

COMPETITIVENESS
of **BEEKEEPING**
Industry in Malaysia



PROF. DR. MOHD MANSOR ISMAIL

COMPETITIVENESS of BEEKEEPING Industry in Malaysia

Prof. Dr. Mohd Mansor Ismail

PhD (Manchester), MS (California-Davis), BSc (Wisconsin-Madison)

21 Mac 2014

Dewan Pertanian
Fakulti Pertanian
Universiti Putra Malaysia



Universiti Putra Malaysia Press

Serdang • 2014

<http://www.penerbit.upm.edu.my>

© **Universiti Putra Malaysia Press**

First Print 2014

All rights reserved. No part of this book may be reproduced in any form without permission in writing from the publisher, except by a reviewer who wishes to quote brief passages in a review written for inclusion in a magazine or newspaper.

UPM Press is a member of the Malaysian Book Publishers Association
(MABOPA)

Membership No.: 9802

Typesetting : Sahariah Abdol Rahim @ Ibrahim

Cover Design : Md Fairus Ahmad

Design, layout and printed by

Penerbit Universiti Putra Malaysia

43400 UPM Serdang

Selangor Darul Ehsan

Tel: 03-8946 8855 / 8854

Fax: 03-8941 6172

<http://www.penerbit.upm.edu.my>

Contents

Abstract	1
Introduction	3
Beekeeping Industry in Malaysia	5
Wild Bees Seasons and Major Production	6
<i>Apis cerana</i> Under Coconut	11
<i>Apis mellifera</i> in Pineapple Plantations	15
<i>Apis mellifera</i> and <i>A Cerana</i> in Acacia Secondary Forests	18
Comparative Study Between Indo-Malayan Stingless Bees and <i>Apis cerana</i>	20
Marketing of Bee Products and By-products	23
Consumption of Natural Honey in Malaysia	25
Trade Potential of Natural Honey in Malaysia	29
Porter Diamond Conditions	32
Summary	38
References	39
Appendix 1	45
Appendix 2	47
Biography	49
Acknowledgements	53
List of Inaugural Lectures	55

ABSTRACT

The Malaysian beekeeping industry is an important and integral component of the agricultural sector, providing additional income to farmers and indirectly producing food for the population through pollination services. The contribution of the beekeeping industry to regional development in Malaysia depends to considerable extent on its competitive potential in terms of producing and marketing of bee products and by-products efficiently. Beekeeping plays a major role in socio-economic development and environmental conservation in Malaysia. It is a source of health food (e.g. honey, royal jelly, pollen and propolis), raw materials for various industries (e.g. beeswax candles and lubricants) and medicine (honey, propolis, beeswax and bee venom). It is an important income generating activity especially for communities leaving close to the tropical forests and forest reserves (*Acacia* spp), and coastal areas where gelam and mangroves are found. Beekeeping also plays a major role in enhancing biodiversity and increasing crop production through pollination. In terms of production, most of the natural honey produced in Malaysia is from Sarawak, Sabah, Johor and Melaka and the bees are from the species of *Apis cerana* (local bees) and *Apis mellifera* (imported bees). The annual yield from local bees is about 5-9 kg per colony and the imported bees is expected to produce up to 15 kg per colony. Usually marketing involved a system of direct selling because producers try to avoid adulteration since the local honeys from different bee species and nectar sources are sold at premium prices. The balance of trade for natural honey is always negative until 2008. In 2009 the country recorded its first trade surplus in natural honey. The declining exports and the increasing imports from the period 2000 to 2009 reflects increased domestic consumption of natural honey and possibly for re-export, thus, reflecting insufficient local supply to meet the domestic

demand for natural honey. The imports of natural honey amounted to RM13.86 million in 2000 and the value had increased in 2009 to RM32.85 million. This implies that, with increasing total trade and the domestic demand, the production of natural honey can contribute to the improvement of the country food trade balance. However, the analysis of comparative advantage and competitiveness at the production and at the frontier levels is scarce. Although Malaysia is not a major exporter of bee products and by-products, this potential industry could contribute significantly to the total export earnings of the country, and hence, improve the country's food trade deficit. The study utilized primary data from consumers and producers survey and secondary data from FAO statistics and Global Trade Information System. Since the local production cannot cope with the domestic demand for natural honey, it is the aim of this study to investigate the current production issues, marketing problems, and trade performance of the Malaysian beekeeping industry. The issues and challenges of the beekeeping industry are discussed using a Porter Diamond approach and the probable solutions considered to improve the competitiveness position of the industry.

INTRODUCTION

Malaysia is the epicenter of biodiversity for bees and honeybees of the world. Thousands of bee species, ranging from honeybee, carpenter bee, sweat bee, alkali bee, orchid bee to stingless bee, and also their natural enemies, are aplenty and thrive well in rainforest ecosystem. In the context of sustainable development the rainforest assumes a critical or important role in carbon sequestration or global carbon sink in the Climate Change era. In that regard, we can consider that bees are important to the conservation of genetic biodiversity of the rainforest flora species (Mardan et al. 1988).

The genus *Apis* has been greatly associated with humans because of its main by-products from the honeybees - honey. The ecosystem of the rainforest is teeming and well-endowed with great diversity of flora-fauna interaction of species that it yields tremendous fractal niches and habitats that enable five (*A. dorsata*, *A. andreniformis*, *A. cerana*, *A. koschevnikovi*, and *A. nuluensis*) out of the eight the world's honeybee species to co-exist in the tropical rainforest of Malaysia (Mardan et al. 1988).

Natural Honey and other Bee By-products (*beeswax, propolis, royal jelly, etc*)

Surprisingly, Malaysia produces a paltry estimate of less than 5% (98mt /yr) of her honey needs in 2000 but the country manage to increase its self-sufficiency level to 284% producing a total of 8548 mt in 2010. This is a great achievement for the beekeeping industry and for Malaysia as a whole. But, the country still imports its honey from abroad mainly for industrial uses. The rest of the honey industrial requirement and for re-export purposes are imported (7915 mt) from the temperate countries, mainly from Australia, New Zealand, China, Iran, etc. Imported honeys are much cheaper than

the local honey. The price can be as low as RM9 per kg. Malaysia imported low price honey and export high price honey for immediate consumption. In industry, honey is mainly used as ingredients or sweetener or additives in the confectionary, bakery, medicinal and pharmaceutical industries. Some of the major honey exporters in the country are Summer Pacific Sdn. Bhd. located in Bintulu, Sarawak. The company produce about 100 mt of Acacia honey every month. Unlike in Europe and America, Malaysians, especially the Malays, consumed honey mainly as medicinal in nature, rather than as food supplements and, that is why, the per capita consumption is very low (estimated about 100g/year). Tropical honeys are by nature to contain high moisture (even up to 23%) and HMF contents, which can easily turns dark when exposed to sunlight and easily ferments.

Apart from honey, there are other bee by-products and bee-related services, such as, beeswax, propolis, royal jelly, pollination services, ecotourism, beverages, etc. which are associated with the beekeeping and honey hunting industries. The demand for honey and other by-products and services from the beekeeping and honey hunting activities are to be explored and connected into the supply-chain concept of management. Other related industries, such as, probiotics (beverages), ecotourism, etc. can be linked and connected into a commercial critical-mass for the bee supply-chain network. The pollination services from honeybees in the USA is estimated to worth more than USD \$ 200 billion annually and it worth more than the honey production. No estimates are available for Malaysia. The orchid industry is worth less than RM 50 million/yr to Malaysia but easily more than RM 300 million to Singapore. However, the beekeeping industry will complement well with the fruit and vegetable industries in Malaysia.

BEEKEEPING INDUSTRY IN MALAYSIA

The honeybee colonies are either hunted or kept or raised in boxes mainly for natural honey. There have been established, deep traditions and cultural relics associated with the honey hunting tradition practised by the Malays in harvesting *Tualang* honey from the colonies of Giant honeybees (*A. dorsata*) from bee trees in the tropical rainforest, as evidenced from their beliefs, folklores and legends, mantra and incantations being practised by the honey hunters (Mardan *et al.* 1988). This traditional art is deemed to be sustainable in its practice, but this traditional activity is under threat due to deforestations of the rainforest. Honey and beeswax are considered as the major by-product potentials to be derived from honey hunting activities. Tourism activities (nature tourism) can be package with honey expeditions to bring additional values to the honey hunting activity. Honey from the rainforest can be best promoted as organic honey by virtue of the non-chemicals being found or used during harvesting in the rainforest. This concept is in consonant with the concerns of sustainable development. Promoting sustainable honey hunting will secure the rainforest biodiversity in that bees promote genetic and biodiversity conservation through the cross-pollinating activities of the bees.

Outside the rainforest areas, modern beekeeping with *A. cerana* and the introduced *A. mellifera* are currently being employed by beekeepers and farmers in the coconut, pineapple and star fruit holdings in the fruit areas. The lack of development of the orchard industry is equally linked to the non-growing beekeeping industry which consequently affects the pollination services by the industry. The introduction of the genetically-bred and improved *A. mellifera* honeybees into the Malaysian agriculture serves well to the development of the beekeeping industry because the species is docile and the associated technologies are easily available to any

entrepreneur to begin with. However, *A. mellifera* is susceptible to major pestilence from the indigenous natural enemies, such as, mites (*Varrao jacobsoni*) and several bee eaters (*Merops* spp.). The use of chemicals to control the mites have become a major contentious trade issue of honey to be exported into Europe and the US, and hence rendering the honey product to become non-organic and subject to meet *HACCP* compliance for food health. It is a monumental task to comply for *A. mellifera* honey for public consumption in importing countries (Ismail and Mardan, 2010).

WILD BEES SEASONS AND MAJOR PRODUCTION

Wild bee honey can only be found during distinct seasons of wild bees which differ according to localities (Figure 1). For example, in Terengganu the flowering season of Gelam forest is between May and December where it peaks in September. Thus, in September normally the price is expected to drop slightly. The annual production of Gelam honey is estimated around 12 mt.



Figure 1 Honey seasons and the number of honey hunters according to the geographical areas in Peninsular Malaysia

Gelam (*Melaleuca leucadendron*) forests are source of nectar and pollen for bees. Honey hunters in the Gelam forest of Setiu and Mercang Terengganu collect honey from the colonies of the open-nesting, Giant honeybees (*Apis dorsata* or *Lebah Tualang*) on trees at the periphery of the submerged Gelam forest between the months of May until December. There are more than 50 honey hunters in

those two districts and most of them are youth that includes school children. The harvested honeys are mostly sold to the roadside vendors along the major roads. It is a source of additional income to these honey hunters who would prefer to go honey hunting and forgo any odd jobs that offer them less than RM50/day.

Initial findings on the qualitative analysis of Gelam honey indicate that it is closer to the superb quality of MANUKA honey from New Zealand. The Melaleuca plant is a close relative of the Manuka plant species (same family). It contains high anti-oxidants and anti-microbial activities which is considered good for anti-cancer treatment and other medicinal properties. Further qualitative and quantitative analysis of Gelam honey is needed in order to discover the assumed benefits of the honey to be marketed with strong branding concept of organic gelam honey and attractive bottling/packaging.



Peak Season Wild bee Nesting on a Tualang Tree in Pedu, Kedah

On the other hand, the honey season in Perlis and Kedah starts in early January and ends in April or early May. The period coincides with dry season of the Peninsula Malaysia. This is important for the bees to reduce the moisture content of the honey. The monetary return from each expedition is very encouraging. Usually each team has their own tree to harvest and the harvesting takes a whole day during a very dark night.

