

The Feasibility of Establishing Aircraft Maintenance, Repair and Overhaul (MRO) in Nakhon Phanom Province of Thailand

การศึกษาความเป็นไปได้ในการตั้งศูนย์ซ่อมอากาศยานในจังหวัดนครพนม

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Abstract

The purpose of this research was to conduct a feasibility study into establishing Aircraft Maintenance, Repair and Overhaul (MRO) in Nakhon Phanom, Thailand. A qualitative research was used with a semi-structured, in-depth interview as a data collection tool. The researcher team selected key informants through the snowball technique. In accordance with the data source triangulation concept, 9 key informants were derived from 3 sources: academic institutions, government agencies and executives from airlines.

The result revealed that Nakhon Phanom province had two major reasons supporting the feasibility of becoming Thailand MRO. First of all, there are extensive plots of land owned by the government and available for continual utilization. Secondly, the existing International Aviation College (IAC) has the potential to produce quality commercial pilots, aircraft maintenance mechanics, flight instructors and aviation personnel at both bachelor and graduate levels. From this research, it was recommended that Nakhon Phanom MRO should seek support from provincial administration and collaborate with Nakhon Phanom University, for its potential of different kinds of curricula to produce a complete range of aviation personnel. Finally, there should be a push for a national policy to recognize MRO as having similar standards as U-Tapao Industrial Estate. Furthermore, the training and preparation of aircraft maintenance mechanics should follow the International Civil Aviation Organization (ICAO) as the basic standard prior to adopting other standards like European Aviation Safety Agency (EASA) or Federal Aviation Administration (FAA).

Keywords: *Feasibility, Aircraft, Maintenance, Repair and Overhaul (MRO)*

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บทคัดย่อ

การวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาความเป็นไปได้ในการตั้งศูนย์ซ่อมอากาศยานในจังหวัดนครพนม ประเทศไทย โดยใช้วิธีวิจัยเชิงคุณภาพด้วยการสัมภาษณ์เชิงลึก เครื่องมือในการเก็บข้อมูล คือ แบบสัมภาษณ์ แบบกึ่งมีโครงสร้าง คณะผู้วิจัยคัดเลือกกลุ่มผู้ให้ข้อมูลหลักด้วยวิธีการแนะนำผู้หนึ่งต่อๆ กันมา ผู้ให้ข้อมูลหลักมาจาก 3 หน่วยงานที่เกี่ยวข้อง ได้แก่ สถาบันการศึกษา หน่วยงานราชการในจังหวัดนครพนม และผู้บริหารสายการบิน รวมทั้งหมด 9 คน ใช้หลักการสามเส้าของแหล่งข้อมูล

ผลการวิจัยพบว่า จังหวัดนครพนมมีความเป็นไปได้ในการตั้งศูนย์ซ่อมอากาศยานของประเทศไทยด้วยปัจจัยหลายประการ ได้แก่ พื้นที่มีขนาดกว้างขวาง และเป็นที่ดินของทางราชการที่สามารถนำไปใช้ประโยชน์ได้อย่างต่อเนื่อง และความพร้อมของวิทยาลัยการบิณนานาชาติที่มีศักยภาพในการผลิตนักบินพาณิชย์ตรีช่างซ่อมอากาศยาน ครูการบิน และบุคลากรด้านการจัดการการบินทั้งระดับปริญญาตรีและปริญญาโท การวิจัยนี้มีข้อเสนอแนะดังนี้ ศูนย์ซ่อมอากาศยานของจังหวัดนครพนม จะเกิดขึ้นได้ต้องอาศัยภาครัฐในระดับจังหวัด ร่วมกับมหาวิทยาลัยนครพนมที่มีวิทยาลัยการบิณนานาชาติที่กำลังกำลังความสามารถในการผลิตบุคลากรครบวงจร ผลักดันขึ้นไปยังนโยบายระดับประเทศ เพื่อให้มีลักษณะเหมือนหรือใกล้เคียงกับนิคมอุตสาหกรรมการบินอุตะเภาและมีการเตรียมความพร้อมในการผลิตช่างซ่อมอากาศยานให้ได้มาตรฐานตามสำนักงานการบินพลเรือนระหว่างประเทศ (ICAO) ซึ่งเป็นมาตรฐานพื้นฐานก่อนที่จะไปสู่มาตรฐานที่สูงขึ้นอย่าง EASA หรือ FAA

