

Full Length Research Paper

Towards developing a framework on acceptance of sustainable agriculture among contract farming entrepreneurs

Jeffrey Lawrence D'Silva*, Bahaman Abu Samah, Jegak Uli and Hayrol Azril Mohamed Shaffril

Laboratory of Rural Advancement and Agricultural Extension, Institute for Social Science Studies, Universiti Putra Malaysia.

Accepted 28 June, 2011

Acceptance of sustainable agriculture practices will undeniably facilitate agricultural entrepreneurs to enhance on their economic and social status, and thus, enable them to enjoy a better livelihood. The focus of this paper is to determine the likely factors that will influence the level of acceptance of sustainable agriculture among contract farming entrepreneurs. Data were collected based on literature analyses. Various factors were identified and it will be a useful input for future researchers that are seeking directions to investigate on the determinants of contract farming entrepreneurs' acceptance of sustainable agriculture.

Key words: Sustainable agriculture, contract farming entrepreneurs, rural development.

INTRODUCTION

By and large, the agriculture sector is an important area in this universe and its invaluable contribution towards enhancing the economic growth of various nations is undeniable as proven from the data gathered pertaining to income generators from the different countries in this world (D'Silva, 2010). Malaysia, too, as one of the fast developing countries in the world today, has recognized the importance of the agriculture sector whereby it has been poised to become the third engine of growth in the national economy and in the recent budget, an allocation of USD1.6 billion has been set aside to further develop this sector and to improve the livelihoods of farmers. Currently the emphasis on the agriculture sector is geared towards developing the concept of New Agriculture and one of the significant factors is the development of entrepreneurial farmers whereby the farmers themselves are supposed to be involved in proactive, initiative-taking, innovative and dynamic business activities. In doing so, the New Agriculture will have the capacity of developing

competitive agribusiness as a mechanism to market products that fulfil the health standards, food safety, and environmental friendly. Entrepreneurship without doubt is gaining wider prominence lately as it is deemed as an important element in the business world especially due to the impact of globalization and market liberalization.

Its relevance in farming is obvious since the agricultural industry over the years is facing tremendous pressure due to aging of the farming community, reduction in the number of farms, and farmland being converted to housing and industrialisation. Hence, entrepreneurship is indeed relevant for the survival of the agricultural industry since due to the changes that are occurring in this field, farmers need to find creative and innovative ways and means to overcome all the shortcomings that arise. Moreover, it is believed that entrepreneurship is an important mechanism to develop novel opportunities for farmers to strengthen their grip in the farming industry by enhancing their productivity and marketing strategies that would eventually assist them to garner a wider income. Of late the concept of contract farming had obtained a favourable response among policy makers, development planners, extension agents and researchers as one of the modern farming methods that could develop

*Corresponding author. E-mail: jeffrey@ipsas.upm.edu.my. Tel: 60389471862. Fax: 60389471856

agri-entrepreneurs and to overcome the calamity faced by the agriculture sector. Contract farming according to Singh (2005) is defined as a system whereby farmers or primary producers supply agriculture or horticulture produce under advance contracts, the essence of such arrangements being a commitment to provide an agriculture commodity of a type, at a specified time, price and in specified quantity to a known buyer.