Return to Labour and Management

The return to labour and management (RTLAM) is determined on a per tree basis. As can be seen from Table 1, a hunter could receive an average income of RM1,618 per month during the honey harvesting season from May to October.

Table 1 Total Cost for a Group of Two

	Cost per Unit / per Day	No.of Units	Total Cost
Initial cost			
Container	RM10.00	6	RM60.00
Ropes	RM100.00	1	RM100.00
Total			RM160.00
Operating Cost			
Food	RM10.00	2(for 45 days)	RM 900.00
Petrol	RM5.00	45	RM225.00
Total			RM1,125.00

Source: Ismail et al. 2007

Table 2 Return to Labor and Management for a Group of Two

No. of Honey Hunters	Peak Harvesting Months (July, Aug, and Sep) 15 days / month (Days)	Average Volume per Day (Kg)	Wholesale Price per kg (RM)	Gross Revenue (RM) / month / hunter
2	45	20	23.00 Less	20,700.00 -1,285.00
Total Return per Season				19,415.00
Return to Labor and Management per Month (6 months)				3,235.84
Return to Labor and Management per Hunter				1,617.92

Source: Ismail et al. 2007

Wild honey is a potential source of supplementary income to rural farmers. Most of the hunters treat honey hunting as a part time job or recreational pastime. It only takes one or two days away from the farm to harvest honey. The monetary reward is encouraging. However, a high return is always associated with high risks where in this case it involves risking their lives (Ismail et al. 2007).

***APIS CERANA* UNDER COCONUT**

Beekeeping, a traditional subsistence industry in coconut smallholdings, has long been ignored by many developing countries as a source of additional income to farmers and as an instrument to alleviate poverty. The industry is not something recent in Malaysia as many farmers and individuals have ventured into this lucrative project as early as in the 1980s. Already, the Malaysian Beekeeping Research and Development Team (MBRDT) is promoting the beekeeping industry in Malaysia since then. The industry can thrive well because Malaysia not only has abundant species of nectar and pollen sources, but it also has indigenous species of honey bees. Colonies of indigenous species (*Apis cerana*, *Apis dorsata* and *Apis florea*) multiply abundantly in Malaysia, and can easily be found in coconut kilns and dwellings. The fact that they are there and can readily hived into boxes without any cost make the industry more favorable.

The states of Perak, Selangor, Melaka, and Johor have long been the center for beekeeping activity in Peninsular Malaysia. There are two main species reared in Malaysia, namely *Apis cerana* (local bees) and *Apis mellifera* (imported bees). In Sabah, beekeeping from local bees is one of the main projects in poverty eradication programs under the auspices of “Koperasi Pembangunan Desa” (KPD), Sabah. By 2010, KPD is expected to have trained 200 beekeepers with 40,000 colonies of *A. cerana*. The annual

production of natural honey in Sabah is also expected to increase to 360 mt from 20 mt currently. But the anticipated increase in production did not materialized because most of the bees from the specie of *A cerana* disappeared without reasons. Thus, the amount of annual production dropped drastically to less than 2 mt. As an alternative, KPD imported 40 hives of *A mellifera* from Western Australia to Sipitang, the acacia forest reserves. Sabah has an estimated of 800,000 ha of *Acacia mangium* forest reserves.

In terms of production, most of the honey produced in Malaysia is from Perak, Johor, Selangor, Melaka, Sabah and Sarawak and the bees are from the species of *Apis cerana* (the local bee) and, recently from *Apis mellifera* (the imported bee). At present, the production of local honey is expected to be higher than in the 1980's because the number of colonies has increased over the years. There are about 520 beekeepers now (9916 colonies) compared to 946 in 1988 (7000 colonies). The yield from local bees was about 2-5 kg per year and *A. mellifera* (the imported bee) is expected to produce up to 50 kg per colony per year. The largest beekeeper is in Sarawak rearing 4000 colonies of *A. mellifera* on 10000 ha of Acacia forest. The company hired skilled apiculturists from China. The production is estimated at 1200 mt per year. The Acacia honey is sold at supermarkets and hypermarkets in Bintulu and Sibul, Sarawak. The company also produced Royal Jelly and Pollen grains for sale in Sarawak. The company has its own processing lab for checking honey quality and its products are also exported to Europe and the US.



A. cerana under Coconut

Currently, the government is concerned on how to turn beekeeping industry into a high income activity. We make a simulation on how an operator can make a return of RM60,000 each year. The beekeeping project is expected to contribute a monthly income of RM5000. The simulated financial analysis for the high income projects are shown in Appendix 1 and 2, and the summary of financial indicators are as follows:

Table 3 Summary of financial indicators for high income projects

Descriptions	Number of hives
	50 hives
Initial Investment	RM102,295
Net Present Value @10%	RM125,858.24
Internal Rate of Return	51%
Payback Period	1 year 10 months
Profitability Index	2.23

Competitiveness of Beekeeping Industry in Malaysia

The project is feasible and manages to provide monthly income of RM5000 (see Appendix 2). The payback period is less than 2 years meaning that the operator can get back his initial investment of RM102, 295 after 22 months. The IRR of 51% shows that the project is able to repay the principal and the interest of the loan. The cost of capital is only 4% and the IRR is 51%. The company pays 25% income tax but if the company entitle for tax break the IRR would jump to 65%.



A good frame of *A. cerana*



A Strong Colony of *A. cerana*

***APIS MELIFERA* IN PINEAPPLE PLANTATIONS**

The financial viability of a beekeeping project can be determined by calculating the estimated costs and returns involved. There are two separate analyses done to find out how viable the projects under the incentives program would be as opposed to independent projects where no incentive is provided. The data were obtained from beekeepers that were surveyed in the country in 2007. The yield of natural honey is taken as 15 kg per year and its average price is RM50 per kg. The cost of a hive with bees is assumed to be RM800 and the labor cost is estimated to be RM700 per month. In addition, the economic life of each project is set to be 10 years and the recommended cost of capital is 10%. Depreciation and income taxes are excluded from the cash flow analysis because apiculture is a promoted industry where operators do not pay tax on their income for up to 10 years from the first day of sales. The four project evaluation indicators used for each analysis (Brigham,

2007), namely Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period (PBP) and Profitability Index (PI) are listed in Table 4.

The financial feasibility analysis (Table 4) shows that the value of an initial investment in a beekeeping project with 50 hives costing about RM52, 900 in the incentive program is RM8000 less than the initial investment in the independent project. The discounted cash flow of the project shows higher NPV which amounts to RM 114,963. The IRR generated, which is computed by the interpolation method is 45%. This value is greater than the average cost of capital offered by most banks plus a risk premium. Without any incentives, beekeepers would have an IRR of only 27%. The PBP of the subsidized projects is approximately 2 years and 1 month compared to 3 years and 2 months for the independent projects. Therefore, beekeepers of the subsidized projects can repay or get back the sum of their initial investment one year earlier than others who are without the incentive. Finally, the PI of the projects is 3.17, indicating that the discounted return for every Ringgit invested is RM 3.17. On the contrary, the PI of the independent beekeeping project is only 1.93.



A. mellifera colonies in pineapple plantation



Pineapple Plantation in Pontian Johor

In order to promote the industry, the government has designated apiculture as one of the promoted agriculture projects that qualify for existing incentives. Based on a partial capital recovery program (MOA, 2005), the return on investment for beekeeping projects under the incentive scheme is higher than the independent project. With other incentives in the list, the potential investors could realize a good return from beekeeping projects. The return here was based on selling honey only. If other benefits such as pollination services, bee venom and bees wax were included, the returns would have been even greater. In order to promote beekeeping projects in pineapple smallholdings, the government should provide specific incentives targeting participants, especially smallholder pineapple farmers and potential investors in pineapple plantations.

Table 4 The Financial feasibility analysis of independent beekeeping projects and projects under the Government's Incentives Scheme Program

Descriptions	Number of hives	
	50 hives	40 hives + 10 hives (incentive)
Initial Investment	RM 60,900	RM 52,900
Net Present Value @10%	RM 56,421	RM 114,963
Internal Rate of Return	27%	45%
Payback Period	3.2 years	2.13 years
Profitability Index	1.93	3.17

Source: Mian and Ismail, 2009

***APIS MELLIFERA* AND *A CERANA* IN ACACIA SECONDARY FORESTS**

Honey from *Acacia mangium* trees has long been collected in European countries like Hungary and Germany. In 2006, a company in Bintulu, Sarawak importing *A. mellifera* from China and started beekeeping with few thousands hives. Now the company operates 4000 hives and producing about 100 mt per month in a 10,000ha block of Acacia forest reserves.



A. cerana in Acacia Forest Reserves

In Sabah, Koperasi Pembanguna Desa (KPD) also reared bees in Acacia forest reserves but they reared *A. cerana* instead of *A. mellifera*. The production is about 20 mt annually which is lower than in Sarawak. This indicates that *A. mellifera* specie produces more honey than *A. cerana*. The former can produce up to 50 kg/colony/year. KPD is the only organisation that can penetrate supermarkets in Sabah.



A. mellifera bees collecting honey from Acacia flowers



Acacia Forest Reserves

The largest Acacia forest reserve is in Sabah, estimated at 800,000 ha. while 290,000 ha found in Sarawak and 60,000 in Johor. If all these forest reserves are used for beekeeping, Malaysia would be among the biggest exporter of Acacia honey and other bee products and by-products in the world.

COMPARATIVE STUDY BETWEEN INDO-MALAYAN STINGLESS BEES (*TRIGONA SPP.*) AND *APIS CERANA*

The financial analyses of beekeeping projects were done using primary data collected in Peninsular Malaysia. The average beekeeping project of *Apis cerena* involves 32 colonies costing about RM8,600 which is RM19,400 less than *Trigona*'s initial investment. The discounted cash flow of the projects show a higher NPV which amounted to RM 40,413 recorded in the *Trigona* project. Both NPV values are positive reflecting that the business of beekeeping is highly profitable. The IRR resulted almost similar between both projects which is generated between 38-39%. This

value is massively greater than the average interest rate of 10% offered by most banks plus a risk premium. The higher IRR indicates the project is feasible. The PBP of *Apis cerena* is approximately 2 years and 4 month compared to 2 years and 6 months for the Trigona's project. Therefore, beekeepers of the *Apis cerana* can repay or get back the sum of their initial investment two month earlier than the project of *Trigona*. Finally, the PI of the *Trigona*'s project is 2.45, indicating that the return for every Ringgit invested is RM 2.45. By comparison, the PI of the *Apis cerena*'s beekeeping project is higher that may contribute more than 10 sen of Trigona's result to the return of single ringgit investment. In summary, all indicators are expected to make the decision of accepting both projects. The participants in the urban agriculture can choose the appropriate beekeeping project for them because each project has some advantages and disadvantages.

Based on the financial results, the return on investment from beekeeping projects under both of the *Apis cerena* and *Trigona* is profitable and the projects are feasible. Based on individual result, *Apis cerena* performed better than *Trigona*'s project to achieve higher contribution in a business enterprise. This is because the former requires less capital than the later. For those who have limited capital should take up beekeeping with *Apis cerena* and those with extra capital can take up *Trigona* project. Even though the return is about the same, both projects have a distinct different in the output produced. The main output, which is natural honey, is very different in the nutritional content. The demand for natural honey from *Trigona* species is very high. The ongoing researches and clinical tests at the USM Kubang Kerian and UITM Puncak Alam have shown positive results for Trigona honey to cure serious illnesses like cancer.

