

Malaysian aviation technologist promotion to managerial role: an empirical overview

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Abstract. The Malaysian aviation industry has continued to march forward. With a turnover of RM23.7 billion in 2013, it is expected to grow higher especially after the Malaysian national aerospace blueprint was launched in 2015. The aviation related organizations currently have a workforce of approximately 13500. These organizations need to be managed by competent managers who have a strong background of technologist. Aviation technologist is one of the key components in the aviation maintenance industry as they are the future managers charged with the responsibility to ensure continuation of the organization's objectives and culture. The technologist role and manager's role are somehow different. The promotion of technologist to managerial roles is quite common but whether the technologist is able to take up managerial role effectively is yet to be fully understood. It is quite common that there was insufficient training for the technologist before being promoted to take up management roles. The purpose of this paper is to give an overview of the role of technologists and managers in professional services industries such as MRO and to understand that there is a need within the industry to re-look into the perspective of a proper training to prepare them to take up management roles effectively.

1. Introduction

The Malaysian aerospace industry has continued to move forward. The industry turnover growth has gradually increased from RM21.5b in 2006 to RM32.7b in 2013 [1]. There is a clear indication that the aviation industry will continue to develop in line with the Malaysian National Aerospace Blueprint 2015 - 2030. The government has clearly listed aerospace industry as one of the key drivers of high-income economy through Economic Transformation Plan (ETP). Currently there are approximately 1800 Licensed Aircraft Engineers (LAEs), 11000 technicians and mechanics, and 600 MRO graduate engineers in this sector [2]. Due to the professionalism of aviation maintenance field, the professional body such as the Board of Engineers (BEM) Malaysia has looked into the details of the engineering profession by practise and identified the professional practitioner of engineering as technologist and technician.



After detailed studies by Board of Engineers Malaysia, the Engineering Technology Path Report [3] dated February 2003, also known as the Blueprint for a Highly Competent Engineering Technical Workforce Report, was being drafted and submitted to the Parliament for review. As a result, an Act of Malaysian Parliament was passed on 1 Dec 2014. The act is known as Bill of the Technologists and Technicians Act 2014. The bill was an act to provide for the establishment of the Malaysian Board of Technologist for recognition and registration of Professional Technologists and Certified Technicians. This may serve as a professional body that is able to support the aviation industry. According to the bill, aviation maintenance, repair and overhaul (MRO) can be determined as technology services. Both technologist and technician can provide these technology services. A technologist is one who holds a bachelor's degree that is recognized by the Board. Licensed aircraft engineers may be grouped into the technologist category due to professional license recognition by the government. On the other hand, a technician is a person who holds a certificate level of the technical education or training in practise.

This paper is focused on the aviation technologists who are one of the key components in MRO organization. It is important because this profession is a knowledge-based profession where only those with highly qualified and trained are able work in the industry safely and effectively on aircraft and its systems. Secondly, a technologist is able to perform the task to aircraft manufacturer and regulatory standards with deep insights. Finally, these technologists are needed to bring life to an organization and also to keep moving forward. It is important that this group of technologists is the future group of knowledgeable managers to ensure the continuity of the organization's objectives and culture. Without these highly qualified and competent managers, it is difficult for the MROs to operate effectively and efficiently.

2. Assessment of aviation technologist role

In order to understand the reasons why an aviation technologist is not recommended to be promoted to the position of managers without proper training, it is imperative to understand the role of technologist by nature and the role of managers in general. In addition, MRO services are a form of professional services compared to other general services such as motorcar or manufacturing sectors. Marion *et al.* state that engineers are very focussed on technical facts and do not have sufficient understanding on leadership as well as management in their research [4]. This is further suggested by Galloway [5] that it is important for engineering students to not only be furnished with latest, non-technical abilities but also with the need to change the perception of public image of these technologists. It is an indication that non-technical abilities refer to management role in an organization.