คำสำคัญ: ความเป็นไปได้ เครื่องบิน ศูนย์ซ่อมอากาศยาน

Introduction

Aviation business in Thailand is highly competitive when considering the number of flights departing to and from Thailand, with a considerable annual increase. In 2013, the number of departure and arrival flights from

airports at Bangkok were 559,423, 609,937 flights in 2014 and 707,362 flights in 2015 (as of Sept 30, 2015). It was found that the growth rate in 2013 increased by 7.26%, in 2014, and doubled to 15.97% and 21.94% in 2015 (Annual Report 2015 Airports of Thailand Plc.).

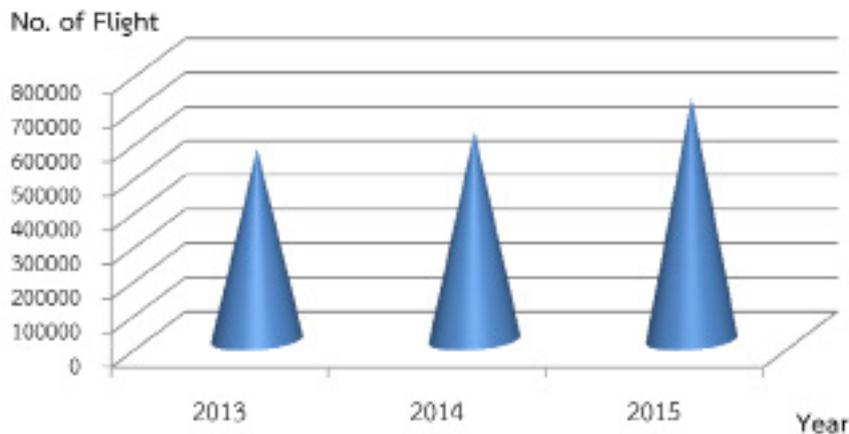


Figure 1 Number of Flights Departing to and from Thailand between 2013-2015 A.D.
Source: Annual Report 2015 Airports of Thailand Plc. (2015)

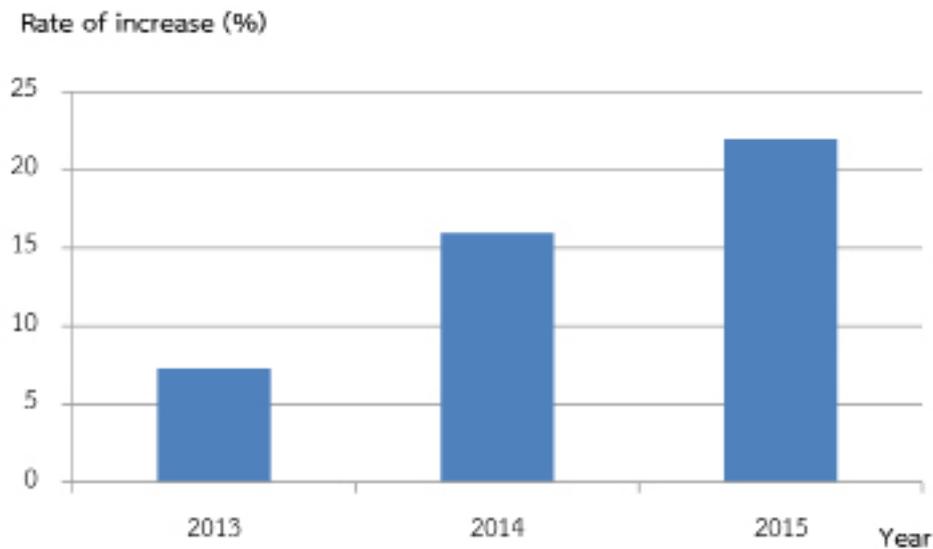


Figure 2 Rate of Flight Increase Departing to and from Thailand between 2013-2015 A.D.