Competitiveness of Beekeeping Industry in Malaysia

Table 5 Financial Indicators of Beekeeping Projects

	<i>Apis cerena</i>	<i>Trigona</i>
Colony	32	54
Initial Investment	RM8,600	RM28,000
Net Present Value @ 10%	RM13,103	RM40,413
Internal Rate of Return	39%	38%
Payback Period	2.46 years	2.55 years
Profitability Index	2.53	2.45

Source: Ismail et al 2013

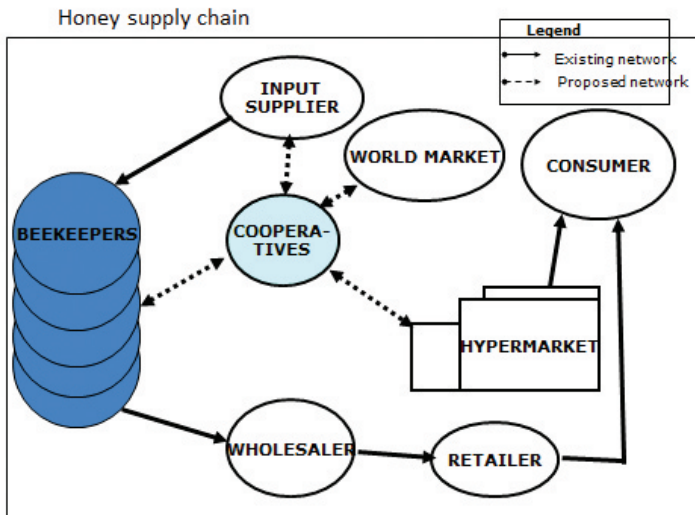


Direct Selling of Natural Honey (Coconut honey and Trigona Honey)
at Home



Retailing of Natural Honey by the Roadside in Terengganu

MARKETING OF BEE PRODUCTS AND BY-PRODUCTS



Source: Mohd Mansor Ismail 2012

Figure 2 Honey Supply Chain

At present, beekeepers purchase their inputs from local suppliers. Previously, the supply of inputs was taken up by cooperatives and this will at least reduce the price of each input because cooperative can buy in bulk and received discounts. After the collapse of the industry in 1995, the cooperative also stop operating. Now the input suppliers are individuals who are sometimes beekeepers or may be honey collectors.

Beekeepers prefer to sell their honey from home, that is, direct selling because by doing so they can ensure the honey quality. There are allegations among beekeepers that the middlemen add impurities such as sugar solution to make more profit. However, when the amount of natural honey increases, like during the peak season, beekeepers need to sell their honey to wholesalers who then sell to retailers and finally to consumers. Since the channel is quit long, the beekeepers often get low price for their products. This is the existing marketing channel for natural honey in Malaysia.

In order to shorten the channel, it is suggested in the new supply chain the work of wholesalers should be replaced by cooperative (Figure 2). The beekeepers should group themselves and form a cooperative that can act as a middleman between retailers and input supplies. Cooperative can buy input in large quantities at a much lower price. For example, empty bottles can be purchased in bulk and get quantity discount. The savings can be passed on to members in terms of annual dividend.

On output side, cooperatives can act as middlemen to supply natural honey to hypermarkets. Each beekeeper can produce only small amount which is not interested by hypermarkets but if they combine and act as one entity, they can agree on a long term contract with hypermarkets that is beneficial to both sides. Again by shortening the supply chain or invent new supply chain combine with the existing chains, beekeepers can at list ensure reasonable returns on their enterprise.

In summary, direct selling from home and small retailing by the roadside can no longer absorb current production. Research on new products and better quality products without worrying on adulteration should be encourage. Honey analysis must be made compulsory for producers and importers. By having Malaysia standards for natural honey, beekeepers can penetrate world markets. Beekeepers should set up cooperatives that can act as a middleman between them and hypermarkets, more market research should be done to ascertain what consumers' wants in natural honey. If it is medicinal properties then the honey can be sold at a premium. Contract farming and contract marketing should be promoted once the cooperative is established. Good promotion, location and pricing should be promoted by cooperative to ensure better returns to beekeepers.

CONSUMPTION OF NATURAL HONEY IN MALAYSIA

Generally, Malaysians consume local natural honey for medicinal purposes. This means that honey intake may be once or twice a year during the sickness period of two or three days. That is why the average consumption per capita is only 100 g which is about 5 table spoons (Table 6). To increase the consumption, local natural honey must be promoted as food supplement that need to consume every day. According to a Professor in USM Kubang Kerian, as a preventive measure one should consume 40 g of honey or two table spoons every day. This will translate into an annual consumption of 440,000 mt $((40 \times 11,000,000)/1000)$. With the current production of 9000 mt, beekeeping is a very potential industry.

If the estimated consumption amount is too big, one can treat the local beekeeping industry as producing substitutes for imported honey and for exports. This is reflected in the value of total trade

which increased from RM16 mn in 2005 to RM88 mn in 2010 an increase of 450%. Such a tremendous increase in total trade should bring positive news to the beekeeping industry which experience slight oversupply at present (Table 8).

In summary, promotion should be done to educate the public in preventive consumption that treat local natural honey as food supplement. Local honey also should be used as substitutes for imported honey. It is normal for the locals to prefer local honey to imported honey. The taste suit locals quite well. The other negative factor on imported honey is that a country will only export low quality honey and consume the good quality honey. If this allegation is true, Malaysian should consume only local honey and let the industries use imported honey to reduce cost of production.

Table 6 Total Natural Honey Produced and Consumed in Malaysia, 2000-2010

Year	Production (metric ton)	Export Quantity (metric ton)	Import Quantity (metric ton)	Quantity Consumed (metric ton)	Quantity Consumed Per Capita (gram)
2000	98	109	2294	2283	97
2001	60	20	1940	1981	82
2002	60	1338	2432	1153	47
2003	60	3829	4904	1135	45
2004	60	322	2319	2057	80
2005	60	83	2194	2172	83
2006	63	239	2483	2307	86
2007	90	2182	4927	2835	106
2008	1228	4969	6749	3008	109
2009	2120	7383	8233	2970	106
2010	8548	13452	7915	3011	105
Average	2024	4718	5417	2723	100
2010*	5000	1218	1998	5,780	210

Note: * Forecasted figures by MOA in Balance of Trade Analysis

The current price of honey in this country varies depending on locations, type of bees and type of nectar sources. For example, honey in Selangor fetches higher price than those sold in Sabah and Sarawak. The most expensive honey is from *Trigona* specie and the one from tropical forest is the most expensive. Table 7 shows that the price of honey offered by the wholesalers is between RM25.00 and RM100.00 per kilogram. On the other hand, the price sold by retailers to consumers is between RM50.00 and RM140.00. Since local honey sold at a premium price, the beekeepers can obtain high income if they increase their production.

Table 7 The price of honey per kg, 2013

States	Wholesale price (RM)	Retail price (RM)	Type of honey
Kedah	70.00	100.00	tropical forest
Perak	60.00	60.00	coconuts
Terengganu	40.00	90.00	gelam
Johor	25.00	50.00	pineapples
Selangor	100.00	140.00	Mixed flowers
Sabah	30.00	50.00	<i>Acacia Mangium</i>
Sarawak	40.00	60.00	<i>Acacia Mangium</i>



Local Natural Gelam Honey

TRADE POTENTIAL OF NATURAL HONEY IN MALAYSIA

Malaysia has experienced persistence balance of food trade deficits over the years. For the first time in 2009 Malaysia recorded a BOT surplus in natural honey which then extended to 2010 with the value increased by more than 200%. This surplus could be further increased if Malaysia sets its own natural honey standards and thus, meeting importer country standards. Malaysia also needs strong enforcement on the quality of local and imported honey to deter adulterated honey. This could be done through honey analysis. The development of new products will also help increase the consumption of local natural honey.

Malaysia depends on imported honey to cater for the high local demand. Therefore, it is not surprising if the trade balance for this commodity is always negative. This situation should not occur because Malaysia is blessed with natural resources such as the tropical rain forest and huge agriculture land areas. Table 4

shows the values of import, export and the total trade of honey in this country from the year 2005 until the year 2010. It is observed that the annual growth rate for the value of import, export and total trade is about 6.8%, 9.6% and 8.7%, respectively.

Table 8 Value of import and export of honey in Malaysia (RM million), 2005-2010

Year	2005	2006	2007	2008	2009	2010
Import	15.29	15.57	23.16	26.73	32.85	31.27
Export	0.74	1.78	11.61	24.10	38.11	47.65
Total	16.03	17.35	34.77	50.83	70.96	88.92
BOT	-14.55	-13.79	-11.55	-2.63	5.26	16.38

Source: Mohd Mansor Ismail, 2013

The positive balance of trade in natural honey coincides with the establishment of apiaries in Samarakan in 2006. After three years of establishment the company manage to export starting 2009. The company operates on 10,000 ha site of acacia forest reserves with 4000 hives of *Apis mellifera*. To sustain the export of honey, Malaysia needs a stringent quality control to meet the standard requirement posted by the importing country. Traceability is very important in ensuring honey adulteration or high antibiotic content. The incident will occur if Malaysia becomes only a transit location for other countries' natural honey.

Local honey is packed in barrels of 300kg each and is ready for exports. The problem is local honey cannot fulfil the foreign standards which impede trade. This is where the assistance from government is needed to regulate the industry. All the natural honey that enter into and out of the country should be certified probably through a body like SIRIM. The certification also will ensure food

Mohd Mansor Ismail

safety and no adulteration of any beekeeping products and by products. In addition, the influx of HFS into the country sold as natural honey is worrying.



Barrels of Honey for ready Storage and Exports

PORTER DIAMOND CONDITIONS

Table 9 Beekeeping Industry Diamond Conditions

	STRENGTH	WEAKNESSES
DEMAND CONDITIONS	• Halal bee products for Middle East market • High demand for natural Gelam, Tualang and Trigona Honeys. • Locals prefer local honey for medicinal purposes.	• Low per capita consumption • Local products selling at premium price
FACTOR (INPUT) CONDITIONS	• Huge Acacia Forest Reserves in Sabah and Sarawak • Surrounding coastal areas suitable for beekeeping • Beekeeping Technology available locally • 300,000 colonies disappear every year	• High cost of bee colonies, queens and vaccines • Lack of skilled labour • Clearing of Acacia and Gelam forests
CONTEXT FOR FIRM STRATEGY AND RIVALRY	• High value primary product like natural honey and royal jelly • High value added finished products. • Promote organic products • Unique nectar sources like Tualng, Gelam, Trigona honeys.	• ASEAN, and world competitors • Low concentration of local competitors • Compete with adulterated honey from local and abroad

RELATED AND
SUPPORTING
INDUSTRIES

- R&D at UPM, MARDI and DOA
 - Skilled entrepreneurs training available at DOA and MARDI
 - Government Incentives for primary production and processing
 - No local standards for natural honey
 - Need more research on final products
-

The approach used by Porter (1990) to analyse the competitiveness of countries, sectors, industries and firms is extended to the beekeeping industry (Mohd Mansor Ismail, 2013). The Porter Diamond approach scrutinised four conditions according to their strengths and weaknesses. The competitiveness position of the beekeeping industry is then determined based on the variables listed and discussed. In summary the strengths of the industry outweighs its weaknesses. This concludes that the beekeeping industry possess competitive advantage.