The basic technical and traditional role of aviation MRO technologist has not changed much due to the nature of the function. Although aviation technologist role is usually listed in the job scope in an MRO organization, it is important to understand technologist role in the Malaysian MRO industry and what did they study in the university or colleges. This should be contrasted against managerial role in the current aviation industry.

2.1. Technologist role

Malaysian Department of Civil Aviation (DCA) Airworthiness Notices No. 1101 [6] specifies that a licensed engineer (aviation technologist) may issue the certificates following maintenance including aircraft structure, power plant, mechanical and electrical systems. The replacement of avionics line replaceable units, requiring tests to prove their serviceability, shall also be included in the privileges. The certificates to be issued includes those for release to service in respect of the approved overhaul, inspections, repair, replacement, modification and scheduled maintenance inspection.

In simple term, aviation technologists are mainly involved in maintenance of aircraft. Maintenance seems to be a common word. Higgins [7] described maintenance as a science since its execution relies, sooner or later, on most or all of the sciences. It implies that maintenance professionals such as the aviation technologist are very much involved in the application and practical aspect of science within this profession. Kinnison and Siddiqui [8] called aircraft repairer or maintainer as aircraft mechanic in the United States (US) aviation MRO industry. Effectively, these are the aviation technologists as described by Malaysian DCA. Entropy in an aircraft is being interpreted as the degree of disorder in its design and systems. Accordingly, the aircraft design engineer designs an aircraft with minimal entropy

during its operational lifetime while a technologist is to battle continuous increase in entropy during the life of the aircraft. These professionals study and involve in the practical details of aircraft systems and components. Specialization consists of the mechanical systems such as hydraulics, pneumatics, flight controls and structures of the aircrafts. The other trade is the avionics system, which covers the electronics, radios, computers, and electrical systems. They function in hangar base maintenance, line maintenance or even the workshops.

Technologists go deep into the systems and address the system or components with comprehension of its operational parameters and correct functionality. Should any discrepancy be detected, a set of established procedures for troubleshooting, discrepancy isolation and rectification is being complied. Aircraft manufacturers' procedures are complied with for removal, installation, inspection, operational test as well as for functional test. They are so specialized that they have the capability to analyze and identify fault when there is a problem with the systems or when the operational parameters of a design are out of tolerance. As aviation technologists function in the field, the skill that comes along with experience is being enhanced more and more over time. Eventually, they are able to conclude whether the problems are able to be solved or require further solution from the design engineering teams. Stevenson [9] identified the following capabilities in Table 1 that are part of a technologist.

Table 1. Capabilities of technologist [9]

Six key capabilities	To use and communicate information
	To measure and make use of measurements
	To choose materials and components and understand the processing of materials
	To understand manufacturing activities and general commercial organization and practise of their firms
	To diagnose
	To organize (but necessarily supervise) and give direction to the work of others
Other capabilities	Communication manufacturing instructions, test report, fault analysis
	Measuring: Tolerances, fits, quality and performance, checking
	Materials: strength, wear, distortion, machining, properties
	Manufacturing: assembly, limits, planning, operations
	Commercial factors: cost, standard components, customer requirements
	Diagnosed: test data, statistics, faults, value analysis
	Organize: planning work, meeting targets.

The Federal Aviation Administration (FAA) of US in its FAA-8083-30 Chapter 13 document [10] states that an aviation technician is considered the central figure in aviation maintenance. One must be fully qualified as an aviation professional in order to function to the required standards. White and Birkinshaw [11] listed a complete syllabus an aircraft maintenance technician must study and passed. The majority of the training syllabuses are of practical aspect of aviation maintenance with minimal management training. Therefore, it is clear that aviation technologist's scope is insufficient to promote them directly to take on managerial positions.

