Factors Affecting the Success of Thai Beekeepers in Beekeeping

Niramol Treetrapetch[1]
Lieutenant General Dr. Tawee Jamjumrus [2]
tawee.ja@ssru.ac.th
Dr. Withilak Chantanasombat [3]
Withilak.ch@ssru.ac.th
[1] Students in the Doctor of Philosophy Program in Development Administration
Suan Sunandha Rajabhat University
Niramol.t2503@gmail.com
[2]Graduate School, Suan Sunandha Rajabhat University
[3] Graduate School, Suan Sunandha Rajabhat University

Abstract

The objectives of this research were to: 1) study the levels of beekeepers' qualifications, beekeeping management, ecological equilibrium, marketing performance and the success of beekeeping of Thai beekeepers; 2) examine factors affecting the success of Thai beekeepers; and 3) develop a model that contributes to the success of beekeeping of Thai beekeepers. This research employed a mixed research methodology combining quantitative and qualitative methods. For the quantitative research part, the sample consisted of 300 beekeepers and people involving in beekeeping. The sample size was determined based on the criterion 20 times the observed variables which consisted of 15 variables. They were selected via stratified sampling. Data were collected via the use of a questionnaire and analyzed with a structural equation model. As for the qualitative research component, in-depth interviews were conducted with 12 key informants including bee farm owners and related parties. The selection criterion was the success of the farm operation. Data were then analyzed by content analysis. The research findings showed that:1) beekeepers' qualifications, beekeeping management, ecological equilibrium and marketing performance were rated at a high level whereas the success of beekeeping of Thai beekeepers was at the highest level; and 2) ecological equilibrium had the greatest overall influence on the success of beekeeping of Thai beekeepers, followed by beekeeping management, beekeepers' qualifications, and marketing performance, respectively; and 3) the relationship model of the factors including beekeepers' qualifications, beekeeping management, ecological equilibrium, and marketing performance that affected the success of beekeeping of Thai beekeepers provided a guideline for the development of a comprehensive beekeeping career and contributed to the

sustainable success in the future. These research findings enable beekeeping entrepreneurs and stakeholders to understand the components that affect the success of beekeeping. They represent a body of knowledge in various fields that can be used to enhance the efficiency of beekeeping and improve the quality of life of beekeepers in a sustainable way. They also enable the beekeepers to realize the importance of reducing the use of chemicals in growing crops and beekeeping which are beneficial in terms of the preservation of local resources.

Keywords Success of Beekeeping, Beekeepers, Ecological Equilibrium

Introduction

Bees have long been insects which are useful to humans, both in terms of agricultural productivity (i.e. they help pollinate plants, which results in an increase in the productivity of crops) and the production of food, cosmetics, supplies and medication. Bees are also beneficial in terms of the production of certain products. These products can be classified, based on how the products are produced, into two main groups: (1) products that are produced from materials that bees bring from outside the hive, namely honey, propolis, and pollen; and (2) products produced by the bees themselves which are bees wax, royal jelly, and bee venom (Siriwat & Sureerat, 2012). In addition, bees play an important role in helping pollinate crops which in turn help increase the productivity of the agricultural products for farmers. They also help farmers realize the consequences of the use of pesticides for the crops. We can say that bees provide the common benefit for both farmers and beekeepers as bees help pollinate the plants, and beekeepers can benefit from bee products (Suthichai et al., 2007).

Beekeeping is becoming more and more important day by day as bees serve as economic insects that can increase the export value of the country. Bees can provide both direct and indirect benefits. Beekeeping has become a way for living and created more income for farmers. They can help increase agricultural productivity. Moreover, they play an important role in the ecological equilibrium because bees are non-specific pollinators and forage all year round. In addition, honey has been used to produce body care and the health care products. Many products have also been used in various industries. Some products produced from bees have been exported and generated a lot of income into the country. Bees are economic insects that can be used to promote and develop a career for farmers.