On top of it, there are different types of contract farming based on the model being used. Mansur et al. (2009) state that in general there are five types of contract farming models comprising of the centralized model whereby it is a vertical coordination where the sponsor purchases the crop from farmers and processes and markets the products, the nucleus estate model whereby the sponsor of the project owns and manages a plantation, the multipartite model whereby it involves many types of agencies, where middlemen are involved between the company and the farmer, the informal model whereby it applies to individual entrepreneurs or small companies who normally make simple, informal production contracts with farmers on a seasonal basis, and finally the intermediary model whereby middlemen are involved between the company and the farmer. Based on the different models of contract farming, a wide range of activities are implemented by contract farmers that include planting of mushrooms and herbs, rearing of leeches, goats and cows, birds nest and others and it is indeed stupendous to notice that the interest in the field of contract farming in many countries has reached across multiple disciplinary borders, different commodities and varied regional areas. Furthermore, according to Da Silva (2005) even though contract farming is not something new, the development of contract farming is definitely remarkable due to the diversity of changes and trends that had affected the agro-food systems worldwide, and these patterns occur as a result of changes that is seen in consumption habits with the increase in the fast-food outlets, the mushrooming of hypermarkets, and the expansion of international trade in fresh and processed products. It is undeniable that the contract farming system is able to enhance the livelihoods of farmers besides alleviating poverty problem, and to ensure the success of this farming system one of the prerequisites will be to make sure that contract farming entrepreneurs adopt the sustainable agricultural practices so that it will be a splendid mechanism for these entrepreneurs to thrive in their agri-business.

SUSTAINABLE AGRICULTURE AND CONTRACT FARMING

Lately, the issue of sustainable development has become an important element in the development of nation as a result of limited resources and the emphasis on a greener economy, and this seeks for a paradigm shift in every

sector of the economy (Ujang, 2008), including the agriculture sector that encompasses contract farming. Generally, the concept of sustainable development is defined as the development that fulfils the current and future needs by achieving equilibrium between the economic, social and environment development so as to satisfy the needs of the current generation without withholding the satisfaction of the needs of the future generations (WCED, 1987). Similarly, Muller (1998) mentioned that even though there are a variety of definitions that describe the concept of sustainability, there is series of commonly identified characteristics of this concept as depicted in Figure 1. Muller (1998) states that in the drive towards attaining the goal of sustainability should focus on achieving the desired results that are widely spread over the systems of economic, social and ecological. The elements that are related to the economic and social goals are efficiency growth, employment, income distribution, satisfaction of basic needs, cultural diversity and poverty alleviation while the ecological goals pursue on biodiversity, pollution and contamination. In similar pattern, Tatlidil et al. (2008) too mentioned that to achieve sustainability, the development process should integrate the three dimensions of environment, economic and social whereby the protection and effective management of natural resources ensure environmental sustainability, long-term employment and income stability bring toward economic sustainability, and a strong participation from the farming community will lead to attaining social sustainability.

In line with the variety of concepts that are attached with sustainable development, there too exist a couple of interpretations of sustainable agriculture. According to Hansen (1996) there exists two distinctive definitions of sustainable agriculture, one that is goal-prescribing, that is related to the ideological and or management approach to agriculture, and the other is the system-describing that is related to the ability of agriculture to fulfil a diverse set of goals or the ability to continue in the future. On the other hand, the concept of sustainable agriculture according to Flora (1992) encompasses a set of dynamic practices with the usage of technology that brings minimum damage to the environment and simultaneously is able to provide a long-term income for the farmers. Meanwhile, according to Lasley et al. (1993), sustainable agriculture, as in Figure 2, pictures an emerging set of agricultural practices and an underlying set of values and beliefs, and by adopting sustainable agriculture it will produce positive outcomes for the environment, for strengthening family farms, and for rural communities. Without doubt the impact of sustainable agriculture is immense as Hess (1991) had mentioned that it uses the best available technology in a balanced, well-managed, and environmentally responsible manner. Moreover based on the operational goals of sustainable agriculture as underlined by Benbrook (1991) that stressed on the environmental and ecological phenomena, sustainable

