Researchers' Viewpoints towards Commercialization of Agricultural Technology for Community Development

Review of Integrative Business & Economics Research

Narissara Muangsawang
Chulalongkorn University
Email: narissarama@gmail.com

Rath Pichyangkura
Chulalongkorn University
Email: Rath725@hotmail.com

Adchara Chandrachai
Chulalongkorn University

Onsuda Charoenrat
Phra dabos Foundation

ABSTRACT

The main objective of this research was to study factors that should be taken into consideration while conducting research on agricultural technology for utilization in community development. The sample consisted of 90 agricultural technology researchers from all over the country. Questionnaires were used as the research tool for data collection to be mailed directly to those units of analysis together with a self-addressed envelope. Outstanding research outcomes were as follows: researchers with and without the experience on the agricultural technology utilization had different viewpoints toward the community's absorptive capacity with the significance of 0.05 for 4 factors, i.e., knowledge acquisition by means of the support from public organizations/institution, viewpoint toward the community's agricultural technology selection in consideration of economic benefits, viewpoint toward the technology selection in consideration of the disseminated technology helping reduce work steps and time and viewpoint toward the community's learning level in consideration of the number of learning sources in the community.

Keywords: utilization, agricultural technology commercialization, community development

1. INTRODUCTION

Roger[1] proposed his concept about the process of innovation development that it was composed of six stage as follows: 1) problem identification, 2) research to get basic research and applied research, 3) development, 4) commercialization, 5) acceptance and dispersion , and 6) utilization. His concept had been adapted in the study of innovation the process of which was divided into three stages as follows: 1) research and development (R&D), 2) innovation development, and 3) utilization in various aspects [2-4]. Thailand adopted the concept of increasing innovation competitiveness in its Tenth National Economic and Social Development Plan (B.E 2550-2554) [5]. However, according to the World Economic Forum's ranking, Thailand was still one of those efficiency-driven economics. In addition, from the analysis of the indicators and guideline for the management of Thailand's weaknesses conducted by the Office of National Competitiveness Development Committee, National Economic and Social Development Board (2011) [6], it was found that Thailand was still weak in technological and innovative competency, particularly shown by the indicator reflecting utilization of scientific and technological researches to increase the country's competitiveness. One likely cause may

ISSN: 2304-1013 (Online); 2304-1269 (CDROM)

arise out of the fact that upstream research organization gave priority to academic-based development that responded to academic excellence development rather than to the need for utilization. The failure to create national competitiveness was reflected in the report on the monitoring and evaluation of research results in the public sector in FY2009 [7], which showed that over half of the research budget had been spent on agricultural technology research projects, and that only 16.93% of those completed projects' research results could be put into utilization. Why could agricultural technology form research not be put into utilization? What factors should researchers pay more attention to while conducting their research so that the research results can be put into utilization? This research will contribute to giving agricultural technology researchers a clear concept so that they can produce research works that are ready for utilization and that research supporting organizations can benefit more from utilization of agricultural technology. The factor that technology should be taken into consideration while conducting research on agricultural technology in order to be easily accessible can practically be the main objective of investigation in this research.

2. AIMS

To study the factors that should be taken into consideration while conducting research on agricultural technology for utilization in community development.

3. THEORY, CONCEPT OF THE RESEARCH AND RELAED

Travis J. Lybbert [8] divided agricultural technology into five groups, namely, 1) new traits, varieties and crops, 2) water management and irrigation, 3) other production inputs, 4) production management and practices and 5) marketing and supply chains. Utilization of agricultural technology for community development differed from other forms of utilization, e.g., commercialization, which was in the form of exploitation/licensing by allowing the right to use knowledge or technology [9].

3.1 Components of Agricultural Technology Research for Utilization in Community Development

Roger [1] defined the scope of R&D as the period consisting of the stage of recognition of the problem or the need for utilization and the stage of invention which might lead to basic research or applied research. The period of R&D was, therefore, the period in which researchers needed academic experience and understanding of the need of three groups of users comprising researchers, policy makers and utilizes [10-12]. A good identification of research agenda would need participation of stakeholders from all sectors, sharing of in-depth data by the civic society, communication and exchange of data and building multidisciplinary research capability, all contributing to determination of research problems from three sources, i.e., users' demand side, policy's demand side and political demand side [3, 13]. Therefore, researchers' viewpoint towards the period of R&D of appropriate agricultural technology should be based on the participatory determination of the research problems [3, 13], and priority should be given to the root of the community's need for utilization of agricultural technology. The power to make mutual decision between the researchers and the users was a factor leading to acceptance and utilization of the respective technology so that the results of R&D in terms of direct output, e.g., scientific experiment findings and body of knowledge and technology, which led to the production of new goods, new processes and intellectual properties, and in terms of impact measured as increased efficiency, e.g., method improvement, production efficiency increasing, competitiveness development [14].