At present, beekeeping is considered as an alternative occupation that can increase income for farmers and create new jobs without causing pollution or any damages to the nature. The important thing that the beekeepers or beekeeping entrepreneurs should learn,

study and understand is that they need to apply technologies in the beekeeping processes in order to make it more convenient and effective. Technologies can also help increase productivity and add value to the products produced from bees. Technologies are beneficial to the farmers, the communities and the whole society as they can help in solving problems which lead to the sustainable development of the bee farms (Wiwat, 2016). However, the researchers found that beekeeping still faces a number of obstacles and problems that hider the success which can be divided into two main aspects: 1) obstacles and problems from the beekeepers themselves as they lack sufficient knowledge and understanding of management processes; and 2) those related to ever-changing natural environment which causes ineffectiveness in beekeeping.

The background and significance of the problem show that the development, training and enhancement of knowledge and skills of the beekeepers have an effect on the proper management of bee farms which are consequently beneficial for the beekeepers and related parties as these factors enable them to understand various elements leading to the success of beekeeping. Based on the literature review, there are several factors affecting the success of Thai beekeepers, but in this research, the researcher emphasized on beekeepers' qualifications, beekeeping management, ecological equilibrium, and marketing performance.

Research objectives

1. To study the levels of beekeepers' qualifications, beekeeping management, ecological equilibrium, marketing performance and the success of beekeeping of Thai beekeepers;
2. To examine factors affecting the success of Thai beekeepers
3. To develop a model that contributes to the success of beekeeping of Thai beekeepers.

Research scopes

1. For the scope of the research in terms of the population, a combination of proportion sampling and systematic sampling were used. The size of the sample was calculated based on the proportion. The multivariate statistical analysis and the structural equation modeling (SEM) suggest that the sample size should be determined based on the 20 times the variables (Supamas et al., 2011). The conceptual framework of this study identified 15 variables. The data was collected from 300 individuals (20x15 = 300 individuals) from four targeted provinces in the Western regions of Thailand. These 300 respondents consisted of 30 individuals from Kanchanaburi Province, 10 from Ratchaburi Province, 75 from

Phetchaburi Province, and 185 people from Prachuap Khiri Khan Province. A questionnaire was used as a data collection instrument. In addition, in-depth interviews were also conducted with 15 key informants including farmers, owners of bee farms and related persons. They were selected from successful bee farms in Thailand.

2. For the research scope in terms of variables, a structural model showing the relationship of the variables was developed. These variables included:

2.1 One external latent variable which was the farmer qualification. This variable was measured in terms of: 1) knowledge; 2) skills; and 3) talents.

2.2 Four internal latent variables. The manifested variable was beekeeping management, and the three observed variables were measured in terms of: 1) personnel; 2); time; and 3) bee population.

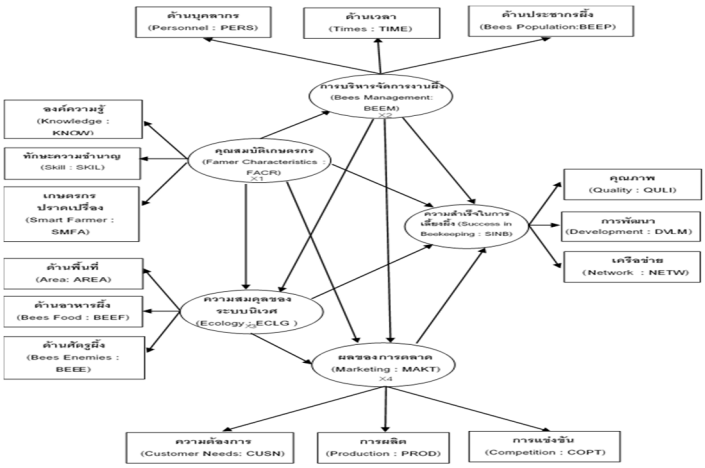
2.3 Ecological equilibrium which consisted of 3observed variables including: 1) area 2) food for bees 3) bee pests.

2.4 Marketing performance which consisted of 3 observed variables including: 1) demand; 2) production; and 3) competition.