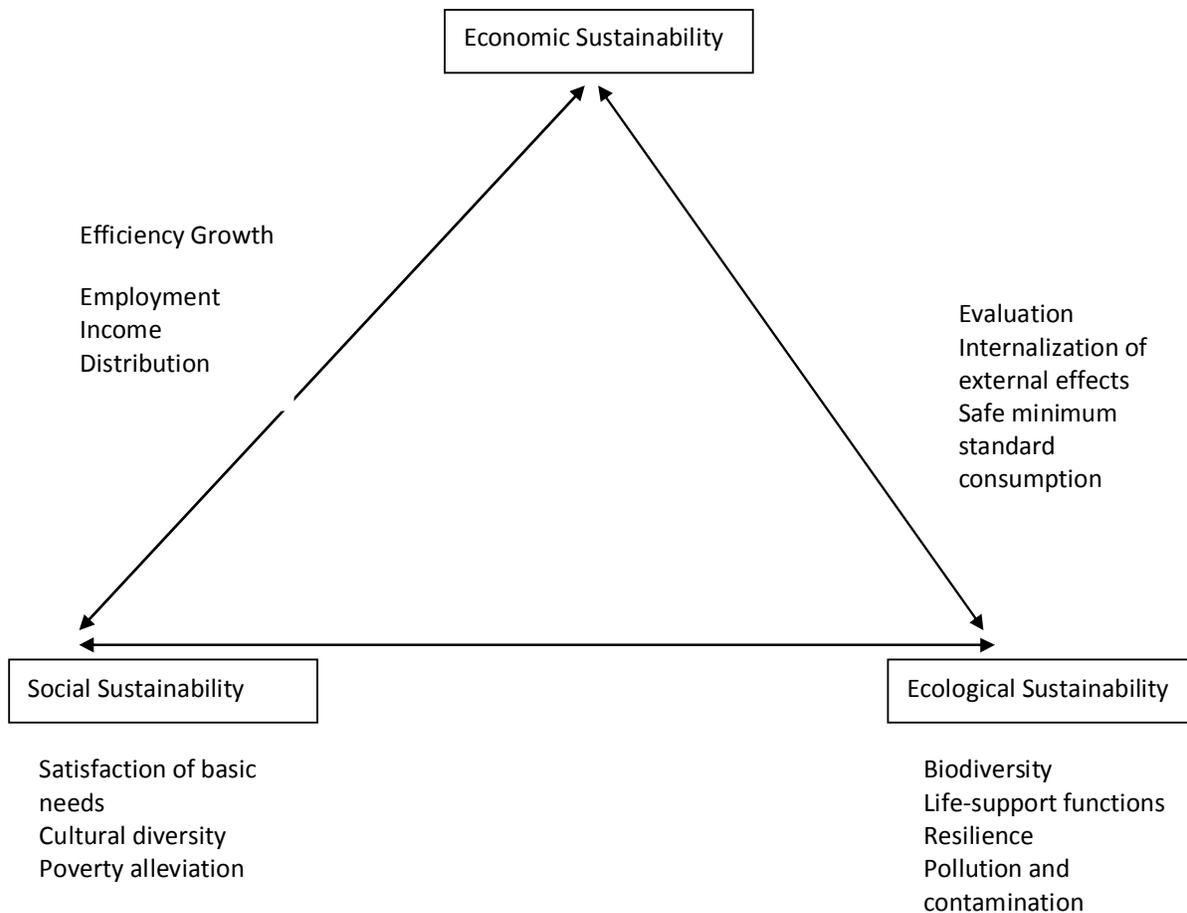


Figure 1. Dimensions of sustainability (Muller, 1998).