As earlier mentioned, the use of the 'technology push' concept by those upstream research organizations can bring about a risk that the respective agricultural technology might not meet users' needs, so the period of innovation development is the critical point in terms of utilization of technology [2]. The factor that researchers should realize during the period of innovation development apart from securing technology readiness [15-16] by trial or testing to confirm the respective technology's performance efficiency is the technology's potential for

ISSN: 2304-1013 (Online); 2304-1269 (CDROM)

extension, e.g., simple design for easy operation, convenient access, easy understanding and non-complication [17].

There has been no definite conclusion about utilization of agricultural technology because those target groups of agricultural technology utilization have equal neither bargaining power nor strength in respect of market pull or demand pull as the private sector. The researchers need to study beneficiaries' readiness by coordinating with related organizations/institutions[18] and consider the beneficiaries' learning potential as well as their potential for connection with the surrounding environment to gain a network for reaching the true need of the groups of people who will benefit from respective research results so that they (i.e., agricultural technologies), created by the researchers, can produce impacts/benefits at social and national levels after implementation socio-economically and the project sustainability [18]. All this implies the benefits to be gained by the community in terms of quality of life and social and environmental development through increased productivity, innovative capability and competitiveness. Examples are applications of the research results to improvement or development of the task of mortality-rate and sickness reduction, improvement of working environment safety, improvement of transportation system and, application of the research results to development of energy, humankind safety and quality of life and gross national product. The technologies used are the ones that help minimize adverse effects or help the community's adaptation [8].

3.2 Researchers' Viewpoints towards Agricultural Technology Utilization for Community Development according to Roger's Adoptive Theory [1]

In order to promote the period of innovation development through dissemination and to gain the target group's more acceptance [15], the concept often used in the study during the period of innovation development is 'transformation knowledge'[19-20] and Roger's Adoptive Theory [1] which proposes factors researchers or those involved should take into account during the said period as follows:

- Sources of Technology [21-22] propose that the technology arising out of research collaboration contributes to exchanging of knowledge as well as linking the gap between the researchers and the industrial sector. Agricultural technology to be introduced into the period of innovation development may come from various sources. It may come from individuals or from development cooperation. It may be developed out of users' need or the one originating from employees' experience or from outsiders. It may be the spill-over technology or the one arising out of process needs [9, 23].

- Pathways: The period of innovation development can be carried out in many ways. Each way may be suitable for a particular target group [24], depending on objectives and goals of dissemination. The question is "What should be the suitable way of introducing an agricultural technology to users for their community development?" It may take the form of dissemination based on location or building a learning center, lead users [9, 23], translation to pass on knowledge or information from one person (informant) to mother whose role is to make a decision [4,25], knowledge dissemination through training, diffusion of knowledge and information via post or internal to promote wide awareness. Technology transfer is a process of the combination of those above-mentioned multi-dimension methods which can take place during the period of R&D, the period of knowledge dissemination and the early period of application which involves activities of knowledge translation and acceptance [26], diffusion method both by planning and by natural diffusion [4].

- Communication Channels [27-28]: Appropriate and efficient communication channels are needed for agricultural technology transfer to the respective community because people from various sectors.

- Actors in the Dissemination Process: Beesley[13] proposed that actors whose role was to disseminate knowledge were key persons to achieve acceptance of the target group, particularly users in the community. Such actors could be the researchers who knew and understand their technology, the researchers' affiliations or the granting agencies who were

ISSN: 2304-1013 (Online); 2304-1269 (CDROM)

technology owners and those agencies whose role was to transfer/disseminate knowledge. Thus, it was important to make sure who the person who played the role in the process of knowledge dissemination was [9, 29].