2.5 Success in beekeeping which consisted of 3 observed variables including: 1) quality; 2) development; and 3) network.

3. For the scope in term of time period, the researcher conducted the study between January - December 2020.

Figure 1 The research conceptual framework



The factors affecting of the success of Thai beekeepers in beekeeping

The conceptual framework of this research shown above represents the relationship between variables which affected the success of Thai beekeepers in beekeeping. These variables consist of 5 latent variables which are beekeepers' qualifications, beekeeping management, ecological equilibrium, marketing performance, and success in beekeeping. Based on this framework, the structural model consisting of the research hypotheses was developed. They are:

Hypothesis 1: Beekeeping management depends on beekeepers' qualifications.

Hypothesis 2: Ecological equilibrium depends on beekeeping management, and beekeepers' qualifications

Hypothesis 3: Marketing performance depends on beekeeping management, beekeepers' qualifications, and ecological equilibrium

Hypothesis 4: The success in beekeeping depends on beekeeping management, beekeepers' qualifications, ecological equilibrium, and marketing performance.

Research methodology

1. Research approach

This study employed a mixed research methodology combining quantitative and qualitative research methods. The quantitative method was used as the primary approach whereas the qualitative research served as the supporting approach. This approach enabled the researcher to achieve all of the research objectives.

2. Research process

2.1 In the data preparation stage, data were gathered from documents, textbooks, articles, research reports, both from the hard copies and the Internet. Theories, concepts and articles on the beekeepers' qualifications, beekeeping management, ecological equilibrium, marketing performance, and the success of beekeeping were analyzed in order to ensure that all the main components were studied.

2.2 In the second stage, all the data gathered in the previous stage were analyzed in order to develop the question items for the questionnaire. Then, a questionnaire was sent to the experts who verified its validity. After that the verified questionnaire was used to collect the data from beekeepers who were not the sample group of the study in order to verify its reliability.

2.3 In the third step, a questionnaire was used to collect the data from the sample group. Then, the data were examined and analyzed.

2.4 In the fourth step, a conclusion was developed and the descriptive results were presented by using tables and diagrams in order to determine the factors which affected the success of beekeeping of Thai beekeepers. A complete model which could be applied in the real situation was also developed

3. Data collection

3.1 Sent a letter to the key informants requesting for a permission to conduct in-depth interviews, and started collecting the qualitative data.

3.2 Collected questionnaires and data from the in-depth interviews on the predetermined dates and times.

4. Data analysis: the researcher analyzed the data by following these steps:

4.1 Data analysis

4.1.1 Descriptive statistics were used to obtain frequency, percentage, mean and standard deviation which were used to describe the profile of the respondents. SPSS was utilized.

4.1.2 For the inferential statistics: a structural equation model (SEM) was used to test the relationship between latent and manifest variables and the relationship between independent and dependent variables. LISREL was used to identify the influence of beekeepers' qualifications, beekeeping management, ecological equilibrium, and marketing performance on the success of beekeepers in beekeeping.

Research findings

1. For the levels of beekeepers' qualifications, beekeeping management, ecological equilibrium, marketing performance, and the success in beekeeping of Thai beekeepers, in overall, beekeepers' qualifications were rated at a high level (4.13), among this the aspect of knowledge was the highest, followed by talents and skills, respectively. For the beekeeping management, it was rated at a high level (4.00) in overall, and the aspect of bee population was the highest, followed by personnel, and time, respectively. In terms of ecological equilibrium, it was rated at a high level (3.99) in overall, and the aspect of the area was the highest, followed by bee pests, and bee food, respectively. For the marketing performance, it was rated at a high level (4.05) in overall, and the aspect of demand was the highest, followed by competition, and production, respectively. Lastly, for the success of beekeeping, it was rated at the highest level (4.25) in overall, and the aspect of network was the highest, followed by quality, and development, respectively.

2. Beekeepers' qualifications, beekeeping management, ecological equilibrium, and marketing performance had an influence on the success of beekeeping of Thai beekeepers.