The competitiveness level of beekeeping industry can be improved further through various incentives provided by the government. Some of the government incentives evaluated in this study are: a) Pioneer status where a company enjoys a partial exemption from income tax. A company pays tax on 30% of statutory income only for five years, commencing from its production day (defined as the day of first sale of products), however there also exist many agriculture activities include processing that are tax free (Table 10) b) an investment tax allowance (ITA); a farm granted an Investment Tax Allowance (ITA) is eligible for an allowance of up to 70% of its qualifying capital expenditure incurred within five years from the date on which the first qualifying capital expenditure is incurred and c) Accelerated Capital Allowance (ACA); the ACA on

the capital expenditure is to be utilized within the next three years, that is, an initial allowance of 60% for the first year and an annual allowance of 20% for the following two years. The other incentive to encourage private sectors' participation is as follows:

A company, which invests in a subsidiary company engaged in food production, together with the subsidiary company, qualifies for one of the following incentive packages:

Table 10 Incentives Packages

Incentives Package	Details of Incentives
A	i. The company which invest in the subsidiary company engaged in food production be granted tax deduction equivalent to the amount of investment made in that subsidiary; and ii. The subsidiary company undertaking food production be given income tax exemption of 100% on its statutory income for 10 years commencing from the first year the company enjoys profits, in which, a) Losses incurred before the exemption period is allowed to be brought forward after the exemption period of 10 years, and b) Losses incurred before the exemption period is allowed to be brought forward after the exemption period of 10 years, and c) Dividends paid from the exempt income are exempted in the hands of the shareholders

B	i. The company which invest in the subsidiary company engaged in food production will be given group relief for the losses incurred by the subsidiary company before it records any profit, and ii. The subsidiary company undertaking food production be given income tax exemption of 100% of its statutory income for 10 years from the first year the company enjoys profits, in which a) Losses incurred during the tax exemption period can be brought forward after the exemption period of 10 years; and b) Dividends paid from the exempt income are exempted in the hands of the shareholders
----------	--

Table 11 List of Promoted Activities and Products General Which Are Eligible to Apply the Incentive under Promotion of Investments Act 1986 and Income Tax Act, 1967

Agricultural production/cultivation	
(1) Cultivation of tea	(12) Livestock farming (excluding rearing of pigs)
(2) Cultivation of fruits	(13) Production of breeder stock
(3) Cultivation of vegetables, tubers or roots	(14) Spawning, breeding and culturing of aquatic products
(4) Cultivation of rice or maize	(15) Off-shore fishing
(5) Cultivation of herbs or spices	(16) Cultivation of medicinal plants
(6) Cultivation of essential oil crops	(17) Cultivation of cocoa
(7) Production of planting materials	(18) Cultivation of coconut
(8) Cultivation of crops for animal feed	(19) Cultivation of sago palm
(9) Floriculture	(20) Rearing of chickens and ducks (<i>considered as promoted activity only at Eastern Corridor of Peninsular Malaysia, Sabah and Sarawak.</i>)
(10) Apiculture	
(11) Sericulture	

Processing of agricultural produce	
(1) Chocolate products and chocolate confectionery	(9) Plant extracts for pharmaceutical, perfumery, cosmetic or food industries
(2) Fruits	(10) High fructose syrup
(3) Vegetables, tubers or roots	(11) Coconut products except copra or crude coconut oil
(4) Essential oils	(12) Starch products
(5) Livestock products	(13) Cocoa paste, cocoa butter and cocoa powder
(6) Agricultural waste or agricultural by-products	
(7) Aquatic products	
(8) Aquaculture feed	

SUMMARY

The study determines the potential of beekeeping industry. Project evaluations have been done in almost all integrations of bees with fruit and forest trees. All the financial indicators show that the projects are feasible. When evaluated again incorporating government incentives the projects' financial indicators are even greater. The Porter Diamond conditions also show encouraging results. The local honey is highly demanded locally and abroad even when the products are sold at a premium. However, Malaysia should develop its own natural honey standards to increase exports and to reduce the importation of adulterated honey. Further research should be done on production and marketing of local natural honey. New product development is important to sustain the industry and creates value added to the primary products. Viability of new product should be assessed first. Consumer awareness on the benefits of natural honey should be exposed during exhibitions and trade shows. Contract production and marketing should be encouraged so that local products can enter hypermarkets. Improve the existing supply chain management through the establishment of cooperatives. In conclusion, the beekeeping industry can achieve higher level of competitiveness when all the recommendations are considered by the government, researchers, parastatals and beekeepers.

REFERENCES

- Abbott, Phillip C., & Bredhal, Maury E. (1994). Competitiveness: Definitions, useful concepts and issues in “*Competitiveness in International Food Markets*” (Edited by Bredahl, Abbot and Reed), Westview Press, Boulder.
- Agriculture Canada (1991). Task force on competitiveness in the agri-food industry. *Growing Together: Report to Ministers of agriculture*. Ottawa, June.
- Alias Radam, Shaufique Fahmi Sidique, & Mohd Mansor Ismail. (2008). Consumer willingness to pay for locally produced pure Tualang Honey in Malaysia. *International Applied Economics and Management Letters* (IAEML), 1(2), 37-40.
- Bank Negara Malaysia, *Annual Reports*, (various issues), Kuala Lumpur, Malaysia.
- Bojnec, S., & Ferto, I. (2009). Agro-food trade competitiveness of Central European and Balkan countries. *Food Policy*, 34(5), 417-425.
- Brigham, E. 2007. *Fundamental of Financial Management*. Dryden Press. New York.
- Fatimah, M.A, Ahmad, S., Alias, R., Amin, M.A, Azali, M., Ismail, L., Khalid, A.R, Kusairi, M.N, Mohd Mansor, A, Mohd Rusli, Y., Ng, K. Y, Tai, S.Y., Zainalabidin, M., & Zulkornain, Y. 2008. *Penilaian Pelan Tindakan Imbangan Perdagangan Sektor Makanan*, unpublished report submitted to the Ministry of Agriculture and Agro-based Industry, Malaysia.
- Hassanpour, B., & Ismail, M.M. (2010). Regional comparative advantage and competitiveness of Malaysian palm oil products. *Oil Palm Industry Economic Journal*, 10(2), 1-6.
- Ismail, M.M., & Radam, A. (2010). Measuring the effect of Asian financial crisis on the comparative advantage of the food processing industry. *International Journal of Economics and Management*, 4(2), 279 – 296.

- Ismail, M.M., & Hassanpour, B. (2009). Measuring competitiveness of Malaysian fish products among regional countries. *Proceedings of the Agriculture Congress 2009* organized by Faculty of Agriculture, UPM at Palace of the Golden Horses, Seri Kembangan, Selangor, Malaysia, 27-29 October 2009, 348-350Pp.
- Khachatryan, N., H. Schuele, A. Khachatryan, & V. Buzov. (2009). Competitiveness of Russian wheat supply chain under stringent food safety policy. In *Proceedings of International Conference on Policy Modeling*, Ottawa, Canada, June 24-26, 2009.
- Khan, N. P., & Akhtar, J. (2006). Competitiveness and Policy Analysis of Potato Production in Different Agro-ecological Zones of Northern Areas: Implications for Food Security and Poverty Alleviation. *Pakistan development review.*, 45(4), 1137-1154.
- Little, I.M.D., & Mirrlees, J.A. (1994). The Costs and Benefits of Analysis: Project Appraisal and Planning Twenty Years on, in “*Cost-Benefit Analysis*” (eds.) Richard Layard and Stephen Glaister Second Edition, Cambridge.
- Loc, N.D. (2006). *Competitive and comparative advantage of the rice industry in the Mekong River Delta of Vietnam*. University of Log Banos, Phillipines.
- Makhdzir Mardan, A.H. Hamid, Z. Emby, A.R. Marasidi, & Mohd Mansor Ismail. (1988). Some Aspects of Honey-Gathering from Colonies of *A. dorsata* in Peninsular Malaysia. Paper presented at the 4th International Conference on Tropical Apiculture, November 1988, Cairo, Egypt.
- Ministry of Finance. (2007). Economic Report. 2007/08 Kuala Lumpur, Malaysia.
- MOA. (2005). Investment Incentives for Agriculture and Agro-based Industries in Malaysia. Putra Jaya, Malaysia.
- Mohanty, S., Fang, C., & Chaudhary, J. (2003). Assessing the competitiveness of Indian cotton production: *Journal of Cotton Science*, 7, 65–74.
- Mohd Mansor Ismail. (2012). Honey marketing in Malaysia, *Agricultural Marketing Issues of Selected Commodities*, Editor Fatimah Mohamed Arshad and Amin Mahir Abdullah.

- Mohd Mansor Ismail, & Alias Radam. (1992). Sikap pengguna terhadap konsep pemasaran madu tempatan di Sarawak. *Jurnal AZAM: Development Issues in Sarawak*, 8(2), 185-197.
- Mohd Mansor Ismail, & Alias Radam. (2004). *Competitiveness of the Malaysian food processing industry*. Serdang: UPM Press.
- Mohd Mansor Ismail, Fatimah. M.A., Zulkurnain Y., & Kushairi M.N. (2013). *Competitiveness of food and feed industry in Malaysia*. Serdang: UPM Press..
- Mohd Mansor Ismail, & Emmy Farha Alias. (2009). Economic potential of apiculture in Malaysia. *OPTION*, 14(2).
- Mohd Mansor Ismail, & Mad Nasir Shamsudin. (1989). Economic feasibility of beekeeping. Paper presented at the Seminar on Beekeeping Development, Pedu. 23 Sept. 1989.
- Mohd Mansor Ismail, & Makhdzir Mardan. (2010). The production potential of natural honey in eradicating poverty in Malaysia. *Paper presented at the 10th Asian Apicultural Association (AAA) Conference & Api Expo*, 4-7 November 2010, BEXCO, Busan, Republic of Korea.
- Mohd Mansor Ismail, & Md Zabid Abdul Rashid. (1992). The production and marketing of wild honey in Malaysia. *Paper presented at the International Conference on the Asian Honey Bees*. 10-14 February 1992, Bangkok Thailand.
- Mohd Mansor Ismail, & Md Zabid Abdul Rashid. (1993). The production and marketing of wild honey in Malaysia in "Asian Apiculture" (Edited by Connor, Rinderer, Sylvester, and Wongsiri) in Asian honey bees and bee mites: Asian apiculture International conference; 1st, Asian honey bees and bee mites: Asian apiculture; 264-271. Wicwas Press, Connecticut.
- Mohd Mansor Ismail, & Muzafer Shah Habibullah. (1989). Beekeeping: Prospect for small business in Malaysia. Paper presented at the *Seminar on Beekeeping Development*, Pedu. 23 Sept. 1989.
- Mohd Mansor Ismail, & Muzafer Shah Habibullah. (1993). An economic analysis of technical efficiency in beekeeping in Malaysia: Frontier Production Function Approach. Paper presented at the PKDP Seminar entitled "Agricultural Outlook".

