that local knowledge is a valuable and underused resource, which can be studied, collected and incorporated into development activities (Rolling, 1997). Indigenous knowledge, as scientific knowledge must be integrated in higher education disciplines (King, 2004) as it enriches the widespread knowledge acquired from laboratories and classrooms. UNESCO currently promotes indigenous knowledge as complementary to the former one. In a compelling description by Nakashima, Pratt and Bridgewater 2000 p.12 (UNESCO, 2010) the authors wrote:

[S]ophisticated knowledge of the natural world is not confined to science. Human societies all across the globe have developed rich sets of experiences and explanations relating to the environments they live in. These ‘other knowledge

systems’ are today often referred to as traditional ecological knowledge or indigenous or local knowledge. They encompass the sophisticated arrays of information, understandings and interpretations that guide human societies around the globe in their innumerable interactions with the natural milieu: in agriculture and animal husbandry; hunting, fishing and gathering; struggles against disease and injury; naming and explanation of natural phenomena; and strategies to cope with fluctuating environments.

Accordingly, in another argument by Nakashima (2010), traditional knowledge and “unscientific” behaviors, among other practices can be useful for the attainment of international development ambitions such as the Millenium Development Goals. Understanding indigenous knowledge systems is then crucial to informing agricultural education professionals about the accumulated wisdom of individuals and families involved directly in cultivating the soil and in animal husbandry (Sulaiman, 2004). Indeed, the combination of these two types of information (scientific and indigenous knowledge) can form a much broader and holistic view of the subject matter of agricultural discipline.

A broader partnership environment

Finally, there is the possibility of developing partnerships with different stakeholders. There is a need to increase the permeability between academia and the private and public sector employers of graduates from agriculture programs. The agricultural industry has little understanding of how colleges and universities are organized, while the academia also has little understanding of industry and public

sector needs. Although a number of universities have long-standing partnerships with particular industries or corporations, there are many opportunities to expand such collaborations to a wider array of private and public institutions, companies, and sectors. To reduce the “silo effect,” the committee endorses steps such as those listed above that enhance communication and coordination between academe and employers of agricultural graduates at different levels.

Each of the elements in the recommendation is meant to provide a mutually beneficial relationship. For example, students benefit from such activities as internships and cooperative education programs to gain real-world work experiences, and industry gains an opportunity to recruit and attract talented young people and hire workers who already have experience working in the company. Closer connections between the academia and industry may result in other opportunities, such as participation of the colleges in solving industrial challenges. Such interactions may serve as case studies in under-graduate classes and provide opportunities for undergraduate research (Board on Agriculture and Natural Resources, 2009).

To check the efficiency of higher agricultural education, this paper will analyze how institutions specialized in agriculture in ASEAN, as Chiang Mai University in Thailand, are facing the current challenges of agriculture. Also, the training program of Farmer’s Field School will be related to this case study.

Chapter 3: Research methodology

Research methods for data collection

This section examines how higher agricultural universities, traditionally focused on crop and animal production, can redirect their mission towards the broader aim of supporting rural development through a sustainable agriculture. Although, most of the work on rural development is still concentrated in faculties of agriculture, increasingly, addressing the needs of the rural people and space also concerns other departments and universities (Atchoarena & Gasperini, 2003). Based on this reason, researcher conducted an interview with Professor Attachai who is currently Associate Professor in the Department of Crop Science and Natural Resources, Faculty of Agriculture, Chiang Mai University in Thailand. Based on his academic qualification (PhD in Agronomy & Soil Science), research and teaching areas, Professor Attachai qualifies for participation in this research work. He currently teaches in a graduate level, which includes:

- Basic of Agricultural Systems
- Climate and Edaphic Resources of Agricultural Systems
- Decision Support Systems for Agricultural Resource Management

At the undergraduate Level, Prof. Attachai is in charge of the Soil-Crop Systems Modeling course.

This interview, answered on June 4th, 2014, shows the main issues in changing from a conventional agriculture to a sustainable one, and which are the implications in the academic environment on the path to adapt to this field changes. His university

has a long-standing experience in research on sustainable agriculture and integrated watershed management, and has developed an extensive network of partner universities and research organizations in the region. Also, the University has the national research mandate for the region of northern Thailand. Furthermore, the university was assigned to become one of the leading universities in research and teaching on agriculture and natural resource management in mountainous regions of Southeast Asia.

Interview's questions justification

This interview was based on the main topics treated in the literature review of this thesis in order to check the coincidence or non- coincidence of the theory and the reality in higher education institutes of the ASEAN area, based on the Chiang-Mai University's example. It is important to remind that Thailand has, after Vietnam and India, the highest production of rice in the world. The eleven questions developed were divided in three groups related with research questions, and the main topics chosen and analyzed in the Literature review. The first five questions of the interview follow the second research question: What are the changes in agriculture from the local context of Thailand's production? And how is it adjusting to sustainable agriculture practices?

- 1- *How is the rice production in Thailand organized?*
- 2- *I realized that rice production is still done with the highest use of pesticides, selected seeds and machinery. How is it possible to transform this important production, into sustainable agriculture?*

- 3- *Is sustainable agriculture comparable to intensive agriculture in levels of production/hectare? What are the specific cases of sugar cane and rice in Thailand?*
- 4- ***We understand intensive agriculture** as the use of the same seed to cultivate extensive lands and consequently the use of agrochemicals, such as herbicides, insecticides, fungicides and antibiotics, while **sustainable agriculture** suggests a diversity of crops in the same land, so the use of pesticides and other chemicals can be avoided or decrease. Following these definitions, these two kinds of agriculture show more opposition than compatibility. Some agriculture products are more risky to cultivate than others in terms of profitability. The less risky ones are nowadays dominated by multinationals (palm oil in Malaysia for example) and the most risky ones are left to small-farmers (survival products). Do you think this can also be the case in sustainable agriculture?*
- 5- *Is it correct to say that there are products adapted to industrial production and others suitable for an organic or sustainable agriculture?*

Questions 6 and 7 correspond to the role of universities in this changing agriculture in Thailand: Are Universities relevant with the current agricultural needs? Are they preparing suitable professionals?