The analysis results of the structural equation model conformed to the empirical data as it was found that: 1) the relative chi-square value (/ df) was equal to 1.37; 2) the comparative fit index (CFI) was equal to 1.00; 3) the Goodness of Fit Index (GFI) was at 0.98; 4) the Adjusted Goodness of Fit Index (AGFI) was equal to 0.95; 5) the Root Mean Square Residual (RMR) was equal to 0.009; 6) the Root Mean Square Error of Approximation (RMSEA)) was equal to 0.035; 7) The largest standardized residual must not exceed 2; 8) the Q-plot was steeper than the diagonal lines; and 9) the Sample Size Index (Critical N: CN) was at 354.28, all of which indicated that the model had a comparative fit.

In terms of the direct and indirect influences between different variables and the success of beekeeping of Thai beekeepers, the variables that had the overall influence, sorted in a descending order, were: 1) ecological equilibrium (ECLG) (=0.90); 2) beekeeping management (BEEM) (= 0.75); 3) beekeepers' qualifications (FACR) (= 0.68); and 4) marketing performance (MAKT) (= 0.46). Beekeepers' qualifications (FACR) had the greatest direct impact on beekeeping management (BEEM) (= 0.91), followed by ecological equilibrium (ECLG) (= 0.42), the success of beekeeping (SINB) (= 0.35) and marketing performance (MAKT) (=0.24), respectively. It also had an indirect effect on the marketing performance (MAKT), ecological equilibrium (ECLG), and the success of beekeeping (SINB). (the values were 0.64, 0.52 and 0.33 respectively). Moreover, beekeeping management (BEEM) had the greatest direct impact on marketing performance (MAKT) (= 0.93), followed by ecological equilibrium (ECLG) (= 0.57) and the success of beekeeping (SINB) (=0.46). It also had an indirect effect on the success of beekeeping (SINB)(= 0.29), but did not have an indirect effect on the marketing performance (MAKT) (=0.07). As for the ecological equilibrium (ECLG), it had a direct effect on marketing performance (MAKT) (=0.53), followed by the success of beekeeping (SINB) (=0.43). It also had an indirect effect on the success of beekeeping (SINB) (=0.47). For the marketing performance (MAKT), it had a direct effect on the success of beekeeping (SINB) (=0.46).

The correlation between internal and external latent variables showed a very high positive correlation. The "r" value was equal to 0.85-0.98. The pair that had a very high correlation was the pair of marketing performance (MAKT) and the success of beekeeping (SINB) which had a value of 0.98, followed by a pair of ecological equilibrium (ECLG) and beekeeping management (BEEM) (=0.95). the correlation value of the pair of marketing performance and beekeeping management was equal to that of ecological equilibrium and beekeepers' qualification, which were .94. The value of the pair of beekeeping management and the success of beekeeping was also equal to that of ecological equilibrium and success of beekeeping which were equal to .93. Moreover, the value of the pair of beekeeping management and beekeepers' qualifications was at 0.91. The value of the pair of beekeepers'

qualifications and success of beekeeping was equal to that of marketing performance and beekeepers' qualifications which were at .88, and the value of the pair of marketing performance and ecological equilibrium was equal to 0.85, respectively. In addition, it was found that based on the structural equation model, beekeeping management, ecological equilibrium, marketing performance, and success of beekeeping had the R2 values of 0.83, 0.93, 0.98, and 0.93, respectively. The variability of beekeeping management, ecological equilibrium, marketing performance, and success of beekeeping were equal to 83, 93, 98 and 93 percent respectively.

The overall analysis showed that the Goodness of Fit Index conformed to the empirical data better, and met with the standards which indicated the a high level of consistency between the model and empirical data.

3. As for the model influencing the success of beekeeping among Thai beekeepers, the results of hypothesis testing show that:

3.1 Beekeepers' qualifications had an effect on the success of beekeeping with a statistical significance. This can be explained that the higher the beekeepers' qualifications, the more the success of beekeeping. Beekeeping management had an effect on the success of beekeeping with a statistical significance. This can be explained that the better the beekeeping management, the more the success of beekeeping. Ecological equilibrium had an effect on the success of beekeeping with a statistical significance. This means that the higher the ecological equilibrium, the more the success of beekeeping. Marketing performance had an effect on the success of beekeeping with a statistical significance which means that the better the marketing performance, the more the success of beekeeping.

3.2 Beekeepers' qualifications had an effect on marketing performance with a statistical significance. This can be explained that the higher the beekeepers' qualifications, the higher the marketing performance. Beekeeping management had an effect on marketing performance with a statistical significance. This can be explained that the better the beekeeping management, the higher the marketing performance. Ecological equilibrium had affected on marketing performance with a statistical significance. This can be explained that the higher the ecological equilibrium, the higher the marketing performance.

3.3 Beekeepers' qualification had an effect on ecological equilibrium with a statistical significance. This can be explained that the higher the beekeepers' qualifications, the higher the ecological equilibrium. Beekeeping management had an effect on ecological equilibrium with a statistical significance. This means the better the beekeeping management, the higher the ecological equilibrium.

3.4 Beekeepers' qualifications had affected on beekeeping management with a statistical significance. This can be explained that the higher the beekeepers' qualifications, the better the beekeeping management.

Discussion of research findings

Discussion of research findings

1. Body of knowledge, skills, and smart farmer were important to the beekeepers' qualifications with statistical significance. This can be seen from the body of knowledge which was rated at the highest level whereas skills and smart farmer were rated at a high level. These results are consistent with the qualitative research of Peter Seng (1991, pp. 82-93) states that learning refers to a situation in which persons are able to do something that they have never been done before, and it leads to the new development. Learning consists of five key components including: 1) personal mastery; 2) mental model; 3) shared vision; 4) team learning; and 5) system thinking, all of which lead to the ability to plan and complete each small part. The findings are also in accordance with the study of Busayamas Saengnern (2019, para.1) who said that the accumulation of professional expertise allows people to continually developed and have more knowledge and expertise in work in a broader way.

2. Personnel, time, and bee population were important to the beekeeping management with statistical significance. This can be seen from the fact that all aspects were rated at a high level. These findings are also consistent with the qualitative research findings and conform to the concept of Thongchai Santiwong (2000, pp. 21-22), which argues that there are 3 areas of administration and management which are: 1) leadership or supervisory; 2) mission or action; and 3) responsibility.

3. Areas, food for bees, and bee pests were important to the ecological equilibrium with statistical significance. This can be seen from the fact that area, food for bees, and bee pests were rated at a high level. The results are consistent with the qualitative research findings and consistent with the concept of Wittawat Yutthakosa (2015, n.a.) who states that the important factors that need to be considered in selecting a place for beekeeping include the type and the amount of local food crops. Another factor to be considered is the natural enemies such as birds, ants, wasps, some types of crawling pets, etc. Some of these natural enemies may destroy the bees in the whole nest, and some of which cause the population in the nest to decrease. Therefore, it is necessary to provide special care for the bees in order to keep them away from these pests.

4. Demand, productivity, and competition were important to marketing performance with statistical significance. This can be seen from the fact that all aspects were rated at a high

level. These results are consistent with the qualitative research findings and in accordance with the concept of Somchart Kitiyongyong (2006, pp. 22-25), who points out that good marketing management is essential to the success of any business. The key to any business success is customer satisfaction which using the marketing mix or 4Ps. The marketers have to manage the 4Ps to suit with the needs and behaviors of the customer. These 4Ps are: 1) product; (2) price; 3) place or distribution; and 4) promotion.

5. Quality, development, and network were important to the success of beekeeping. This can be seen from the fact that network was rated at the highest level whereas quality and development were rated at a high level. These results are consistent with qualitative research findings and conform to the concept of Somkhin Hong Kongka (August 25, 2020, Interview) who said that creating a network for a group of local beekeepers is critical to the implementation of beekeeping activities as it helps make beekeeping become more systematic. The beekeepers can also cooperate with each other and seek help from relevant government agencies to solve the problems currently faced by them. In addition, the network also helps in developing a pathway for beekeeping career in a more comprehensive way which in turn leads the beekeepers to enjoy sustainable success in the future.

Suggestions

1. The followings are some suggestions which can be applicable in beekeeping management.

1.1 The ecological equilibrium in terms of the area, food for bees, and bee pest is an important issue that needs to be considered by the beekeepers. The is the because the selection of the hive location is related to the amount of food used to feed the bee population within the hive, and this also serves as the main factor leading bees to have perfect health. At the same time, the beekeepers also need to have a well-organized system of pest control as this factor will result in quality bee products.

1.2 For the management of bee jobs, the beekeepers should pay attention in the planning process and the information on how to spend time appropriately in beekeeping in each season. They need to control the number of bee population, and assess the amount of food available in the hives and ensure that there is sufficient food to feed the bees. These factors also lead the bees to have healthy and perfect conditions, resulting in quality bee products.

1.3 In terms of the beekeepers' qualifications, the beekeepers should be provided with more opportunities to learn, get training and develop their skills based on the principles of proper beekeeping. They should also have experts who serve as their mentors.

1.4 For the marketing performance, the focus should be on consumer demand, control of the production of honey or other bee produces and the use of materials that meet with the requirements of good agricultural practice for bee farms. These factors can help in creating trust and reliability in the quality and safety of the products which will in turn encourage consumers to have a growing demand for the products, and this can result in the growth of the beekeeping business and the achievement of competitive advantage.

1.5 In terms of the success in beekeeping, entrepreneurs of good beekeeping businesses should continue to develop their business and strive to develop innovative products for the markets. They should try to compete in the global marketplace. The emphasis should be placed on the development of networks among beekeepers as this can strengthen the beekeepers and serve as a means to develop a comprehensive beekeeping career sustainably in the future.

2. Suggestions for future research

2.1 More studies should be conducted on the factors influencing the decision-making to presume a beekeeping career. Such studies can provide a guideline for those residing the communities as well as other persons who may be interested in beekeeping as they will have useful information to help in making a decision.

2.2 The studies on the development of techniques to increase productivity of bee-related products and the use of new innovations in integrated agriculture should be conducted. The findings of these studies can serve as a guideline to increase the productivity and provides the feasibility in the beekeeping business.

2.3 There should also be studies on the food crops and the business by-products of beekeeping so that the society and communities can understand the diversity of food crops and by-products of beekeeping, and they can take part in the conservation of these crops so that they can serve as a sustainable food source for bees.

References

Thai

Kunides, N. & Somjai, S. (2015). Advanced research methods and research design (2nd ed.). Bangkok: Master Print Samsen.

Suntiwong, T. (2000). Strategic management. Bangkok: Thai Wattana Panich.

Saengngoen, B. (2019). Building career expertise (Expertise - EXP). Retrieved March 27, 2019, from https://www.gotoknow.org/posts/437581.

Waramit, W. (2016). Information for livestock farm management. Agricultural Technology Rajamangala University of Technology Eastern. Chanthaburi Campus: Animal Production Technology Program.

Yuthakosa, W. (Program producer). (2015, February, 28). Beekeeping for occupation. [Radio program]. Bangkok: Kasetsart University Research and Development Institute.

Kitiyanyong, S. (2018). Marketing strategy for executives. Bangkok: S. Asia Place (1989).

Wongsiri, S. & Dowanich, S. (2012). Bee Biology. (3rd ed.). Bangkok: V. Print (1991).

Angsuchote, S. et al. (2011). Statistical analysis for research in social sciences and behavioral sciences. Techniques for using LISREL program (3rd ed.). Bangkok: CDMKprinting.

Suthiwarapirak, S. Thongjang, U. & Seneewong Na Ayudhya, O. (2007.) The situation of beekeeping in Thailand. In the accompanying document for the seminar on Beekeeping approaches to bee farm standards. (The page number does not appear). Chiang Mai: Chiang Mai Orchid Hotel.

English

Award, E. M. and Ghaziri, H. M. (2004). Knowledge management. New Jersey: Pearson Education.

Best & Kahn James V. (1993). Research in Education. (7th ed.) Boston: Allyn and Bacon.

Crane, E. (1975). The World's Beekeeping-Past and present in The Hive and the Honey Bee. Hamilton, Illinois: Dadant & Sons Inc.

Free, J. B. (1982). Bees and Mankind. London: George Allen & Unwin Ltd.

Seng, P. M. (1991). Team Learning. McKinsey Quarterly.