- Mohd Mansor Ismail, & Muzafar Shah Habibullah. (1993). Returns to scale in Agriculture: Some empirical evidence on beekeeping in “Asian Apiculture” (Edited by Connor, Rinderer, Sylvester, and Wongsiri) in Asian honey bees and bee mites: *Asian Apiculture International Conference*; 1st, Asian honey bees and bee mites: Asian apiculture; 264-271. Wicwas Press, Connecticut.
- Mohd Mansor Ismail, & Muzafar Shah Habibullah. (1995). Production technology and beekeeping activities in Malaysia: Does technology differ among beekeepers and farm size? Paper presented at the *International Conference on Tropical Bees and the Environment*, 11-15 March 1995, Kedah, Malaysia.
- Mohd Mansor Ismail, Alias Radam, & Hishamuddin Zainuddin. (1995). The impact of forest conservation on honey hunting in Malaysia. *Proceedings of the Malaysian Natural Resources: Sustainability, Development, and Strategies*. p. 173-182.
- Mohd Mansor Ismail, Ismail AbdLatif, Zainalabidin Mohamed, Makhdzir Mardan, & Alias Radam. (2007). Forest conservation through honey hunting and ecotourism in Malaysia. *The Malaysian Journal of Agricultural Economics (MJAE)*, 20.
- Mohd Mansor Ismail, Makhzir Mardan, & Zawawi Jawahir. (2008). Potensi pengeluaran produk pelebahan di Malaysia. Paper presented at the *Seminar Honey Beekeepers* in Batu Pahat, Johor.
- Mohd Mansor Ismail, Muhamad Fadzil Repin, & Makhdzir Mardan. (2007). The economic potential of honey hunting in the Gelam Forest of Terengganu. *Proceedings of the USM-UPM-PETA International Conference*, 28-29 November 2007.
- Mohd Mansor Ismail, Zainalabidin Mohamed, Ismail AbdLatif, Shaufique Fahmi Sidiq, & Makhdzir Mardan. (2008). Production and trade of natural honey in Malaysia. *Proceedings of the 29th Malaysian Society of Animal Production (MSAP)*, 25-27 May 2008, Penang.
- Mohd Mansor Ismail. (2008). Gelam conservation Through honey hunting and ecotourism in Terengganu. *The Malaysian Journal of Agricultural Economics (MJAE)*, 21.

- Mohd Mansor Ismail. (2009). Potensi penternakan lebah madu di Bagan Datoh. *AgroSearch Research Bulletine*, 14(1).
- Mohd Mansor Ismail. (2009). Production and trade potential of natural honey in Malaysia. Paper presented at the *3rd Asia pacific Marketing Conference* in UNIMAS.
- Mohd Mansor Ismail. (2009). The impact of government incentives on beekeeping project in Malaysia: A case of *Apis mellifera*. *Proceedings of the 30th Malaysian Society of Animal Production (MSAP)*, 2-5 June 2009, Kota Kinabalu, Sabah.
- Mohd Mansor, I., & Shamsudin, M.N. (1989). Beekeeping: A potential activity in small farm diversification. *Options*, 4(1). UPM, Serdang, Malaysia. p. 5-6.
- Mohd Mansor, I., Mohammed, Z.A., Latiff, I., Sidique, S.F., & Mardan, M. (2008). Production and trade of natural honey in Malaysia. *Proceedings of the 29th MSAP*. UPM Serdang, Malaysia
- Mohd. Mansor Ismail, Ismail Abd. Latiff, Zainalabidin Mohamed, Makhdir Mardan, & Alias Radam. (2007). Honey hunting and nature tourism in Malaysia. *The Malaysian Journal of Agricultural Economics (MJAE)*, 20.
- Muzafar Shah Habibullah, & Mohd Mansor Ismail. (1991). A ray-homothetic frontier production function approach in measuring technical inefficiency: Its application to a sample of Malaysian feekeepers. *The Malaysian Journal of Small and Medium Enterprise*, 2, 55-67.
- Muzafar Shah Habibullah, & Mohd Mansor Ismail. (1991). Beekeeping activity: Prospect for increasing farmers' income in the rural areas of Malaysia. *Journal of Rural Development*, 10(1), 55-66.
- Muzafar Shah Habibullah, & Mohd Mansor Ismail. (1992). Returns to scale and optimal output in beekeeping in Malaysia. *Indian Economic Review*, 27(2), 229-234.
- Muzafar Shah Habibullah, & Mohd Mansor Ismail. (1994). Production frontier and technical efficiency: The case for beekeeping in Malaysia. *The Bangladesh Journal of Agricultural Economics*, 17(1&2).

- Muzafar Shah Habibullah, & Mohd Mansor Ismail. (1995). An economic analysis of technical efficiency in beekeeping in Malaysia: Frontier production function approach. *The Indian Journal of Economics*, 75(298), 407-420.
- National Competitiveness Council. (2004). Retrieved 3 March 2013 from <http://cordis.europa.eu/euroabstracts/en/june04/feature02.htm>
- Porter, M. E. (1980). *Competitive strategy: techniques for analyzing industries and competitors*. New York: Free Press.
- Porter, M. E. (1985). *Competitive advantage: Creating and sustaining superior performance*. New York: Free Press
- Porter, M. E. (1990). *The competitive advantage of nations*. New York: Free Press.
- Shaufique Fahmi Sidique, Mohd Mansor Ismail, & Alias Radam. (2008). Consumer willingness to pay for certified pure Tualang Honey in Malaysia. *Proceedings of the 29th Malaysian Society of Animal Production (MSAP)*, 25-27 May 2008, Penang.
- Shazali Abu Mansor, Mohd Mansor Ismail, Alias Radam, Nik Mustapha Raja Abdullah, & R. Salleh. (1993). The Consumer Profile and Preference of Honey among Various Ethnic Groups in Sarawak, Malaysia in "Asian Apiculture" (Edited by Connor, Rinderer, Sylvester, and Wongsiri) in Asian honey bees and bee mites: Asian apiculture International conference; 1st, Asian honey bees and bee mites: Asian apiculture; 264-271. Wicwas Press, Connecticut.
- WEF Global Competitiveness Index. Retrieved 3 March 2013 from <http://blogs.reuters.com/andrew-marshall/2010/09/10/wef-global-competitiveness-index-2010/>
- Winter-Nelson, Alex, & Aggrey-Fynn, Emmanuel. (2008). *Identifying opportunities in Ghana's agriculture*. International Food Policy Research Institute (IFPRI).
- Zakbah Mian, & Mohd. Mansor Ismail. (2009). Beekeeping in pineapple smallholdings: A case of *Apis mellifera*. *AgroSearch Research Bulletin*, 13(2).

APPENDIX 1

Table A1 Revenue and Operating Costs for RM5000 per month Project

A.	REVENUE	Price/unit	Revenue/Year	Total Revenue
	HONEY 6.0kg x50 =300kg	30.00	108,000.00	540,000.00
	HIVE AND BEES		-	-
	FRAME (COMB, NATURAL HONEY, BEES)		-	-
	WAX		-	-
	GELODOK		-	-
	TOTAL REVENUE		108,000.00	540,000.00
B.	PRODUCTION COST			
B1.	FIXED COST	Price/unit	unit	Total Cost
	a. A.mellifera colony (50 colonies)	900.00	50.00	45,000.00
	b. EXTRACTOR (10 YEARS)	1,500.00	1,500.00	1,500.00
	c. SMOKER (5 YEARS)	150.00	150.00	150.00
	d. CAP AND VEIL (5 YEARS)	55.00	55.00	55.00
	e. PROTECTIVE CLOTHING (5 YEARS)	350.00	350.00	350.00
	f. GLOVE (5 YEARS)	180.00	180.00	180.00

	g.	TOOL (5 YEARS)	60.00	60.00	60.00
	h.	LORRY (5 YEARS)	-	-	-
	i	STORAGE BUILDING (10 YEARS)	5,000.00	5,000.00	5,000.00
		TOTAL FIXED COST		7,345.00	52,295.00
B2.		OPERATING COST	Price/unit	Cost/Year	Total Cost
	b.	MEDECINE	-	1,000.00	5,000.00
	e.	FOODS SUBTITUTE	23,000.00	23,000.00	115,000.00
	h.	TRANSPORT (PETROL)	-	3,650.00	18,250.00
		TOTAL OPERATING COST		27,650.00	138,250.00

Average Production: 6.0kg/hive/month

APPENDIX 2

Table A2 High Income package RM5000 per month – Loan Amount 80000 at 4%

YEAR		0	1	2	3	4	5
A	REVENUE						
	HONEY	-	108,000.00	108,000.00	108,000.00	108,000.00	108,000.00
	POLLEN	-	-	-	-	-	-
	VENOM	-	-	-	-	-	-
	PROPOLIS	-	-	-	-	-	-
	EQUIPMENTS /COLONY	-	-	-	-	-	-
	TOTAL REVENUE	-	108,000.00	108,000.00	108,000.00	108,000.00	108,000.00
B	PRODUCTION COST						
B1	FIXED COST						
	a. Apis mellifera COLONY	45,000.00			-	-	-
	b. EXTRACTOR	1,500.00			-	-	-
	c. SMOKER	150.00			-	-	-
	d. CAP AND VEIL	55.00			-	-	-
	e. PROTECTIVE CLOTHING	350.00			-	-	-
	f. GLOVE	180.00			-	-	-
	g. TOOL	60.00			-	-	-
	h. LORRY	50,000.00			-	-	-
	i. STORAGE BUILDING/ CABIN	5,000.00			-	-	-
	TOTAL FIXED COST	102,295.00			-	-	-

Competitiveness of Beekeeping Industry in Malaysia

B2	OPERATING COST								
	a.	MEDECINE	-	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
	b.	FOOD SUBSTITUTE	-	23,000.00	23,000.00	23,000.00	23,000.00	23,000.00	23,000.00
	c.	TRANSPORT (PETROL)	-	3,650.00	3,650.00	3,650.00	3,650.00	3,650.00	3,650.00
	d.	LOAN REPAYMENT @ 4% (RM80K)	-	19,200.00	19,200.00	19,200.00	19,200.00	19,200.00	19,200.00
	e.								
	TOTAL OPERATING COST		-	46,850.00	46,850.00	46,850.00	46,850.00	46,850.00	46,850.00
	TOTAL DEPRECIATION COST			11,459.00	11,459.00	11,459.00	11,459.00	11,459.00	11,459.00
	EARNING BEFORE TAXES			49,691.00	49,691.00	49,691.00	49,691.00	49,691.00	49,691.00
	TAXES (25%)		25%	12,422.75	12,422.75	12,422.75	12,422.75	12,422.75	12,422.75
	NET PROFIT AFTER TAXES			37,268.25	37,268.25	37,268.25	37,268.25	37,268.25	37,268.25
	OPERATING CASH FLOW			48,727.25	48,727.25	48,727.25	48,727.25	48,727.25	48,727.25
	CASH INFLOW (OPERATION)			48,727.25	48,727.25	48,727.25	48,727.25	48,727.25	48,727.25
	NET CASHFLOW		(102,295.00)	60,186.25	60,186.25	60,186.25	60,186.25	60,186.25	60,186.25
	CUMULATIVE CASH FLOW		(102,295.00)	(42,108.75)	18,077.50	78,263.75	138,450.00	198,636.25	
Number of hives									
50 hives of <i>A mellifera</i>									
RM102,295									
RM125,858.24									
51%									
1 year 10 months									
2.23									

BIOGRAPHY

Mohd Mansor Ismail [PhD. Prof.] was born on 30th of November 1959 in Sungai Nibong, Penang and is the fourth child in a family of five. He is married to Dr Shahrum Ismail and has six children – Syafiqah, Safwan, Sufyan, Suhail, Sohaib, and Syahril.