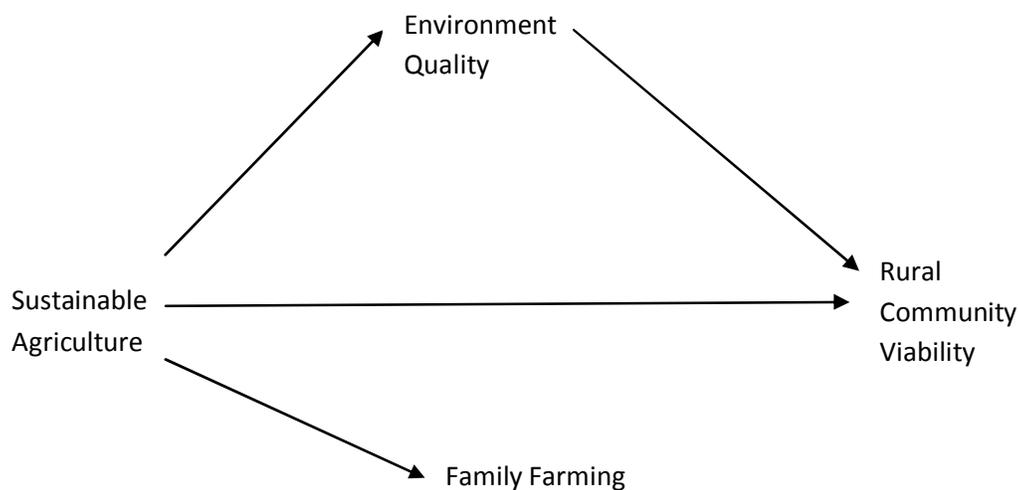


Figure 2. Beneficial Impacts of Sustainable Agriculture (Lasley et al., 1993).

agriculture will ensure the productivity of the land besides enabling the farming community to enjoy a better welfare. Adoption of sustainable agriculture, according to Lasley

et al. (1993), requires the acceptance of this new system by the farming community. Even though much emphasis has been put forward through the various government

policies to encourage practices of sustainable agriculture, not much research has been conducted to identify the extent agriculture entrepreneurs including those involved in contract farming take a serious approach in implementing sustainable farming and the factors that influence it (Tatlidil et al., 2008). There is a need for contract farming entrepreneurs to look at the issue of agriculture sustainability more seriously because contract farming is a novel farming trend in the agriculture sector and has the potential to penetrate the international market. If agriculture sustainability is implemented in contract farming, it is believed that it will bring much benefit in terms of sustainability of land and water management, an increase in the agriculture productivity, a better system in the marketing of agriculture products and the extensive use of technology (NEPAD, 2008). If the entrepreneurs of contract farming were to implement sustainable agriculture many factors need to be considered that will build their confidence to believe that such practices are important, it provides a safe environment, and it will bring a stable income in the long term

Acceptance of sustainable agriculture

In general, there are a number of factors that are associated with the level of acceptance of sustainable agriculture in a farming method. According to Rigby et al. (2001), agriculture sustainability can be measured in terms of source of seed, pest control, maintaining the fertility of soil and crop management. Meanwhile, Bhutto and Bazmi (2007) mentioned that the characteristics of sustainable agriculture encompasses factors that are related to soil erosion and land degradation, proper usage of fertilizers and pesticides, and investing in agriculture research and extension service. Indeed, the research done by Rigby et al. (2001) and Bhutto and Bazmi (2007), and other researchers such as Hansen (1996) and Rahman (2003) have stressed on the dimensions of environment, social and economic as the indicator to measure sustainable agricultural practices. On the other hand, Lalsey et al. (1993) stressed that farmers' level of acceptance of sustainable agriculture include the philosophy behind the concept of sustainable agriculture and among the elements are cooperation, preservation of farm traditions and rural culture, fostering family farms, farming as a way of life, permanence, beauty, quality and bring to more local employment opportunities in terms of figure and quality of jobs. Drost (1998) had suggested that the components of economically sustainable agriculture among others should contain the following elements: dependence on purchased inputs (chemicals, fertilizers), diversity of crops and livestock, rural areas improve on their economies and standards of living, soil base is improved through fertility, and organic matter, reduce the use of agrichemicals, reduce energy consumption in agriculture, decrease the complexity of

the food processing and distribution systems, improve farmer's management abilities and farming skills, improve the stability of the farm economy and improve the health and well being of people, livestock, wildlife and the environment.