- 6- *If sustainable agriculture can replace industrial agriculture, this implies an increase of labor in this field, or not?*
- 7- *If yes, is sustainable agriculture an opportunity or an issue in the global trend of critical unemployment? Is it a possibility to increase employment while producing healthier food?*

In the same guideline of the role of universities, Question 8, 9 and 10 correspond to the recommendations of adjustments to HAE and improvements needed to face agriculture field changes in Thailand.

8- *How to redirect Higher Education in order to prepare suitable professionals to lead and adapt to this changing conditions in agriculture?*

9- *Chiang Mai University participated in the Project on Upland Agriculture Curriculum Development of a Network of Universities and Related Education Institutes in Cambodia, Laos PDR, Thailand and Vietnam, organized from September 2005 – December 2008. Since then, can you explain which are the main changes agriculture curriculum made in Chiang Mai University, in order to prepare professionals to lead the changing of paradigm, for a sustainable agriculture?*

10- *Which are the means for universities to train professors, already molded in the paradigm of industrial agriculture, to fit their course to sustainable agriculture requirements?*

Finally, the 11th question corresponds to the assumption concerning going beyond university and integrate different stakeholders of the society in a new concept of learning- teaching.

11- *Could it be assumed that there is presently more interaction between the Agriculture faculty and small-farmers in the region? Are theoretical courses, complemented with field experience providing a broader view of the issues to future agriculture experts? Is there any specific example in Chiang Mai University?*

Interview transcription with Dr Attachai Jintrawet, CMU-Thailand

1- How is the rice production in Thailand organized?

(It is organized in) numerous small farms, medium, large family farms and also (in) a number of large companies lands. (No numbers)

2- I realized that rice production is still done with the highest use of pesticides, selected seeds and machinery. How is it possible to transform this important production, into sustainable agriculture?

Farmers in several locations in Thailand are transforming into 'organic rice farming systems', a form of sustainable agriculture (SA). Again, I don't have a number with me now. However, to convert all 12 million hectares of paddy land in Thailand into SA (sustainable agriculture) will take time and a shift of society's paradigm to understand the benefits, both short and long-terms, of practicing SA (sustainable agriculture) in rice farming.

3- Is sustainable agriculture comparable to intensive agriculture in levels of production/hectare? What are the specific cases of sugar cane and rice in Thailand?

Obviously SA (sustainable agriculture) is not compatible and comparable practice with IA (intensive agriculture) on any given farms. Based on your definition, I would say that SA (sustainable agriculture) farmers develop their skills and practices based on a very different thinking, objectives, and situations than IA (intensive agriculture) farmers and vice versa. Several cases of SA (sustainable agriculture) and IA (intensive agriculture) in rice, sugarcane, cassava and other crops in Thailand and, may be, in other ASEAN member states. In Thailand, SA (sustainable agriculture) farmers may be called 'organic farming'.

- 4- **We understand intensive agriculture** as the use of the same seed to cultivate extensive lands and consequently the use of agrochemicals, such as herbicides, insecticides, fungicides and antibiotics, while **sustainable agriculture** suggests a diversity of crops in the same land, so the use of pesticides and other chemicals can be avoided or decrease. Following these definitions, these two kinds of agriculture show more opposition than compatibility. Some agriculture products are more risky to cultivate than others in terms of profitability. The less risky ones are nowadays dominated by multinationals (palm oil in Malaysia for example) and the most risky ones are left to small-farmers (survival products). Do you think this can also be the case in sustainable agriculture?

(It can be) comparable. It really depends on your definition of both terms. So, Intensive agriculture (IA) can be a SA (sustainable agriculture).

- 5- Is it correct to say that there are products adapted to industrial production and others suitable for an organic or sustainable agriculture?

(It) could be.

- 6- If sustainable agriculture can replace industrial agriculture, this implies an increase of labor in this field, or not?

Yes. But, the labor must (be) trained, (have) a shift of paradigm, and learn how to cultivate their own foods from SA (sustainable agriculture).

- 7- If yes, is sustainable agriculture an opportunity or an issue in the global trend of critical unemployment? Is it a possibility to increase employment while producing healthier food?

Yes, it is possible to promote SA (sustainable agriculture) as a 'job creation' mechanism in the 21st Century and beyond. Also, the food industry must participate in the globalized and cross-generations and cross-cultural efforts.

8- How to redirect Higher Education in order to prepare suitable professionals to lead and adapt to this changing conditions in agriculture?

We have to make sure that new SA (sustainable agriculture) curriculum in schools and University implement and gear next generations of producers and consumer(s), towards the shift to SA (sustainable agriculture), maybe by 2040 or 2050.

9- Chiang Mai University participated in the Project on Upland Agriculture Curriculum Development of a Network of Universities and Related Education Institutes in Cambodia, Laos PDR, Thailand and Vietnam, organized from September 2005 – December 2008. Since then, can you explain which are the main changes agriculture curriculum made in Chiang Mai University, in order to prepare professionals to lead the changing of paradigm, for a sustainable agriculture?