Source: Annual Report 2015 Airports of Thailand Plc. (2015)

From the above information, the government under General Prayuth Chan-Ocha has initiated a development policy of transport of Thailand, and in particular, the increase in capability of providing air transport service (Juntong, 2016). There are six projects as follows;

1. Development of Suvarnabhumi Airport Project Phase 2
2. Construction of the Third Runway Project : Suvarnabhumi Airport
3. Development of Donmuang and U-Tapao Airport Project
4. Development of Donmuang Airport Project Phase 2
5. Development of Phuket Airport
6. Development of Aviation Industrial Estate Project

All of these projects would affect the air service capability 1) to serve 10-90 million passengers at the airports in Bangkok, 2) to serve 800,000-3,000,000 passengers at U-Tapao Airport, and 3) to increase air traffic management from 600,000 to 1,400,000 flights per year within 10 years (2023 A.D.).

With regard to aviation industrial estates and Maintenance, Repair and Overhaul (MRO) Centers, manufacturers of aviation spare parts are privately owned, with sites in different industrial parks along the eastern coast of Thailand, for example, Amata City Industrial Park and Pin Thong Industrial Park, which are OEM on Tier 1 and Tier 2. However, Singapore is the major center of aviation spare part manufacturers, making it highly competitive for Thai industry. It is, therefore, deemed essential that the Thai government push MRO as a regional center for ASEAN and Asia.

At present, U-Tapao Airport is the MRO for Thai Airways International Co. Ltd. to provide services to its own fleets and other airlines. However, several low cost airlines, such as Thai Air Asia, Nok Air, and Thai Lion Air have to rely on services from abroad because there is inadequate services from inside the country. The value of MRO in foreign countries is 23,000,000 million baht per year. Regarding services provision for airlines, it will be a beneficial alternative if Thailand could provide proximity and lower

expenses for MRO services and hence cause the impact on the growth of aviation industry in Thailand, as well as increasing employment opportunity for 6,000 positions in this business (Thansejthakij, 2015). Therefore, it is becoming essential to produce personnel to meet the growing demand of the industry.

At present, there are eight vocational institutions running MRO curriculum, including NakhonPhanom University, Talang Technical College, Donmuang Technical College, Samut Prakarn Technical College, UbonRatchathane Technical College, KhonKhean Industrial and Community Education College, Sattahip Technical College, and Civil Aviation Institution. Also, there are 8 higher education institutions providing a bachelor's degree in aviation engineering, such as Rajamangala University of Technology Krungthep (RMUTK), Civil Aviation Institution, Rangsit University, Kasetsart University, Chulalongkorn University, Assumption University, and Thammasat University. Together, they are capable of producing 300-400 graduates per year when the market needs are higher than 400 per year. Nowadays, there are approximately 8,000-9,000 aircraft maintenance mechanics working in Thai Airways International Public Company Limited (Thai). However, only 10% of them hold an international license, whereas the rest only possess Thai DCA, and that barring them from working internationally (Thaipublica, 2016).

NakhonPhanom province is located in the northeastern part of Thailand, with an airport managed by the Department of Airports, Ministry of Transport. Two major airlines, Thai Air Asia and Nok Air, operate 5 flights daily to and from this province. There is an International Aviation College under Nakhon Phanom University offering aviation curricula including MRO at the vocational

level and aviation management at a higher education level. Furthermore, it offers Commercial Pilot License – Aeroplane (CPL) and Private Pilot Licence – Aeroplane (PPL). Considering the above information, NakhonPhanom has a potential for the establishment of MRO center. Prior to doing this research, my team and I as researchers found that the government has invested a large amount of money in five industries in the Eastern Economic Corridor (EEC) Project, in which aviation industry is one of the five industries; including medical hub, robotics, biofuel & biochemical and digital in EEC (Board of Investment, 2016). However, NakhonPhanom province has not been positioned as aviation hub, even though there are several factors supporting such a hub. Consequently, we have posed the following research questions:

1. Are Thai academic institutions adequately capable of producing aircraft maintenance mechanics?
2. How capable is NakhonPhanom University's International Aviation College in producing competent aircraft maintenance mechanics?
3. Does NakhonPhanom province have the potential to become Aircraft Maintenance, Repair and Overhaul (MRO) Center?

It is, therefore, our interest in conducting a feasibility study of set up Aircraft Maintenance, Repair and Overhaul (MRO) Center in Nakhon-Phanom province, regarding the issues mentioned in this section.