He further mentioned that the following considerations should be taken into account by the farming community in ensuring that they practice appropriate sustainable cropping and livestock and they are as follows: reduce chemical costs, reduce fuel costs, reduce equipment costs, reduce fertilizer costs, family health, consumer health, environment, conserve soil, conserve moisture, build soil nutrition, reduce field time, control weeds, control insects, control disease, energy conservation, improve crop health, improve crop quality, improve livestock health, improve livestock quality, participation in government farm programs and maximizing profits. Meanwhile, Tatlidil et al. (2008) in their study have identified the elements that the farmers attach to selected sustainable agriculture practices and have ranked the following practices in a descending order and they are as follows: leaving the farm to one heir only, long-term crop rotation, not burning residues after harvest, proper care of animal health, personel involvement in commodity marketing, avoiding early and excessive grazing of rangelands, protective measures for pastures and meadows, proper irrigation, proper use of pesticides, owning adequate farm machinery, reforestation of less advantaged farm environment, proper use of chemical fertilizers, enlarging farm by buying more land, using animal manure, not using fallow, taking adequate measures to control soil erosion, using legume crops in rotation, pasture grazing rotation, proper use of energy sources in agriculture, growing cover crops and conducting soil test. If the concept of sustainable agriculture is to be adopted by the farmers, it is believed that they will be in a positive and developing system, whereby it will enable them to obtain higher profits, become stewards of the environment and be an essential component of the community.

Possible factors affecting acceptance of sustainable agriculture among contract farming entrepreneurs

Even though the elements of sustainable agriculture among contract farmers were identified, yet it will not bring any effect if the contract farming entrepreneurs failed to accept and adopt it. A thorough search of the existing literature showed that there were yet any studies that were carried out that looked into the factors that influence contract farming entrepreneurs' acceptance of sustainable agriculture. However, based on previous studies, there are a number of factors that affect acceptance and participation of farmers on sustainable programmes that could be used as a basis to investigate on the factors that will have an impact on contract

farming entrepreneurs to accept the notion of sustainable agriculture. The first factor is knowledge which is widely recognized by scholars as the starter to attain sustainability. It is a well-known fact that knowledge is an important element to the success and progress of the agriculture sector. Knowledge, which can be defined as organized or processed information or data, is fundamental in enhancing the understanding of someone towards something as it's' accumulation and application will drive people's perception. In a study carried out by Man (2008) it was identified that the level of agricultural knowledge with regards to farming practices among farmers has the potential to be enhanced.

Further studies carried out by D'Silva (2010) proved that there exists a significant relationship between acceptance and knowledge. Besides, according to Asenso-Okyere et al. (2008), if the necessary knowledge pertaining to success farming practices were transferred to the farming community, it will propel towards the implementation of many innovation projects in the agriculture sector and through these innovations it will enhance productivity, competitiveness, and the welfare of the farming community. These views were in line with what have been stated by Etling et al. (2002) that stressed on the importance of knowledge as a mechanism to develop potential sustainable farming entrepreneurs. Based on these facts, the development of the agriculture sector particularly contract farming entrepreneurs will be greatly enhanced if they were to be engineered with sound knowledge as it will enable them to practice sustainable agriculture that will eventually bring great much benefit to them in the long run. Moreover, attitude also has the potential to play an important role in influencing acceptance of sustainable agriculture. It is generally believed that those having a positive attitude towards sustainable agriculture will readily accept this system. According to a study carried out by Hyttia and Kola (2006) it was identified that 20% of the society has a positive attitude towards the role and function of agriculture sustainability while 35% of opposes such a notion. Samah et al. (2010), on the other hand, had identified that the relationship between attitude and farming methods is positively significant. Meanwhile, a study on youths by Gidarakou (1999) has discovered that generally youths' have a negative attitude toward agriculture and this might pose a problem for them to accept the practices of sustainable agriculture.