The SAIWAM (Sustainable Agriculture and Integrated Watershed Management) program is a M.Sc. program, jointly organized by CMU (Chiang Mai University) and UoH (University of Hohenheim) . I've noticed (that) major changes are;

1. *On the curriculum: Modular courses, focusing on bio-physical and socio-economic processes of agricultural systems especially the highland and the upland of mainland Southeast Asia, home of more than 50 ethnic minorities.*
2. *On the (teaching staff): Both German and Thai side have to jointly teach a module.*
3. *On the students: (there was) a shift to (an) active and self-directed learner.*
4. *On the funding: (it is) not a well-funded program from Government and Private*

sectors for scholarships and research activities.

- 10- Which are the means for universities to train professors, already molded in the paradigm of industrial agriculture, to fit their course to sustainable agriculture requirements?

Based on experiences in SAIWAM (Sustainable Agriculture and Integrated Watershed Management) program, Professors have to learn to shift to SA (Sustainable agriculture). The Universities provide administrative support (or some might called it 'burden').

- 11- Could it be assumed that presently there is more interaction between the Agriculture faculty and small-farmers in the region? Are theoretical courses, complemented with field experience providing a broader view of the issues to future agriculture experts? Is there any specific example in Chiang Mai University?

Yes. In the Northern Thailand, small farmers are the dominant farm type and at CMU (Chiang Mai University) we put a lot of efforts to work with small farms. Bio-physical laws and principles are global and can be used to support the shift to SA (sustainable agriculture) of future expert's generations

Research findings

This interview although short, is concise and brings a lot of information concerning the research topic of this thesis. First of all, it is important to contextualize why Thailand is so important in ASEAN region and why Higher agricultural education plays a major role.

Thailand's context

The food-production cluster is significant to the Thai economy. Agricultural production and related industries contribute to over 50 per cent of the nation's economy. Since the nation's first commencement on social and economic development plan (1958- 1964), agricultural development has continued to rank in the top priority of national policy. Although economic growth has been increasingly significant in the industrial sector over the recent decade, agriculture remains an important part of the national economy and the Thai culture (Traimongkolkul & Tanpichai, 2005). As a result of the Green- Revolution, Asian developing countries in particular have experienced a rapid expansion of agricultural exports since the mid-1970s (OECD, 2010). However, given the challenging milieu of tomorrow, agriculture and agricultural education in Thailand still needs to be redefined and revolutionized. Although, some previous initiatives, the challenge for higher agricultural education still.

From 1997 economic crisis in Thailand, the King Bhumibhol issued a renowned philosophy of “sufficient economy” calling for the nation to seek alternative approaches to development with the goal of self-reliance, a balance of

social and economic sustainability. Policy-makers and academia welcomed this initiative for building a development agenda in agriculture with those foundations (Traimongkolkul & Tanpichai, 2005). As a consequence, the latest national plan for agricultural development (2002-2006) has thus shifted emphasis from development that relies solely on the mainstream agriculture to a more balanced “dualistic approach” of Thai agriculture. Under this renewed direction, there was competitive “export- oriented” agriculture on one side, and “sufficient agriculture” for small-scale farmers on the other (Ministry of Agriculture, 2002). Agricultural education should therefore be re- oriented to serve the future direction of Thai agriculture. At the beginning of 1999, Thailand has embarked on a holistic educational reform. To achieve the goal of this reform, policy research was needed in all areas of education to stimulate information required for strategic planning. Perceiving the significant role of agricultural education in fostering agricultural development, the Thailand Research Fund (TRF) initiated a nationwide study entitled “A Critical Review: Status and Prospects of Agricultural Education in Thailand.” Aiming for policy implications, the study examined holistically the system of agricultural education in Thailand (Traimongkolkul & Tanpichai, 2005).

However, agricultural issues were not solved since then, moreover the former Thai government was indifferent in regards to Thai education, which is a serious, major problem from which many other socioeconomic problems originate. If the government is incompetent to deal with this issue, it thus becomes a task that must be taken up by communities and individuals. The most evident fact to prove this are the recent political events in Thailand with the latest “Coup d’Etat” in May, 22nd, 2014, which are related with how Thai government decided to manage rice production. The

current regime of Thaksin Shinawatra built its political machine on the backs of Thailand's rice farmers – with the vast majority of its support being drawn from the populous rice growing regions in the north and northeast of Thailand. It has done so by offering “populist” policies that have collapsed in a turbulent of corruption, ineffectiveness, scandal, and financial crisis. In particular were rice subsidies. Farmers, who were promised above-market prices for their rice, have not been paid since October 2013, and have been facing decreasing prices since last summer (Hariraksapitak, 2014). The multinationals in Thailand selling outputs for agricultural production are also very important and have monopolized the field with the government help, reducing the gains for small-farm holders in Thailand and thus, contributing to the investment in Thailand of foreign multinationals for acquiring huge extensions of land and the use of pesticides and other outputs for maintaining high productivity.

After the May 22, the new military-led government has presented agricultural reforms based on sustainable, organic agriculture – an extraordinary and broad-minded departure from the unmanageable system of subsidies (Caralucci, 2014). The plan seeks to relieve as soon as possible, farmers cheated by the expelled regime's disastrous subsidy program. To replace the subsidies, General Prayuth intends to implement a version of self-sufficient, localized agriculture that replaces intensive agriculture with local and sustainable solutions. Former anti-regime protester, Buddha Issara, who helped lead six months of protests against the regime of Thaksin Shinawatra before the May 22nd coup, outlined a “New Way For Farmers”.