3.3 Researchers' Viewpoints toward Agricultural Technology Utilization for Community Development according to Absorptive Capacity Concept

The authors adopted absorptive capacity concept which is believed to have its effect on technology utilization [3] to investigate the viewpoints of agricultural technology researchers towards knowledge absorptive capacity of the users. The researchers should take into account the absorptive capacity of the target community who utilizes the agricultural technology. They should know how the community, whenever they need an agricultural technology, forms the process/method of acquiring the knowledge, e.g., how to search the technology, the source of the technology and access to the technology. In addition, when the technology comes, how the community selects the knowledge/agricultural technology is important [31]. For example, they may need to consider the harmony with and the balance of the existing circumstances, e.g., local beliefs, values, culture an experience of the past adoption of agricultural technology [28]; whether the technology will help reduce work steps and time [33-34]; whether the technology can be operated and easy to understand [32-33]; whether there is any clear example of successful performance elsewhere [32-33]; whether there are any economic benefits [33-35]; whether there are any economic benefits[33-34]; whether there are any social benefits, e.g., the agricultural technology is adopted through the community's participation or it helps take care of the community members' health; whether there are any environmental benefits, e.g., the agricultural technology adopted to help maintain the richness of the community's ecosystem.

Community Absorptive Capacity is an importance factor that researchers should take into account during the period of utilization. It can be measured by access to technology, reliance on technology quality, linkage with organization/institution network or farmers' locality [35], or technical support to the community[27] and strong collaboration of the community. In addition, it also depends on financial affordability of that community or financial support from organization/institutions [27, 35].

The fact that community members can learn, understand, practice, apply their knowledge or agricultural technology to their traditional way of life and can adapt it to be best suited to the existing circumstances can be used for measuring the community's learning level [28], in terms of, for example, diverse forms of community participation, availability of learning sources in the community, the rate of service use of the community learning sources and the numbers of activities held for community knowledge sharing, and community agricultural technology capacity or knowledge processing capacity is the factor determining external knowledge absorbing capacity which can be measured in terms of the number of the local learned men, the rate of internal access, the number of academic institutions in the area and the percentage of agricultural technology collaboration [28].

4. METHODOLOGY

4.1 The Sample and Data Collection

The population of this research consisted of 18 public universities from all over the country which are affiliated to the Office of the Commission on Higher Education (OCHE). The sample was selected by three universities from each region granted agricultural research funds, leading to a total of 12. The researchers collected the data by sending letters of request to the selected universities. Each letter was attached with 20-30 copies of the questionnaire, depending on the size of the respective universities. A letter requesting each researcher's cooperation in completing the questionnaire was also enclosed together with a pre-addressed envelope and a postage stamp for returning the questionnaire within a month's time. Purposive sampling was used to select the researchers from those who had been granted agricultural technology research funded by the National Research Council of Thailand (NRCT) during FY2007-2010.

4.2 Statistics Used for Data Analysis and the Tool for Measuring Variables

ISSN: 2304-1013 (Online); 2304-1269 (CDROM)

This research used a questionnaire based on related literature review as the tool for measuring the variables. The quality of the research tool was examined in terms of its content validity and validity was constructed having the questionnaire reviewed by qualified experts. The questionnaire was then adjusted according to their comments so that it was clear, easy to understand and inclusive of all the variables as specified in the objective. Totally 280 copies of the questionnaire had been mailed to the researchers, whereas 90 copies (32.142%) were returned.

5. RESULT

5.1 Researchers' Viewpoints towards Utilization of Agricultural Technology for Community Development

In terms of their viewpoints towards utilization of agricultural technology for community development, the researchers placed experience as the first priority (Weight=14.588), impacts on/benefits to the society and the country as the second priority (Weight =13.671), the origin of the need for utilization of research results as the need for utilization of research results as the third priority (Weight =12.835), potential for the technology's extension as the fourth priority (Weight =12.588), the project sustainability as the fifth priority (Weight =12.296), the result of R&D as the sixth priority (Weight =12.247), the readiness for utilization of the technology as the seventh priority (Weight =11.576) and the readiness of the beneficiaries as the last priority (Weight =10.200). The group of the researchers without experience in utilization of agricultural technology placed experience as the first priority (Weight =14.735), followed by impacts on/benefits to the society/country as the second priority (score=13.796) , the origin of the need for utilization of research results as the third priority (Weight =13.000), the project sustainability as the fourth priority (Weight =12.796), potential for the technology's extension as the fifth priority (Weight =12.286), the readiness for utilization of the technology as the sixth priority (Weight =11.878), the result of R&D as the seventh priority (Weight =11.367) and the readiness of the beneficiaries as the last priority (Weight =10.143).