3. Assessment of manager's role

While technologist's promotion to a managerial role is common in the industry, not all promotions are effective. It is because managers play a key role in organization. The manager's role has continued to draw the attention of scholars and leaders. It was evidently written by the Chinese as early as 3500 BC and later in Sun Tzu's Art of War [12]. According to these records that were treated as one of ancient military discourse of Chinese classical works and military strategists [13, 14]. Even in the current era, business leaders and scholars have been trying to grip the roles and skills of the managers from those

times. An analysis of ancient Romans method of communication over a large empire leads to further introspection of managers' conduct and capability [15]. Historical records did not clearly spelled out how managerial roles were managed. However, work by Machiavelli in the sixteenth century provided greater contribution on understanding the managerial role. Management pioneers during the Industrial Revolution such as Adam Smith and Karl Marx also provided greater insights on the role of managers [15]. As human race continues to move along with time, classical scholars and social scientists laid out wider concepts and fundamentals in an attempt to comprehend the metamorphosis of the manager's functions. Mintzberg [16, 17] exerted an influential study in the recent era on the role a manager. His work involves detailed description of observation made on managers in his working environment. His results described 10 roles of manager functions. He divided the major dimensions of managerial role into three categories:

- (1) interpersonal roles (figurehead, leader, liaison)
- (2) informational roles (monitor, disseminator, spokesperson)
- (3) decisional roles (entrepreneur, disturbance handler, resource allocator, negotiator)

Table 2. Mintzberg's Management functions [17]

Category	Role title	Activities
Informational	Monitor	Seek and/or receive information; scanning periodicals and reports; maintaining personal contact with stakeholders
	Disseminator	Forwarding information to organization members via e-mails, memos, reports, and phone calls
	Spokesperson	Transmitting information to outsiders via e-mails, reports, memos, and speeches
Interpersonal	Figurehead	Performing ceremonial and symbolic duties, such as greeting visitors and signing legal documents
	Leader	Directing and motivating subordinates; counselling and communicating with subordinates
	Liaison	Maintaining information links both within and outwith the organization via e-mails, mail, phone calls, and meetings
Decisional	Entrepreneur	Initiating improvement projects; identifying new ideas and delegating idea responsibilities to others
	Disturbance handler	Taking corrective action during disputes or crises; resolving conflicts among subordinates; adapting to environments
	Resource allocator	Deciding who gets resources; preparing budgets; set schedules and determining priorities
	Negotiator	Representing department during negotiations of contracts, sales, purchases, and budgets

However, Cecil *et al.* [18] challenged Mintzberg's proposition. They claimed due to the dynamism of economic transition at different levels especially in Asian countries, the new generation managers require more than the 10 roles identified by Mintzberg [17]. Even with the dynamics of organization activities and environment, it appears that minimal attention was given to re-inspect the manager's role and competency required. In addition, there are strong indications (Edwards *et al.* [19], Hornsby *et al.* [20], Kickul and Gundry [21]) that due to the swift growth associated with technology development and disposal, organization needs to adjust its organizational operations and practices. It is shows that management roles are not fixed but varies according to time. Van der Velde *et al.* [22] realize that as business environment evolves over time, work configurations appear to be more complicated with the staff clenching onto newer expectations, and together, these manifestations are focussing toward re-enacting of managerial functions. However, it appears that most management still tends to refer to the Mintzberg identified 10 manager roles. There are also concerns that the spread of industrialization from developed nation to the developing nation such as Malaysia, the Western management education concepts may result in homogenous managerial roles.

Generally, MRO managers are responsible for schedule and unscheduled maintenance checks from various aircraft operators. The managers can be classified as a form of project managers. Sommerville *et al.* [23] described that project manager is generally considered as a person accountable for ensuring that a project can be completed safely, on schedule, within budget and also to the expected quality and performance standards as specified by customers and aircraft manufacturers.

Notwithstanding the numerous discussions on the features of managerial roles, there seem to be minimal international studies with regard to managerial functions. Apparently, the Mintberg notion of the managerial roles has somehow been considered as generic roles and general management [24- 27].