The points outlined in his plan include: investment in national infrastructure, including irrigation systems, education programs, as well as media channels to broadcast issues pertinent and useful to farmers. It also focuses on land reform and in particular, the enforcement of land renting schemes designed to prevent exploitation and debt, as well as heavier taxes for land left unused by wealthy speculators. There are also provisions for improving the quality of agricultural products – producing products that are healthier and of higher quality for consumers. The plan also calls the localization of agricultural processing, including warehouses, marketing centers, distribution and even fertilizer production to be done within villages to cut out intermediaries who have traditionally purchase produce from farmers for the cheapest price possible and sell it to consumers for the highest price possible, making themselves astoundingly wealthy at everyone else's expense (Caralucci, 2014).

The importance of changing paradigm to an organic agriculture comes in, while there is the need of decreasing costs, and then the role of higher agricultural education is critical. Both the production of fertilizers locally and the control of weeds and pests will be accomplished by training farmers through national programs focusing on organic methods. Already in Thailand there exists several examples of schools effectively implementing and training farmers in the use of organic agriculture such as the Khao Kwan Foundation and Ploen Khao Baan. It would be then necessary to expand their efforts and duplicate their methods across the country for implementing meaningful reforms. This framework is based on the Thai King's "self-sufficiency economy" previously mentioned and reflects similar efforts found throughout the world attempting to break the vicious circle of domination and exploitation that results from dependence on a globalized system dominated by

multinational corporate monopolies. The self-sufficiency economy centers on the principles that families should farm first to sustain themselves through organic polyculture – rather than the dangerous and dependency-inducing monoculture championed by big-agri-suppliers and big-retail distributors. Extra land and resources should then be used to produce a variety of crops to hedge against market fluctuations and natural disasters. The income should be used to sustainably expand a family's operation, including through investment in technology to improve efficiency, process crops for sale, and even diversify economic activity away from strictly agricultural pursuits. The King of Thailand maintains a network of projects throughout the country where demonstration fields and processing centers showcase the self-sufficiency economy and assist farmers in expanding their knowledge and economic prospects. With this apparently being the underpinning of upcoming reforms, these networks will most likely be expanded and made more accessible to the farmers who can benefit from them the most (Caralucci, 2014).

In this context, Chiang Mai University has an important national but also regional role in sustainable agriculture, as mentioned in its website: “As one of the major academic centers of the Greater Mekong Sub-region, CMU is in an excellent position to attract students from both South Asia and Southeast Asia and become a regional education hub for sustainable agriculture and integrated watershed management” (Chiang Mai University Website).

Comparison with the literature review assumptions

1. The transition to a sustainable agriculture depends on a “change of paradigm”

Firstly, the transition to a sustainable agriculture depends on a “change of paradigm” as mentioned by Prof. Attachai, to prove the benefits of it, but also to adjust to new practices. Prof. Attachai says this adjustment to sustainable agriculture, even though recognized as urgent in the literature previously analyzed, would “take time”. This is related to changing mentalities, which has always been a tough process for revolutionizing ideas, changing paradigms and assimilate new practices in all time’s societies. For him, this process would be culminating around “2040 or 2050” as mentioned in his answer to question 8.

2. There is not a solid idea of what “sustainable agriculture” really is

Secondly, Prof Attachai’s answers to the first five answers, concerning the challenges of conventional agriculture and sustainable agriculture, indicate that for now, there is not a solid idea of what “sustainable agriculture” is as there is not yet a unique and homogeneous definition of it. All along this work, following the documentary data, conventional agriculture is opposed to sustainable agriculture. However Prof. Attachai’s answers are not very concrete about the opposition of these ones, and to the fact that both kinds of agriculture can or cannot be adapted to the same kinds of products (questions 4 and 5). It can then be understood, that maybe they are complementary, and not opposed. Nevertheless, Prof. Attachai highlights the fact that industrial agriculture and sustainable agriculture imply each one a “*very different thinking, objectives and situations*” (answer to question 3). As mentioned, in the literature review, industrial agriculture monoculture relies on high productivity at

less cost for commercial purposes, while a sustainable one depends on diversity of crops, preserving natural resources and has a goal of improvement of social conditions for farmers, the most vulnerable population, while the expansion of industrial agricultural practices in Thailand.

3. It is possible to promote Sustainable Agriculture as a “job creation” mechanism

This interview confirms the predictions of Asian Development Bank (ref: “The current mismatch between field needs and agriculture professionals in the region” in this paper) that there is a potential niche of employment in this transition from conventional agriculture to sustainable agriculture. Prof. Attachai mentions it in its answer to question 6:

a. *“But, the labor must be trained, a shift of paradigm, and learn how to cultivate their own foods from SA”. In this way, not only higher agricultural education institutions must participate to promote this shift of paradigm but also the food-industry: “Yes, it is possible to promote SA as a ‘job creation’ mechanism in the 21st Century and beyond. Also, the food industry must participate in the globalized and cross-generations and cross-cultural efforts” (answer question 7), which confirms the assumption of going beyond Higher education and the need of public-private partnerships in order to reach sustainability goals in agriculture.*

4. There is crucial to implement new Sustainable Agriculture curricula

To the questions concerning what are the tools for Higher Agricultural education to support a sustainable agriculture, Prof. Attachai mentions the need of a Sustainable agriculture curriculum in Higher Education in order to prepare agricultural

professionals, but also mentions the importance of “educating” consumers: “*We have to make sure that new SA curriculum in schools and University are implemented and geared next generations of producers and consumer towards the shift to SA, may be by 2040 or 2050*” (answer question 8). In this paper, the researcher decided to focus on the agricultural producer’s (small-farmers) perspective and TNC’s, still the behavior of consumers is also crucial and complementary. This last one is not developed due to the lack of time to write this thesis, as it can be a vast and additional time-consuming topic to develop.