He received his primary education at the Sekolah Kebangsaan Telok Air Tawar, Butterworth and his secondary school at the Penang Free School, Georgetown. At school, he was actively involved in athletics, games, and other co-curricular activities. After passing his Malaysia Certificate of Education in 1977, Mohd Mansor pursued his undergraduate study at the Universiti Pertanian Malaysia (UPM). Mohd Mansor obtained a Diploma in Agriculture from UPM in 1981. Then, he was offered a Public Service Department's scholarship to pursue bachelor and master's degrees in the United States of America. He performed exceptionally well as an undergraduate student at the University of Wisconsin, Madison, where he graduated with the highest distinction in 1983. In 1986, he joined the Faculty of Economics and Management, UPM, after the completion of his master's degree in Agricultural Economics from the University of California – Davis, USA. In September 1995, Mohd Mansor went to the University of Manchester, United Kingdom to pursue a doctorate degree in Agricultural Economics. He worked on a thesis entitle "The Competitiveness of the Food Processing Industry in Malaysia". He successfully completed the thesis in 1999 and was awarded the degree in the same year.

As a lecturer at the Department of Agribusiness and Information Systems, Faculty of Agriculture, Universiti Putra Malaysia (UPM), he has been active in teaching, research, advisory services, and administrative duties. He has been teaching Project Planning and Management at both the undergraduate and graduate levels in addition to Agricultural Finance and Agribusiness Finance.

Prior to 2005, the courses that he taught included Corporate Finance, Agribusiness Management, Microeconomics, Managerial Economics, and Quantitative Analysis. Recognition for his academic, research and administrative abilities came to him in May 2007 when he was appointed as the Head, Laboratory of Agricultural Production and Food Policy at the Institute of Agricultural and Food Policy Studies (IKDPM) and later in January 2012 when he was promoted to a full Professor.

Mohd Mansor is actively involved in conducting researches on production and trade of food industry in line with his academic background in competitiveness of food processing industry. Some of the food commodities included paddy, palm oil, tobacco, marine fish, aquaculture species, pineapple, poultry and beekeeping. Mohd Mansor is actively involved in the development of beekeeping industry in Malaysia. Since 1987, he held a position as an economist in the Malaysian Beekeeping Research and Development Team, led by Professor Dato' Dr Makhdzir Mardan. The team has been awarded with numerous research grants from various local and international donors such as IDRC, IRPA, MOE, MOSTI and YDSM. His expertise in the area was recognized when he and the team were offered several consultancy projects to study the production viability and marketing of bee products in Malaysia. Some of the projects were funded by FAMA and were successfully completed in 1992. At present, he is the project leader of a research entitled "The Optimal Stocking Rate of *Apis mellifera* and *Apis cerana* in Acacia Forests Reserves", funded by the Ministry of Education, Malaysia (MOE). To date, Mohd Mansor has received funds for beekeeping research and development projects for a total of more than one million ringgit local grants and international donors.

Recognition of his expertise and research capabilities in the economics of beekeeping in Malaysia also came to him through various invitations to deliver short courses and key note speakers in seminars and conferences, both locally and internationally. He has been occasionally invited to speak on the situation and outlook of beekeeping industry in Malaysia from various government agencies in Perlis, Kedah, Selangor, and Johor. Currently, he is a project leader in various research grants ranging from LRGS sub project, ERGS, RUGS and UPM GRANTS that covers the food industry especially paddy, aquaculture and beekeeping. He is able to train one post-doctoral candidate, 2 GRAs, one RA and 10 ROs at IKDPM from the grants.

In consultancy services, he was involved in projects funded by FAMA, MOA, MIMOS, Bank Rakyat, EPU and recently UPENJ. The projects covered beekeeping, fruits and vegetables, paddy, oil palm flowering sensor applications, agro based cooperatives, agriculture modelling and food processing industry. Apart from research activities and consultancy jobs, Mohd Mansor has supervised numerous students at various levels. He managed to graduate 3 PhD and 1 Master student as their principal supervisor. He is currently supervising one post- doctoral candidate, 7 PhD student, 3 master's students, and an undergraduate student. In addition, he has also examined 19 PhD theses and 24 master's theses internally and externally.

Currently he has 126 publications to his credits of which among others 21 were cited and 2 books on competitiveness. The first book was written on the competitiveness of food processing industry. The analysis was done at production and trade levels. The products include 20 food processing sub sector in the Malaysian Industrial Classifications (MIC) code. The potential products were recommended. The second book was just published in

December 2013. The book covered all food and feed industry in Malaysia. There were 23 food commodities and food products found in the Harmonise System (HS) trade code. However, the analysis was done at trade level only. Similarly, at the end of the book, food commodities or food products that possess high level competitiveness are recommended. Other publications were in non-cited journals, book chapters and proceedings. In recognition of his expertise in Competitiveness study, he was appointed as a leader in “Competitiveness of Food and Agriculture” research program.

In 2012, he received the Excellent Service Award from UPM. In the quest for a better marketability of agribusiness graduates, he has contributed a great deal in revising the curriculum of Agribusiness program. At the same time, he was much involved as the coordinator in designing new courses in Agricultural Economics and Agribusiness especially for the master’s degree in Agribusiness Management. He is looking forward to more fruitful services at UPM in Teaching, Research and Consultancy works in years to come.

ACKNOWLEDGEMENTS

First of all, I would like to thank Universiti Putra Malaysia (UPM) for providing me the opportunity to pursue my career as an academicians. The success in teaching, research and consultancy services would not be possible without the world class infrastructure, grants and manpower especially in the faculty of agriculture and UPM as a whole.

I would like to extend my sincere thanks to The Ministry of Education, MOSTI and UPM for funding all the research projects. The assistance of The Ministry of Agriculture and Agro-based Industry in providing and collecting production and trade data is highly appreciated. The help of Koperasi Pembanguna Desa (KPD) Sabah, Apiary Parit Botak and Jabatan Pertanian Sarawak in providing photographs of their beekeeping projects in their respective states are also greatly appreciated. The effort of beekeepers who were never tired from persistent interviews to fulfil my needs in the quest for more information is highly appreciated. I would like to thank all my colleagues in the beekeeping research and development team and business network Datuk Dr Makhdzir Mardan, Mr Zakbah Mian from Parit Botak Apiary, Mr Willie Gom from KPD Sabah, Mr Hamdan from MARDI and all the researchers and beekeepers in Malaysia for their efforts and cooperation in making Malaysia the main producer and exporter of bee products and by-products in the future.

I am very grateful to my wife and children for their consistent prayer, patience, understanding, support and encouragement in my pursuit of academic excellence. Lastly, a sincere appreciation goes to all my co researchers, Professor Datin Paduka Dr. Fatimah Mohamed Arshad, Dato Dr Makhdir Mardan, Dr. Muhammad Muid, Professor Datuk Dr. Mad Nasir Shamsudin, Professor Dr Zainalabidin Mohamed, Associate Professor Dr. Alias Radam,

Competitiveness of Beekeeping Industry in Malaysia

Associate Professor Dr. Amin Mahir Abdullah, Associate Professor Dr. Norsida Man, Dr. Ismail Latiff, Dr. Nolila Mohd Nawi, Dr. Nitty Hirawatty Kamarulzaman, Mr. Wan Mohd Marzuki Wan Bakar and to all the staff at IKDPM, JPSM and Faculty of Agriculture, UPM.

LIST OF INAUGURAL LECTURES

1. Prof. Dr. Sulaiman M. Yassin
The Challenge to Communication Research in Extension
22 July 1989
2. Prof. Ir. Abang Abdullah Abang Ali
Indigenous Materials and Technology for Low Cost Housing
30 August 1990
3. Prof. Dr. Abdul Rahman Abdul Razak
Plant Parasitic Nematodes, Lesser Known Pests of Agricultural Crops
30 January 1993
4. Prof. Dr. Mohamed Suleiman
Numerical Solution of Ordinary Differential Equations: A Historical Perspective
11 December 1993
5. Prof. Dr. Mohd. Ariff Hussein
Changing Roles of Agricultural Economics
5 March 1994
6. Prof. Dr. Mohd. Ismail Ahmad
Marketing Management: Prospects and Challenges for Agriculture
6 April 1994
7. Prof. Dr. Mohamed Mahyuddin Mohd. Dahan
The Changing Demand for Livestock Products
20 April 1994
8. Prof. Dr. Ruth Kiew
Plant Taxonomy, Biodiversity and Conservation
11 May 1994
9. Prof. Ir. Dr. Mohd. Zohadie Bardaie
Engineering Technological Developments Propelling Agriculture into the 21st Century
28 May 1994
10. Prof. Dr. Shamsuddin Jusop
Rock, Mineral and Soil
18 June 1994
11. Prof. Dr. Abdul Salam Abdullah
Natural Toxicants Affecting Animal Health and Production
29 June 1994
12. Prof. Dr. Mohd. Yusof Hussein
Pest Control: A Challenge in Applied Ecology
9 July 1994
13. Prof. Dr. Kapt. Mohd. Ibrahim Haji Mohamed
Managing Challenges in Fisheries Development through Science and Technology
23 July 1994
14. Prof. Dr. Hj. Amat Juhari Moain
Sejarah Keagungan Bahasa Melayu
6 Ogos 1994
15. Prof. Dr. Law Ah Theem
Oil Pollution in the Malaysian Seas
24 September 1994
16. Prof. Dr. Md. Nordin Hj. Lajis
Fine Chemicals from Biological Resources: The Wealth from Nature
21 January 1995
17. Prof. Dr. Sheikh Omar Abdul Rahman
Health, Disease and Death in Creatures Great and Small
25 February 1995

Competitiveness of Beekeeping Industry in Malaysia

18. Prof. Dr. Mohamed Shariff Mohamed Din
Fish Health: An Odyssey through the Asia - Pacific Region
25 March 1995
19. Prof. Dr. Tengku Azmi Tengku Ibrahim
Chromosome Distribution and Production Performance of Water Buffaloes
6 May 1995
20. Prof. Dr. Abdul Hamid Mahmood
Bahasa Melayu sebagai Bahasa Ilmu-Cabaran dan Harapan
10 Jun 1995
21. Prof. Dr. Rahim Md. Sail
Extension Education for Industrialising Malaysia: Trends, Priorities and Emerging Issues
22 July 1995
22. Prof. Dr. Nik Muhammad Nik Abd. Majid
The Diminishing Tropical Rain Forest: Causes, Symptoms and Cure
19 August 1995
23. Prof. Dr. Ang Kok Jee
The Evolution of an Environmentally Friendly Hatchery Technology for Udang Galah, the King of Freshwater Prawns and a Glimpse into the Future of Aquaculture in the 21st Century
14 October 1995
24. Prof. Dr. Sharifuddin Haji Abdul Hamid
Management of Highly Weathered Acid Soils for Sustainable Crop Production
28 October 1995
25. Prof. Dr. Yu Swee Yean
Fish Processing and Preservation: Recent Advances and Future Directions
9 December 1995
26. Prof. Dr. Rosli Mohamad
Pesticide Usage: Concern and Options
10 February 1996
27. Prof. Dr. Mohamed Ismail Abdul Karim
Microbial Fermentation and Utilization of Agricultural Bioresources and Wastes in Malaysia
2 March 1996
28. Prof. Dr. Wan Sulaiman Wan Harun
Soil Physics: From Glass Beads to Precision Agriculture
16 March 1996
29. Prof. Dr. Abdul Aziz Abdul Rahman
Sustained Growth and Sustainable Development: Is there a Trade-Off 1 or Malaysia
13 April 1996
30. Prof. Dr. Chew Tek Ann
Sharecropping in Perfectly Competitive Markets: A Contradiction in Terms
27 April 1996
31. Prof. Dr. Mohd. Yusuf Sulaiman
Back to the Future with the Sun
18 May 1996
32. Prof. Dr. Abu Bakar Salleh
Enzyme Technology: The Basis for Biotechnological Development
8 June 1996
33. Prof. Dr. Kamel Ariffin Mohd. Atan
The Fascinating Numbers
29 June 1996
34. Prof. Dr. Ho Yin Wan
Fungi: Friends or Foes
27 July 1996
35. Prof. Dr. Tan Soon Guan
Genetic Diversity of Some Southeast Asian Animals: Of Buffaloes and Goats and Fishes Too
10 August 1996

