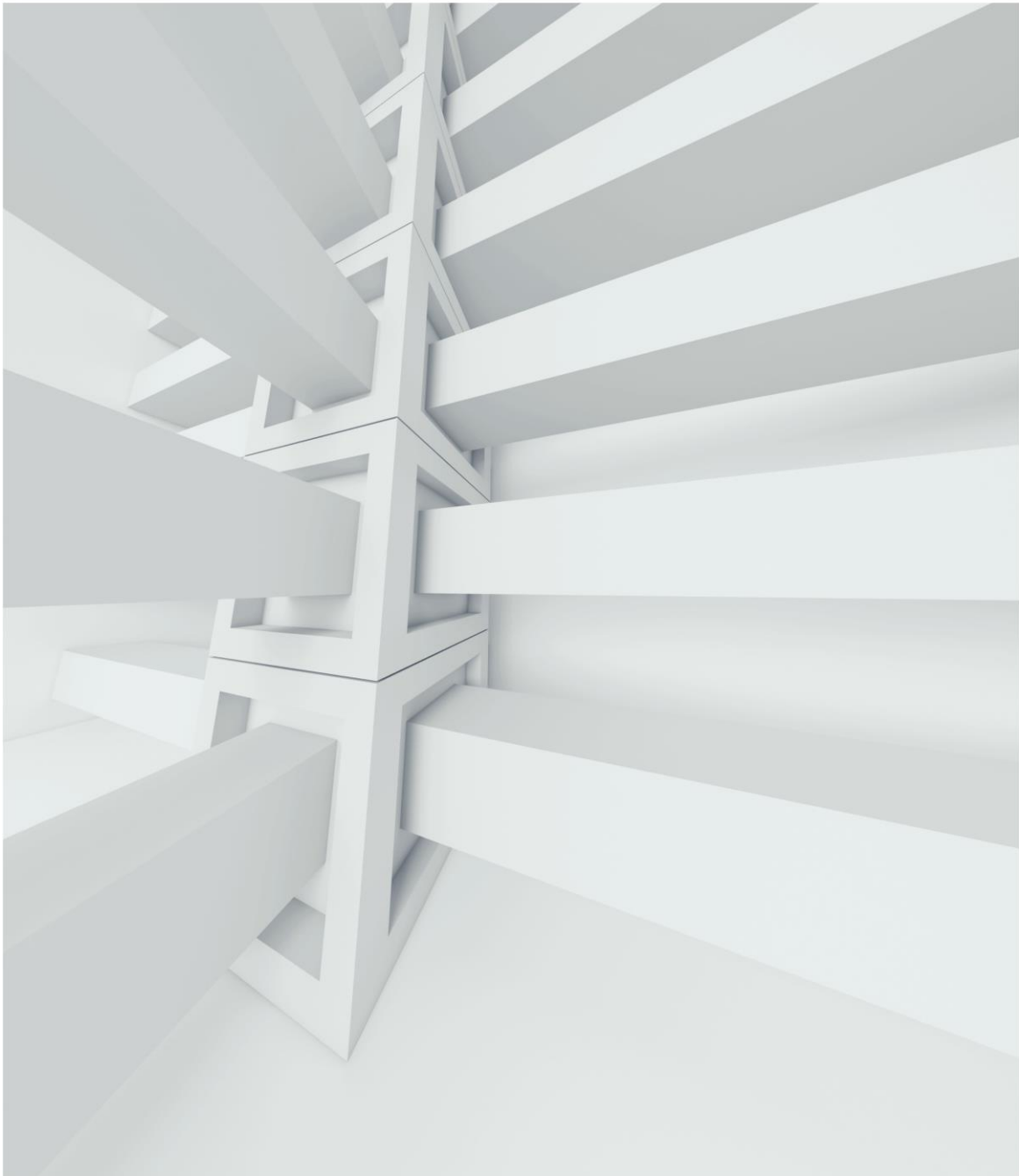




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UNIVERSITY OF
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BOOK CHAPTER 2021



CONTEMPORARY ISSUES & IDEAS IN

PROJECT MANAGEMENT

INTERNATIONAL UNIVERSITY OF MALAYA-WALES

Contemporary Issues & Ideas in

PROJECT MANAGEMENT

By Learning & Teaching Committee, IUMW

Nurul Nisa Omar
Shahril Efzueni Rozali
Elilarasi Letshmanan

Contemporary Issues & Ideas in Project Management

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Block A, City Campus, Jalan Tun Ismail
50480 Kuala Lumpur, Malaysia
Tel: (603) 2617 3131
Email: enquiry@iumw.edu.my

Contemporary Issues & Ideas in

PROJECT MANAGEMENT

Editor-in-Chief

Nurul Nisa Omar

Associate Editor

Shahril Efzueni Rozali

Elilarasi Letshmanan

Contributors

Cheong Cheow Wah

Cheah Ee Pheng

Abu Hanifah Haji Abdullah

Papa Ibrahima Sene

Dania Sammani

Shanmuga Sundaram

Kamran Shavarebi

Hafiz Hassan

Special Mention

Rozainun Haji Abdul Aziz

PREFACE:

We are pleased to present the IUMW Book Chapter; Contemporary Issues & Ideas in Project Management.

The field of Project Management comes with the knowledge and expertise related to the processes, constraints, and other required actions in achieving the project goals. There is a wide range of skills involved; technical, management, communication, financial, etc.

This book chapter is a compilation of research articles that covers the area of current issues, innovation, and ideation in the Project Management field written by the IUMW lecturers and students. These articles I believe will have a great contribution not only to the academic but also to industry practitioners. The chapters will contain the knowledge, information, in-depth discussion, and reflection of current topics.

I would like to say thank you to all authors who contributed their articles to this book chapter.

Nurul Nisa Omar

Editor-In-Chief

Head, Learning & Teaching Committee

International University of Malaya-Wales

Kuala Lumpur, Malaysia

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LIST OF REVIEWERS

Jasmine Ahmad

School of Science and Psychology
Faculty of Arts and Science
International University of Malaya-Wales

Ashley Ng Sok Choo

School of Communications and Technology
Faculty of Arts and Science
International University of Malaya-Wales

Diyana Syafiqah Abd Razak

School of Science and Psychology
Faculty of Arts and Science
International University of Malaya-Wales

Abdul Rahim Abdul Rachman

School of Science and Psychology
Faculty of Arts and Science
International University of Malaya-Wales

Chapter 1

Project Management for Medical Evacuation of COVID-19 Patients by Aircraft

Abu Hanifah Haji Abdullah¹, Kamran Shavarebi²

¹*School of Science and Psychology, Faculty of Arts and Science, International University of Malaya-Wales, Block A, City Campus, Jalan Tun Ismail, 50480 Kuala Lumpur, Malaysia*

²*Faculty of Engineering and Quantity Surveying, INTI International University, 71800 Nilai, Negeri Sembilan, Malaysia*

Abstract

Project Management methodology has shown success in completing many projects within the stipulated cost, time, and scope of work. However, some industries do not appropriately apply project management in their businesses operation, while some sectors apply the aspect of project management selectively. For example, in aircraft operation and maintenance, the focus is more on planning rather than the complete project management process. The aviation regulatory agency itself emphasizes planning on aircraft operations and maintenance. However, planning is only one of the processes in project management phases. One of the aircraft's critical flight operations is a flight for Emergency Medical Services (EMS) using specifically configured and certified aircraft carrying patients and its life support system. This operation is also called Medical Evacuation (MEDEVAC) or air ambulance, which is a special flight mission to rescue and transport patients using aircraft either by helicopter or fixed-wing airplane. The complete process of the flight operation fits into the definition of a project, which consists of several activities with specific resources, time, and definite goals. MEDEVAC EMS during COVID-19 Pandemic created a new challenge because the COVID-19 is an airborne disease and highly infectious. Medical evacuation EMS for COVID-19 patients will endanger the flight crew on board the aircraft. Effective Standard Operating Procedures (SOP) are required to ensure the risk to the crew is minimized. The complete process steps are captured by considering the EMS as a project in accordance with the ISO 21502:2020. The project methodology develops the detailed Work Breakdown Structure (WBS) of the tasks for the operation.

Project Management in Aircraft Industry

A project is defined as short-term activities with specific resources and time to achieve the objective. It is managed by the project manager by applying their knowledge, skills, tools, and techniques to the project activities (Project Management Institute, Inc., 2017). In a business, many of the activities fall into the project category but most organizations may not be aware of this aspect. The organizations and even the regulatory agency for the industry have mandated the use of part of the project management process, mostly planning. Whereas the complete process of project management is more than just Planning. It includes Project Initiation, Planning, Implementation Monitoring, and Closure. In the aircraft industry, the focus is more on planning for aircraft flight operations and maintenance (Civil Authority of Malaysia, 2016).

COVID-19 Challenges

Referring to the definitions of project, the aircraft special operation such as Medical Evacuation Services (MEDEVAC) for Emergency Medical Services (EMS) fall under the definition of the project because the MEDEVAC EMS requires several activities with specific resources and time to deliver the patients safely to the medical center (Grabenstein, 2019). Like aircraft maintenance, it is a project which requires the completion of several activities, using specific numbers of maintenance personnel, tools, and documents to deliver safe aircraft within a specific time (Samaranayake & Kiridena, 2012). The

civil aviation authority approving the maintenance company has put the regulations to develop Production Planning procedures to maintain the aircraft. In many industries, Project management has been proven to ensure the projects are completed within cost, time and scope agreed in the contract with the customers (Abylova, & Salykova, 2019). The success was due to the project management methodology having elements such as WBS which allows detailed risk assessment for the project (International Standard Organization, 2018). Since the MEDEVAC EMS fits the definition of the projects. Therefore, it is wise to apply Project Management methodology in aircraft operation for transferring COVID-19 patients. The project management methodology allows the development of detailed WBS, which is later used in the risk assessment.

Medical Evacuation (MEDEVAC) Emergency Medical Services (EMS)

Medical Evacuation (MEDEVAC) by aircraft is an Emergency Medical Flight Services (EMS), which is required whenever the patients require immediate medical attention but are unable to get immediate access to medical services due to the patients living in the rural or remote areas, which transporting the patients by road to the medical facilities is not feasible (Bjørn et al., 2019). MEDEVAC EMS uses modified aircraft, which is designed with the provisions to carry stretchers and the Basic Life Support (BLS) system (Olasveengen, 2021). The country's authority where the aircraft is registered and operated will approve the design of the EMS aircraft system and its operations. The EMS operators develop operating procedures for the MEDEVAC EMS as the prerequisite for approval by the Civil Aviation Authority (CAA). The operation is mostly for standard health cases such as traumatic injury and heart failure. Most cases are for a small number of patients, the most in a single patient evacuated by helicopters. It has proven to be successful, and it was a simple operation. The helicopter is already equipped with the Basic Life Support (BLS) system and already has the provision to secure the medical stretchers. It is a simple operation, where the patients will be transferred from the ambulance to the stretcher on the aircraft and hooked to the BLS system. The patients will be attended to by the paramedic during the flight. However, similar procedures are not safe when transporting COVID patients since the patients will be able to transmit the diseases to the paramedic and all the crew onboard the aircraft. The paramedic may wear Personal Protective Equipment (PPE), which may protect them from catching the diseases, but the flight crews are unable to wear the PPE since it will restrict their movement in flying the aircraft. Therefore, the flight crew is exposed to the diseases. It is worse for small aircraft without a separated cockpit. The airborne disease is kept from spreading by placing the patients in a negative pressure enclosure (Isovac Products LLC, 2020). The change in the method of carrying the patients and keeping the patient in a negative pressure enclosure as well as to ensure maintaining the enclosure to always be in negative pressure requires a Standard Operating Procedures (SOP). For the SOP to be effective, it must cover all aspects of the process from the preparation of the patients, transferring them to the aircraft, caring for the patient in flight and transferring the patients to the ambulance, and taking them to the hospital.