Finally, concerning the concrete changes in curricula made by Chiang Mai University (question 9), where the interviewee teaches, he provides the example of the program: Sustainable Agriculture and Integrated Watershed Management which is an international joint Degree Master Program lead by Chiang Mai University in Thailand and Universitat Hohenheim in Germany. Watersheds are of significant importance for the global ecosystem and are characterized by a high degree of ethnic, cultural and ecological diversity. However, high population growth, insecurity of resource rights, and extraction of natural resources by a variety of actors have increased the pressure on fragile watershed areas (Chiang Mai University Website). Political, economic and social marginalization of people living in these areas – often belonging to ethnic minority groups – has resulted in widespread poverty and food shortages. In order to stop the downward spiral of resource degradation (landscape instability, reduced biodiversity, rural poverty and food insecurity), integrated scientific analysis and new approaches to sustainable agriculture and integrated watershed management are needed, to identify sustainable land use practices, strengthen local institutions and knowledge systems, and increase the resilience of both mountain ecosystems and rural

livelihoods (Chiang Mai University Website).

That is the reason why the International Master Program has been developed, and it seeks to lay the foundation for such integrated approaches already in education and training. The curriculum follows the requirement of inter-disciplinarity and trans-disciplinarity, mentioned in the previous literature review as it integrates different disciplines to the study of the same topic: in Prof. Attachai words it is made following *“Modular courses, focusing on bio-physical and socio-economic processes of agricultural systems especially the highland and the upland of mainland Southeast Asia, home of more than 50 ethnic minorities”*. Checking in detail the curriculum of the program, there are new subjects taught as: “Development Policies and Economic Strategies” or “Ethnic, Cultural and Social Aspects of Watershed Development” integrating political with economic disciplines in the first case, and combining ethnology, sociology with biology and physic in the second case. ■

5. There is a shift from the traditional higher-education

Also, this program is the result of international academic cooperation between Higher agricultural Education institutions in order to avoid “research isolation” or “double-efforts”, and built an international academic network, contributing to solve common agricultural issues: *“Both German and Thai side have to jointly teach a module”*. This is related with the requirement of going beyond Higher Agricultural education, mentioned in Section 3 of chapter 2 in this paper. The shift showed by this program is also related with a participative approach and a teaching-learning process: *“A shift to active and self-directed learner”*. Although, the qualities of this program Prof. Attachai mentions the lack of funds for scholarships and research activities from

public and private entities. This shows that governments and private entities can initially support these programs, but deriving activities from it are not guaranteed. Consequently, this financial issue can block the progress to sustainable agricultural goals.

6. There is an important interaction between small-farmers and HEIs

Prof. Attachai answers the last question: *“Yes. In the Northern Thailand, small farmers are the dominant farm type and at CMU we put a lot of efforts to work with small farms. Bio-physical laws and principles are global and can be used to support the shift to SA of future generations of experts”*. The importance of these interactions between formal and outreach education is revealed by the Farmer-Field Schools (FFS). The Farmer Field School is a form of adult education, which evolved from the concept that farmers learn optimally from field observation and experimentation. It was developed to help farmers tailor their Integrated Pest Management (IPM) practices to diverse and dynamic ecological conditions (Pontius, 2002). IPM Farmer Field Schools were started in 1989 in Indonesia to reduce farmer reliance on pesticides in rice. Policy-makers and donors were impressed with the results and the program rapidly expanded. Follow-up training activities were added to enhance community-based activities and local program ownership. Eventually, IPM Farmer Field School programs for rice were carried out in twelve Asian countries and gradually branched out to vegetables, cotton and other crops. From the mid-nineties onwards, the experience generated in Asia was used to help initiate IPM Farmer Field School programs in other parts of the world. New commodities were added and local adaptation and institutionalization of these programs was encouraged. In regular

sessions from planting till harvest, groups of neighboring farmers observe and discuss dynamics of the crop's ecosystem. Simple experimentation helps farmers further improve their understanding of functional relationships (e.g. pests-natural enemy population dynamics and crop damage-yield relationships). In this cyclical learning process, farmers develop the expertise that enables them to make their own crop management decisions. Special group activities encourage learning from peers, and strengthen communicative skills and group building. The ultimate aim of the school is to improve farmer's decision-making abilities to cope with biotic (insect pests, weeds) and abiotic (water, soil, weather) stresses (Rola, S., & Olanday, 1998). In fact, this FFS is oriented towards providing agro-ecological education through participatory learning (Braun, 2000). Outcomes common to this approach are:

- Increased farmer's capacity for research, innovation and informed decision-making.
- Development of Farmer's capacity to define their own research agendas as part of the FFS follow-up activities.
- Stimulation of farmers to become facilitators of their own research and learning processes
- Increased responsiveness to farmer-clients' demands and needs by organizations in national research, extension and development systems

In line with this model of Farmer's Field School in the region, Chiang Mai University opened this year a Community Development and Civic Empowerment (CDCE) a three-month certificate course in development management and community development theory. With participants from NGOs, media groups, religious organizations, non-formal education institutes and civic empowerment organizations who focus on strengthening community participation in development and governance,

CDCE has been building for over six years the capacity of local agents for grassroots social transformation in Myanmar (Local Resource Center Myanmar, 2011). This short-term program for training Myanmar human-resources, was possible thanks to the funding of European Union and the knowledge and experience contribution of Chiang Mai University from Thailand, underlining the importance of international cooperation (ASEAN countries and Europe) and the different stake-holders' partnership (academia: Chiang Mai University, government authorities: EU and Myanmar community) to face nowadays complex agricultural problems.