Mohd Mansor Ismail

36. Prof. Dr. Nazaruddin Mohd. Jali
*Will Rural Sociology Remain Relevant
in the 21st Century?*
21 September 1996
37. Prof. Dr. Abdul Rani Bahaman
*Leptospirosis-A Model for
Epidemiology, Diagnosis and Control
of Infectious Diseases*
16 November 1996
38. Prof. Dr. Marziah Mahmood
*Plant Biotechnology - Strategies for
Commercialization*
21 December 1996
39. Prof. Dr. Ishak Hj. Omar
*Market Relationships in the Malaysian
Fish Trade: Theory and Application*
22 March 1997
40. Prof. Dr. Suhaila Mohamad
Food and Its Healing Power
12 April 1997
41. Prof. Dr. Malay Raj Mukerjee
*A Distributed Collaborative
Environment for Distance Learning
Applications*
17 June 1998
42. Prof. Dr. Wong Kai Choo
*Advancing the Fruit Industry in
Malaysia: A Need to Shift Research
Emphasis*
15 May 1999
43. Prof. Dr. Aini Ideris
*Avian Respiratory and
Immunosuppressive Diseases- A Fatal
Attraction*
10 July 1999
44. Prof. Dr. Sariah Meon
*Biological Control of Plant Pathogens:
Harnessing the Richness of Microbial
Diversity*
14 August 1999
45. Prof. Dr. Azizah Hashim
*The Endomycorrhiza: A Futile
Investment?*
23 Oktober 1999
46. Prof. Dr. Noraini Abdul Samad
*Molecular Plant Virology: The Way
Forward*
2 February 2000
47. Prof. Dr. Muhamad Awang
*Do We Have Enough Clean Air to
Breathe?*
7 April 2000
48. Prof. Dr. Lee Chnoong Kheng
Green Environment, Clean Power
24 June 2000
49. Prof. Dr. Mohd. Ghazali Mohayidin
*Managing Change in the Agriculture
Sector: The Need for Innovative
Educational Initiatives*
12 January 2002
50. Prof. Dr. Fatimah Mohd. Arshad
*Analisis Pemasaran Pertanian
di Malaysia: Keperluan Agenda
Pembaharuan*
26 Januari 2002
51. Prof. Dr. Nik Mustapha R. Abdullah
*Fisheries Co-Management: An
Institutional Innovation Towards
Sustainable Fisheries Industry*
28 February 2002
52. Prof. Dr. Gulam Rusul Rahmat Ali
*Food Safety: Perspectives and
Challenges*
23 March 2002
53. Prof. Dr. Zaharah A. Rahman
*Nutrient Management Strategies for
Sustainable Crop Production in Acid
Soils: The Role of Research Using
Isotopes*
13 April 2002

Competitiveness of Beekeeping Industry in Malaysia

54. Prof. Dr. Maisom Abdullah
Productivity Driven Growth: Problems & Possibilities
27 April 2002
55. Prof. Dr. Wan Omar Abdullah
Immunodiagnosis and Vaccination for Brugian Filariasis: Direct Rewards from Research Investments
6 June 2002
56. Prof. Dr. Syed Tajuddin Syed Hassan
Agro-ento Bioinformation: Towards the Edge of Reality
22 June 2002
57. Prof. Dr. Dahlan Ismail
Sustainability of Tropical Animal-Agricultural Production Systems: Integration of Dynamic Complex Systems
27 June 2002
58. Prof. Dr. Ahmad Zubaidi Baharumshah
The Economics of Exchange Rates in the East Asian Countries
26 October 2002
59. Prof. Dr. Shaik Md. Noor Alam S.M. Hussain
Contractual Justice in Asean: A Comparative View of Coercion
31 October 2002
60. Prof. Dr. Wan Md. Zin Wan Yunus
Chemical Modification of Polymers: Current and Future Routes for Synthesizing New Polymeric Compounds
9 November 2002
61. Prof. Dr. Annuar Md. Nassir
Is the KLSE Efficient? Efficient Market Hypothesis vs Behavioural Finance
23 November 2002
62. Prof. Ir. Dr. Radin Umar Radin Sohadi
Road Safety Interventions in Malaysia: How Effective Are They?
21 February 2003
63. Prof. Dr. Shamsheer Mohamad
The New Shares Market: Regulatory Intervention, Forecast Errors and Challenges
26 April 2003
64. Prof. Dr. Han Chun Kwong
Blueprint for Transformation or Business as Usual? A Structural Perspective of the Knowledge-Based Economy in Malaysia
31 May 2003
65. Prof. Dr. Mawardi Rahmani
Chemical Diversity of Malaysian Flora: Potential Source of Rich Therapeutic Chemicals
26 July 2003
66. Prof. Dr. Fatimah Md. Yusoff
An Ecological Approach: A Viable Option for Aquaculture Industry in Malaysia
9 August 2003
67. Prof. Dr. Mohamed Ali Rajion
The Essential Fatty Acids-Revisited
23 August 2003
68. Prof. Dr. Azhar Md. Zain
Psychotherapy for Rural Malays - Does it Work?
13 September 2003
69. Prof. Dr. Mohd. Zamri Saad
Respiratory Tract Infection: Establishment and Control
27 September 2003
70. Prof. Dr. Jinap Selamat
Cocoa-Wonders for Chocolate Lovers
14 February 2004

Mohd Mansor Ismail

71. Prof. Dr. Abdul Halim Shaari
High Temperature Superconductivity: Puzzle & Promises
13 March 2004
72. Prof. Dr. Yaakob Che Man
Oils and Fats Analysis - Recent Advances and Future Prospects
27 March 2004
73. Prof. Dr. Kaida Khalid
Microwave Aquametry: A Growing Technology
24 April 2004
74. Prof. Dr. Hasanah Mohd. Ghazali
Tapping the Power of Enzymes- Greening the Food Industry
11 May 2004
75. Prof. Dr. Yusof Ibrahim
The Spider Mite Saga: Quest for Biorational Management Strategies
22 May 2004
76. Prof. Datin Dr. Sharifah Md. Nor
The Education of At-Risk Children: The Challenges Ahead
26 June 2004
77. Prof. Dr. Ir. Wan Ishak Wan Ismail
Agricultural Robot: A New Technology Development for Agro-Based Industry
14 August 2004
78. Prof. Dr. Ahmad Said Sajap
Insect Diseases: Resources for Biopesticide Development
28 August 2004
79. Prof. Dr. Aminah Ahmad
The Interface of Work and Family Roles: A Quest for Balanced Lives
11 March 2005
80. Prof. Dr. Abdul Razak Alimon
Challenges in Feeding Livestock: From Wastes to Feed
23 April 2005
81. Prof. Dr. Haji Azimi Hj. Hamzah
Helping Malaysian Youth Move Forward: Unleashing the Prime Enablers
29 April 2005
82. Prof. Dr. Rasedee Abdullah
In Search of An Early Indicator of Kidney Disease
27 May 2005
83. Prof. Dr. Zulkifli Hj. Shamsuddin
Smart Partnership: Plant-Rhizobacteria Associations
17 June 2005
84. Prof. Dr. Mohd Khanif Yusop
From the Soil to the Table
1 July 2005
85. Prof. Dr. Annuar Kassim
Materials Science and Technology: Past, Present and the Future
8 July 2005
86. Prof. Dr. Othman Mohamed
Enhancing Career Development Counselling and the Beauty of Career Games
12 August 2005
87. Prof. Ir. Dr. Mohd Amin Mohd Soom
Engineering Agricultural Water Management Towards Precision Framing
26 August 2005
88. Prof. Dr. Mohd Arif Syed
Bioremediation-A Hope Yet for the Environment?
9 September 2005
89. Prof. Dr. Abdul Hamid Abdul Rashid
The Wonder of Our Neuromotor System and the Technological Challenges They Pose
23 December 2005
90. Prof. Dr. Norhani Abdullah
Rumen Microbes and Some of Their Biotechnological Applications
27 January 2006

Competitiveness of Beekeeping Industry in Malaysia

91. Prof. Dr. Abdul Aziz Saharee
Haemorrhagic Septicaemia in Cattle and Buffaloes: Are We Ready for Freedom?
24 February 2006
92. Prof. Dr. Kamariah Abu Bakar
Activating Teachers' Knowledge and Lifelong Journey in Their Professional Development
3 March 2006
93. Prof. Dr. Borhanuddin Mohd. Ali
Internet Unwired
24 March 2006
94. Prof. Dr. Sundararajan Thilagar
Development and Innovation in the Fracture Management of Animals
31 March 2006
95. Prof. Dr. Zainal Aznam Md. Jelani
Strategic Feeding for a Sustainable Ruminant Farming
19 May 2006
96. Prof. Dr. Mahiran Basri
Green Organic Chemistry: Enzyme at Work
14 July 2006
97. Prof. Dr. Malik Hj. Abu Hassan
Towards Large Scale Unconstrained Optimization
20 April 2007
98. Prof. Dr. Khalid Abdul Rahim
Trade and Sustainable Development: Lessons from Malaysia's Experience
22 Jun 2007
99. Prof. Dr. Mad Nasir Shamsudin
Econometric Modelling for Agricultural Policy Analysis and Forecasting: Between Theory and Reality
13 July 2007
100. Prof. Dr. Zainal Abidin Mohamed
Managing Change - The Fads and The Realities: A Look at Process Reengineering, Knowledge Management and Blue Ocean Strategy
9 November 2007
101. Prof. Ir. Dr. Mohamed Daud
Expert Systems for Environmental Impacts and Ecotourism Assessments
23 November 2007
102. Prof. Dr. Saleha Abdul Aziz
Pathogens and Residues; How Safe is Our Meat?
30 November 2007
103. Prof. Dr. Jayum A. Jawan
Hubungan Sesama Manusia
7 Disember 2007
104. Prof. Dr. Zakariah Abdul Rashid
Planning for Equal Income Distribution in Malaysia: A General Equilibrium Approach
28 December 2007
105. Prof. Datin Paduka Dr. Khatijah Yusoff
Newcastle Disease virus: A Journey from Poultry to Cancer
11 January 2008
106. Prof. Dr. Dzulkefly Kuang Abdullah
Palm Oil: Still the Best Choice
1 February 2008
107. Prof. Dr. Elias Saion
Probing the Microscopic Worlds by Ionizing Radiation
22 February 2008
108. Prof. Dr. Mohd Ali Hassan
Waste-to-Wealth Through Biotechnology: For Profit, People and Planet
28 March 2008