Patients Evacuation During COVID-19 Pandemic

The COVID-19 as airborne diseases are highly contagious, which make MEDEVAC for the COVID-19 patients extremely dangerous to the flight crew, and the onboard medical crew who are handling the patients. It also endangers the ground handler, who handles the patients on the ground. During COVID-19, the MEDEVAC operation is still required for emergency medical cases, which still can use the standard operating procedures. However, they are cases where the COVID-19 patients are having complications and require urgent medical attention from the hospital with appropriate facilities and there are no details Standard Operating Procedures (SOP) or guidelines issued to evacuate the COVID-19 patients by aircraft, except administrative staff evacuation (United Nations Department of

Operational Support, 2020). Currently, the aircraft operators take their initiative insuring the patients that they bring on board the aircraft will not infect the crews, especially the flight crews. The SOP or guidelines may develop from the experience in transporting patients infected with airborne diseases such as Ebola (Gilsdorf, 2015). The SOP must be elaborate to ensure all the safety aspects of not transmitting the diseases are covered. Effective SOP is possible if there is a complete risk assessment of each step in the Standard Operating Procedure (SOP). Each step can be assured by detailing the complete process from preparing the patient, aircraft, flying the aircraft, landing the aircraft, and transfer of the patients to the ground ambulance. The risk assessment must be carried out for each step and the mitigation of the risks is included in the SOP. Comprehensive tasks are determined by treating the MEDEVAC as a project, where the Work Breakdown Structure (WBS) for the operation is developed and each process step is further determined by process mapping. SIPOC (Supplier Input Process, Output, and Customer) methods are used to uncover the complete process for each process step (Marques, and Requeijo, 2009).

MEDEVAC EMS Process Steps

The MEDEVAC EMS involves several process steps and stakeholders. This process is approved by the civil aviation authority. The following is a generic process that allows the company approved to operate EMS, it was the author's experience in certification of aircraft for EMS.

Review Contractual Agreement

Once there is demand for MEDEVAC EMS, the EMS operators will assess the patients' needs before deciding on the selection of aircraft or accepting the job. The contract is drafted between EMS operators, who operate the aircraft, with the customers of the EMS such as medical centers, insurance companies, who want the best care of their customers. One of the prerequisites, the company must be approved by the civil aviation authority for the EMS operations and the approval certificate shall remain valid. The aircraft is modified and approved for such operation, where it has to be installed with equipment required for EMS flight.

Flight Plan

The EMS operators need to prepare the aircraft for flight. There shall be an approved flight plan. The flight plan needs to consider the minimum time to reach the medical center., which will be the factor in choosing the aircraft type. The choice of aircraft will depend on the distance to travel to pick up the patients and deliver them to the required medical center. Robyn Holgate determines that 0-200 Km and some distance 200 to 350 km helicopter to be used but once it requires travel for over 350 Km fixed-wing aircraft is more practical (Holgate, 2016). However, it still depends on the access to land the fixed-wing aircraft, if it is not accessible by fixed-wing aircraft, a helicopter is required for airplane transfer.

Prepare the aircraft

The aircraft itself must have a valid Certificate of Airworthiness and is safe for flight. All the EMS equipment must be inspected and fitted to the aircraft according to the approved design requirements.

Prepares the crews

The flight crews are the pilots and co-pilot, loadmaster (if required). The other set of crews is the air paramedics. These crews must be trained, their training is current on the EMS MEDEVAC, and the flight crew licenses must be valid.

Prepare the patients

The patient's condition is also another factor to be considered because it will be the determination of the patient's care and equipment required to be carried onboard. The COVID-19 patients require an isolation chamber for mass transportation of patients to separate the patients and the flight and medical crew. For single patient transportation in small aircraft or helicopters, the patients need to be placed in the Personal Isolation Unit (PIU). PIU is a negative pressure enclosure to prevent the diseases from spreading in the cabin. These isolation chambers eliminate the use of PPE to handle the patients.

Pre-flight briefing

The captain will brief the crew on safety procedures in flight. He also will brief on the flight route, duration, any weather issues because the flight may have to avoid storms or strong winds. The patient's stretchers and the life support equipment must be protected since the aircraft may not be stable.

Pre-flight inspection

The aircraft be inspected for any defects or damage and all the required liquid be refilled and all the safety items are onboard and locking pins are removed.

En route weather and destination check

The pilot checks again the en-route weather condition.

Preparation before landing

During the landing phase, the aircraft flying into rough air, gusts, this is normal during the transition of altitude. Therefore, the paramedic must ensure the patient and its life support system is properly secure and there is no disruption to the system, which affects the patient.

Land and disembark the patients

The pilot needs to land the aircraft at a specific runway or helipad for the helicopter. The ambulance shall be ready to receive the patients.

Post-flight inspection

The aircraft is inspected again for any defects that occurred during flights and prepared the aircraft for the next mission.

The above is the generic process of MEDEVAC EMS in an aircraft. It may differ between companies and the operation. However, fundamentally it will be similar. When referring to the process steps, there is no detailed assessment of resources (time, cost, risk). The above process is a cycle from the aircraft on the ground back to the ground and it will repeat for the next flight. It also has a start date and time, requirements for crews, and delivery objectives. These characteristics are strongly fitted to be classified as a project. Once it is considered a project, it is mapped to the project process cycles.

The above process steps do not consider the related process, which will be an important part of the complete process to carry out a project risk assessment and implement the project. The detailed process will be used to develop the project WBS.

Discussion

The project management guidance ISO 21502 establishes 5 phases, and each phase has its activities. However, the ISO standard is generic, which needs to be adapted to the specific project. It also has a start date and time, using crews, and delivery objectives, which strongly fit to be classified as a project. Once it is considered a project, it is mapped to the project process cycles. The following table shows how to map the MEDEVAC EMS into a project.

Table 1: Mapping the Medical Evacuation process to the project management phases.

Phases	Project Management Process	MEDEVAC Process
Initiating	Project team mobilization, Project governance, and management approach	Review Contractual Agreement
Planning	Initial project planning Developing the plan, Identifying and analyzing benefits, defining scope, Planning the project organization, Planning, managing, and controlling physical and material resources.	Flight Plan
Implementation	Managing the start, progress, and close of each work package, Establishing the team, Developing the team, Planning, managing, and controlling physical and material resources	Prepare the aircraft. Prepare the crews. Prepare the patients. Pre-flight briefing Pre-flight inspection Enroute weather and destination check Preparation before landing Land and disembark the patients. Post-flight inspection
Controlling	Progressive justification, managing project performance, Monitoring the plan, monitoring benefits, maintaining benefits, controlling scope, Confirming the scope delivery, Managing the team, Planning, managing, and controlling physical and material resources	Monitoring the plan by ensuring all the post, inflight, and post-flight checklists are completed
Closing	Managing the (start and) close of each project phase	Customer feedback

Conclusion

The Project Management process based on the ISO 210502:2020 has been mapped to the activities in transferring COVID-19 patients by MEDEVAC EMS. The map shows that indeed project management methodology can be applied to the aircraft flight operation for MEDEVAC EMS. The mapping provides the base for risk assessment of the MEDEVAC EMS operation since the project management methodology can show the complete activities from the initiation of the contract between the EMS operator to the Insurance or the Medical Centre to the end of the preparation of the aircraft for the next mission.

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Chapter 2

The Adoption of the e-Procurement in Project Management Procurement

Cheong Cheow Wah¹, Kamran Shaverabi²

¹*School of Science and Psychology, Faculty of Arts and Science, International University of Malaya-Wales, Block A, City Campus, Jalan Tun Ismail, 50480 Kuala Lumpur, Malaysia*

²*Faculty of Engineering and Quantity Surveying, INTI International University, 71800 Nilai, Negeri Sembilan, Malaysia*

Abstract

Electronic Procurement (e-Procurement) aims to improve the supply chain management of an organisation from traditional approaches to an electronic platform. Over the past decade, the lower the adoption rate of e-Procurement as compared with the traditional approaches in which data integrity, time management, and information tracking lead to substantial uncertainty over the supply chain management performance by stakeholders. Consequently, substantial amounts of time and resources are being allocated to further ensure the completeness and accurate information is being recorded. Thus, this paper aims to provide an understanding of the importance of the application of e-Procurement through the effects of the barriers and benefits for an organisation or stakeholder, both in business process performance and project management procurement. Also, this paper will be highlighting the major barrier identified by researchers Aini Aman and Hasmiah Kasimin (Aman & Kasimin, 2011) as a case study on the efforts taken to overcome the challenges in the implementation of e-Procurement systems in government agencies, would encourage the priorities of the e-Procurement adoption by an organisation in business or project management procurement.

e-Procurement

e-Procurement an abbreviation of Electronic Procurement, is an exchange of electronic data to support the operational, tactical, and strategic business transaction, is a term used in professional purchasing and e-commerce for B2B transactions that is to expedite business to business (Ong et al., 2016). This is not about ordering goods from suppliers, more precisely a communication tools introducing its products and services to counterparts combining the use of electronic information and Communication Technology ("ICT") to create close contact relationship between customers and suppliers to enhance value chain partnership and strengthens the internal and external processes.

In the context of digitalisation, certain operations processes within an organisation are moving toward digital solution. Particularly in procurement departments are found in most of the organisation, there are responsible to source, communicate, select and purchase raw materials and services on behalf of an organisation, given the automation of operational flows saving the amount of time for the companies involved.

In short, e-Procurement able and possibly improves organisation and supplier experiences lying on its technology foundation could offer significant cost savings. The phenomenon of cost-saving allowed by e-Procurement is based on the new processes that cut all costs associated with purchasing, that is the cost of goods and services purchased, ordering costs, and holding costs (Brull, 2002).

The E-procurement system aims to streamline the budgeting and bidding processes whenever a new tender is to supply products or services from outside the organisation. Traditionally, procurement was done through submission of paper forms whenever there is project tendering, bidding sourcing of new material and products supply and services, which then acknowledged to be inefficient in

consideration of time taken of these physical documents arriving at the destination and lack of effective tracking system in place but to rely on the handwriting for proof of receiving of this piece of information.

With the advent of the technology flourished, procurement is slowly transforming the traditional method to an electronic platform tapping on the usage of an electronic medium or over the internet to enable organisation fulfils automation processing and auctioning of orders and certainly of doing business at cost-saving. To do this efficiently and effectively, a robust e-Procurement platform and strategies shall be in place to be simplified and speed up overall procurement processes by introducing an electronic procurement (“e-Procurement”) system.

Traditional Procurement vs e-Procurement

No doubt that technology has improved the efficiency and responsiveness of labour-intensive and manual activities. e-Procurement solutions provide us with a web-based foundation of the supply chain and purchasing activities and systems, which may be applied to procurement operations as well. Below outline of the major differences between traditional procurement and e-Procurement of an organisation. Procurement process varies in accordance to different organisations and purposes, the illustration below is mainly to differentiate the traditional and electronic methods, certainly, the procurement manager will have their complete understanding of its organisation requirement by incorporating more details to best suit their organisation needs and process monitoring.