4. Manager role in professional services organization

Aircraft MRO services can be considered as professional services. According to Sahin [28], expansion of professional business services is being observed as “the most profound business phenomenon of the twentieth century” [29]. In professional service organizations, it is critical that competence is the key in delivering towards customer satisfaction. These competency-based services have to be effectively managed. The specialized, highly skilled and autonomous professionals working in these firms make the manager's role challenging. Since MROs are mainly knowledge-skill intensive, it is imperative that these firms' focal point should be developing workforce quality, especially to increase the manager's competency. For this reason, it is important that technologists are trained to equip them with the right competency. Mills *et al.* [30] highlighted that in such companies, coordination and improving the competencies is the management primary task while delivering the services at the same time. This is especially true in the Malaysian MRO industry where the number of MROs are increasing as well as high number of workforce are being produced by the local training institutions and colleges each year. McKaig-Berliner [31] and Lowendahl [32] found that, top managers of professional services, unlike normal manufacturing firms that emphasise on profit and lost, investment returns and financial results, they are more immersed in activities related to non-financial purposes like new markets' development, developing workforce and expanding competitive advantages through research, development and innovation. Managers in MRO need to have similar capabilities as well.

Management scholars' interest to relate management capabilities to firm success has been going on for decades [16, 30, 33, 34, 35, 36]. The focal point was on the managers through examining their knowledge level and competency, ability to execute strategies and relationship with stakeholders. The conclusion of the studies showed that managerial resources are critical in building the competitive advantage. However, it is even more important that the managers themselves being viewed as the resources [37]. Ochel [38] highlighted that manager's education background, personality, experiences and inter-personal relationship exerts a strong impact on the firm strategies and competitiveness. An interesting note from [38], is that through combination of individual competency of its managers, an organization can improve its managerial ability. Effectively, it means to say that with strong teamwork among managers, more effective decision making can take place in practise. Kor [39], Van Den Bosch and Van Wijk [36] purported that as managers gain experience in managing over time, they establish their own management technique, the speciality is mostly tacit and hard to be duplicated, thus a source of competitive advantage itself.

Sahin [28] found that the *modus operandi* of a manufacturing organization is quite different to that of professional service organization in two ways. First, it is a highly customized professional service. As a result, relationship with customers itself is a feature. Secondly, these professional services require highly trained and skilled people, which in itself is a personalized service. Using MRO services as an example and concurrence with the findings of McKaig-Berliner [31], the professional service firms are grouped as knowledge-intensive that are displayed by organization core competence through customer orientated employees, empowered and autonomous members with specialized knowledge. It is clear that the key customer requirements are the specialized knowledge and specific skills possessed by the organization to be chosen by a customer. Interestingly, Ofek and Sarvary [40] claimed that knowledge constitutes the “production technology” for such services, which resulted in business knowledge on its own.

The ability to deliver professional service by attending to the needs of the customers also generates additional knowledge and experience from each of the occurring projects. As a result, there should be

a capacity through effectively trained managers to capture and provide improved effective solutions over time. Eventually, an organization variable cost should decrease with improvement in efficiency that benefits organizations. Roberts [41] stated an additional benefit whereby, knowledge obtained and real experience that were captured through serving one customer can also be applied to service another customer. Therefore, a competitive advantage can be developed through increasing the list of customer portfolio, which provides an advantage to professional service organizations. The advantages could then be leveraged through use of communication technologies (like emails, electronic presentations and record system, etc.), thereby enabling effective communication within the organization teams and allowing them to retrieve the data they required [42].

Since the quality of professional services are largely dependent on individual competency, Stumpf *et al.* [43] and Ochel [38] found that inclination towards recruiting individuals equipped with a high level of education is supported by implementing a system of individual monitoring, continuous in-house training and development, and continuous improvement philosophy. Using advertising as an example of professional services, Halinen [44] identified that it is important that there is an ability to manage professionals effectively so that an organization is able to continue supporting the customer despite resignation of professionals instead of having the customer follows the individual to another organization. This also means that the ability to assign the right quality personnel who is compatible to the customer traits needs to be handled effectively. In the MRO services, multinational customers tend to source for local professional services provided that there is a well managed human capital. Hitt *et al.* [29] concluded that professional service organizations need to ensure they have well-experienced, educated, trained and skilled manager along with their employees in order to maintain a strong client relationship.

Nordenflycht [45] provided an insight on developing a "common commitment" among managers (Sanchez [46]), which has been observed to be able to keep highly mobile and skilled professionals in the professional service organization to maintain the professional value of organization. These can be in the form of prestigious recognition or shared responsibility or partnership. This leads to professional standing and trustworthiness of the managers, which is viewed as competitive abilities indicators. This team of managers is to be involved in developing and communicate the team and organizations vision, mission, objectives and values with priority setting [32]. Therefore, it is critical that the managers are able to manoeuvre within an organization so that all team members are able to share the organization strategic vision to enhance the organization performance. This tacit knowledge and experience that the manager holds can be a competitive advantage as it is unique to the organizations and managers. It is clear that a manager's ability to carry out the induction of right candidates, and develop and maintain key personnel is critical for professional service organization such as MRO to succeed. Therefore, it is acceptable when Lowendahl [32] states that the professional service organizations not only need to compete for customers but also for brilliant professionals to be more competitive.

Burke [47] considers that a successful project is achieved when quality parameters, duration and cost are equal. It is also implying that the managers, in addition to team management, need to be able to lead teams with a positive leadership, for instances in achieving trustworthiness, respectfulness, motivation, co-ordination and up keeping morale of team members. However, MRO managers need to practise other skills while taking the team lead to achieve project delivery targets. Taking example of a construction project manager, Griffith and Watson [48] identified the other skills such as conducting, controlling and administration of the project and team. Despite the manager's role needs to evolve over time, it is surprising that discussions on managerial work today still has the focal point conceived of manager that embraces the "work roles" laid out by Mintzberg [16]. From another perspective, MRO managers should possess related skills in order to competently commit to project execution. Barber [49], Fryer [50], Jha and Iyer [51], Pant and Baroudi [52], and Shehu and Akintoye [53] reasoned that these skills change as the age and experiences increase. In these contexts, managers need to continue to improve themselves to stay relevant and maintain their competitiveness. Particularly, when every project has its own uniqueness and managers must be able to identify the skills required and apply them as required to match each project requirements. This was echoed by Edum-Fotwe and McCaffer [54] that stated manager becomes competent with knowledge gained through training, together with skills sharpened as time and experience increases. Hoffman [55] described competence as what people

do and competency as how they do it. As a competent MRO manager, one must have the capability to carry out what one is supposed to do and able to do it effectively and efficiently.

The authors' observation of the managerial role for aviation technologist is being depicted in Figure 1. The left half section of the flow chart shows that the aviation technologist taking up managerial role through an unstructured root. Generally, it is through appointment or promotion due to experience and seniority within an organization. The right section of the flow shows the technologist managerial role being developed through a structured system. This is possibly the right solution that requires further study after this paper by the authors.

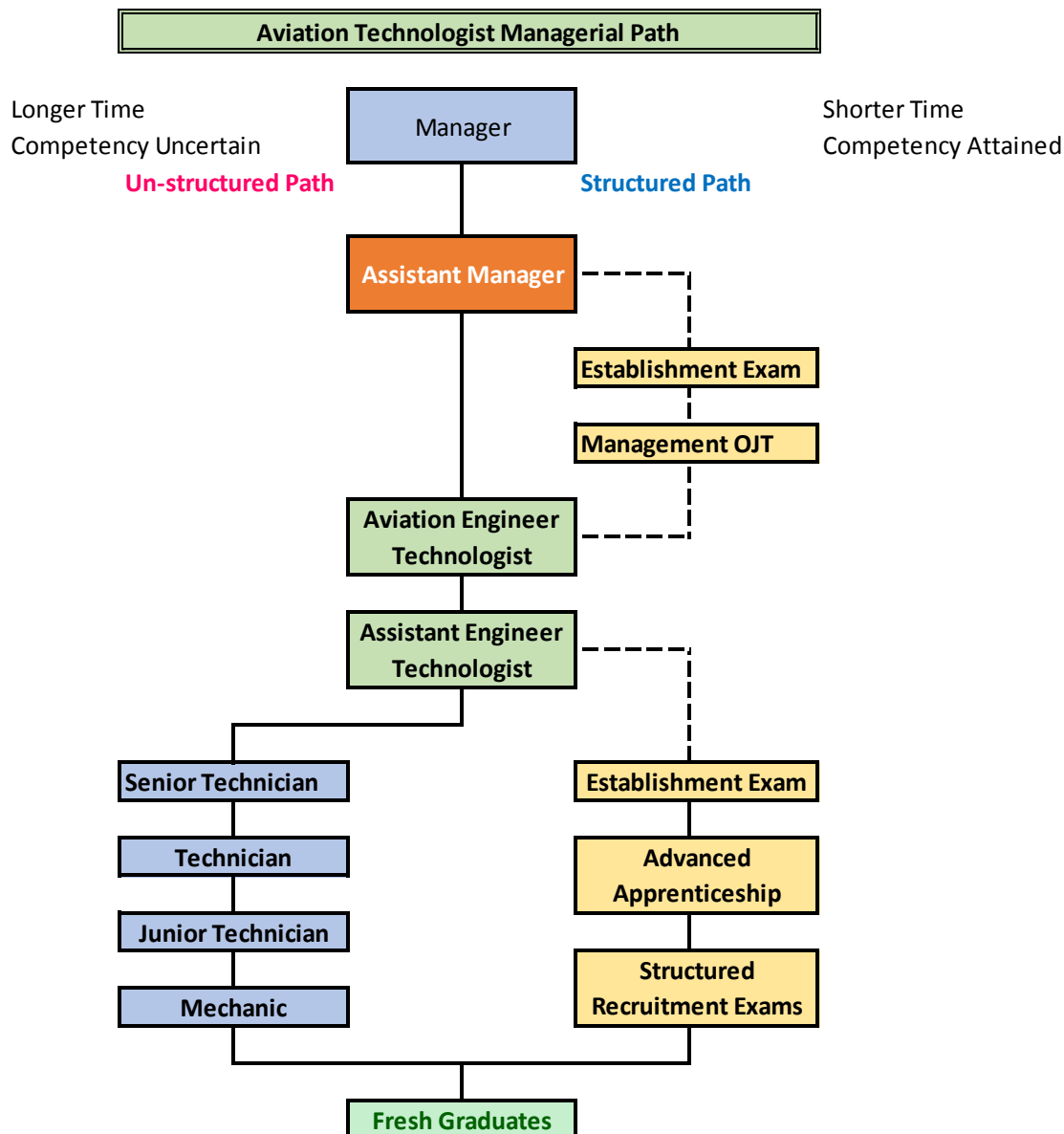


Figure 1. Aviation technologist managerial role path

5. Conclusion

It is clear that manager's role is not to be taken lightly, especially in the aircraft maintenance industry. Based on the overview presented, it is evident that the traditional way of promoting technologists to a managerial role is not simply an appointment process or fill up the position. The task of managing future work force is a great challenge. The traditional way of managing erodes due to the changing

environment. This is especially true when the technologist is promoted without the understanding of the management role effectively. In other words, there were not enough training for these technologist to prepare them to take up the management roles. As the industry relies heavily on technologists and effective managers to ensure the national aerospace blueprint objectives can be attained, it is important to re-look into the issue of preparing technologists to take up the management roles. In addition, it is also a need to recognize that competitiveness-managerial capabilities and roles are a phenomenon that has several aspects. It means to say that a single view is unable to indicate the full perspective on the issue of the MRO managers. This is an initiation for future research on the issues and concerns about promoting technologists to management role in the aviation MRO industry.

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