Chapter 4: Research findings and discussion

Research findings

Are current agriculture higher-education institutions in ASEAN region preparing professionals responding to the current problems? Higher education institutions in the region are trying to acclimatize to the current challenges in agriculture field. This is the case of Chiang Mai University with the opening of a tailored new program in cooperation with an outstanding university from Germany. That is also the case of Farmer Field Schools (FFS) started in Indonesia. With the aim to extend education to farmers, largely left behind from all kinds of education, this program implements some strategies of learning by doing, directly in the field place. What are the current changes in agriculture pressuring higher- education institutions to adapt in order to prepare appropriated professionals? The current changes in agriculture pressuring higher-education institutions to adapt are food security

problems, climate change, soil pollution and commercial food chain, benefiting multinational companies to the detriment of small-farmers. The former ones, representing different roles: they are producers of food, distributors and providers of outputs, for improving the productivity of the land. How should agricultural education be improved to meet the current and future challenges so as to be responsive to individual and national needs? What are the changes agriculture's higher- education institutions have to make? The type of Higher-education needed in ASEAN region is related with trans- disciplinary and interdisciplinary programs, participative approaches, more praxis than theory and more interactions with all the society stakeholders to work together on the common issue of food safety. How well equipped are today HAE entities to shape programs for the professional and technical cadres that will lead the process of rural development? As prof. Attachai mentioned, the adjustment to this recent paradigm in agriculture can take time (possibly year 2040 or 2050) not only because the changes of the land can be very slow to transform a polluted soil, full of pesticides and other artificial outputs to a soil where natural outputs are used for the production of food. Also higher agricultural education institutes are challenged by this "call for change", usually petrifying social organizations and turning the process of change very slow. However, the researcher finds that from a closer study of the Sustainable Agriculture and Integrated Watershed Management curricula as a good starting-point and can be a model in ASEAN region. Furthermore, it can be called a program adapted to the paradigm shift in agriculture nowadays. First, because the different subjects taught combine different disciplines as anthropology or biology. This was not the case before as social sciences and natural sciences were always separated one from each other. Secondly, this program aims to

balance between “real-world” experiences and theory classes. That is why, during the two years, compulsory-modules and semi-elective modules are complemented by field excursions to follow the participatory approach of the program. Thirdly, the fact that is an international Joint-Program between two higher agricultural institutions support the need of broader partnerships in order to strength international cooperation to solve global issues. Finally, the suitability and relevancy of the program is underlined in the introduction flyer of the program:

[c]areer opportunities: With its interdisciplinary, team-oriented, participatory and intercultural approach, the study programme addresses a rapidly growing job market at the national and international level. Professionals with a profound expertise in key global issues, such as climate and land use change, resource conservation and high-value agricultural production, are in high demand. Jobs will be available in international research and development organizations working on sustainable agriculture, global environmental change, nature protection, and food security. National careers can be pursued, for instance, in land use planning, environmental impact assessment as well as teaching interdisciplinary approaches to land care and natural resource management (Hohenheim University, 2012, p. 1)

From these, there are two important discussion topics: first, higher agricultural education must change in the way it is not more limited to provide academic and research learning. Secondly, it has nowadays a broader scope role, contributing to national agricultural development, not only by preparing appropriate professionals but also by interacting with the different socio-economic and political stakeholders.

Discussion

Higher agricultural education is not limited to academic learning

Improving higher agricultural education in ASEAN implies an important question concerning whether the university should be primarily a center for academic learning or a developmental university. Coleman (1984) suggests that the developmental university aims at '...making the entire university learning experience more relevant to the indigenous culture and the practical problems of development. 'Research is applied to national problems and the professoriate participates in public formation, and the university serves society directly' (Coleman, 1984, p. 92). International organizations further contribute to this view by ascribing universities to a distinct role in combatting rural poverty. Hoffmann from FAO highlights: "Without a thorough knowledge on the rural poor, without a scientifically valid situation analysis, agricultural colleges and universities will not be able to effectively participate in the combat of rural poverty and to achieve an impact of some significance" (Hoffman, 1988, p. 3)

Therefore, the developmental role of university is then broadly related with rural development and the possibility of empowerment of rural population for poverty alleviation. The vast majority of poor people in developing countries live in rural areas and education is a key factor in helping to reduce the level of poverty. In this context, the relationship between higher agricultural education and rural development is becoming an important policy concern, particularly in countries where the revival of rural areas represents a critical challenge.