Mohd Mansor Ismail

109. Prof. Dr. Mohd Maarof H. A. Moxsin
Metrology at Nanoscale: Thermal Wave Probe Made It Simple
11 April 2008
110. Prof. Dr. Dzolkhiffi Omar
The Future of Pesticides Technology in Agriculture: Maximum Target Kill with Minimum Collateral Damage
25 April 2008
111. Prof. Dr. Mohd. Yazid Abd. Manap
Probiotics: Your Friendly Gut Bacteria
9 May 2008
112. Prof. Dr. Hamami Sahri
Sustainable Supply of Wood and Fibre: Does Malaysia have Enough?
23 May 2008
113. Prof. Dato' Dr. Makhdzir Mardan
Connecting the Bee Dots
20 June 2008
114. Prof. Dr. Maimunah Ismail
Gender & Career: Realities and Challenges
25 July 2008
115. Prof. Dr. Nor Aripin Shamaan
Biochemistry of Xenobiotics: Towards a Healthy Lifestyle and Safe Environment
1 August 2008
116. Prof. Dr. Mohd Yunus Abdullah
Penjagaan Kesihatan Primer di Malaysia: Cabaran Prospek dan Implikasi dalam Latihan dan Penyelidikan Perubatan serta Sains Kesihatan di Universiti Putra Malaysia
8 Ogos 2008
117. Prof. Dr. Musa Abu Hassan
Memfaatkan Teknologi Maklumat & Komunikasi ICT untuk Semua
15 Ogos 2008
118. Prof. Dr. Md. Salleh Hj. Hassan
Role of Media in Development: Strategies, Issues & Challenges
22 August 2008
119. Prof. Dr. Jariah Masud
Gender in Everyday Life
10 October 2008
120. Prof. Dr. Mohd Shahwahid Haji Othman
Mainstreaming Environment: Incorporating Economic Valuation and Market-Based Instruments in Decision Making
24 October 2008
121. Prof. Dr. Son Radu
Big Questions Small Worlds: Following Diverse Vistas
31 Oktober 2008
122. Prof. Dr. Russly Abdul Rahman
Responding to Changing Lifestyles: Engineering the Convenience Foods
28 November 2008
123. Prof. Dr. Mustafa Kamal Mohd Shariff
Aesthetics in the Environment an Exploration of Environmental: Perception Through Landscape Preference
9 January 2009
124. Prof. Dr. Abu Daud Silong
Leadership Theories, Research & Practices: Farming Future Leadership Thinking
16 January 2009
125. Prof. Dr. Azni Idris
Waste Management, What is the Choice: Land Disposal or Biofuel?
23 January 2009

Competitiveness of Beekeeping Industry in Malaysia

- | | |
|--|--|
| <p>126. Prof. Dr. Jamilah Bakar
<i>Freshwater Fish: The Overlooked Alternative</i>
30 January 2009</p> | <p>136. Prof. Dr. Taufiq Yap Yun Hin
<i>Catalysis for a Sustainable World</i>
7 August 2009</p> |
| <p>127. Prof. Dr. Mohd. Zobir Hussein
<i>The Chemistry of Nanomaterial and Nanobiomaterial</i>
6 February 2009</p> | <p>137. Prof. Dr. Raja Noor Zaliha Raja Abd. Rahman
<i>Microbial Enzymes: From Earth to Space</i>
9 Oktober 2009</p> |
| <p>128. Prof. Ir. Dr. Lee Teang Shui
<i>Engineering Agricultural: Water Resources</i>
20 February 2009</p> | <p>138. Prof. Ir. Dr. Barkawi Sahari
<i>Materials, Energy and CNGDI Vehicle Engineering</i>
6 November 2009</p> |
| <p>129. Prof. Dr. Ghizan Saleh
<i>Crop Breeding: Exploiting Genes for Food and Feed</i>
6 March 2009</p> | <p>139. Prof. Dr. Zulkifli Idrus
<i>Poultry Welfare in Modern Agriculture: Opportunity or Threat?</i>
13 November 2009</p> |
| <p>130. Prof. Dr. Muzafar Shah Habibullah
<i>Money Demand</i>
27 March 2009</p> | <p>140. Prof. Dr. Mohamed Hanafi Musa
<i>Managing Phosphorus: Under Acid Soils Environment</i>
8 January 2010</p> |
| <p>131. Prof. Dr. Karen Anne Crouse
<i>In Search of Small Active Molecules</i>
3 April 2009</p> | <p>141. Prof. Dr. Abdul Manan Mat Jais
<i>Haruan Channa striatus a Drug Discovery in an Agro-Industry Setting</i>
12 March 2010</p> |
| <p>132. Prof. Dr. Turiman Suandi
<i>Volunteerism: Expanding the Frontiers of Youth Development</i>
17 April 2009</p> | <p>142. Prof. Dr. Bujang bin Kim Huat
<i>Problematic Soils: In Search for Solution</i>
19 March 2010</p> |
| <p>133. Prof. Dr. Arbakariya Ariff
<i>Industrializing Biotechnology: Roles of Fermentation and Bioprocess Technology</i>
8 Mei 2009</p> | <p>143. Prof. Dr. Samsinar Md Sidin
<i>Family Purchase Decision Making: Current Issues & Future Challenges</i>
16 April 2010</p> |
| <p>134. Prof. Ir. Dr. Desa Ahmad
<i>Mechanics of Tillage Implements</i>
12 Jun 2009</p> | <p>144. Prof. Dr. Mohd Adzir Mahdi
<i>Lightspeed: Catch Me If You Can</i>
4 June 2010</p> |
| <p>135. Prof. Dr. W. Mahmood Mat Yunus
<i>Photothermal and Photoacoustic: From Basic Research to Industrial Applications</i>
10 Julai 2009</p> | <p>145. Prof. Dr. Raha Hj. Abdul Rahim
<i>Designer Genes: Fashioning Mission Purposed Microbes</i>
18 June 2010</p> |

Mohd Mansor Ismail

146. Prof. Dr. Hj. Hamidon Hj. Basri
A Stroke of Hope, A New Beginning
2 July 2010
147. Prof. Dr. Hj. Kamaruzaman Jusoff
Going Hyperspectral: The "Unseen" Captured?
16 July 2010
148. Prof. Dr. Mohd Sapuan Salit
Concurrent Engineering for Composites
30 July 2010
149. Prof. Dr. Shattri Mansor
Google the Earth: What's Next?
15 October 2010
150. Prof. Dr. Mohd Basyaruddin Abdul Rahman
Haute Couture: Molecules & Biocatalysts
29 October 2010
151. Prof. Dr. Mohd. Hair Bejo
Poultry Vaccines: An Innovation for Food Safety and Security
12 November 2010
152. Prof. Dr. Umi Kalsom Yusuf
Fern of Malaysian Rain Forest
3 December 2010
153. Prof. Dr. Ab. Rahim Bakar
Preparing Malaysian Youths for The World of Work: Roles of Technical and Vocational Education and Training (TVET)
14 January 2011
154. Prof. Dr. Seow Heng Fong
Are there "Magic Bullets" for Cancer Therapy?
11 February 2011
155. Prof. Dr. Mohd Azmi Mohd Lila
Biopharmaceuticals: Protection, Cure and the Real Winner
18 February 2011
156. Prof. Dr. Siti Shapor Siraj
Genetic Manipulation in Farmed Fish: Enhancing Aquaculture Production
25 March 2011
157. Prof. Dr. Ahmad Ismail
Coastal Biodiversity and Pollution: A Continuous Conflict
22 April 2011
158. Prof. Ir. Dr. Norman Mariun
Energy Crisis 2050? Global Scenario and Way Forward for Malaysia
10 June 2011
159. Prof. Dr. Mohd Razi Ismail
Managing Plant Under Stress: A Challenge for Food Security
15 July 2011
160. Prof. Dr. Patimah Ismail
Does Genetic Polymorphisms Affect Health?
23 September 2011
161. Prof. Dr. Sidek Ab. Aziz
Wonders of Glass: Synthesis, Elasticity and Application
7 October 2011
162. Prof. Dr. Azizah Osman
Fruits: Nutritious, Colourful, Yet Fragile Gifts of Nature
14 October 2011
163. Prof. Dr. Mohd. Fauzi Ramlan
Climate Change: Crop Performance and Potential
11 November 2011
164. Prof. Dr. Adem Kiliçman
Mathematical Modeling with Generalized Function
25 November 2011

Competitiveness of Beekeeping Industry in Malaysia

- | | |
|---|--|
| <p>165. Prof. Dr. Fauziah Othman
<i>My Small World: In Biomedical Research</i>
23 December 2011</p> | <p>173. Prof. Dr. Azmi Zakaria
<i>Photothermals Affect Our Lives</i>
7 Jun 2013</p> |
| <p>166. Prof. Dr. Japar Sidik Bujang
<i>The Marine Angiosperms, Seagrass</i>
23 March 2012</p> | <p>174. Prof. Dr. Rahinah Ibrahim
<i>Design Informatics</i>
21 Jun 2103</p> |
| <p>166. Prof. Dr. Zailina Hashim
<i>Air Quality and Children's Environmental Health: Is Our Future Generation at Risk?</i>
30 March 2012</p> | <p>175. Prof. Dr. Gwendoline Ee Cheng
<i>Natural Products from Malaysian Rainforests</i>
1 November 2013</p> |
| <p>167. Prof. Dr. Zainal Abidin Mohamed
<i>Where is the Beef? Vantage Point form the Livestock Supply Chain</i>
27 April 2012</p> | <p>176. Prof. Dr. Noor Akma Ibrahim
<i>The Many Facets of Statistical Modeling</i>
22 November 2013</p> |
| <p>168. Prof. Dr. Jothi Malar Panandam
<i>Genetic Characterisation of Animal Genetic Resources for Sustainable Utilisation and Development</i>
30 November 2012</p> | <p>177. Prof. Dr. Paridah Md. Tahir
<i>Bonding with Natural Fibres</i>
6 Disember 2013</p> |
| <p>169. Prof. Dr. Fatimah Abu Bakar
<i>The Good The Bad & Ugly of Food Safety: From Molecules to Microbes</i>
7 Disember 2012</p> | <p>178. Prof. Dr. Abd. Wahid Haron
<i>Livestock Breeding: The Past, The Present and The Future</i>
9 Disember 2013</p> |
| <p>170. Prof. Dr. Abdul Jalil Nordin
<i>My Colourful Sketches from Scratch: Molecular Imaging</i>
5 April 2013</p> | <p>179. Prof. Dr. Aziz Arshad
<i>Exploring Biodiversity & Fisheries Biology: A Fundamental Knowledge for Sustainable Fish Production</i>
24 Januari 2014</p> |
| <p>171. Prof. Dr. Norlijah Othman
<i>Lower Respiratory Infections in Children: New Pathogens, Old Pathogens and The Way Forward</i>
19 April 2013</p> | |
| <p>172. Prof. Dr. Jayakaran Mukundan
<i>Steroid-like Prescriptions English Language Teaching Can Ill-afford</i>
26 April 2013</p> | |