Objectives

1. To study the potential of Thai academic institutions for producing aircraft maintenance mechanics
2. To study the competency of aircraft maintenance mechanics trained by

International Aviation College, Nakhon -
Phanom University

3. To study the feasibility of setting up MRO center in NakhonPhanom province

Literature Review

According to Nanosoft Marketing Series (2017), to start a new business is highly risky. Entrepreneurs, therefore, deem it necessary to give a careful consideration to the following issues to find a proper approach to business operation to reduce risks.

1. They ensure that goods and service are available to target customers and markets should be large enough to make profit and to ensure sustainability.
2. There should be competitive advantages over the competitors.
3. There are experienced staff and executives to run the business
4. There is enough capital to operate the business
5. They should collaborate with other businesses to produce goods or to provide services.

The aviation industry needs a lot of experienced pilots and staff to handle airport ground and aircraft maintenance. However, the numbers of such personnel is inadequate in terms of quantity and experiences. (Thairath, 2018)

The investment in the aviation industry is extensive, so the government has initiated Eastern Economic Corridor Project to boost investor confidence. Their investment scheme covers high speed train (Bangkok-Rayong), LaemChabang Deep Sea Port Expansion, U-Tapoa International Airport, Double track Railway, Motorway (Map Ta Phut) and Map TaPhut Industrial Port Expansion. U-Tapoa International Airport is targeted as the

future area for aviation and marine service and maintenance center to support ASEAN growth (Board of Investment, 2016).

As Eyring, Johnson, and Nair (2011) stated, new business models are redirected demand by offering Customer Value Proposition (CVP): effectiveness, simplicity, accessibility and affordability. Effectiveness concerns margin requirement, overhead and resource velocity which means the capacity to generate the given volume of business with in a specific time frame. Also, it relates to the concept of differentiation and price which is known as cost leadership. When simplicity covers law and regulations which have flexibility to attract investment, availability of expertise, financial service advisers, and advertising agencies that understand the need of target customers would follow suit. Accessibility is to move easily and frequently. Time consuming to move is challenging. Finally, affordability implies the period of time when target customers can purchase goods or services, depending on what they earned.

The competition in aviation business at present is fierce; therefore, entrepreneurs in this business should be concerned when they wants to set up their business. Shaw (2011) described that the strategy the airlines used would be true low cost and differentiation. The features of true low cost strategy are low fleet costs, low landing fees, short turnarounds/high aircraft utilization, limited on board services, simple fares, low distribution costs, non-refundable tickets, ancillary revenues and generation of new traffic flows. When talking about the strategy of differentiation, the airlines business has to initiate innovativeness. These strategies have impact on aviation industry.

To study the feasibility of establishing MRO, the researcher team applied the 4M concepts, consisting of Man, Money, Material and Management to explain the research results. Bangmo (2005) described the concepts as following:

1. Man is an important factor of managing organization. Any organizations that employ high quality and responsible personnel will support them to grow and, thus, have good opportunity to compete.
2. Money is an evitable factor that any organizations need to have to attain their objectives. If they lack this criterion, they will not succeed in management.
3. Material is necessary in the production process or in helping to facilitate other jobs in the organization. Therefore, if materials are not available, there will be a barrier to successful organization management.
4. Management is a mission of executives who are the most crucial persons to connect all the people in the organization to do the job on the same purposes efficiently.

Research Methodology

This research is qualitative using in-depth interview with key informants from 3 related organizations: International Aviation College, state organizations in NakhonPhanom province and airline businesses. Data source triangulation was utilized to find out the similarity and differences of information from different main key informants (Carter, Bryant-Lukosias, Dicenso, Blythe & Neville, 2014). There are 9 key informants chosen by means of snowball technique. According to

Atkinson and Flint (2001); snowball technique is not a difficult method to seek key informants. The 9 key informants were invited to the interview session and gave a consent to identify their names as follows;

1. Mr. Sumrueng Rodkeam from International Aviation College
2. Mr. Seree Toawal from International Aviation College
3. Mr. Viroj Noiwilai from Civil Aviation Institution
4. Mr. Surapong Prasert from the Industrial Council of Nakhon Phanom
5. Mr. Somchai Tiuanubun from Nakhon Phanom industrial office
6. Mr. Atiphu Jitranukroa from Office of Transport and Traffic Policy and Planning
7. Mr. Vuttichai Sighamanee from the Civil Aviation Authority of Thailand
8. Mr. Buncha Chunsit from Nok Air
9. Mr. Jatupong Hongwiset from Thai Air Asia