The group of the researchers with experience in utilization of agricultural technology placed experience as the first priority (Weight =14.000), impacts on/benefits to the society/country as the second priority (Weight =13.473), the result of R&D as the third priority (Weight =13.081) and the potential for the technology's extension as the fourth priority (Weight =12.649). The origin of the need for utilization of research results as the fifth priority (score=12.608), the project sustainability as the sixth priority (Weight =12.608), the readiness for utilization of the technology as the seventh priority (Weight =11.635) and the readiness of the beneficiaries as the last priority (Weight =10.000).

5.2 Researchers' Viewpoints towards Utilization of Agricultural Technology for Community Development according to Roger's Adoptive Theory (2003)

In terms of their viewpoints towards knowledge sources, the researchers placed collaboration with public organizations/institutions as the first priority(39.8%), followed by collaboration with the community(31%) and collaboration with other research organizations/institutions as well as private organizations/ institutions(14.6%). As to actors who played the role in the dissemination process, the researchers placed themselves as the first priority(50%), followed by their affiliations(15%), funding agencies and private institutions (13.6%) and knowledge transfer/dissemination institutions (2.3%).

As regards their viewpoints towards pathways, it was found that the researchers placed trainings on technology transfer through practicing as the first priority (Weight =25.178) and meetings to give knowledge about technology as the second priority (Weight =15.889). The test of differences between the two groups of researchers showed that both groups had no statistically significant differences (p=.05) in their viewpoints towards every of the variables. Both groups of researchers used community leaders as the community channel. However, the researchers with experience in utilization of agricultural technology placed the contact with

ISSN: 2304-1013 (Online); 2304-1269 (CDROM)

public organizations/ institutions as the first priority, whereas those without experience in utilization of agricultural technology place the contact with local academic institutions as the first priority.

5.3 Researchers' Viewpoints towards Utilization of Agricultural Technology for Community Development according to Absorptive Capacity Concept

Analysis of related factors according to absorptive capacity concept revealed that the researchers placed the community's process/means of knowledge acquisition through the support of public organizations/institutions as the first priority (Weight =22.244), the support of local academic institutions as the second priority (Weight =20.189), application for training courses as the third priority (Weight =19.744), requesting for the knowledge directly from the researcher as the fourth priority (Weight =19.633) and study trips as the fifth priority (Weight =18.189). In terms of differences between the two groups of researchers, it was found that the two groups had statistically significant differences in their viewpoints towards the community's process of knowledge acquisition through the support of public organizations/institutions at the significance level of .05 (F=4.086, sig. = 0.046).

As to researchers' viewpoints towards the community's method of agricultural knowledge technology selection, they placed economic benefits as the first priority (Weight =14.281), the technology disseminated in the community being easy to understand and follow as the second priority (Weight =14.112), previous examples of effective performance as the third priority (Weight =13.978) and the disseminated technology helping reduce work steps and time as the fourth priority (Weight =11.888). The test showed that there was a statically significant difference between the two groups of researchers in terms of their viewpoints towards the community's method of agricultural knowledge technology selection based on economic benefits at the significance level of .05 (F=6.056, sig.= 0.016).

In terms of the community's absorptive capacity, the researchers placed the community's strong collaboration as the first priority (Weight =28.200), followed by availability of the community learning sources (Weight =26.156), the support from academic institutions (Weight =22.878) and the support from public organizations/ institutions (Weight =22.767). The test showed that there was no statistically significant difference between the two groups of researchers in terms of their viewpoints towards the community's absorptive capacity at the significance level of .05.

The researchers placed the community's learning capacity based on the number of learning sources in the community as the first priority (Weight =27.764), followed by the number of activities creating the community's knowledge sharing (Weight =26.449), diverse forms of the community's participation (Weight =24.787) and the frequency of use of the community's learning source service (Weight =21.000). The test showed that there was a statistically significant difference between the two groups of researchers in terms of their viewpoints towards the community's learning capacity based on the number of learning sources in the community at the significance level of .05 (F=11.098 , sig.=.001)