First, there is a need for the examination of agricultural development beyond

the traditional perception that agriculture is for food production only. Providing higher agricultural education to a broad public can also fight against current society inequalities, concerning urban/rural dualities and extensive /subsistence production. Over the past 40 years, world food production per capita has grown by 25% and annual cereal production up from 420 to 1176 million tones (Pretty & Morison, 2003). However, the Rural Poverty Report 2011, a comprehensive study presented by the International Fund for Agricultural Development, emphasize the fact that despite improvements over the past 10 years- having lifted more than 350 million rural people out of extreme poverty- global poverty remains a massive and predominantly rural phenomenon – with 70 per cent of the developing world's, 1.4 billion people extremely poor living in rural areas. These numbers show that rural development is then crucial to eradicate poverty issues. According to Robert Chambers:

[R]ural development is a strategy to enable a specific group of people, poor rural women and men, to gain for themselves, and their children more of what they want and need. It involves helping the poorest among those who seek a livelihood in the rural areas to demand and control more of the benefits of rural development (Chambers, 1983, p. 4)

Secondly, beyond its traditional role, higher agricultural education has an opportunity, in cooperation with other stakeholders, to enrich and support other levels of education with critical knowledge and information on agriculture and Natural Resources Management. This latter contribution can be of key importance in the pursuit of rural development, poverty reduction, and food security. In the following table 1, based on the table issued from “Education for rural development” in

(Atchoarena & Gasperini, 2003, p. 318) are summarized the connections between higher agricultural education and its role for a rural development.

Table 1

Higher agricultural education and rural development

Type of support by HAE	Input	Output
Professional and technical education for rural development	HAE delivered programs. Joint programs with other parts of HE system. Interdisciplinary: contribution to other academic programs (social, health, education, economics, infrastructure and environment) <i>Integration of indigenous knowledge to complement conventional one.</i>	Human resources with knowledge and skills to manage and implement the process and detail of rural development
Policy advise on education for rural development (Universities as “think-tanks”)	Vision, strategy, analysis and data for policy-makers and leaders from other sectors and society at large concerned about rural development issues	Rational and sustainable education policies for agriculture and the rural space together with the resources needed to implement the policies
Support to primary, secondary, vocational and adult education for the rural space	Curriculum advice and input for each level/Materials preparation for each level/ Teacher training related to agriculture and natural resources management in curricula. In-service training for education for rural development practitioners <i>through a participative- approach and teacher-learner perspective</i>	Key knowledge and skills for agriculture, Natural Resources Management (NRM) and related agribusiness activities available to the population of the rural space. Links between agriculture and NRM and the environment, health, nutrition, infrastructure clarified.
Lifelong education for rural space population and others	Structured learning activities and debate on agriculture and NRM issues and their importance to rural development. Short duration training for policy-makers, politicians and civil-society leaders.	An informed public supportive of the process of rural development form a position of knowledge and factual information. Alert and aware policy-makers and political leaders who provide sustainable support for rural development

An emerging concept for development lead by a transformed HAE

This initiative for rural development through education, in particular higher agricultural education, contributes to feed a new development concept. David Korten defines development as “a process by which the members of a society increase their personal and institutional capacities to mobilize and manage resources to produce sustainable and justly distributed improvements in their quality of life consistent with their own aspirations” (Korten, 2013, p. 1). Korten further mentions “Growth-centered development must be replaced with a development that strengthens the self-reliant capacity of people and communities to better use their own resources to meet their own needs. Because official aid agencies are captive to internal structures and imperatives that serve the inconsistent logic of growth-centered development, leadership for change must come from citizen volunteers motivated by life-centered values rather than conventional economic and political rewards” (Korten, 2013, p. 1). The “growth-centered development” can be related to the narrow view of agriculture, linking it with profits and productivity. The author calls this new way of development: “the people-centered development”, which can be linked with higher agricultural education reforms for a “rural empowerment”.

Chapter 5: Conclusion

Summary of research findings

The previous era of Green Revolution was an ideal one for investment in HAE and, in a sense, a dangerous one institutionally as it created an illusion of an ever-growing need for graduates of a certain profile entering a resistant market secured by the public sector. Support from donors was generous and production agriculture reacted positively to a combination of science, investment and education with huge productivity gains registered in many parts of the globe. In too many instances contentment set in. However, high input-high output production agriculture, despite its success in overcoming the danger of mass hunger and famine, began to have negative impacts on the environment and increasing demands for natural resources, especially forests and water, raised questions about the planet's capacity to continue to support a growing and resource-hungry population.

The era of environmental conservation and natural resources management (NRM) is born and drives a paradigm-shift not only in agriculture, but also in higher agricultural education. Many HAE entities were slow in reacting to this new concern and a large amount of the funding made available by donors and international organizations found its way to other parts of the education system. Falvey (1996) observes that transition to environmental courses has not always been smooth and, in fact, has only just begun. While many HAE institutions are struggling with survival and with catching up to the NRM/Environment movement a new challenge has emerged: rural development (RD). Those advocating change in agricultural education

agreed with the observation that HAE must go beyond a focus on production-agriculture. This, despite the concern of many in HAE institutions, does not mean the end of agricultural education but it does mean that agricultural education will have to reinvent itself and be seen as part of a larger education concern for rural development and food security. Despite visible successes in producing more food, scientists are concerned about stagnation of yield growth rates and yield declines and the unpredictability of climate change and environmental degradation.

This research revealed many important aspects concerning the current need of going beyond higher agricultural education in order to adjust to the current field requests, and could answer the research questions established at the beginning of the study.

Implications of this research

Firstly, this research has proved that currently there is a paradigm-shift in agriculture and so is it in Higher agricultural Education. It shows that there are very few problems in today's world that can be solved by knowledge from only one discipline. In the case of HAE, the challenge is to have strong disciplinary departments, while at the same time engaging them in collaborative endeavors. Johnson and Bently (1992), (Atchoarena & Gasperini, 2003) suggest that the important point is that higher agricultural educational institutes have gone far beyond the earliest and most urgent mission of teaching individuals, and are teaching almost exclusively about production agriculture. Added, most often the non-teaching aspects of knowledge generation and dissemination (research and extension) are needed in the service of society for the solution of its problems: first the domestic ones and then

those reflecting the interdependence of the modern world. If higher agricultural education is to play an active and constructive role in rural development, it will have to adjust its programs to new and nontraditional topics, new teaching and learning models, new partnerships with academia, research organizations and rural space stakeholders, expanded representation in governance and continuous dialogue with policy-makers.