The semi-structured interview questions were prepared and submitted for validity check by professors and experts in aviation industry. The questions were divided into 3 parts according to the objectives of this research. All of the key informants were contacted through mobile phone to make an appointment and were later interviewed at their offices except for Mr. Buncha and Mr. Jatupong who were interviewed in a restaurant at Donmuang International Airport. Once the data were collected, they were analyzed by using content analysis according to each objective by means of interpreting and explaining its results (Mayring, 2000). Data source triangulation was applied to look for similarities and differences among all of the answers (Carter, Bryant-Lukosias, Dicenso, Blythe & Neville, 2014).

Research Results

This research results are explained according to each objective as follows:

Objective 1: to study the potential of producing aircraft maintenance mechanics of academic institutions in Thailand.

The results revealed that the potential of producing the number of aircraft maintenance mechanics was inadequate when compared to the need of the market and the purchasing order of the aircrafts from Low Cost Airlines, particularly when demand in the Asia Pacific region increased (Office of Transport and Traffic Policy and Planning, 2015). Furthermore, the number of air travel passengers increased as reflected in the increasing number of flights between 2013 and 2015.

There are now 8 institutions that produce aircraft maintenance mechanics namely: Nakhon-Phanom University, Talang Technical College, Donmuang Technical College, SamutPrakarn Technical College, UbonRatchathane Technical College, KhonKhean Industrial and Community Education College, Sattahip Technical College, and Civil Aviation Institution. In fact, from the present time until the end of 2022, they are capable of producing only 412 aircraft maintenance mechanics, despite the expectation of theirs is capability to produce up to 2,148 aircraft maintenance mechanics during the said period.

As planned by the working group for developing aircraft maintenance mechanics, Deputy Prime Minister Air Chief Marshal Prajin Juntong and his team initiated the following strategies to boost the production of maintenance crew. They are: 1) to develop MRO Curriculum to meet the standard of ICAO Doc 7192, 2) to look for materials necessary for this course, and 3) to develop adequate number of instructors

for MRO Course to match the market demand (Moving Project of Aircraft Maintenance Mechanics Development, 2016). Nevertheless, there are some institutions offering aviation engineering that is not related to aircraft maintenance mechanics. As a result, aviation engineers would need time to obtain the necessary license by passing the examination in accordance with The Civil Aviation Authority of Thailand (CAAT). This would help increase the number of aircraft maintenance mechanics from 1,520 to 3,040. However, this number is far from meeting the need of the industry that needs approximately 10,000 of these positions between 2015 and 2024 (Moving Project of Aircraft Maintenance Mechanics Development, 2016).

Objective 2: to study the competency of aircraft maintenance mechanics trained by International Aviation College (IAC), Nakhon-Phanom University

The result showed that there are 4 licensed aircraft maintenance mechanics whose sole responsibility is to provide maintenance to aircraft needed during the training of CPL (Commercial Pilot License), not the teaching job. The reason is to prevent detrimental incidents that could happen when urgent repair is needed while the mechanics are engaged in conducting a training.

The interesting issue is motivation; they are not motivated to work with IAC because of a lower salary when compared to working in the airline industry. Some have chosen to work with IAC because of the proximity to their homes; otherwise, they would have changed to other careers. Though licensed aircraft maintenance mechanics can inspect the aircraft, they would have to be registered by ICAO (International Civil Aviation Organization) as a basic standard,

but it can be EASA (European Aviation Safety Agency) to meet the European Union standard as requested by the customer's need.

Objective 3: to study the feasibility of setting up MRO center in NakhonPhanom province

The result revealed that there were several reasons supporting the feasible set up of MRO center in NakhonPhanom province as follows;

- 1) The areas were large, close to NakhonPhanom Airport and belonged to a government agency that can be put to continual utilization.
- 2) There was International Aviation College that had the potential to produce Commercial Pilot License (CPL), Private Pilot License (PPL), flight instructors, aircraft maintenance mechanics at vocational level and airline management personnel at bachelor's and graduate levels.
- 3) The present NakhonPhanom Airport had once been a US army base which is composed of sturdy construction and wide runways capable of supporting big aircrafts like Boeing 777. Therefore, it would be beneficial to serve commercial aircrafts at the present time to reduce the investment cost in this aspect.