Supplier

Traditionally, the procurement officer has to conduct market research and sourcing various reputable supplier catalogues and worst not knowing whether there are offering discounts in which numerous phone calls being made to further inquiries and seek clarification with the suppliers, and it is usually not recorded elsewhere, or trails of conversation is not available for further referencing. Likewise, by having e-procurement, the in-sourcing suppliers can be done through laptop or smartphone, easily compared hundreds of different suppliers online and communicate concurrently instant purchase order. Thus, reducing the time taken by conducting internal due diligence over selected suppliers to further ascertain their business track record before the relationship is established (Ong et al., 2016).

Purchase requisitions

Ong et al. (2016) and Aman and Kasimin (2011) agreed that, where traditional procedures processes on purchase requisition where a physical note and orders are taken manually by respective note taker then manually submitted for approval from supervisor then proceed to contact the supplier on the order requested by an organisation. Subsequently, such tedious processes undertaken electronically, purchase requisition created and approved in the system itself under specific pre-set conditions and time savings.

Purchase orders and tracking process

In the traditional approach, purchase orders were created and approved manually then sent to the vendor through fax or courier. Vendor response is lengthy taking several working days are counting from the date of receipt of the purchase orders. Contrastingly, purchase orders created through e-Procurement to be approved and sent to vendors online without manual delivery. Relatively fast response from vendors probably within an hour or less. The transmission method is secured and reliable over the confirmation of the order being successfully acknowledged by the

vendor (Ageshin, 2001). Conveniently, tracking can be done online through an order tracking functions and management system, purchaser rest assured the order is being taken up and processed and confirm the expected delivery date of the order placed with the supplier. All updates can be viewed and event conversation over the application to have better time management that certainly gives extra benefits to the purchaser (Aman & Kasimin, 2011).

Advantages of e-Procurement

The internet has brought traditional corporate purchasing practices and increased the connectivity of people at different geographical locations together, increasing productivity across many industries of the economy and becoming a significant improvement in various businesses and countries. Most often is the cost savings segment of purchased goods and services (Hof et al., 2000; Nowikow, 1999). Generally low in cost of information and technology provided by internet-based purchasing through creating absolute different economics edge and characteristics with the implementation of e-Procurement for an organisation.

In addition, Moon (2005) has further proven that introducing an e-Procurement system enables an organisation to solve many administrative problems such as reducing administrative costs, shortening the order turnaround time, lowering inventory levels, lowering the purchase cost for good and preparing organisations for increased technological collaboration and planning with business partners (Ronchi et al., 2010).

Supplier matching is no longer an organisation problem. In most situations where most organisations face huge problems to locate and identify the desired supplier, by way of phone calls is time consuming and quality and reliability appeared to be another significant question mark to an organisation specifically for first time dealing and subsequent services. However, with the internet technology platforms, sourcing a potential supplier is no longer an issue while providing wider choices, instant products comparison become more easily compared previously and more convenient without relying on the traditional processes. This has been further confirmed and agreed by Moon (2005).

Low barrier costs to market entrance. There are positive reductions in supply and tender cost respectively and Ronchi et al. (2010) measured driven by their assessment model applied to 6 different types of companies and 5 different industries.

While human intervention transformed to electronic handling of tasks, time is taken accept and process become automated make operational matters becoming much faster as compared to traditional methods. Data collection is consistent according to an organisation requirement that may simplify the purchasing process proved that eliminates unnecessary activities and focus more on valuable tasks. Ronchie¹³ measured time savings by converting lead-time into financial results and in numeric measured by Panayiotou et al. (2004) were measured on open tender given that, there are saving in 2.7 months or 39.7% versus restricted tender of 4.1 months or equivalent to 34.7%.

Efficient integration and data qualities. E-Procurement is said to be able to provide more efficient integration of supply chains and better organisation tracking of the transaction records. Given the information exchanged done electronically hence data tracking can be tracked more easily. Standardise data collection from customers. This has improved the internal business processing cycle and better communication with the businesses. Ronchi et al. (2010) quantified it in their journal paper and further highlighted that the effectiveness and efficiency of an organisation have a direct contribution to organisation revenue resulting from customer satisfaction.

Trend analysis. The data exchanged is standardised and sales trend are captured in the system and handled electronically. In other words, the e-Procurement system deemed having stored large information would then contribute to behavioural sales trend analysis by an organisation. Brull (2002) assessment concluded that company sales volume growth accompanied by the implementation of e-Procurement so to revenues spike across corporate buyers in the US market. This is much benefited arising from sales trend analysis based on the data collected and hence produce quality sale trend analysis report for business strategy plan tackle consumer needs effectively.

Disadvantages of e-Procurement

New revolution brings in new advantages to an organisation, market condition and increased competition coupled with market pressure to adopt e-Procurement system especially for an organisation penetrating the international market. However, there are some may be reluctant to adopt the idea of e-Procurement. Benefits outweigh disadvantages by adopting e-Procurement system, provides greatest business advantages and larger marketplace even international presence without setup a representative office residing in designated countries.

However, reference to journal paper published by Eei, et al. (2012), the adoption rate of e-Procurement among Small and Medium Enterprise (“SME”) in Malaysia is relatively low despite several initiatives undertaken by The Malaysian Industrial Development Finance, namely SME loans to support in infrastructure aspect where SME’s allowed to have government financing up to 90% on purchasing of ICT technologies equipment, further supported by TM SME (Telekom Malaysia Berhad, 2011) to help and promote ICT among SME (TM SME is one of the subsidiaries company of Telekom Malaysia, one of the major landline internet service providers and sole proprietor in Malaysia).

The factors contributing to barriers of an organisation considered that are being widely discussed are high training cost, technologies, infrastructures and legislation cost, environmental factors as well as internal constraints like management culture and human capital. In addition, the security risk is the crucial part that is not to be avoided in the adoption of e-Procurement system in place.

External factors. Driven by the government, industry, technology and market change that is often out of control of an SME’s indicates in Table 1: External factors below. However, the collective efforts developed certain external barriers can be minimized and mitigated accordingly.

Table 1: External Factor

Factors	Argument
Technologies	The challenges arising from the adoption of e-Procurement are arguably not an external barrier, but rather a result of the idea that users are participating in the system's development. SMEs' adoption of e-Procurement systems is hampered by a lack of support from system developers and vendors. Highlighted by Stockdale & Standing (2004), understanding or commitment rendered to software specialists and start-up fees deemed beyond SMEs capabilities may be demanded by the respective vendors. In relation to this, technical support is also to be discussed and required by the majority of the larger companies. Tan et al. (2009) proposed that the adoption of an ICT system is influenced by the perceived power or usefulness of the technology. In addition, system security aspect is also a major concern for potential adopters.
Infrastructures and Legislation	<p>Lack of competence in government policies and legislation affected the uptake of an ICT system (Ongori & Migiro, 2010). For example, the standard procedure of the government tender process, mandates the buying of printed tender documents in physical offices by interested parties in person. This essentially prohibits the use of e-tendering systems leaves a huge setback for the government's attempt to introduce electronic or digital initiatives for the government system. The application of the e-Procurement system also very much depends on the availabilities of infrastructure support, such as broadband coverage.</p> <p>In addition, lack of standards guidelines in place in the development of e-procurement systems by an organisation. Different developers may use different standards and approaches for their products. Resulted, smooth integration between users and system is questionable, creating a diverse but fragmented e-Procurement environment. The network increases exponentially with the number of users connected, thus a fragmented e-procurement environment will decrease the overall value of the system. This will prove detrimental to both vendors and users in the long term.</p>
Environmental	The market is oversupplied coupled with industry competitive inevitable indirectly force SMEs to explore the biggest marketplace or even overseas by adopting e-Procurement (MIDF, 2011). This is especially true, there are conditions where businesses choose not to use e-Procurement system to maintain trust and close relationships with their suppliers or customers. In most instances, trustworthy not established within suppliers or customers or with their counterparts to complete a deal. This phenomenon thus contributes to wait and see behaviour which is commonly found among SMEs.

Internal factors, are common issues beneath inside in most of an organisation precisely SME as shown in Table 2: Internal factors. Describe factors in relation to Resource Constraints, Organisational and Management Cultures and Security Risk that shall be benefiting of the e-Procurement system (Fillis et al., 2004; Johansson & Wagner, 2009). Some of these barriers are interrelated and hard to be clearly defined individually, for example small paid-up capital due to small organisational structure and volume of businesses can affect the owner to become risk-averse when investing and implementing e-Procurement system. However, with collective and ongoing efforts, some external barriers can be addressed and mitigated accordingly.

Table 2: Internal Factors

Factors	Argument
Resource constraints	SME classified as small paid-up capital and employee below 50 or few. Hence, resource allocation becomes the biggest consideration for all SME owners. Most of the situations where SME owners require to allocate huge lump-sum amounts for system maintenance and training purposes (Ongori & Migiro, 2010). While such difficulties are less common the usage corporate.
Organisational and management cultures	This tends to be the main factor affecting the adoption rate of the e-Procurement system SME. Large corporate be favourable with international trade involvement. Meanwhile administrative management such as company policies, organisation structure and supply chain integration in the case of SME, their decision-making attitude towards ICT are important and their future business direction conclude e-Procurement adoption.
Security risk	Security risk arising from unauthorised penetration of trading platforms and failure to protect confidential information being exchanged between counterparts. An unfortunate side effect of this growth is that there are more opportunities for cybercriminals to steal valuable information. Password sniffing, data modification, and spoofing are among the common security risks that are inherent in e-Procurement (Vaidyanathan et al., 2012), it does, business transactions and information may be in danger. This can be mitigated with visible signs of encryption and decryption with private and public key exchange, authenticated and trusted websites. This is supported by Pavlou et al. (2007) that uncertain about online exchange through proper IS application.

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Although there appears to be individual consideration, nonetheless, it shall not stop being adopted by an institution and even corporate SME in Malaysia. The subsequent discussion was depicted from one of the researcher journal paper from Aini Aman and Hasmiah Kasimin, detailed discussion and challenges faced by implementing e-Procurement in the government sectors and collective effort to overcome such challenges is sought. One of the key findings of the paper showed by implementing e-Procurement system by an organisation does, not stop others by adopting it as part of their business strategy long term and going globally. A good example is the Government sector and the effort taken by the Government of Malaysia by incorporating e-Procurement as a priority e-government agenda., the challenges are not only related to technology and infrastructure it does includes legal and

administrations procedures that in-line with Panayiotou et al. (2004), Ronchie et al. (2010), Brull (2002), Paylou et al. (2007) and, Ongori and Migiro (2010). In addition, findings show the importance of establishing IT facilities centre in rural areas thus working closely with a third-parties vendor is equally important toward implementing of e-Procurement.

Finding and challenges observed over the issues addressed by Aini Aman and Hasmiah Kasimin, adequate system integration exists in between current e-Procurement with the financial system, budget checking and payment channel, legal and administrative procedures to be carried out electronically, and communication between suppliers and government agencies. More time requires to fully address those obstacles faced by their respective counterparts.