Furthermore, Gidarakou (1999) mentioned that youths believed that the agricultural industry is not a vibrant industry and it generates just a meagre income. Hence, from the mindset of the youth, generally, getting involved in agricultural sector is seen as a temporary expedient, acceptable as an answer to unemployment problem only as such time a better solution can be found. However, Kumar (2007) in his study had noticed that youths like to participate in modern farming methods and with the applicability of sustainable agriculture, it enhances the involvement of youths in agriculture and in the long-run it

is believed that these youths will be running their farms in line with the practices of sustainable agriculture. Kumar's study further boost the study done by Mann and Kogl (2003) whereby it was identified that the economic and social element depicted in sustainable agriculture are important elements that bring more farmers to possess a positive attitude and accept sustainable agriculture. Continuous support towards sustainable agriculture in contract farming is important to ensure its relevance. As farmers might be new to the concept of sustainable agriculture, they need the much support from various quarters. Guo et al. (2005) and Wheeler (2008) had emphasized that the government and specialist extension support are crucial in motivating the farming community to accept ideas pertaining to novel farming methods. While knowledge, support and attitude are important factors that are related toward the acceptance of sustainable agriculture, another significant factor is the belief agriculture entrepreneurs possess toward sustainable agriculture (Adrian et al., 2005). When the farming community believes that sustainable agriculture will bring much benefit to them, it will lead towards enhancing their acceptance on sustainable agriculture (D'Silva, 2010).

Demographic factors and acceptance of sustainable agriculture among contract farming entrepreneurs

Demographic factors also have the potential to influence acceptance towards sustainable agriculture. According to Tatlidil et al. (2008) based on the adopter categories described by Rogers (2003) among the likely socio-economic characteristics that might influence acceptance are age, education, income, the farming system, farm size, extent of irrigated land, ownership status, mechanization, use of credit, membership of a cooperative society, participation in village administration and information-seeking behaviour such as reading a newspaper, listening to the radio, watching television, accessing the Internet, participating in any agricultural event, and interacting with agricultural extension personnel. Age is believed to be an important element for acceptance of sustainable agriculture. A study done by Fritz et al. (2003) proved that there are significant difference on acceptance and perception on agriculture between youths and senior farmers. It is a common fact in many countries that the majority of farmers are of senior farmers. In Malaysia, for instance, the majority of the agriculture community are those aged 42 years and above (Hassan et al., 2009) and this data further supports the evidence collected by Zaleha (2007) that had identified only 15% of the agriculture workers are youths while the balance are those age 55 years and above and foreign labour. However, D'Silva's (2010) study on youths' perception towards contract farming had identified that they are favourable towards modern farming methods and lately there are number of young entrepreneurs who are involved in it. Hence, it will be interesting to see if the factor of age has any correlation

with the acceptance of sustainable agriculture so that it will be a vital input for policy makers to develop suitable programs that would enhance the practice of sustainable agriculture being implemented in the agriculture sector. Even though agriculture is a thriving sector, previous studies had shown that those with higher education especially university graduates do not get actively involved in it (Mc Larty, 2005).

Similar patterns were also observed in Malaysia where by agriculture is dominated by those with lower education achievement. Studies done by Hassan et al. (2009) proved that agriculture is the popular choice among those who possess a low education. However, lately there are a substantial young and vibrant entrepreneurs with a good level of education that are involved in modern farming methods such as contract farming and it will be a worthwhile venture to seek whether their level of education does have any impact on the level of acceptance of sustainable agriculture. Recently the World Bank had indicated that almost 72% of the poor are living in rural areas and their main source of income is agriculture. On the other hand, it cannot be denied that there too exist many farmers that had become wealthy due to their involvement in agriculture. Contract farming being one of the modern methods of agriculture has been able to provide a steady income for those that are involved seriously in it. Do these farmers level of income encourage them to accept sustainable agriculture practices and do they use it as a tool to generate a bigger income? This will be an interesting aspect to be studied as identifying the relationship between acceptance of sustainable agricultural practices and income is believed to bring much added-value knowledge that would enable to uplift the status of the farming community. Several studies have been conducted to determine the influence of region on the participation in farming programs. It was identified that farmers from smaller cities and towns were found to be more knowledgeable and involved extensively in farming activities compared to their counterparts from larger population centres (Shaffril, 2010). It is believed that people from smaller communities and rural areas would be more likely to interact with farmers and other individuals working in agricultural businesses. Conversely, people who reside in larger cities and metropolitan areas would expectedly have fewer opportunities to interact with farmers and individuals employed in agricultural businesses. It would be interesting to note then whether region has any role to play in ensuring farmers practice sustainable agriculture so that it will enable us to make a better conclusion on the impact of acceptance based on the place where these farmers reside.