Nevertheless, there are some barriers against the proposal of establishing the province as MRO center:

Lack of urbanization: there are no large and well-stocked department malls like Central, Robinson or The Mall, only super stores like Tesco Lotus, Big C and Makro for local consumers. Hence, foreigners working on the initial stage of setting up MRO may find it inconvenient to their lifestyles. Moreover, there is only one

bilingual school, Demonstration School of NakhonPhanom, and run by NakhonPhanom University. The school started only three years ago and may not be considered up to standard.

Lack of government financial support and there is no legislation for tax exemption which would not give investors financial confidence in MRO project in this province. However, the cabinet has approved a sum of 7 billion baht, together with EEC Act into force in Eastern Economic Corridor Project. At the same time, NakhonPhanom has been categorized as special economic development zone, phase 2, with the possibility of future private investors (Ministry of Industry, 2017). Besides, the government initial stage is to invest in building 1,400-rai industrial estate. Furthermore, Thai and foreign investors are gradually interested in investing in logistics, eco-tourism and processed agriculture (Thansettakij, 2016).

In order to describe the results theoretically, we used 4M concept to conclude as follows;

1) Man

Licensed aircraft maintenance mechanics of International Aviation College (IAC) have been employed to release aircrafts for training pilot students. Thus, if this province could be the MRO center, aircrafts that are for maintenance would be the narrow body type used by most low cost airlines, not the wide body type. It was because U-Tapao had been the MRO center for wide body which would be to avoid competition in the red ocean where Singapore had also MRO for wide body. It would, then, be a good opportunity for NakhonPhanom. Therefore, it would need to seek and urgently produce licensed aircraft maintenance mechanics for narrow body as its first priority.

2) Money

To build an MRO center would require a large amount of money, from hundred to thousand million bahts, depending on the number of aircrafts to be served. The allocation of area for MRO center should be close to NakhonPhanom Airport, which is now belonging to Air Force Base and presently utilized by IAC. Thus, it could be negotiated easily. However, the investment on this project should come from the government with only one project of 1,400-rai industrial estate under construction.

3) Material

Investment should be a concern on tools as the starting factor. Spare parts would also be considered, depending on the level of inspection. For example, A Check would require hand tools; for ground equipment, Rat test, Hydraulic Cart, Generator Cart would be needed. Also, this would include tire care, tire wore and tare, fuel refill, inspection of fuel lid and dents on fuselage. In case of C Check, it would be heavy maintenance, for example, aircraft structure, engine, and other components such as landing gear and air condition. Spare parts could be ordered from manufacturers or agents using the "just in time" (JIT) concept. First, and most obviously, it would save the cost of warehouses, related equipment and personnel needed to manage the inventory in those warehouses. Second, it would eliminate the need to predict how much material would be needed in advance, so that it would reduce wasted materials. It would also enable manufacturers to respond to customer requests in a fraction of the time previously required. In the world of aggressive cost competition, JIT would enable a highly cost-effective way to manufacture if it was well implemented (eNotes, 2018).

4) Management

A marketing oriented approach was recommended during the interview session to ensure survival as follows;

4.1 It was necessary to identify the airline market target that would use the MRO services. To make active memorandum of understanding (MOU) would help the MRO center at Nakhon-Phanom province sustainable.

4.2 It was necessary to make decision on what type of aircraft and what level of service inspection required by airlines to avoid competition.

4.3 It was necessary to manage cost reasonably to set up competitive price with good and standard services according to ICAO and the manufacturer manuals.

4.4 Long-term parking in MRO would cause unprofitability to airlines when they come to get the maintenance service. If the service was faster, aircrafts would be ready in a short time to provide services to the passengers. In this case, both parties would gain collateral benefit: in which one would get revenues, while the other would get customer satisfaction from seat availability and on-time flight.