Table 3: Summary of the issues discussed and mitigation strategies implemented by respective stakeholders

Issues	Challenges	Discussion	Mitigation
System specification	Inadequacy found in between current e-Procurement with the financial system implemented earlier in the government sectors. The systems were called Government Financial System (GFMas) and Electronic Budget Planning and Control System (eSPKB).	e-Procurement involving GFM and eSPKB systems. This means purchase requisition needs to obtain budget approval from sSPKB and payment has to go through GFM. Each system is administered by 3 different parties. Should any of the system down or malfunctions, it will affect the efficiency of e-Procurement but without fully understanding the entire workflow and challenge, blame all channels to e-Procurement.	Suggested by CDC that to integrate the budget approval processes and payment system flow into e-Procurement.
	Budget checking and payments channel into e-Procurement which is difficult to reach due to certain government policies and restrictions in the Ministry.	CDC has discussed with respective divisions and took a long time for them to decide. However, this is noted as the project stakeholder is the Ministry of Finance/Government of Malaysia.	With the integration of budget approval and payment channel, the purchase requisition, e-Procurement would operate efficiently in the context whereby contract validation is being handled automatically by the system itself instead of separately.
	Legal and administrative matters	CDC further explained, the MoF has a set of complex and difficult legal and administrative policies and	CDC statement was in contrast with Auriol (2009) statement, claims that the outsourcing

Issues	Challenges	Discussion	Mitigation
		procedures that is hard to change and not easily negotiated and understood by external parties.	vendors are having to customise features to further define their output level. Nevertheless, after 2 years of negotiation and discussion with the Government of Malaysia, finally allowed to be incorporated in the budget check by the e-Procurement system.
	No internet access by Government agencies and schools located outside coverage areas.	The e-Procurement system is unable to implement and extended to government agencies and schools located outside coverage areas due to flow in the IT infrastructure that causes internet access unavailable in rural areas. This issue has seriously affected the e-Procurement rollout as its web-based application.	Both parties MoF and CDC have overcome such problems by establishing facilities centres called eP@DESA.
Implementation management	Communication breakdown between suppliers and government.	As explained by the interviewee, in most of the instances happened where suppliers are not available online that delay the transaction cycle. The e-Procurement system does not provide reminders or email alerts on any changes or updates in the system. Hence, suppliers might miss this important information.	Such discrepancies have been refined by including email or mobile notification to respective suppliers whenever there are changes or additional information requested by the government agencies by e-Procurement system automatically.
	Service fees	Findings show that most suppliers are reluctant to pay the service fee imposed on every e-Procurement transaction transacted by suppliers hence incurring costs and burdening suppliers. The service fee of	Since the system required CDC to cover the expenditure of the the eP project, hence CDC is allowed to collect 0.08% service fees per transaction capped at RM9,600 per eP transaction. By

Issues	Challenges	Discussion	Mitigation
		0.08% of the amount billed to the government.	introducing the capping amount per transaction, the suppliers will not be overburdened by the service charge while developers can continuously enhance the system experiences.
	Lack of IT skills	MoF further iterated that, e-Procurement needs to involve government staff to perform the role of system administrator, requisitioner, approver, goods received officer and payment match officer. Apparently, insufficient resources to accommodate and fulfill such roles.	To overcome that challenges, the Ministry of Education suggested hiring temporary or contract staff and providing training to government users with CDC.

Table 3: Summary of the issues discussed and mitigation strategies
(source: Aini Aman and Hasmiah Kasimin (Aman & Kasimin, 2011))

Discussion

The major obstacles projected throughout this case study, review the important adoption of the project management concept, the project management body of knowledge (PMBOK) from project initiation to project completion and closing with adequate guidance, concepts and techniques guided by PMBOK in every single component of the main task and sub-task proven to provide insight to project success to project manager and stakeholder (Hartman & Ashrafi, 2002; Adam et al., 2017; Ong et al., 2016).

Further assessment, discovered that, most organisation reluctant to adopt e-procurement were due to (1) comfort level given over existing purchase methods and processes (2) inadequate resources to support e-procurement adoption including financial and technical (3) no in-depth assessment or evaluation being carried out by stakeholder over benefits by adopting e-procurement and lastly (4) lack of knowledge and expert in the field in long-term and current market trend on digitalisation edge. With positive, encouragement and market factors, to further address the costs, increased customer satisfaction and confidence (Gunasekaran et al., 2008) thus increase competition in supply chain integration, it does help and provides in business success.

Issues faced by organisations as well as project managers can be effectively addressed with guidance provided by PMBOK. As highlighted, PMBOK has identifies five (5) process groups namely initiating, planning, executing, monitoring and controlling and closing, supported by ten (10) knowledge areas which are project integration management, project scope management, project time management, project cost management, project quality management, project resource management,

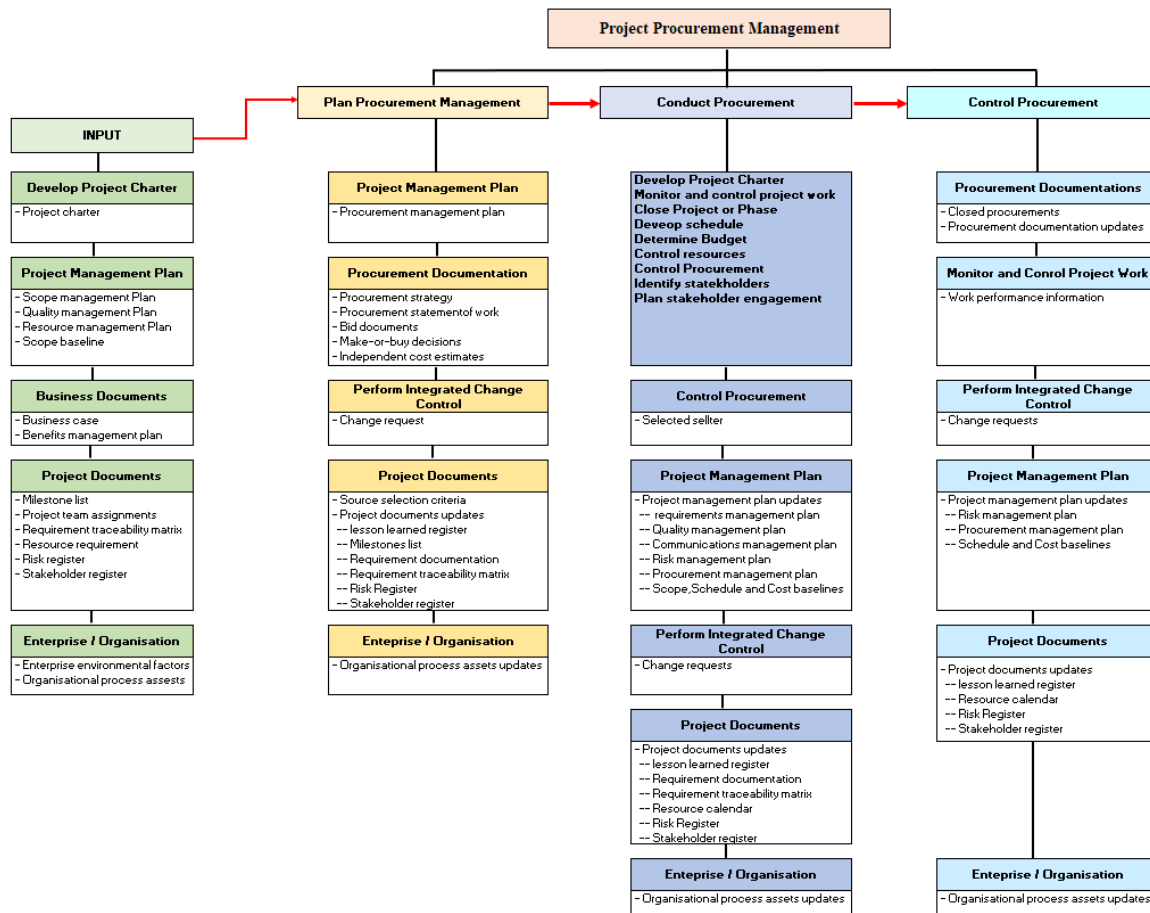
project communications management, project risk management, project procurement management and project stakeholder management (PMBOK, 2017).

The success of an e-procurement adoption by an organisation not only contributes greatest benefits in operations efficiency toward an organisation, but it should also be able to shorten the administrative workflows by eliminating the manual process that was being adopted earlier. With guidance from PMBOK knowledge knows Project Procurement Management (PMBOK, 2017), the desired processes of the e-procurement system should consist of such functions and capabilities to administer documentation submitted by the respective sellers, bidders, etc. Followed by an assessment to identify the potential sellers and award the contract accordingly. Finally, the expected e-procurement system shall provide a controlled worksheet to monitor such contract performance, where required, contract changes, corrections and closing out contracts.

In the case study observed, the critical success factors for e-procurement adoption where an organisation faced were stakeholder communication, unclear accountability and streamlined approving workflow which much related to business process reengineering, such discussion and obstacles discussed were commonly faced by most project managers in implementing and adoption of e-procurement system in an organisation by Angappa and Eric (Gunasekaran et al., 2008). Further, they explained the overall system development, data classes that incorporated in the adoption framework a basic reference for e-procurement system development with the following recommendation provides certain business insight to project manager when commences activity plan in relation to e-procurement.

- Business processes assessment, outlines in detail the entire process of goods being purchased starting from the inception point till the completion of such goods purchased.
- Collecting business requirements, inputs from respective sections their consideration, requirement and expectation from the system. In short, assumption discontinued of manual procurement processes, to be undertaken digitally.
- Alignment of software function with current practice. Ensure there are no missing steps in the event such processes are to be handled completed by the system. User experience and satisfactory navigating the system when go-live.
- Project deliverables and measures for evaluation. Quality assurance, the right business processes as agreed by the user is of utmost importance, as the evaluator as the end-user of the system when go-live.

With PMBOK, Project Procurement Management guide, the above processes can be further brake-down into smaller components, making it a standalone task with respective objectives and deliverable timeline. Eventually, identifying the component and features that an e-procurement system is expected to deliver seemed a complicated assignment for a project manager to transform from physical to electronic processes. Nonetheless, the key concepts for project procurement management as shown in table 4 may provide certain assistance toward the implementation and adoption of e-procurement in an organisation. It further associated respective tasks to be carried out in a systematic approach.

Table 4: Plan Procurement Management: Inputs, Tools & Techniques and Outputs (PMBOK guide)

Apart from Project Procurement Management, Project Time Management does contribute an important role in the implementation and adoption of e-procurement. As known, time is defined as one of the most valuable resources in a project, without proper time management in place, a project can be headed towards a disaster and affect overall project deliverable (Esa et al., 2020). Therefore, the management and schedule control not just depend on a project manager alone while the project team and stakeholders play a significant role during the project initiation until the completion stage (Anantatmula, 2010). Organisations achieve business goals and benefits, produce innovative products and designs through investing and improving existing company infrastructure and systems.

Projects Time Management is defined by the Project Management Institute as the tools of communication in between human and material resources through the modern project life cycle using modern management techniques to achieve pre-determined goals of cost, time and quality (Al-Nady et al., 2016). The Project Management Body of Knowledge (PMBOK), defined, project management as a temporary assignment to create a unique task to be fulfilled within a specific a timeframe with a given set of resources (Aman & Kasimin, 2011). The PMBOK has identified 5 process groups namely project integration, execution, controlling and closing and 10 knowledge areas in relation to project success practices.

Poor performance of projects is reflected in time delays, cost overruns, and quality defects (Kannimuthu et al., 2019). Fails completion promptly might cause huge losses of funding that will impact an organisational business in the long term.

Project Time Management will help an organisation in a more realistic approach to achieve project success. Preparing a timetable is a tool of communication for employees to get a task completed on time. Task and sub-task assignment with specific time frame assigned. This tends to be the easiest approach to managing project time. The activities of the project are appropriately estimated and the durations are pre-determined based on the resource optimization for each activity. Further to the estimation and resources allocation, cost always plays a vital role in time management. This is imperative related to the fact that the schedule overruns are quite expensive where an organisation might need to suffer compensation resulting schedule overruns with a huge sum of amounts in dealing with defects liability issues.