6. DISSUSION AND CONCLUSION

The agricultural technology researchers put the highest emphasis on the variable of experience of the researchers and teamwork during the period of R&D and they put the lowest emphasis on the variable of the user's readiness during the period of utilization. This can be concluded that the researchers preferred the application of the concept of the technology push to that of the demand pull. Also, by comparison of the viewpoints of both groups of the researchers, the researchers with agricultural technology utilization put higher emphasis on 2 variables, i.e., the variable of the research utilization source that corresponded to the study by Braun and Benninghoff (2003), Beesley (2003) and Peterson, Rogers *et al.* (2007), and the variable of the project sustainability that was related to the study by Sianipar, Yudoko *et al.* (2013), whereas the researchers with agricultural technology utilization put higher emphasis on

ISSN: 2304-1013 (Online); 2304-1269 (CDROM)

the variable of R&D result. Thus, such different emphases on the above-mentioned 3 variables may be the significant cause of the agricultural technology inaccessibility.

According to the researchers' viewpoint toward the agricultural technology utilization for community development based on the Adoptive Theory by Roger (2003), the researchers had a viewpoint toward the collaboration with public organizations/institution and the research collaboration with communities for the purpose of the community's technology adoption, which corresponded to the study by Bjerregaard (2010) and Bowen and Graham (2013) showing that researchers themselves performed the role as knowledge actors. It is remarkable that the fact that the researchers put no emphasis on any agencies whose responsibility is the direct knowledge/technology dissemination to communities and on any foundations and non-profit organizations may be the gap of technology transfer to the community's utilization.

Both groups of the researchers adopted the channel mostly via community leaders, which corresponded to the study by Straus, Tetroe *et al.* (2011) and Addiction Technology Transfer Center Network Technology Transfer (2011) putting emphasis on the technology transfer to decision makers. However, both groups of the researchers put emphasis differently on the channels via public organizations/institution and local educational institution and on pathways of the technology transfer; in other words, the researchers with agricultural technology utilization put emphasis on practical pathways of the technology transfer which included workshop training, learning center and meeting, whereas those with agricultural technology utilization put emphasis on practical methods and disseminated publications which included workshop training, meeting and research report dissemination.

The researchers' viewpoint toward the agricultural technology utilization for community development based on the Absorptive Capacity Concept was still an attract issue for a further in-depth study as both groups of the researchers put different emphasis, with the significance of 0.05, on 4 variables, i.e., knowledge acquisition by means of the support from public organizations/institution, the agricultural technology selection in consideration of economic benefits, the technology selection in consideration of the disseminated technology helping reduce work steps and time and the number of learning sources in the community.

7. ACKNOWLEDGMENT

The research is funded by THE 90 (Ratchadaphiseksomphot Endowment Fund).

8.REFERENCES

[1] Rogers, E.M. (2003), Diffusion of innovations (5th ed.). New York: Free Press.

[2] Wonglimpiyarat, J. and N. Yuberk (2005), "In support of innovation management and Roger's Innovation Diffusion theory." *Government Information Quarterly* 22(3): 411-422.

[3] Peterson, J. C., *et al*. (2007), "A framework for research utilization applied to seven case studies." *Am J Prev Med* 33(1 Suppl): S21-34.

[4] Addiction Technology Transfer Center Network Technology Transfer, W. (2011), "Research to practice in addiction treatment: key terms and a field-driven model of technology transfer." *J Subst Abuse Treat* 41(2): 169-178.

[5] The National Competitiveness Development Office, Office of the National Economic and Social Development Board. Tenth National Economic and Social Development Plan (B.E 2550-2554).

[6] The National Competitiveness Development Office, Office of the National Economic and Social Development Board. (2011),The analysis of the indicators and approaches to Thailand's weakness management.

[7] The Office of the National Research Council of Thailand. The report on the monitoring and evaluation of research results in the public sector in FY2009.

[8] Travis J. Lybbert **(**2012**),** "Agricultural technologies for climate change in developing countries: Policy options for innovation and technology diffusion". *Food Policy* 37 (2012) 114–123.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM)