Discussion

According to the objective on Thai academic institutions' potential to produce aircraft maintenance mechanics, it is found that the institutions were unable to produce sufficient number of graduates. Thus, they would have to put more efforts to produce them urgently. Airlines now need aircraft maintenance mechanics who are keen at their jobs, so their basic backgrounds should come from vocational level rather than higher education. This is in consistent with the Aviation Institution of Rajamangala University

of Technology Krungthep, whose courses on aircraft maintenance and electronic aviation, aimed to produce graduates with professional certificate, rather than in the bachelor's degree level. Later, after 4 years of work, they would be qualified for a test of international license. (Thaipubilca, 2016)

According to the objective on exploring the training competency of aircraft maintenance mechanics offered by International Aviation College (IAC), NakhonPhanom University, IAC demonstrates the competence for maintenance of specific type of aircrafts, particularly for training aviation students to serve as private and commercial pilots. However, to set up MRO, it would be necessary to have licensed aircraft maintenance mechanics for a specific aircraft type required by airline business. The narrow body aircraft type would be an alternative for MRO Center in NakhonPhanom to avoid the red ocean competition with U-Tapao and Singapore. As reported in Office of Transport Policy and Planning (2015), it is disclosed that Thailand should serve narrow body type of A 320/320 NEO because of the maximum number of purchasing order of the aircrafts on this type at the end of 2018. There would be a total of 112 orders; only 94 would use MRO service internationally, and the rest (18) would use the domestic services. Therefore, there would be room available to pull international to domestic MRO services.

In accordance with the feasibility of setting up an MRO center in NakhonPhanom province, NakhonPhanom Airport still has 2,000 rai available for the construction of MRO Center, with the permission from Air Force. Furthermore, there is a longer runway that could serve Boeing 777. The flight time from Bangkok to Nakhon-Phanom is approximately a bit over 1 hour from

Donmuang Airport, Bangkok. This information is in line with factors relating to location selection for MRO Center as follows: the areas of more than 200 rai would be proper for constructing a building that would connect to the ramp area of the airport parking deck. This would be designed to accommodate the length of runway suitable to the types of aircrafts. Lastly, the distance from Bangkok to the location of MRO Center in terms of business cost without passengers would not be too costly.

To clearly identify the target airlines and types of service offered were very important. The marketing concept should be used to run MRO Center profitably and sustainably. The concept of Kotler and Kelller (2006) stated that marketing is an organization function that would select target market and deliver product/service valuable to customers for the benefits to both organizations and stockholders.

However, it may be said that to develop new business as described by Eyring, Johnson and Nair (2011), it should concern 4 factors, namely, effectiveness, simplicity, accessibility and affordability. However, this research referred to only 2 significant factors: accessibility and affordability. The location of NakhonPhanom province is close to CLMV (Cambodia, Laos, Myanmar and Vietnam). Therefore, MRO in this province could provide its service and be accessible within a short time. Furthermore, it could offer services at a reasonable or lower price with the same standard as competitors in domestic or international markets.

Moreover, the concept of Porter's Generic Competitive Strategies (1985) was referred to in this research, particularly the differentiation to avoid intense competition. To be MRO in Nakhon-Phanom, it is necessary to select its uniqueness

which the customers can perceive. As identified earlier, MRO in this province should provide services for narrow body aircrafts. Therefore, it should concern about aircraft maintenance mechanics who have a license of that particular aircraft type.

Recommendations from the Research

The researchers recommend three interesting issues as follows;

1. MRO Center in NakhonPhanom province should be initiated from the provincial administration with the collaboration of NakhonPhanom University, with potential to produce aviation personnel, particularly aircraft maintenance mechanics.

2. Preparation for producing standardized aircraft maintenance mechanics for narrow body aircrafts in accordance to ICAO as the basic standard prior to higher steps required by airlines, such as European Safety Agency (EASA), Federal Aviation Administration (FAA), should be considered.

3. The target customers may also be the owners of the small private aircrafts from Cambodia, Laos and Vietnam because of the proximity from the neighboring countries to NakhonPhanom province

Recommendation for Future Research

Due to the limitation of research budget and scarce secondary data, the researchers suggested as follows:

1. To survey the opinions of people living in NakhonPhanom province toward the demand for MRO Center situated in NakhonPhanom province

2. To study the potential of producing aviation personnel as a whole in Thailand such as pilots, aircraft maintenance mechanics, and related careers, to respond to the growth of aviation industry.

3. To compare the feasibility study of building MRO Center between NakhonPhanom and SakonNakorn where physical conditions are similar to NakhonPhanom

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