Project Time Management under the PMBOK has defined a detailed plan that represents how and when as a tool for communication with respective stakeholders, managing stakeholder expectations and reporting. Following are the Project Time Management processes, each addressing a distinct area of time management in a project (PMBOK, 2017).

- *Plan schedule management.* The process of establishing procedures, policies, and standard documentation for a project.
- *Define activities.* When dealing with a project, usually the high-level requirements are broken down into high-level tasks or deliverables to be achieved at the beginning level. Then, based on the task granularity, the tasks or deliverables are further broken into smaller activities and presented in the form of a Work Breakdown Structure (WBS).
- *Sequence activities.* To facilitate effective management of the project deliverable time, it is critical to identify the activity in sequential order. The activities identified in the previous step should be sequenced based on the execution order. When sequencing, the activity interdependencies should be considered.
- *Estimate activity durations.* This is the key section in the project planning process. Since estimates are about the total times required, ideally should be completed with a high degree of accuracy. Several mechanisms available, expert judgment, analogues estimating, parametric estimating, three-point estimating, bottom-up estimating, data analysis, decision making, and meeting.
- *Develop a schedule.* Monitoring activities and the milestones through project management software such as Microsoft Project or Gantt Chart.
- *Control schedule.* Changes update to the original schedule.

Conclusion

In summary, technology advancement inevitably brings greater benefits to most corporate, small and medium enterprises and further covers government and agencies. By introducing and adopting e-Procurement it is said to benefit outweighs costs. More importantly, the identified project is to be carried out systematically by applying the principle of project management approach once a project has been decided by an organisation to ensure it has been executed and delivered as scheduled.

Control and monitoring measures undertaken by the organisation, individuals and stakeholders guided by PMBOK provide certain assurance over project deliverables. To the worst, in the event of

project delay or failure it continues to provide a channel of investigation over the entire project schedule and adequate measurement to be considered by them on the subsequent project in the future.

In most, project failure, delays and overruns are closely related to poor project planning, practices and time management has an imperative impact on employees, job losses or worst throughout the organisation in a long-term strategic plan. Nonetheless, the application of Project Management approaches, tools and techniques have proven to provide standard guidance toward project success initiated by an organisation within limited time and resources given (Yong & Mustaffa, 2012). PMBOK videos identified five process groups namely initiating, planning, executing, monitoring and controlling and closing, supported by ten knowledge areas which are project integration management, project scope management, project time management, project cost management, project quality management, project resource management, project communications management, project risk management, project procurement management and project stakeholder management. Arising from a real case study of Measure Interior we can conclude that, Project Management is essential and effective tool of techniques not limited to the construction industry alone while having impressive results in other industries as well.

Finally, most of the challenges and obstacles can be eliminated at the early stages saved for there is no proper project charter in place. Practicing and adopting the principle of project management is crucial and tested proven is essential to have by all project managers. Lack of skilful and effective project manager in the area of expert field be next challenges faced by most of the organisation currently. While this topic can be further discussed and assessed individually in the future.

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Chapter 3

Improving Projects Resilience in Humanitarian Organizations During Pandemics

Papa Ibrahima Sene, Dania Sammani

School of Science and Psychology, Faculty of Arts and Science, International University of Malaya-Wales, Block A, City Campus, Jalan Tun Ismail, 50480 Kuala Lumpur, Malaysia

Abstract

The purpose of this book chapter is to present a model that humanitarian organizations can adopt to improve their projects, resilience with strategies tackling the vulnerabilities caused or aggravated by a pandemic. Enablers for organizations' resilience building are extensively studied by scholars and the current body of knowledge lends itself to further analysis to better understand why a number of humanitarian projects don't survive major stressors such as the COVID-19 pandemic. The various perspectives of analysis offered by scholars need to be bridged with the opinion of project management practitioners through extensive literature confronted with an opinion survey. The magnitude of the disruptions caused by COVID-19 offers this new window of research opportunity. The study should contribute to narrowing the critical knowledge gaps leading organizations and projects to fail during a crisis. By the conclusion of the paper, time will give some useful hindsight and evidence to better analyse and understand organizations and projects behavioural changes for adaptation to shocks. The optimal mix of the most prominent resilience attributes and other key enablers in the project ecosystem will be validated by both academia and humanitarian project managers. Research should confirm the need for humility when conducting predictive studies in a domain of high incertitude and volatility. As the main outcome, the research will propose a set of recommendations for humanitarian practitioners to consider when devising and rolling out strategies to reinforce projects resilience.

Introduction

COVID-19 crisis has no comparable precedence in history. It has claimed a heavy toll of infections globally and its socio-economic impacts are far-reaching. As we explore this subject, the consequences of the pandemic continue to unfold opening to scholars' large avenues for research which outcome will be valuable for governments, organisations and communities trying to navigate these uncertain times. The immediate effect of the pandemic on organisations and projects sustainability is also yet to be fully scoped. Uncertainties around the evolution of the infection open a wide range of scenario analyses. Economists' predictions and messaging seem to vary on the severity of the potential long-term ramifications. Any prospective analysis carries limitations because the time factor is a parameter no one seems to control. While medical researchers have secured political attention and support to work 24/7 in labs testing therapies and vaccines against biological threats, the onus of saving humanitarian projects from termination is on project management practitioners. Can they propose models that can reinforce and expand the humanitarian safety net through more resilient projects? All analysis on the current pandemic seems to have uncertainty as a common denominator. Health experts keep revisiting the epidemiological assumptions and scenario anticipation has become difficult for business continuity managers. Forecasting for COVID-19 has failed (Ioannidis et al., 2020). The consequences in terms of adverse economic impact have put public authorities in a catch 22 situation leading to what appears to be inconsistent and uncoordinated response initiatives. Within the same regions, public authorities have different levels of risk appetite when deciding on movement restriction and public health advisories. All the recipes are gathered for a long and lasting social, economic, health crisis going to

compound already existing vulnerabilities and torpedo the resilience of humanitarian projects. Past health crises of smaller magnitude offer a baseline for studies and learning from the previous epidemics in fragile contexts such as 40 years of Ebola in the DRC (Nachega et al., 2020). There are well-documented organization and project resilience enablers scattered in the academic literature waiting to be tapped into to support further research on resilience to novel threats. This book chapter proposes to bring them forward to the attention of humanitarian workers who are yearning for improved project resilience formula.

Initial problem scoping

Impact of COVID-19 on organizational resilience

From the bubonic plague in the 6th century Byzantine Empire to smallpox, which claimed over 20 million lives, cholera, and Spanish flu, which infected more than 500 million people, pandemics have been a major source of disruption globally. Within a few months, the coronavirus disease 2019 (COVID-19) went from a remote threat to global health, humanitarian, and socio-economic crisis (Leung et al., 2020; Sharma et al., 2021). One way of monitoring the crisis is to use the high-frequency media articles as a sensor (Gandasari & Dwidienawati, 2020). The UN initial appeal estimated at US\$2 billion also reveals the scope of the emergency (Ishiwatari et al., 2020). Raising funds in the wake of a global economic recession appears problematic with donors withdrawing from international engagements (Gramer & Lynch, 2020). The ground painstakingly gained towards the achievement of UN sustainable development goals (SDGs) is being surrendered to COVID-19. By at end of August 2020, around 70 countries had interrupted their immunization programs (Bruni et al., 2020). Undoubtedly, the most vulnerable will be affected most affected. It is anticipated that the contraction of income could push up to half a billion new individuals into poverty (Sumner et al., 2020). As vulnerabilities are on the rise and funding is being reprioritized away from humanitarian organizations, the resilience of aid programmes is at stake. 2021 and beyond are looming Annus Horribilis for the most vulnerable. Yet, it is not known to what extent humanitarian organizations can improve their effectiveness and projects resilience to expand the humanitarian safety net despite and because of pandemics.

One scholarly question of research interest could be to identify the key enablers for the most effective coping strategies to improve projects resilience. That would pave the way towards isolating the most prominent resilience factors influencing humanitarian projects' resilience building. An inventory of resilience predictors from the empirical study would give a long list of enablers. This paper focuses on a model that confines the research scope to organisations' internal resources and conducive environment.

Interest for Scholars, practitioners, and decision-makers

The far-reaching humanitarian consequences of the pandemic have given the coronavirus disease attention detrimental to other lower profiled crises. As the sustainability of several humanitarian projects is at risk, the thematic of business continuity and resilience-building has become the cornerstone of adaptation strategies. This book chapter proposes to build on intrinsic resilience factors and attributes of each organization to offer guidelines inspired by success stories and lessons learned from failures. Commonalities will emerge to either comfort or challenge any certitude. COVID-19 pandemic offers the opportunity for organizations to dust off their workbooks on contingency planning and verify their pertinence.

A research effort on humanitarian project resilience will be a modest contribution to the SDG political commitment of 'leaving no one behind'. It would look into all types of pandemic-induced vulnerabilities without setting any geographical boundaries. It would aim to offer a response to the humanitarian practitioners invested with the mandate to reduce human suffering. From the victims of domestic violence in the OECD to the refugees in third world settings, no amount of suffering would be left out of the research scope. Organization resilience is a wide body of knowledge lending itself to more focused studies dedicated to the singularities of humanitarian programmes.

The Scholarly Perspective

To study organisational and projects resilience one can approach the matter by asking what causes organizations to fail. Several factors of influence can be identified as a determinant to an organisation's failure, which is the macro (external environment) level includes criteria such as economic conditions, formal institutions, government policies, competitors and rumours. The factors addressed in the meso (organizational) level include organization age and size, location, property structure, client, supplier and shareholder relationships, financial resources, physical resources, human resources, and succession process. At the micro (individual) level the managers' skills, characteristics, actions, and mindset are of influence (Higashi et al., 2020). A review of the literature on resilience indeed confirms the mapping of the knowledge contribution along these lines of external and internal factors. The external factors are mainly taping the organisations and projects ecosystem with research topics mainly articulated around partnership, SDGs, localisation, supply chain, humanitarian space, macro-economic reforms. The internal factors identify enablers intrinsic to projects and organisations such as organisation resilience factors, culture, approach to risk management, capacity in programming, strategic planning, and leverage on project support services.

The External factors

Partnership, cooperation, and international coordination

For an efficient response to the pandemic partnership, cooperation and coordination are brought into the reflection as key enablers for resilience. Because of the far-reaching consequences of the pandemic, the importance of coordination at all levels from local to global is extensively quoted by scholars. The idea can be summed up in 4 Ps (Public-Private-People Partnerships) for improving the response to COVID-19. NGO success highly correlates with its capacity to partner with other stakeholders (Seddighi et al., 2020). Indeed, collaboration can be fostered through a silo breaking approach with solutions being co-designed by different experts (Menoni & Schwarze, 2020). That view is corroborated by other authors who highlighted the importance of humanitarian workers sharing experiences and learning across sectors (Durrance-Bagale et al., 2020). If knowledge and experience sharing is pinpointed as one catalyst for organisations' recovery, the good practice can be extrapolated to the larger landscape of international relations. A scenario-based analysis can be proposed that aims to guide policymakers on the economic benefits and financial savings when responses are globally coordinated (McKibbin & Fernando, 2020). This rationalization of response investments speaks to the concern raised by a few scholars who project drastic reductions in the funding needed to respond to already existing and emerging vulnerabilities. In anticipation of a looming economic downturn, donors should resist the temptation of reprioritising the aid funding for COVID-19 response to the detriment of other vulnerabilities (Al-Awlaqi et al., 2020). The outcome would be devastating in fragile contexts. Another important aspect of partnership worth exploring is the bridge building between the academic and the practitioners (Kovacs & Moshtari, 2019). It is vital for scholars and practitioners

to work together. With the COVID-19 pandemic, novel research avenues on organization's resilience are opening up.