CONCLUSION AND FUTURE RESEARCH

Undoubtedly sustainable agriculture is important to enable farmers especially those that are involved in contract farming to gain a higher income and to boost the

agricultural sector to be on par with other sectors that exist in an economy. It is evident that the acceptance of sustainable agriculture in the field of contract farming relies very much on our vibrant entrepreneurs since they are the pillar of the future. Without doubt, more studies need to be implemented to identify factors that would boost the participation of contract farming entrepreneurs in agriculture sustainability. After a thorough search on all the available resources, several factors were identified and these factors could be used by future researchers as primary theoretical understanding for predicting and explaining entrepreneurs of contract farming level of acceptance towards sustainable agriculture. Policy makers, extension agents, agro-researchers and agro-entrepreneurs would gain much benefit from future studies as the identified constructs would reveal factors that explain farmers' involvement in contract farming and the sustainable agriculture practices they demonstrate. Besides, future studies should be able to picture out whether those energetic and vibrant agro-entrepreneurs are ready to embrace contract farming and be more comfortable to participate in sustainable agriculture farming activities. More importantly, it would show whether involvement in contract farming using sustainable agriculture philosophy would have any impact on the development of agricultural activities in the future since its' future relies very much on the high interests and participation of the contract farming entrepreneurs using these practices.

REFERENCES

- Adrian AM, Norwood SH, Mask PL (2005). Producer's perception and attitudes toward precision agriculture technologies. *J. Comput. Technol. Agric.*, 48: 256-271.
- Asenso-Okyere K, Davis K, Aredo D (2008). Advancing agriculture in developing countries through knowledge and innovation. Synopsis of an International Conference. Paper prepared for International Food Policy Research Institute.
- Benbrook CM (1991). Introduction (in Banr's sustainable agricultural research and education in the field: A proceedings). National Academy Press, Washington, D.C.
- Bhutto AW, Bazmi AA (2007). Sustainable agriculture and eradication of poverty in Pakistan. *Nat. Res. For.*, 31: 253-262.
- Da Silva CAB (2005). The growing role of contract farming in agri-food systems development; drivers, theory and practice. *FAO*. <http://www.fao.org/ag/ags/subjects/en/agmarket/contractfarming.html>.
- D'Silva JL, Shaffril HAM, Uli J, Samah BA (2010). Acceptance and sustainability of contract farming among youth in Malaysia. *Am. J. Agric. Bio. Sci.*, 5: 350-356
- Drost D (1998). Targeting extension efforts for the adoption of sustainable agricultural practices. *J. Ext.* 36(5).
- Etling AW, Barbuto JE (2002). Globalizing colleges of agriculture. Proceedings of the 18th Annual Conference, Association for International Agricultural and Extension.
- Flora CB (1992). Building sustainable agriculture: A new application of farming system research and extension. *J Sustain. Agric.*, 2: 37-49.
- Fritz S, Husmann D, Wingenbach G, Rutherford T, Egger V, Wadhwa P (2003). Awareness and acceptance of biotechnology issues among youth, undergraduates and adults. *J. Ag. Biol. Forum*, 6: 178-184.
- Gidakou I (1999). Young women's attitudes towards agriculture and women's new roles in the Greek countryside: A first approach. *J. Rural Stud.*, 15: 147-158.
- Guo H, Jolly RW, Zhu J (2005). Contract farming in China: Supply

- chain or ball chain? Proceedings of the Minnesota International Economic Development Conference, Apr. 29-30, University of Minnesota, pp: 1-1.
- Hansen WJ (1996). Is agricultural sustainability a real concept? *Ag. Syst.*, 50: 117-143.
- Hassan MS, Shaffril HAM (2009). Internet usage among agro-based entrepreneurs: Can it affect productivity? *J. Agric. Ext. Soc. Sci.*, 5: 61-66
- Hess CE (1991). The US Department of Agriculture commitment to sustainable agriculture (in Banr's sustainable agricultural research and education in the field: A proceedings. National Academy Press, Washington, D.C.
- Hyttia N, Kola J (2006). Finnish citizen's attitude towards multifunctional agriculture. *J. Int. Food Agribus. Manage. Rev.*, 9: 1-22.
- Kumar P (2007). Resource provision, productivity and contract farming: A case study of Punjab, Proceedings of the ICAR-NCAP and USAID, May 5-6, New Delhi, India, pp: 1-23.
- Lasley P, Hoiberg E, Bultena G (1993). Is sustainable agriculture an elixir for rural communities? *Am. J. Altern. Agric.*, 8: 133-139.
- Man N (2008). Perception towards agriculture among youth farmers and the necessity for agriculture education. *J. PBM.*, 1: 99-114.
- Mann S, Kogl H (2003). On the acceptance of animal production in rural communities. *J. L. Use Policy*, 20: 243-252.
- Mansur K, Tola M, Ation R (2009). Contract farming system: A tool to transforming rural society in Sabah, MPRA. <http://mpra.ub.unimuenchen.de/13271>
- Mc Larty R (2005). Entrepreneurship among graduates: Towards a measure response. *J. Manage. Dev.*, 24: 223-238.
- Muller S (1998). Evaluating the sustainability of agriculture. GTZ, Eschborn, Germany.
- NEPAD (2008). East Africa Policy Brief No. 2: Contract farming's potential in linking smallholder farmers to market. www.aiaee.org/attachments/093_Rivera-eVol-11-2-4.pdf.
- Rahman S (2003). Environmental impacts of modern agricultural technology diffusion in Bangladesh: An analysis of farmers' perceptions and their determinants. *J. Environ. Manage.*, 68: 183-191.
- Rigby D, Woodhouse P, Young T, Burton M (2001). Constructing a farm level indicator of sustainable agricultural practice. *Ecol. Econ.*, 39: 463-478.
- Rogers EM (2003). *Diffusion of innovations* (5th ed.). New York: The Free Press.
- Samah BA, D'Silva JL, Shaffril HAM, Uli J (2010). Acceptance, attitude and knowledge towards agriculture economic activity between rural and urban youth: The case of contract farming. *J. Appl. Sci.*, 10: 2310-2315.
- Shaffril HAM, D'Silva JL, Uli J, Samah BA (2010). Socio-demographic factor that impinge youth acceptance towards agriculture: The case of contract farming in Malaysia. *Am-Eu. J. Agric. Environ. Sci.*, 7: 242-246.
- Singh S (2005). Contract farming for agricultural development: Review of theory and practice with special reference to India. New Concept Information Systems Pte. Ltd. <http://ideas.repec.org/press/wpaper/id246.html>.
- Tatlidil FF, Boz I, Tatlidil H (2008). Farmers' perception of sustainable agriculture and its determinants: A case study in Kahramanmaras province of Turkey. *Environ. Dev. Sustain.*, 11: 1091-1106.
- Ujang Z (2008). Commonwealth: Basic sustainable development. <http://www.cheme.utm.my/index.php>.
- Wheeler SA (2008). The barriers to further adoption of organic farming and genetic engineering in Australia: Views of agricultural professionals and their information sources. *J. Renew. Agric. Food Syst.*, 23: 161-170.
- Zaleha MN (2007). Labour in Agriculture. In Fatimah Arshad et al. (Eds.). *50 Years of Malaysian Agriculture: Transformational Issues, Challenges and Direction* (pp. 652-658). Serdang, Selangor: UPM Publisher