Secondly, according to Bently and Mbithi (1976), cited in (Atchoarena & Gasperini, 2003), the incentive for rural development – and by implication for the types of educational opportunities that are needed – must spring from the people themselves. This transformation of the individual is essentially what education for rural development is all about. In contrast to the conventional notion that equates education with schooling, education should be equated with learning as a lifelong process involving a great variety of experiences. This can also be linked with further studies in Peace Education (for example in Betty Reardon works). However, to shift from the narrow school view of education to this wide lifelong view requires a change of focus that is extremely difficult for anyone whose thinking has been conditioned by very traditional formal education programs.

Finally, this work has exposed the potential of higher agricultural education for current and future international development, and this was the main ambition of the researcher. It is then pertinent to go back to the wise vision of scholar Anderson in 1984: non-reforming higher agricultural education cost is very high. Indeed, one of the issues locking agricultural development today is denying the fact that agricultural education is “THE” key opening the door for long-lasting benefits for developing

nations. These will improve their contribution not only to their own society, but also to the world (Anderson, 1984).

Recommendations

A concerted effort from the agricultural education community is needed in moving agricultural education forward. Scholar Maguire (2007) suggests two levels of recommendations:

- 1) At macro level: An “agricultural education forum” should be established. This task force of the professionals in agricultural education should assume first the responsibility to develop a national plan for agricultural education, where there is an active involvement of agricultural educators, policy makers, private sectors, farmers, and government/non-government development personnel. Secondly, these stakeholders will also be in charge of analyzing the manpower demands in agriculture leading to a master plan of manpower supply in the agricultural sector. Thirdly, they will formulate a strategic plan for agricultural education where a set of policy measures and key performance indicators should be defined. Finally, the most important, they will determine key channels and mechanisms for mobilizing the plan into action.
- 2- At micro/institutional level: Strengthening of formal agricultural education is recommended at every level. In the particular case of higher education, well-established colleges of agriculture in major universities should take the lead in reforming the degree programs in agricultural sciences to be more responsive to the needs of the society. Keeping the “balance” is the key concept, some of which are suggested below:

- Balance of mission (teaching, research and outreach). A strong sense of mission must be improved in the system of professional promotion and rewarding for faculty members. Sustainable linkage with Ministry of Agriculture must be strengthened in research and extension, particularly when dealing with small-scale farmers.
- Balance of disciplinary orientation. For agricultural sciences to be most relevant to the needs of the country, balance in the content must be considered in such aspects as “specialized/integrated knowledge,” “import-based technology/local-based technology,” “mainstream agriculture/alternative agriculture,” and “conventional agriculture/hybrid agriculture.”
- Balance of program diversity and quality. A quality forum should be set up to establish and anticipate guiding principles and minimum standards to be imposed on degree curricula. The standards, however, should allow flexibility for program diversity among universities with different backgrounds.
- Balance of “academic/social-driven” and “market-driven” models of education. The proposed quality forum should assume an active role keeping the balance on this aspect. Restructuring of resource management is needed for adaptation of quality programs. Furthermore, the profession must communicate explicitly to policy makers that higher agricultural education runs the risk of losing the balance if unit- cost budgeting is strictly imposed without appropriate measures.
- Balance of competition-cooperation. Horizontal as well as vertical networking of educational institutions should be strongly encouraged with a viable

implementing channel. Area-based networking of institutions should be strengthened (Maguire, 2007)

Currently, in ASEAN while there is a growing number of ASEAN-related courses and some programs, there is a lack of ASEAN centeredness in any ASEAN university. This can be attributed to the highly competitive global higher education market and the competition within ASEAN universities for students, funding and global recognition mainly in terms of global rankings. Today, there is not an ASEAN university or institution focused on conducting research on ASEAN-related issues such as agriculture and the challenges and opportunities brought about by the establishment of an ASEAN Community. Furthermore, there is no authoritative institution that serves as a foundation of ASEAN-related knowledge or serves as a think-tank focused on the current and future challenges of the ASEAN and its member states. That is why, it is important to suggest the idea of an ASEAN University to promote ASEAN-ness among its regional population, as well as regional collaboration and integration, but also create new knowledge on ASEAN agricultural and development challenges, and serve as an authority on ASEAN topics.

Finally, the agriculture-for-development agenda cannot be realized without more and better international commitments. The global agricultural agenda has a variety of dimensions: establishing fair rules for international trade, conserving the world's biodiversity, and mitigating and adapting to climate change. Current international organizations –largely defined in the 1950s in an extremely different world– are weakly prepared for this new agenda, and institutional reforms and innovations are needed to rebuild capacity in agriculture and facilitate greater coordination across international agencies and with the new actors in the global arena,

including civil society, the business sector and academia.

The main recommendation for further contributing to this research, is the fact that a field-study is important to see the details of this changing paradigm in agriculture field related with higher agricultural institutions' adjustment in ASEAN.

The researcher also implies that a higher agricultural institution as the former focus for this research case-study: The Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA), with regional scope, should be transparent and willing to share essential information about its activities' impact in the region. Only in this way, good-agricultural practices in ASEAN will be promoted and will be able to be applied in other regions of the world facing similar problems. Although, the current importance of this research's topic, it is disappointing to see that collaboration and shared knowledge from some institutions still depend on short-term economical/political interests

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