International solidarity and SDGs

Several papers make diagnostic and conclusions that are concurring on the fact that the vulnerability to the pandemic has been aggravated by the little progress on the attainment of SDGs (Sustainable Development Goals). COVID-19 is a reminder that the cure will reside in the political will to ameliorate the underlying conditions that have made societies vulnerable (Parikh et al., 2020). To make matters worse, it is turning out that COVID-19 will in return slow down the progress on the SDG agenda. The modest SDG achievements and the COVID-19 pandemic appear to have mutually worsening effects. Indeed, the long-term impact of COVID-19 on the attainment of SDGs is worrisome with the shutdown of economies to contain the infections (Iwuoha & Jude-Iwuoha, 2020). Difficult times are ahead, governments worldwide will at some stage have to attend to the increased debts they have accumulated in trying to respond to the crisis (Hamilton et al., 2020). This may slow the adoption of policies to address the SDGs. The above pessimism is moderated by the fact that COVID-19 could be an accelerator for the attainment of SDGs. One can opine that despite its significant damage to human lives and livelihoods, the coronavirus pandemic presents an excellent opportunity for the human family to act in solidarity and turn this crisis into an impetus to achieve the United Nations (UN) (SDG), through responsible information systems research (Pan & Zhang, 2020).

Advocating for more localisation

The pandemic has certainly amplified the need for more reliance on local actors as advocated in the Grand Bargain commitments. So far, it has remained a commitment yet to be fully implemented. One viable solution is in the capacity building of local actors and local governance to be the main responders when COVID-19 prevents international action (Barbelet et al., 2020). Converging views prescribe localised response building from the affected communities themselves (Sperling et al., 2020; Betts et al., 2021). However, it is worth noting differing opinions that do not share the same enthusiasm for all local action. There are downsides in community-led responses, in certain contexts, being uneven and shaped by ethnicity, gender, and partisanship (Farhoud et al., 2021). Other skeptics about the benefits of localisation would cast doubts on limited state capacity and risk of donor dependency (Hendriks & Boersma, 2019).

Improving Supply Chain resilience

Among the most visible and immediate disruptions caused by the COVID-19 suppression measures is the International Supply Chain. Movement control Orders, border closure, curfews, state of emergency, trade restriction on strategic commodities are examples of responses that caused havoc in the supply of the most needs goods and services very much needed for humanitarian assistance. That situation is aggravated by the gap identified in the literature on Supply Chain resilience to pandemics (Queiroz et al., 2020). Before the pandemic shock, scholars already attempted to contribute to eliciting the concepts of complexity, uncertainty, risk, and resilience and their interactions in both Project Management and Supply Chain Management (Thomé et al., 2016). More recently, scholars' publications examined the social capital emanating from supply chain partners as an external factor to building organizational resilience (Jia et al., 2020).

Access and humanitarian space

Enablers for resilience can only thrive in an ecosystem where political will is guaranteed with public authorities endorsing and supporting the humanitarian agenda. That may seem to be a given pre-condition easy to secure as all leaders should be first and foremost concerned about the safety and security of their populations. Surprisingly, a few research publications suggest otherwise. Governmental corruption and political interference in humanitarian action can impede efforts towards project resilience. Government denial can indeed stall humanitarian response and compromise project outcomes (Ostergard, 2020). International power dynamics can sometimes hinder INGO investments in improving deliveries to the most in need. More humanitarian diplomacy efforts appear to be a key contributor towards creating an ecosystem favourable and conducive for better access and effective disaster response with no restriction on cross-border movements of goods and aid workers (Cardwell & Ghazalian, 2020).

Initiating macro-economic and social reforms

The successful economic policy response is key to maintaining a conducive ecosystem for humanitarian projects to thrive and achieve their goals. A global depression or economic crisis will have devastating effects with the collapse of all efforts and gains made so far in building aid projects resilience. Mitigation policies reside in profound macro-economic and social reforms which should moderate the fears on the unintended but inevitable consequences of the lockdowns in poverty eradication. In reaction to pressing demands often assorted with criticisms, public authorities have to strike a delicate balance between biology and the economy. However, the global context of emergency should not lead to precipitation with trial and errors response measures that could worsen the socio-economical and humanitarian crisis. Failures in fiscal responses with increased burden of public debts may eventually translate into both more vulnerabilities and funding restrictions for humanitarian actions (Makin & Layton, 2021). The easing of the socio-economical pressure caused by COVID-19 will depend on how successful the monetary authorities will implement monetary policies in trying to dampen the recessionary consequences of the pandemic (Costa et al., 2021). From the disaster response phase, a few scholars are already moving fast-forward into the recovery steps advocating for radical transformation in global policies in shaping the post pandemic era. Far from being just a disruption the pandemic is an indication of the urgent need to re-set economic policy sectors (van Barneveld et al., 2020). Failing to implement far-reaching transformative changes will torpedo the project of ‘development’, and future inevitable shocks will wreak even greater havoc (Leach et al., 2020).

The Internal factors

The organisation attributes and resilience factors

Scholars identify common strategic and structural features of resilient organisations of different type, size, and purpose. They are attributes and success factors project managers can set as resilience benchmark. A lack of instruments to quantify organisational resilience is noted as a limitation that can be addressed with the application of the short-form version of Benchmark Resilience Tool (Gonçalves et al., 2019). Alternatively, a resilience analysis grid (RAG) can measure how resiliently an organization performs (Patriarca et al., 2018). Other variables that have an influence on organisations resilience are the following: location, external crises events, and entrepreneurs’ attitudes towards prevention, social capital & network, strategic formalisation (Herbane, 2019). The project manager behaviour is an equally important resilience enabler. In the same vein scholars isolated more factors highly correlated to system resilience building (Silvius &

Schipper, 2020). They include proactive management of unforeseen events, organizational modifications, combined competences, and system's autonomy (Villemain & Godon, 2017). Depending on the type, the purpose of the organisation and the perception of the threats, the different resilience factors are not of the same prominence. A model for the evaluation and ranking of resilience factors (RFs) in an uncertain environment is a research novelty (Macuzić et al., 2016). Larger organisations and projects are more concerned about sustainability given the domino effect and great impact their failure could cause. The RSVOs (reliability-seeking virtual organizations) can be a research object to analyse the resilience of globally distributed disaster relief organisation. The fluidity of the organizational structures is also identified as key enabler (Grabowski & Roberts, 2019).

The organisation culture and approach to risk management

Project risk management and resilience building may have concurring and mutually reinforcing aims. They can be presented as two separate/siloed bodies of knowledge that can offer new research avenues if weaved together (Naderpajouh et al., 2020). To cope with the disruptive impacts of COVID-19 outbreak, the risk management approach does not rally consensus in the academia. Limitations are exposed related to what to be gulf between risk awareness and its integration in policies and practices. Difficulties are noted in the anticipation of the cascades of hazards possible scenario, this the need for flexibility in situations of operational uncertainty (Pescaroli, 2018). Resilience cannot be blind to uncertainty but rather needs to integrate uncertainty into its understanding (Darkow, 2019).

The organisation capacity in programming and disaster management

This enabler is not the least in the matrix of factors that influence project resilience. Humanitarian organisations develop expertise in different disaster response areas such as food security, shelter, health, and WASH, first aid or migration. They specialise in resilience building with various strategies articulated around their core business. In a context of depleting funding, aid organisations tend to focus their programming effort on priority projects they have expertise. A showcase is how against all odds and in the name of humanitarian imperatives a nutrition programme delivery can be redesigned to ensure humanitarian business continuity despite movement restrictions (Francis & Pegg, 2020). As scholars appear to agree about the merits of programmes prioritisation to cope with reducing resources versus increasing needs a few authors bring forward one potential perverse effect. They reveal the risk of discrimination as public authorities that are confronted to limitation of resources may adopt non-inclusive social actions (Bukuluki et al., 2020).

Strategic planning

Preparedness is key in building organizational resilience. Being prepared for disruptive events requires proactive planning of internal and external resources of the organization so that it can cope with disasters effectively and efficiently (Sahebjamnia et al., 2015). However, a few studies have identified inaccuracies and short-sighted approaches in planning to have caused setback in resilience building. Organisations are capitulating when they face difficulties of planning during uncertain times (Kumar et al., 2020). In the same vein, policymakers are advised against short-sighted policy responses focusing on the short term as COVID-19 crisis unfolds, to the detriment of the post event recovery phase (Ishiwatari et al., 2020). Given the socio-economic consequences of the lockdowns it can be inferred that over exaggeration of predictions and forecasts about the pandemic fatality rate has fuelled the fear factor which inflicted more damage than the virus.

Moreover, one can be critical about how little research was actually done on forecasting in humanitarian operations where inaccurate plans have costed lives (Altay & Narayanan, 2020b).

The organisation leverage on project support services

One important pillar identified for resilience building is the organisation support services. The ways in which the organisation manages its financial and human resources, the ability to adjust processes through innovation and technology are determinant to projects perennity. It has been demonstrated that strategy & leadership is positively correlated with proper financial administration financial (Stanovci et al., 2019). Successful business continuity during the pandemic can be largely credited to organisations digital maturity (Fletcher & Griffiths, 2020). Ideas of supporting business continuity and resilience with more process automation are flourishing. COVID-19 has created a fertile land to plant the seed for academic interest and research. The global pandemic has re-invigorated this debate with several academics arguing that COVID-19 will provide the tipping point that accelerates the widespread adoption of Artificial Intelligence (Coombs, 2020). Other publications are converging to the same point by reiterating that information systems and technologies are becoming foundational to society (He et al., 2021). For organisations to overcome shocks, innovative information systems and sound financial management are strategic tools that need to be entrusted to skilful hands. The quality of the human resources emerges as instrumental to organisation's capacity to navigate the crisis. The survival of an organization during crisis is dependent on the resilience of its members, as well as its leadership (Teo et al., 2017).

Conclusion

COVID-19 is a novel pandemic causing disruptions of a scope and severity that have not been anticipated by neither scholars nor practitioners. Consequently, the slim body of knowledge on its impact of organisation's resilience is building up with very recent and limited publications. Meanwhile public authorities and decision makers are left with what seems to be a trial-and-error approach in their social and humanitarian response strategies. The initial review of scholarly publications reveals a limited number research tapping humanitarian projects resilience and sustainability. Scholars investigate a wide range of factors in the organisation ecosystem and organisational intrinsic attributes that are enablers for resilience. Very few are addressing specific humanitarian realities and specificities. When they do, the approach is not wholistic to encompass the multifaceted and multiphase aspects of resilience building, hence the limited replicability of the solutions proposed. Moreover, the perception of the construct of resilience varies a lot, making scholars declare that there is little consensus about what resilience means and how it is composed (Duchek, 2020). The complexity of the construct is furthered when authors ask what makes some organizations more successful in dealing with, and responding to, the unfamiliar (Linnenluecke, 2017).

Against such a backdrop offering a panoply of tactics for response, it appears clearly that there is no one size fits all model. Scholars are widening the research streams with new avenues to engage into to further the advancement of the knowledge in organisational resilience without offering a panacea. In the absence of consensus, they leave it for each organisation to build capacities and appropriate decision-making knowledge on how resilience is defined, by which variables it is determined, and how it can be assessed, maintained, and improved over time. That decision making will remain a challenge no amount of research will fully address. The difficulty will continue to reside on what is described as disruptions in the environment characterized by sparse or lacking information and dynamic changes over time. Information arising from the environment in the immediate aftermath of a disaster might be,

if it is available, vague, or cryptic in its format. Its translation into an appropriate format might be time-consuming and undermine swift and appropriate remedies (Schätter et al., 2019).