[9] Gagnon, M. L. (2011), "Moving knowledge to action through dissemination and exchange." *J Clin Epidemiol* 64(1): 25-31.
[10] Glasgow, R. E., *et al.* (2012), "An evidence integration triangle for aligning science with policy and practice." *Am J Prev Med* 42(6): 646-654.
[11] Kim, Y., *et al.* (2012), "The effect of the triple helix system and habitat on regional entrepreneurship: Empirical evidence from the U.S." *Research Policy* 41(1): 154-166.
[12] Diedrich, A., et al. (2011), "Framing environmental sustainability challenges for research and innovation in European policy agendas." *Environmental Science & Policy* 14(8): 935-939.
[13] Beesley, L. G. A. (2003), "Science policy in changing times: are governments poised to take full advantage of an institution in transition?" *Research Policy* 32(8): 1519-1531.
[14] Geisler, E. (1994), "Key Output Indicators in performance evaluation of Research and Development organizations." *Technological Forecasting and Social Change* 47(2): 189-203.
[15] Albors-Garrigos, J., *et al.* (2009), "Analysing high technology adoption and impact within public supported high tech programs: An empirical case." *The Journal of High Technology Management Research* 20(2): 153-168.
[16] Son, M. and K. Han (2011), "Beyond the technology adoption: Technology readiness effects on post-adoption behavior." *Journal of Business Research* 64(11): 1178-1182.
[17] Shafran, R., *et al.* (2009), "Mind the gap: Improving the dissemination of CBT." *Behav Res Ther* 47(11): 902-909.
[18] Sianipar, C. P. M., *et al.* (2013), "Community Empowerment through Appropriate Technology: Sustaining the Sustainable Development." *Procedia Environmental Sciences* 17: 1007-1016.
[19] Uddin, M. K. (2006), "The role of diffusion of innovations for incremental development in small enterprises." *Technovation* 26(2): 274-284.
[20] Walter, A. I., *et al.* (2007), "Measuring societal effects of transdisciplinary research projects: design and application of an evaluation method." *Eval Program Plann* 30(4): 325-338.
[21] Bjerregaard, T. (2010), "Industry and academia in convergence: Micro-institutional dimensions of R&D collaboration." *Technovation* 30(2): 100-108.
[22] Bowen, S. J. and I. D. Graham (2013), "From knowledge translation to engaged scholarship: promoting research relevance and utilization." Arch Phys Med Rehabil 94(1 Suppl): S3-8.
[23] Smith, David **(**2006**),** Exploring Innovation (First Edition ed.) . *UK: McGraw-Hill Higher Education*.
[24] Andrews, G. and N. Titov (2009), "Hit and miss: Innovation and the dissemination of evidence based psychological treatments." *Behav Res Ther* 47(11): 974-979.
[25] Straus, S. E., *et al.* (2011), "Knowledge translation is the use of knowledge in health care decision making." *J Clin Epidemiol* 64(1): 6-10.
[26] Rampersad, G., *et al.* (2012), "Investigating the use of information technology in managing innovation: A case study from a university technology transfer office." *Journal of Engineering and Technology Management* 29(1): 3-21.
[27] Zhu, B., *et al.* (2011), "Adoption of renewable energy technologies (RETs): A survey on rural construction in China." *Technology in Society* 33(3-4): 223-230.
[28] Biesma, R., *et al.* (2012), "The implementation of a global fund grant in Lesotho: applying a framework on knowledge absorptive capacity." *Soc Sci Med* 74(3): 381-389.
[29] Akbar, H. and S. Mandurah (2013), "Project-conceptualisation in technological innovations: A knowledge-based perspective." *International Journal of Project Management*.
[30] Nieto, M. and P. Quevedo (2005), "Absorptive capacity, technological opportunity, knowledge spillovers, and innovative effort." *Technovation* 25(10): 1141-1157.
[31] Robertson, P. L., *et al.* (2012), "Managing open incremental process innovation: Absorptive Capacity and distributed learning." *Research Policy* 41(5): 822-832.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM)

[32] Behkami, N. A. and T. U. Daim **(**2012**),** "Research Forecasting for Health Information Technology (HIT), using technology intelligence." *Technological Forecasting and Social Change* 79(3): 498-508.

[33] Batz, F. **(**2003**),** "Predicting technology adoption to improve research priority—setting." *Agricultural Economics* 28(2): 151-164.

[34] Subedi, M., et al. (2009), "An Awareness-Adoption Matrix for Strategic Decision Making in Agricultural Development Projects: A Case Study in Yunnan Province, China." *Agricultural Sciences in China* 8(9): 1112-1119.

[35] Baumgart-Getz, A., *et al.* (2012), "Why farmers adopt best management practice in the United States: a meta-analysis of the adoption literature." *J Environ Manage* 96(1): 17-25.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM)