



***SUSTAINABLE MANAGEMENT OF THE SWIFTLET RANCHING INDUSTRY
IN JOHOR BAHRU AND GUA MUSANG, MALAYSIA***

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INDUSTRY IN JOHOR BAHRU AND GUA MUSANG, MALAYSIA**

By

RABIATUL MUNIRAH BTE ALPANDI

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in
Fulfilment of the Requirements for the Degree of Doctor of Philosophy**

November 2018

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Doctor of Philosophy

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Chairman : Mohd Shahwahid Haji Othman, PhD

The rise in the number of swiftlet ranches leading to a year-on-year rise in EBN production is testament to the beguiling market demand. However the industry faces a major hurdle where 70 percent to 80 percent of swiftlet ranches are regarded as inefficient since failed to achieve 1.36kg of nest after one year of operation due to a lack of understanding and knowledge in the management of swiftlet ranching. In order to boost the production of EBN, the level of total management efficiency of swiftlet ranches in Johor Bahru and Gua Musang has been measured using the Data Envelopment Analysis (DEA). The results reveal that the efficiency of management inputs (electricity, water irrigation, human labour and pesticides) are more important than the scale or size in both areas. The DEA results also suggest that there are a total of 15 efficient ranchers in both areas that can be as benchmarked for inefficient ranchers. From the empirical results of the Tobit regression, the usage of planks, water irrigation and labour are important determinants that can influence total management efficiency in Johor Bahru while size of swiftlet ranch and water irrigation are important determinants in Gua Musang. By applying the DEA method its not only can help to improve the level of management of swiftlet ranch but also can improve the environment practice with an optimum input energy level for only 18.04MJ and 9.81MJ was required for Johor Bahru and Gua Musang respectively. As such, the total energy that could be potentially be saved at 286.69% and 700.14% for Johor Bahru and Gua Musang respectively.

Other than that, the management of swiftlet ranch also can be improve by maps out the social network of swiftlet ranching in Johor Bahru and Gua Musang in order to capture the main stakeholders that can play an important role for knowledge sharing regarding the management of swiftlet ranch. In Johor Baharu and Gua Musang Rancher 3 and Rancher 21 have higher indegree relationships where known as the higher knowledge collector in the network, while for out degree relationship, Rancher 2 and DV1 are the main stakeholder that can play role as given information regarding management of swiftlet ranches. However base on the result centralization closeness 36.52% in Johor Bahru and 39.92% in Gua Musang showing that the knowledge sharing inside both

networks are subdued. All this important stakeholder need to be highlight since any information and policy to improve the management of the swiftlet ranch can be seen through these actors or stakeholders to ensure the industry becomes more successful in the future.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

PENGURUSAN MAMPAN INDUSTRI PENTERNAKAN WALID DI JOHOR BAHRU DAN GUA MUSANG

Oleh

RABIATUL MUNIRAH BTE ALPANDI

November 2018

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Kenaikan bilangan rumah burung walid dari tahun ke tahun dan peningkatan pengeluaran EBN adalah bukti permintaan pasaran yang menggalakkan. Bagaimanapun industri menghadapi halangan utama dimana kira-kira 70 peratus hingga 80 peratus daripada rumah burung walet dianggap tidak cekap kerana gagal mencapai 1.36kg sarang selepas satu tahun beroperasi kerana kurangnya pemahaman dan pengetahuan dalam pengurusan penternakan burung walid. Dalam usaha untuk meningkatkan pengeluaran sarang burung walid, tahap kecekapan peternakan burung walet di Johor Bahru dan Gua Musang telah diukur menggunakan Analisis Pengumpulan data (DEA). Hasilnya mendedahkan bahawa kecekapan pengurusan input (elektrik, pengairan air, tenaga buruh dan racun perosak) lebih penting daripada skala atau saiz input yang digunakan di kedua-dua kawasan. Keputusan DEA juga mencadangkan terdapat sebanyak 15 pengusaha rumah burung yang cekap di kedua-dua kawasan yang dapat dijadikan sebagai penanda aras bagi pengusaha yang tidak cekap. Dari hasil keputusan regresi Tobit, penggunaan papan pemancang, pengairan air dan tenaga buruh merupakan factor penentu penting yang dapat mempengaruhi kecekapan menguruskan rumah burung secara keseluruhan di Johor Bahru manakala saiz rumah burung dan pengairan air adalah factor penentu di Gua Musang. Dengan menggunakan kaedah DEA ianya bukan hanya boleh membantu meningkatkan taraf menguruskan rumah burung walit tetapi juga boleh membantu dalam pengurusan alam sekitar dengan jumlah tenaga optimum yang digunakan bagi rumah burung hanya 18.04MJ dan 9.81MJ bagi Johor Bahru dan Gua Musang. Oleh itu, jumlah tenaga yang boleh disimpan ialah 286.69% dan 700.14% bagi Johor Bahru dan Gua Musang. Selain itu, pengurusan rumah burung walit juga boleh di pertingkatkan dengan memetakan rangkaian social rumah burung walit di Johor Bahru dan Gua Musang dengan mengenalpasti pemegang kepentingan yang boleh memainkan peranan penting dalam berkongsi maklumat berkenaan pengurusan rumah burung walit. Di Johor Bahru dan Gua Musang Penternak 3 dan Penternak 21 mempunyai bilangan hubungan “indegree” paling banyak dimana dikenali sebagai pengumpul maklumat di dalam rangkaian, selain itu hubungan “outdegree” penternak 2 dan DVS1 adalah paling penting dimana memainkan peranan sebagai pemberi informasi berkenaan pengurusan rumah burung walit. Walaubagaimanapun berdasarkan keputusan pemusatan keakrapan, 36.52% di

Johor Bahru dan 39.92% di Gua Musang menunjukkan perkongsian maklumat didalam rangkaian masih lemah. Kesemua pemegang kepentingan yang penting ini perlu di perkenalkan kerana sebarang maklumat dan polisi untuk mempertingkatkan pengurusan rumah burung walit boleh dicari melalui pelakon atau pemegang kepentingan ini bagi memastikan industri lebih berjaya di masa akan datang.



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I certify that a Thesis Examination Committee has met on 20 August 2018 to conduct the final examination of Siti Salwa binti Sheikh Mokhtar on her thesis entitled "Factors Contributing To Zakat Compliance Behaviour Among Employees In Melaka, Malaysia " in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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LIST OF ABBEVIATIONS

| | |
|------|-----------------------------------|
| DEA | Data envelopment analysis |
| DMU | Decision making units |
| DVS | Department of Veterinary Services |
| EBN | Edible bird nest |
| EPP | Entry point project |
| ETP | Economic Transformation Programme |
| GNI | Gross national income |
| MOA | Ministry of Agriculture |
| NKEA | National Key Economic Areas |
| PTE | Pure technical efficiency |
| SE | Scale efficiency |
| USA | United States of America |
| VRS | Variable returns to scale |
| CRS | Constant returns to scale |
| SNA | Social network analysis |
| TBL | Three bottom lines |
| SD | Sustainable development |
| ESTR | Energy saving target ratio |

CHAPTER 1

INTRODUCTION

This chapter aims to provide a general idea of the study regarding the edible bird nest (EBN) industry. The first part of the chapter provides general information about the study and the issues this research ought to address, while the latter part discusses the objectives, significance, framework and summary.

1.1 Background of study

EBN is a collective name that refers to the nest produced by several species of swiftlets, which is of commercial value, and consumed, either in whole or in part, by humans. In Malaysia, these birds are commonly known as "burung walid". Although there are eight species found in Malaysia, only two are able to produce edible nests, which are *Aerodramus fuciphagus* (EBN from swiftlet ranches) and *Aerodramus maximus* (EBN from cave) (Zulnaidah and Mohd Shahwahid, 2012). *Aerodramus fuciphagus* species build their nest using saliva – usually known as “white nest” (Figure 1.1), while *Aerodramus maximus* are known for their black nest (Figure 1.2) because the nest is built using saliva mixed with feathers.



Figure 1.1: *Aerodramus fuciphagus* in a white nest
(Source: International Animal Rescue Foundation Asia)



Figure 1.2: *Aerodramus maximus* in a black nest
(Source: International Animal Rescue Foundation Asia)

The EBN industry has long existed in Malaysia – it was first traded in China during the Tang Dynasty (618-907 AD), and there is also historical proof that Admiral Cheng Ho, during the years between 1368 and 1644, had introduced it to the imperial Court of the Ming Dynasty. In China, EBN is considered as a luxurious delicacy, as it was consumed by the Imperials in China. Demand for EBN is normally amplified during the Chinese New Year, as gifts of bird's nest are synonymous with wealth and good fortune (Zulnaidah and Mohd Shahwahid, 2012).

This industry is well-known as an exotic commodity that caters to the Chinese market. This is because it is widely believed that EBN produced by *Aerodramus fuciphagus* using salivary secretions has potential therapeutic effects in traditional Chinese medicine and also can help to trigger cell division resulting in skin rejuvenation (Guo et al., 2006). Because of its high nutritional and medicinal value, demand for EBN has annually increased in the global market, and with it, the growth in its trade. This has led to EBN from Malaysia reaching the RM66,000 per kg price tag in China. In September 2015, the price for raw clean EBN in Malaysia was around RM8,000 per kg while the price for raw unclean EBN hovered at RM3,000 per kg (Mstar, 2016).

In Malaysia, bird nests were originally harvested from caves, which are commonly found at limestone caves at Gomantong and Niah in Borneo. However as demand for the EBN increased, the bird house business or swiftlet ranching saw a boom in the late 1990s in order to fulfil the needs of the market. The purpose-built swiftlet ranch, as seen in Figure 1.3, involves the conversion of human-centric buildings to a design that can suit the nature of swiftlets (like cave), in order to lure the birds to reside in these purpose-built concrete dwellings and more importantly, nest there. (Ibrahim et al., 2009).



Figure 1.3: A purpose-built swiftlet ranch

Swiftlet ranching is increasingly popular in the real estate today due to its high return on investment with low operation cost. This is because the rancher does not need to control any of the bird's movement, feeding, or even breeding because the swiftlet life may go on naturally without any interference from human. There are no set specifications or standard operation procedure (SOP) for the construction of swiftlet ranch. Various building designs made to look like the original swiftlet cave habitats have been used in swiftlet ranching. In general, these houses are made from concrete with dark hollow interior space, cool and humid ambience. These swiftlet house designs include:

- i. converted empty shop lots
- ii. renovated terrace houses
- iii. single houses with the second storey converted for ranching
- iv. dedicated 3-storey swiftlet house building

Typically, many swiftlet houses have asbestos rooftop and wood, plywood and polystyrene or white cork interior walls. The wall of a swiftlet house is built similarly to a cave wall to facilitate swiftlet nest building. A swiftlet ranch needs many small entrances for the birds that should not be big enough to allow other larger predators to enter. These predators include owls and hawks. There is one main door used as entrance for labour to maintain the houses and harvest the nests. A swiftlet ranch needs nesting planks for swiftlet to build their nests. The nesting planks are created to encourage high-quality nests by increasing the number of corner nests. These nesting planks are usually made of Light Red Meranti sawn timber.

Other important equipment includes internal and external audio system, mist spray and fake nests. This equipment depends on the ranchers or consultant's creativity and capability. Other characteristics needed in order to lure the birds to come to the swiftlet house include;

- Humidity levels maintained at 80% to 95%.
- Temperature maintained at 26 to 29 degrees Celcius.
- Doors/space between floors – space for birds to fly from the third to second or first storey.
- Doors/space between rooms – this is for swiftlet houses with many small rooms.
- Space/vents to air your swiftlet house
- Roving Areas – space for swiftlet to rove when they enter the house.
- Nesting Areas – space for swiftlet to settle and build nests.
- Equipment Areas – space for all the necessary equipment.
- Safety systems- door lock, closed circuit television (CCTV) and electric pest control

Equipment and their purpose:-

- The MP3 player and amplifier to attract the swiftlet into their new home, and consequently to live and nest there thus increasing nest production.
- Mist sprays are needed to attract swiftlet. These are also useful for monitoring temperature and humidity levels.
- Fake nests must be created in the earlier stages to attract swiftlet to come into the house and build their nest
- A main speaker to attract swiftlet into their new homes
- Tweeters to attract swiftlet into their new homes, live and build their nest thus increasing production (Zulnaidah and Mohd Shahwahid, 2012)

From the above characteristics, the swiftlet ranch needs the electric in order to make the internal and external audio system to be functioning to attract the birds to the house. In natural habitat, the swiftlet only will come the place that full with their population and they will make a sound to make sure that place is theirs. In swiftlet ranch the consultant try to imitate this situation by using internal and external audio system. Electricity and water irrigation are also important in order to control the mist and the temperature setup at 26 to 29 degree Celsius in order to imitate like cave temperature which is not too cold or hot. These birds are very sensitive to the temperature since their nest need to be produced at the place that moist in order to avoid fragile nest structure.

Other than that plank and size also very important in order to increase the potential area for the birds to produce the nest and easier to flying inside the house without any accident. The pesticide also is very important to avoid insects from destroying or eat the valuable nest. These birds are very sensitive to threat, if they feel threatened they will migrate to another place and never come back. That's why one of the condition to manage the swiftlet house is controlling the number of labour harvesting and set the correct timing to come in the house. These birds are very systematic, they will go out from the house early in the morning to find food and return back at dusk. Between this time is very suitable for workers or owner to come in to settle down all the harvesting, cleaning and maintaining purpose (IGP Development of swiftlet Industry, 2010).

According to the Swiftlet Eco Park Group of Companies, there were only 900 swiftlet ranches in Malaysia in 1998 but the numbers have since increased significantly. This can be seen from the Swiftlet premises registration statistics report obtained from the Department of Veterinary Services (DVS), where the number of ranches registered stood at 10,016 units in 2015.

Table 1.1: Swiftlet ranches registered under the DVS in 2015.

| State | Number | Percentage |
|-----------------|---------------|---------------|
| Johor | 2381 | 23.8% |
| Kedah | 452 | 4.5% |
| Kelantan | 384 | 3.8% |
| Melaka | 113 | 1.1% |
| Negeri Sembilan | 579 | 5.8% |
| Pahang | 1012 | 10.1% |
| Perak | 1622 | 16.2% |
| Perlis | 86 | 0.9% |
| Pulau Pinang | 349 | 3.5% |
| Putrajaya | 0 | 0.0% |
| Sabah | 584 | 5.8% |
| Sarawak | 790 | 7.9% |
| Selangor | 921 | 9.2% |
| Terengganu | 693 | 6.9% |
| Kuala Lumpur | 0 | 0.0% |
| Labuan | 50 | 0.5% |
| Total | 10,016 | 100.0% |

(Source: Department of veterinary services (DVS), 2015)

Data from table 1.1 shows that Johor has the highest numbers of swiftlet premise registered which is 2,381 units or 23.8% in Johor and followed by Perak (1,622 units or 16.2%), Pahang (1,012 units or 10.1%), and Selangor (921 units or 9.2%).

1.2 EBN world market overview and EBN contribution to the Malaysian economy

Consumption of EBN has become popular since 1500 years ago. Chinese community across the world constitute the primary market, mainly in China, Singapore, Taiwan and North America. The increasing market demand in China and the emerging of new potential market from the middle east, Korea and Japan lead to constant unmatched demand and supply of EBN. This mismatch is further amplified during Chinese festivals, especially during Chinese New Year as EBN are popular gift. There are thousands of wholesale and retail business operator in China involved in Swiftlet Industry. Swiftlet industries has good branding, which is one of the key factors to expand a business. Guangdong, Shanghai, Fujian, Beijing and other major cities are central areas for the EBN markets.

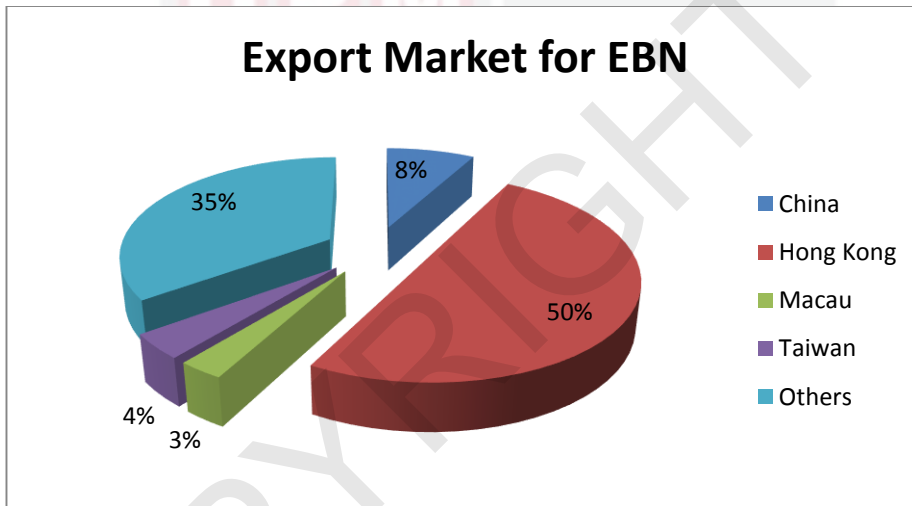


Figure 1.4: Main Export Market for EBN

Based on figure 1.4, Hong Kong recorded the biggest number of EBN consumption by importing 100tons or \$25 million annually which constitutes about 50% of total world trade, followed by China 8%, Taiwan 4% and Macau 3 % (Jeanine Mackey. 2007). According to Malaysian Swiftlet Farming industry report (2007), The total consumption of EBN recorded was approximately 160tons during 2016 and it's valuing from RM8 billion to RM 12 billion. The Swiftlet Eco Park Group Companies (2009) stated that the production of EBN in the world is worth RM13 billion which approximately 2600 tons in 2008.

In Malaysia, the swiftlet ranching industry has been prioritized under the ETP. Under the NKEA, production of EBN is regarded as one of an EPP because of its potential to contribute towards national economic growth. Malaysia, currently the second largest producer of EBN, has consistently achieved a 20 percent global market share compared

to its main competitor – Indonesia, due to better quality and grading of Malaysian EBN (MOA, 2011).

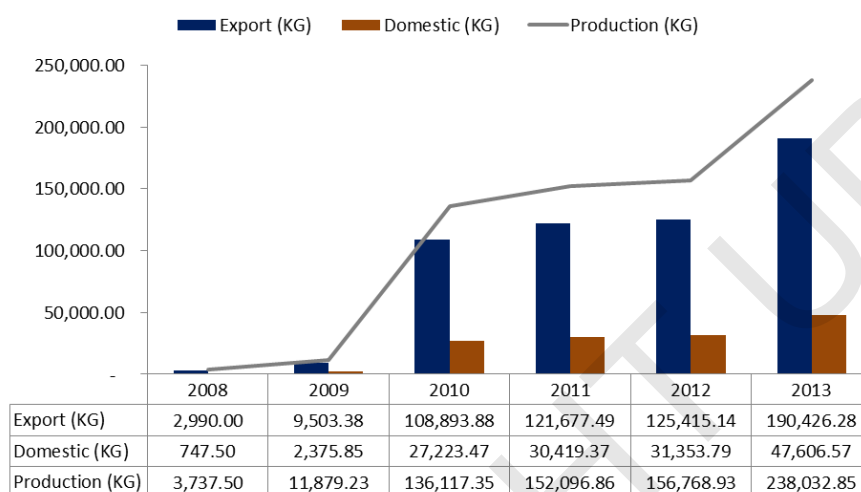


Figure 1.5: Malaysia's export, domestic demand and production of EBN (kg)
(Source: DVS, 2014)

Figure 1.5 shows Malaysia's production as well as local and international demand for EBN. Exponential growth in the export of EBN is particularly seen between 2009 and 2010 (218 percent year-on-year (yoy) and 1,046 percent yoy increase). According to Department of Veterinary Services (DVS), the total export for all exporters in the world only covers 30 percent of the demand for EBN and the remaining 70 percent of world demand still cannot be fulfilled by exporters. Department of Veterinary Services (DVS) also estimates that 80 percent of Malaysia's total production are for export while 20 percent is for the domestic market. From figure 1.5 above, it is seen that the growth in the export of EBN is in tandem with its production.

In the Ninth Malaysia Plan (RMK-9) EBN production was forecasted to increase at eight tonnes per year. However, since 2010, swiftlet ranches have recorded a production hike and achieved continuous growth with the annual production recording an impressive 135 tonnes worth a total of RM1 billion, exceeding the forecast. Base on this prompted the Malaysian Government to recognize the economic potential of the EBN industry and hence, the industry is expected to contribute more than RM5.2 billion to the country's Gross National Income (GNI) and aims for at least 40 percent of the global market share by increasing production to 870 tonnes by 2020 (MOA, 2011).

It is clear that the development of swiftlet ranching has resulted in a steady increase in EBN production. However, demand continues to exceed supply. Despite the huge demand for EBN, more than 70% of Global market has not been met (Abdullah et. al, 2011). Therefore, this presents an ample economic opportunity for Malaysia as an EBN

producer. The future and sustainability of the EBN industry in Malaysia depend very much on the role of swiftlet ranching.

1.3 Problem statement

As mentioned above, despite the growth in the EBN trade that is progressing rapidly, about 70 percent of global demand still cannot be fulfilled (Abdullah et. al, 2011). Malaysia only contributes 20 percent of world demand (Department of Veterinary Services). The production of EBN is expected to see a steady increase due to continued demand. The industry has responded by increasing the number of swiftlet ranches. Thus, the sustainability of this industry is crucial.

However, this begs the question, could the significant increase in the number of EBN ranches in recent years lead to an equivalent rise in the production of EBN to support the demands of the international market? According to Ismail (2014) and Anuar (2013), about 70 percent to 80 percent of EBN ranches are inefficient. Since they implement improper management techniques in terms of internal design and construction of the ranch, thereby resulting in a very small number of nests being produced and failing to achieve the optimal range of production. These ranchers have failed to achieve at least 1.36KG of the nest after a year of operation due to a lack of understanding and knowledge in managing a ranch. This can pose a serious threat to the industry's sustainability. The high percentage of unsuccessful swiftlet ranches makes the investment in this industry considerably risky. Not only risky to the economy but also to the environment. According to Anuar et al., (2013) the main cause of this failure is the rancher's lack of understanding and guidance regarding infrastructure characteristics and proper management. Improper management can cause wastage in terms of use of input management (electricity, water irrigation, human labour and pesticides) and this also can result in high energy consumption and will contribute to greenhouse gases (GHG) release and further cause an impact to global warming Ashkan et al., (2016)

Efficiency measurement is an integral part of management control, and it can be used as a reference in decision making and also as the basis for improvement. Therefore, measurement of efficiency becomes an important and broad-scope subject (Yen et al, 2011). Thus it is important to measure efficiency factors to ensure that the output, the production of EBN is efficient. This is in line with the EPP, which aims to boost production of this industry by encouraging the establishment of new ranches (Zulnaidah and Mohd Shahwahid, 2012). This objective also inlines since Malaysia targeting 40% of world export and currently Malaysia only able to capture 20 % of world export. In order to achieve this 20% increment world export during 2020, it is needed to understand the factor that can potentially influence the efficiency in swiftlet ranching management.

Wan Khairy et al (2015) states that all novices in this industry need to gain full knowledge of the EBN market as well as the technical know-how of operating swiftlet ranches from the main stakeholders of the industry before starting their business. This

will reduce the number of unsuccessful ranchers and increase efficiency in the through proper management. It is important for Malaysia to ensure that the swiftlet ranching industry continues to excel in order to achieve the national target whilst maintaining an environmentally friendly industry. Since much of the investment, in terms of the number of swiftlet ranches, have been ploughed into the EBN industry, its performance can very well be on the right track, only if, the available production capacities are fully utilized. That is why in order to sustain the industry, improving management in an environmentally friendly and economic manner, as well as the role of the social network must be captured. This resonates with Kamarudin and Abdul Aziz (2011), who said in their research that sustainability and proper management of the EBN industry require the participation from all stakeholders in the industry (Utusan, 2014).

Since lack of knowledge and management on swiftlet ranches giving the high percentage on inefficient of this industry Ismail (2014) and Anuar (2013), the newcomers should capture the main player among the stakeholders of the swiftlet ranching industry and who is the main player are playing an important role in knowledge sharing regarding how to manage the swiftlet ranch. This industry is famous with knowledge sharing among the players despite each of the districts has their or EBN association but lack of newcomers nowadays want to joint. Many studies have been done and realise the importance of this association and player inside the association. But most the study just focusing one by one practitioner in order to capture what is the factors or secret ingredient to make their swiftlet ranch successful (Wan Khairy et al (2015), Nurshuhada S. et al (2015) and Mohd Rafi Y. et al (2015)). It is important for the industry to know who is the main players and pattern of knowledge sharing regarding how to manage the swiftlet ranch with a wide network view. Therefore, it is important to map out the network of the EBN industry in order to identify the important stakeholders or experts within the industry, and understand the interactions and flow of knowledge and experiences among skilled players using platform “knowledge sharing” network. With this understanding, ranchers or policymakers would have access to critical stakeholders, both within the private and public sectors, to obtain the necessary guidance and expertise.

1.4 Research objective

From the problem statement above, the main objectives of this research are to support the sustainable management development of the EBN industry, which is still new and with research on it at the rudimentary stage. It is also necessary to investigate the way EBN ranchers allocate their management input in order to raise their output of production via technical and environmentally sustainable practices in order to reduce the number on 70-80 percent inefficient ranchers and improve the management of swiftlet ranch. Other than that this research is needed in order to ensure the EBN industry is green, in terms of management of resources and the usage of scarce resources like electric, water irrigation, human labour, and pesticides in term of energy consumption. For this industry to succeed, there is a need to identify the stakeholders involved in the sharing of knowledge relating to swiftlet ranching management. Obtaining a social network analysis of stakeholders can help the industry perform better, since by understanding the relationship involved and the stake and/or influences to the industry. Below are the specific objectives for this research:

- i. to examine the level of efficiency and energy consumption of swiftlet ranches in Johor Bahru and Gua Musang;
- ii. to ascertain the factors that can influence swiftlet ranching efficiency in Johor Bahru and Gua Musang using the Tobit regression model;
- iii. to identify stakeholder that can play an important role in knowledge sharing that would improve the management of the swiftlet ranching industry in Johor Bahru and Gua Musang.

1.5 Research Questions

- i. What are the levels of management efficiency and energy consumption of swiftlet ranching in Johor Bahru and Gua Musang?
- ii. What are factors that can influence swiftlet ranching management efficiency in Johor Bahru and Gua Musang?
- iii. Which stakeholder can play an important role in knowledge sharing to improve the management of swiftlet ranches in Johor Bahru and Gua Musang?

1.6 Significant of study

This research can contribute significantly to the sustainable growth of the EBN industry via:

- i. Knowledge sharing among stakeholders and helping less experienced ranchers find the correct person or stakeholder to engage and/or to share experiences, problems and opportunities;
- ii. Improved communication and network system in the EBN industry;
- iii. Helping existing ranchers or newcomers enhance their production performance;

- iv. Creating greater awareness and undertake steps toward reducing environmental hazards, preventing the destruction of natural resources and ensuring agricultural sustainability since agriculture production relies on finite and scarce sources.

1.7 Scope of the study

All the survey in this research has been done in Johor Bahru, Johor and Gua Musang, Kelantan. A total of 300 samples from these two states were surveyed at the end of 2015 until mid-2016 in order to obtain information and data needed for the research. The distributions of the samples surveyed are 50% each from Johor Bahru and Gua Musang which contributing 150 samples respectively for objective number one and two.

These two states were chosen after we run the preliminary study at several states which are Penang, Melaka, Selangor, Kelantan, Terengganu, Perlis, Negeri Sembilan and Johor for the national centre of excellence for Swiftlet industry research grant under DVS. Johor has been chosen since it has the highest number of swiftlet ranching in Malaysia base on statistic given in table 1.1 and according to DVS, Johor Bahru is the district that having the highest number of swiftlet ranching around Johor. Based on the interview during the pilot study, many ranchers also suggest Johor Bahru as a good place to do research since it has different demographic features which Johor Bahru is the only successful urban area in produce EBN. It's quite different from the original habitat of Swiftlet which only can survive in the area of forest or farm that full of food sources. Other than that the ranchers and DVS also suggest Gua Musang as a good comparison with Johor Bahru since they can produce the best quality of EBN and the demographics are quite different with Johor Bahru since they operate at rural area. This two different demographics are quite interesting to investigate since Azman Otman et al (2008) mention during 2005 the number distribution of swiftlet ranches in Malaysia 71.63% were operating in an urban area while 28.37% of swiftlet ranches are operating in the rural area. However, the number of swiftlet ranches in urban area are decreasing since the year 2008 and gradually increasing in the rural area. According to Azman Othman et al (2008) the increasing number of swiftlet ranch in rural area may be due to three main reasons: 1) The Swiftlet population are saturated in rural area, 2) Its relatively more cheaper to manage and build Swiftlet ranches in rural area, 3) urban area support more food sources for the birds especially insect. However, there is a lack of study comparing these two demographics (urban and rural area) how they manage the swiftlet ranches since its showing the different type of habitats for Swiftlet sepsis and how it can sustain.

Other than that these two places also have been managed by two different race which in Johor Bahru has been managing by Non-Bumi community while in Gua Musang manage by Bumi community. With these two different demographics, we can observe and compare the management practices and the structure of swiftlet ranching for each state since this industry has been pioneer by the non-bumi community for many years however recently the Bumi community entering this industry and we should compare either there is the difference in term of management of swiftlet ranches.

The sample data for objectives 1 and 2 covers 300 ranchers (150 in Johor Bahru and 150 in Gua Musang). This data was obtained from interviews done via open-ended questions. The levels of management efficiency of swiftlet ranches the two areas are measured using the data envelopment analysis (DEA) method by applying the production approach in the first stage of the analysis. The data is then put through the parametric (t-test) and non-parametric Mann-Whitney and Kruskal-Wallis tests in order to compare which of the two areas are better in management of swiftlet ranches.

On top of addressing the management efficiency issue, this study also seeks to identify ranching-specific characteristic determinants that can influence management efficiency in the second stage of analysis. Four main ranching specific characteristic determinants were examined in this study namely, capital, size, water irrigation, planks and race. By using the same data of the DEA, this study also computed the energy consumption and energy saving of input recourse.

Why energy consumption? EBN is regarded as one of the livestock farming sectors under agriculture in Malaysia (Agro-food statistics, 2014). Agricultural production has become more energy intensive in an effort to supply more food to the increasing population and provide sufficient and adequate nutrition (Sama Amid et al, 2016). Considering the limited natural resources and the effect of the use of different energy sources on the environment and human health such as global warming, it is necessary to investigate energy consumption patterns in agriculture (Homa et al, 2016). Measuring the energy efficiency of farming requires both developing and developed countries (Sefeedpari et al, 2012). There is a need to ascertain the sustainable development of this industry, which would not only focus on production to boost the economy but also ensure good environmental and social practices.

Furthermore, this study proceeds to identify stakeholders that can play an important role in knowledge sharing to improve the management of the swiftlet ranching industry in Johor Bahru and Gua Musang. The social network study focuses on discrete ties (knowledge sharing) for the industry and how these patterns can be used to manage the industry. This study uses the snowball sampling method propose by Scoot (2000). In the snowball sampling method, every person on the stakeholder list was asked the same questions and then they were required to identify other management personnel to be interviewed (snowball sampling). The interviewed start by DVS introducing one of the ranchers from each district and the process continued until no new personnel was recommended and the desired population targeted was reached.

This is the framework of this study – to use the three pillars of sustainable development proposed by John Elkington (1997), who suggests that sustainable development must contain profit (economic), planet (environment) and people (social) elements. However, in this study, we are narrow the scope to the Sustainable management development of swiftlet ranching industry in Johor Bahru and Gua Musang. Figure 1.6 describes the research framework of this study:

1.8 Framework of the study

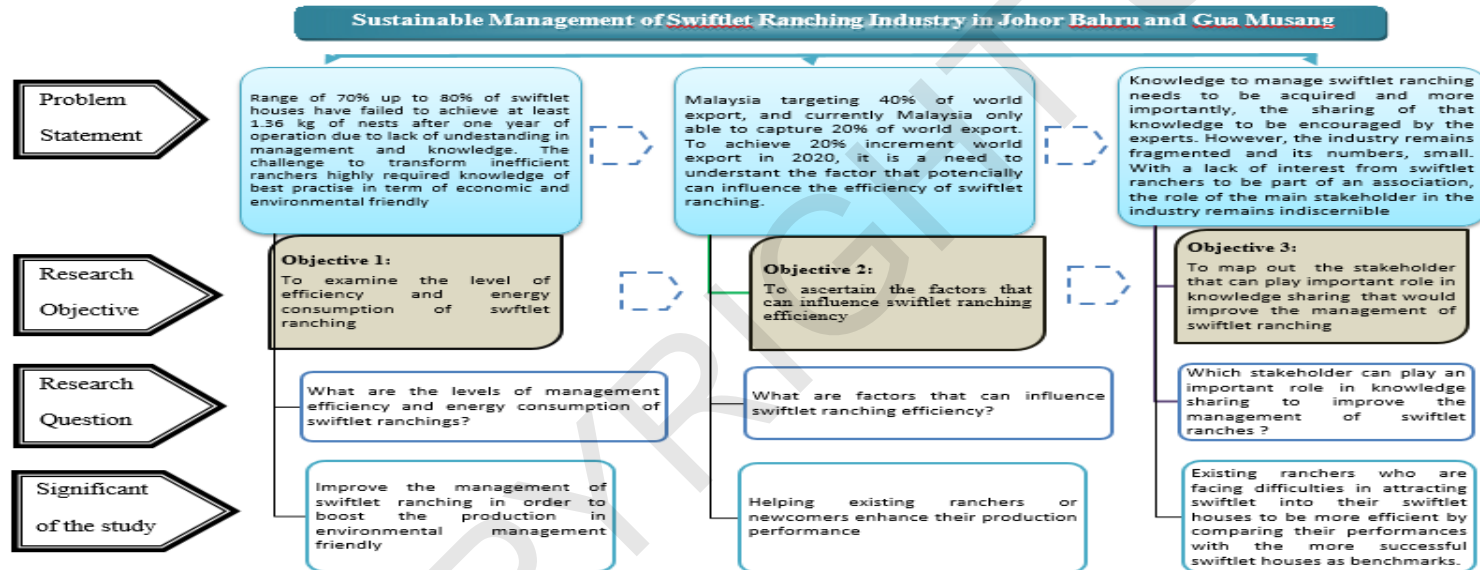


Figure 1.6: Framework of study

From the problem statement, research objective, research question and significance of study we can conclude that this research is suitable namely under research framework (Figure 1.6) Sustainable management of swiftlet ranching industry in Johor Bahru and Gua Musang. Since this industry is facing 70-80% inefficient swiftlet ranching in term of management and lack of knowledge. This problem can be captured in term of economic and environment by improving the management efficiency and boost the production using DEA method at objective number 1 and determined the factors that can influence swiftlet ranching efficiency using Tobit regression in objective 2. Other than that this study also can improve the ranching management to become more efficient through social network analysis where we can capture the main stakeholder that are actively sharing their knowledge and their role should be highlight since their knowledge is very important in order to guide the rancher, government and even policy maker in the right track how to manage the swiftlet ranching properly and become efficient and successful.

1.9 Organization of the study

This thesis is organized in five chapters; chapter one provides the introduction; chapter two presents the concepts and literature review of studies relating to the sustainable development of the EBN industry. It also elaborates on the methodology adopted in this kind of study; chapter three describes the theoretical framework and methodology used to achieve the stated objectives; chapter 4 consist of results and discussion of the study and chapter 5 elaborates more on the conclusion, the implication of the study, limitation and suggestions for future research.

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APPENDICES

APPENDIX A

Social network analysis questionnaire

1. Who is the person you refer and share information/knowledge regarding the management of swiftlet ranching?