Whatever perception, definition, approach, and solution is retained as most appropriate by practitioners and policy makers, the common denominator should be and remain the integration of the concept of human security into new policies with the objective of prioritisation and protection of human life while focusing on the vulnerable groups (Ishiwatari et al., 2020).

Research conclusions and recommendations leave it for the end user to decide on the right mix enablers to prioritize when building project resilience. The success will reside in the capacity of finding a balanced set of resilience predictors both from the organization limited internal resources and the enabling factors in the project ecosystem often beyond the project manager's control. The certitude of the moment can be challenged by unknown future developments. The matter of resilience to pandemic lends itself permanent revisiting and revision of assumptions and hypotheses aiming to approach the ideal answer without ever reaching it.

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Chapter 4

Emotional Intelligence in Virtual Project Management

Cheah Ee Pheng¹, Kamran Shavarebi²

¹*School of Science and Psychology, Faculty of Arts and Science, International University of Malaya-Wales, Block A, City Campus, Jalan Tun Ismail, 50480 Kuala Lumpur, Malaysia*

²*Faculty of Engineering and Quantity Surveying, INTI International University, 71800 Nilai, Negeri Sembilan, Malaysia*

Abstract

This chapter aims to explore the influences of emotional intelligence towards Virtual Project Management. It is with a particular interest of the impact of adopting Emotional Intelligence in Virtual Project Management. According to the World Economic Forum 2020, emotional intelligence is one of the top 10 skills that is needed in a workplace environment. The outcome of this study will be very impactful towards the project team's performance and success of every Virtual Project Management as a whole. The need for this study arises where Project Management practitioner's perceived emotional intelligence and its potential impact on virtual projects have limited attention. The outbreak of the COVID-19 pandemic has accelerated the remote working arrangement as Movement Control Orders (MCO) has made commuting to work and working physically in offices are quite impossible for billions of people. There is also a sharp increase of employees working from home five or more days per week. This includes daily operations, and projects to be carried out daily in offices. Working from home (WFH) provided an option for employees performing their roles away from the office, and supported by a virtual team is crucial. Thus, the importance of virtual teams to manage daily operational work and projects is needed.

Introduction

Emotional Intelligence (EI) and its importance will be presented in this chapter below. In addition to that, it is crucial to know all the EI components, such as self-awareness, self-management, social awareness, relationship management, and how all of these components are able to be practised and exercised during interpersonal interactions or communication in virtual project management for better and higher success rate despite the non-face to face or physical communication. As well as how EI plays an important role in influencing the success of Virtual Project Management.

Emotional Intelligence

What is emotional intelligence? Why do we perceive that emotional intelligence is an important factor in our day to day working environment? Why do we need emotional intelligence especially in Virtual Project Management? In any business environment, productive relationships are progressing and sustained through interactions between colleagues. Research in several areas has proved that these interactive skills are established to capture, manage, and interpret emotions upon interactive communications (Ashkenazy et al., 2000; Lopez et al., 2003). Bar-On & Parker (2000) and Druskat et al. (2006) both stated that emotionally focused skills are known as EI. This is because of its significance in constructing meaning and productive relationships. Previous studies on EI are positive outcomes such as diverse personal well-being and their job performance. In addition to that, Goleman (2001a) in his research suggests that EI is crucial to the leaders' performance that leads their team towards a common success. Neuroscientist has revealed that any decision made, or action taken are much influenced by emotion and logic (Damasio, 1994; Damasio 1999). Thus, Goleman (1995) & Salovey & Mayer (1990) in their study suggests that successfully adapting to the changes in the environment, effectively interacting among others, coping with impediments and dilemma requires form of

intelligence that combines both emotional and cognitive capacities. EI is defined as the ability to monitor one's own and others' emotions and use emotional information to guide thinking and actions (Mayer & Salovey, 1993). Also, Mayer & Salovey (1997) stated that Emotional Intelligence specifically involves four distinct sets of abilities that are; i. The ability to perceive, appraise, and express emotion precisely; ii. The ability to access and generate feelings when they facilitate cognition; iii. The ability to understand emotion-laden information and make use of emotional knowledge; and iv. The ability to regulate emotions to promote emotional and intellectual growth and well-being.

Emotional Intelligence Competencies

Salovey and Mayer were the first to be able to formally define and measure EI. It is also very important to stress that EI is complementing cognitive intelligence. EI includes observing and accepting emotion and its impacts, also applying EI to improve cognitive thinking, which involves the actions and judgments. EI is particularly valuable when actions and decisions involve others (Salovey et al., 2000). Goleman (1998) was amongst the first social scientists to investigate how EI impacts work efficiencies. Goleman (1998) and Boyatzis (2000) analyzed data on over hundreds of organizations and produced a model of emotional competencies in the working environment. Both authors defined emotional competencies as learned skills based on EI that result in exceptional performance at work. EI determines the possibility in developing and putting these competencies in working successes despite working environments (Druskat et al, 2006). Boyatzis et al. (2000) in their Goleman and Boyatzis model have 18 individual emotional competencies which belong to the following two categories and four subcategories of competence. First is personal competence with self-awareness, self-management; and for Social Competence it is with social awareness and relationship management. All four of these sub-categories are interrelated as shown in Figure 1 below.

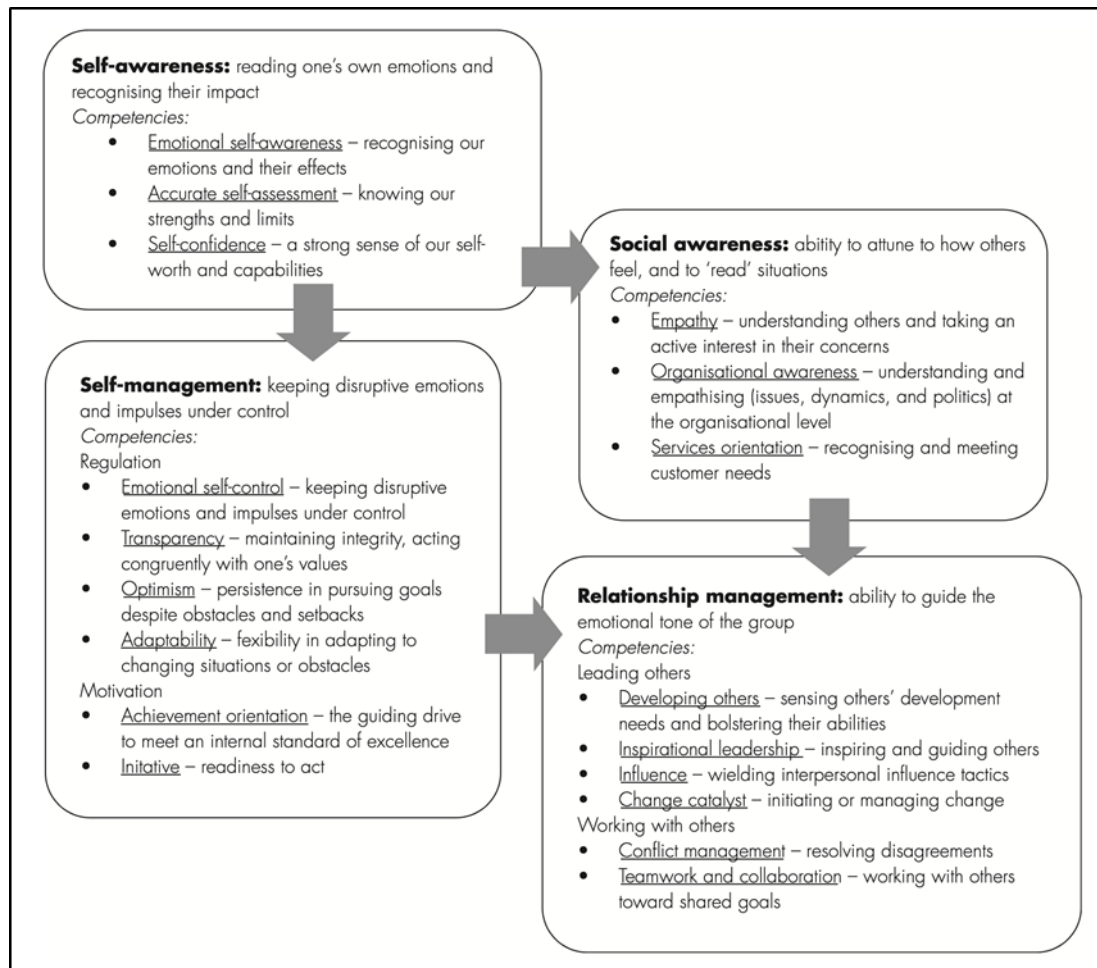


Figure 1: Emotional Intelligence Competency Model (The Goleman and Boyatzis)

Self-Awareness

Self-awareness is defined as an awareness of an individual's emotional states and aware that they may have an impact on other individuals or group's emotions. Self-awareness is a fundamental subcategory of the EI element. Without self-consciousness or awareness of own emotions, it becomes a lesser possibility for a person to be empathic, social awareness is also understanding other individuals' emotions. And it will become less likely for one to engage in inspirational leadership. Self-awareness first competency is emotional self-awareness that is understanding what another individual feels, and it also recognizes an individual's feelings, and then how possibly the emotions will affect performance. Self-awareness second competency is self-assessment, where when an individual who are aware of their strengths and improve on their weakness. The individual seeks criticism to self-access and learn from their past actions and will collaborate with other individuals or teams that have fortes complementing themselves. Self-awareness third competency is self-confidence, and it means that an individual has an awareness of self-worth and experiences. Self-confidence appears when an individual was presented in a confident and positive manner. An individual who is exhibiting confidence is essential for acquiring agreement on their philosophies and mindset and then, encouraging other individuals or teams in the organization to follow. It is important for self-awareness to be cautiously practice in organizations for a better communication within the same team or with other teams.

Self-management

Self-management is handling an individual's emotions to regulate and monitor those that are abnormal and expresses emotions in dynamic and constructive manners. It also helps an individual to focus on emotional mindset and practices reach the level of distinction. In self-management, there are six subcomponents. Emotional self-control is the skill to maintain emotions and void negative actions upon facing stressful situations. Self-control is referred to invisible ability. This is because, when being practiced, there will not be any reaction due to stress, anger or any emotion that may give a negative impact or reaction during the events that occurred at that moment. A clear example can be seen when an upset manager proceeded in discussions in an impartial and tranquil manner although earlier the manager's situation was being pressured by the higher management versus a manager who responded in anger and constructively their team. Many researchers have proven that managers who are able to control their emotions, performed better than those managers who score lower in this ability (Boyatzis, 1982). However, sometimes, it is best to exhibit frustration and dissatisfaction in a constructive manner. This contributes to the second subset that is transparency, that is to be honest, and acting genuinely in line with an individual's belief. Peer's or subordinates in the team often perceived managers that practices transparency as reliable, and these managers are open to sharing their constructive feedback, opinion and suggestions, also even acting on their core beliefs even when personal cost is involved. Managers who have transparency and are honest about their own mistakes are honest and open to discussing with others about their mistakes and working in a team is effortless as there is no need for assumptions in determining their values and contributions. With practicing transparency in the manager's work practices, the outcome of these practices includes an increase in the team's willingness to work together and proactively focus on their allocated work and then performed well (Druskat & Wolff, 2001). Optimism is the ability to be optimistic upon pursuing goals despite roadblocks and hiccups. There is data that supports that emotion is contagious and when a manager demonstrates positivity and optimism, in extents to all individuals that he collaborates with and allows the whole team to remain positive upon facing setbacks (Barsade, 2002; Hatfield et al., 1994). Adaptability is the fourth subcategory. It is the ability to familiarize with transformation and to perform seamlessly within ever-changing environments. Adaptability needs individuals to remain adaptable when priorities shift rapidly and when change is required. Adaptability needs every individual in the team or organization to interpret the event impartially to the way forward and enables one to easily adjust to the detailed needs of the customers easily and effectively. The second last of these are motivation, that is focusing on an individual's emotional strengths. These are achievement orientation and initiative. Both subcategories often complement each other. The achievement orientation is the energy to achieve a particular standard of brilliance and thus improve performance, whereas initiative is defined as the promptness to grab opportunities. These two are essentially in-line to motivation as numerous studies have linked both subcategories to performance. Self-management is equally important to be able to work together as a team, as trust and transparency are good core values to work as a team in an ever-changing environment. And thus, it does play an important role in team collaboration especially in project management.

Social Awareness

Social awareness is the skill to accommodate how people feeling now or the instance in time and to sense the communicative tone in social environments. Social awareness is the basic necessity for EI. Social awareness also enabled an individual adapts to how other person feel, while improving ability in managing relationships. Goleman and Boyatzis placed three abilities in the social awareness subcategory, that is empathy, organizational awareness, and service orientations. Empathy is identifying others' feelings, perspectives and putting awareness in their interests.

Empathy is also the yearning to know an individual's emotions, worries and desires. Self-awareness is crucial to empathy. It is challenging to know the reactions and feelings faced by an individual if us, ourselves continuously ignoring our feelings. Empathy will be directly connected with our routine to understand what others' need. It is common that empathy is often related to performance in a multinational company, which also involves communicating among people from various countries and as well as cultures. Organizational awareness is the ability to recognize the feelings, reaction as well as political trait existing and ongoing in a team or group of people. The individual also must have yearned to understand issues, changes and politics in the organization.

The managers who are to independently observe and recognized the changes in organization, that allowed them to control the situations that were beneficial and suitable. The final subcategory is service orientation which has ability to predict, determined and then fulfilling their customer's unexpressed needs. It was demonstrated when the manager sees a long-term view, compromised smaller profits for a better management in relationship with the customer.

Relationship management

The abilities in relationship management involves the abilities focused on leading or collaborating with others. There are four abilities focused on guiding the team to move forward. Improving others is the first, and definition of this is to identifying other individual or team in improving needs in the form of training or attending theoretical courses and guiding them to sharpen their skills. In Johnson & Johnson research developing others was recognized as a distinctive factor among top performing and middle-ranged performing managers. Successful managers demonstrate their abilities to be aligned with their employees' and organization needs that is empathy. Organizational awareness to identify suitable and successful actions to develop their employees.

It is common that the three other competencies are centering in leading the team was also identified as most distinct from top performing and middle-ranged performed leaders at Johnson & Johnson. The top performing managers have inspiring leadership, and transformation catalyst qualities. Inspirational leadership encompasses supporting individuals or team that requires inspiring them emotionally. Inspirational leadership is important as feeling good and being happy are contagious. To be a successful leader, an individual must display strong good vibes and eagerness that extents to others in the team or organization. This is factual because good leaders are in spotlighted positions and views are adapting and interpreting the leader's actions both verbal and non-verbal cues. The second emotional ability is collaboration. It is collaborating and creating synergy among the team with a common goal and achieving all its successful outcomes. Goleman (2001b) states that involves the real intention to work together. When leaders exhibit significance in collaborating with the team towards a common goal, collaboration are contagious and thus have an important impact on the behavior of members.

Virtual Project Management

Virtual Teams

Now in international organizations, and among multiple talents that ranged to the extent of many time zones, and through multiple nations. And currently with movement-controlled order (MCO) or lockdowns are being enforced around the world has led companies to have no choice but to have their employees work over the internet, remotely from their home, and with very minimal face to face contact. These collaborative technologies and the cost-effective email, broadband and the concept of virtual teams emerges with the use of internet and often associates with another internet breakthrough. Becker (n.d) of Cornell University mentioned that “employees or teams are doing substantial parts of their works from different places”. Also, when people communicate regularly, with widely spread distances, and even with enhanced communications, virtual project management is currently a common trend among employees around the world. There are also various types of virtual teams’ definition that have been listed by researcher in Table 1 below (Peter et al., n.d.).

Table 1: A summary of the Virtual Teams with seven different types

Types of Virtual Teams	Description
Network Team	Individuals that work together to accomplish a specific goal; team is diverse and diffused
Parallel Team	Team that works in short team to develop recommendations for a process improvement; and the team is diverse
Project Team	Manage projects within a time frame. Tasks are uncommon, project outcomes are measurable. Have authority to make decisions.
Production Team	Team perform common work, normally in single function, and distinct.
Service Team	Team supports customer in a typical service support role 24/7
Management Team	Team work together daily in a functional division
Action Team	Team offers an immediate response, only activated in an emergency.

Virtual Project Management

Virtual teams work together within a timeframe to complete a specific goal and is defined as virtual project management. In another definition by Peterson and Stohr, virtual teams are a group of individuals who work across time, space, and organizational boundaries with multiples communication technology. Let’s look at another brief definition on virtual teams – is a cooperative work towards a common goals and achievement which is “collective but remote” performance (Krill et al., 1997). There are many suggestions on the managing virtual project management. Gray and Larson (2000) supports the steps of team member selection, and teambuilding for the project team, stakeholders, project roll-out and finally project completion therefore celebrating success of the project completion.

Emotional Intelligence in Virtual Project Management

In this section we discuss why EI are crucial in virtual project management environment. Precisely, we emphasize EI qualities are crucial mainly because virtual projects are exclusive, short-termed within a specific time bound, Project Management Institute (2017) stated that emotional intelligence are gradually increasing in scope and conducted by a team of people from different departments, organizations, disciplines, and with diverse culture. Each EI qualities guides to form a working culture that builds relationship and with reliable accountability among a group of people and their goal is to project success. With research related to virtual project management, the author has accessed the skills of over 70 project managers around the globe in a multinational petroleum company.

These project managers were from a service provider that were assembled from different business units to manage construction project, and the outcome of the project was successfully completed in a timely, safe, reliable manner. This research outcome is that the skills possessed by project managers, were 69 percent from EI qualities such as influences, coordination, self-confidence, teamwork, achievement orientation, and 31 percent are related to business expertise, and zero were from analytical thinking or conceptual thinking (Mount, 2006). In addition to the above, Spencer (2001) in his studies on 28 project managers also found that EI competency was highly interrelated to their daily tasks and project success. Project managers that were exhibiting EI qualities saves \$27 million by reducing time and cost overruns and savings from reducing change requests. Many researched have emphasized on the relevance and significance of EI competencies for project managers, whether it is ground project managers or virtual project managers. We emphasized earlier that emotional intelligence is even more important in virtual project management than in face-to-face meetings. Virtual Team members are diffused and fluid, moving swiftly from one team to another, from one project to the next. Therefore, it is important to build and established trust relationship among the virtual team members and stakeholders, the sooner the better as the team can move from dissonance to productive and effective team quicker. Thus, saving more time in collaborating, or understanding each other better, especially during this Covid-19 situation of working from home and basically 100% virtually based, and virtual projects will include circumstances that we have not managed before such as challenges that are not anticipated at all. Therefore, EI competencies as discussed above will be very helpful to a virtual project manager to handle and to manage the unexpected circumstances. Virtual projects are progressively developed and expand during the project life cycle, from concept proving to execution phases up to roll out. In short, virtual projects are always evolving and changing especially if the methodology adopted is Agile Methodology where the output is being developed by part, change is constant. With this practice in place, virtual team managers and leaders must adopt and practice EI to ensure their team in their leadership can survive and perform well in the evolving circumstances.

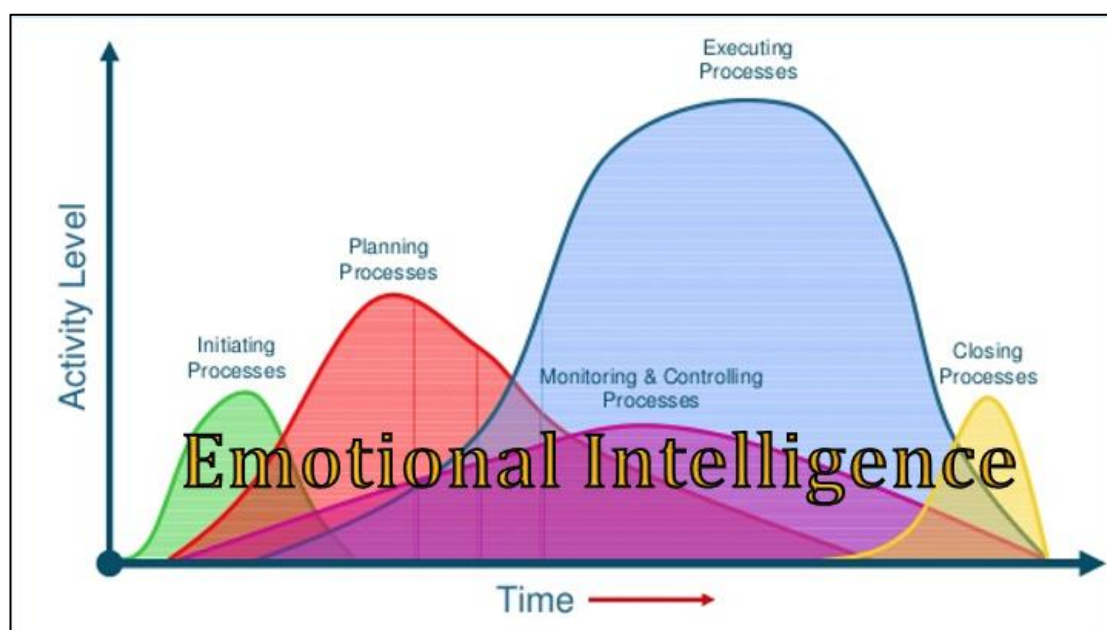


Figure 2: Applying Emotional Intelligence across Project Management Processes

Now, let us see EI competency subcategory and its application to virtual project management.

Table 2: Emotional Intelligence Competency and its application to Virtual Project Management.

EI competency	Application
Self-awareness	Virtual team leaders must have self-confidence due to constant changes in the project requirements and output and change is constant. Where with self-confidence, it does help in higher chances of success of the virtual projects.
Self-management	Virtual team leader needs this skill in leading virtual projects as transparency is the most crucial skills in establishing working relationship among virtual teams.
Adaptability	Virtual project management continues transform and evolve over time. Adaptability in virtual project management is very crucial in achieving the virtual project success despite the changes that the organization is facing
Social Awareness	Empathy helps developing virtual project member organizational awareness, and what need to be done in order to overcome the obstacles to achieve virtual project management success.
Relationship Management	Virtual Project Team must develop trust in their working relationship to minimize conflict and increase teamwork which are very significant and contributing to the success of virtual project management.

This section has shown the importance of EI competencies, and their application as well as their importance in virtual project management environment. EI qualities are crucial to virtual team members because they do not have all the time, they want to establish trust in their working relationship as traditional working environment has. Also, virtual projects naturally interdependent, ever-changing. Firstly, organization must ensure that their hiring process and quality to emphasize on EI competencies

in selecting and developing employees whether for virtual project managers and virtual team members or otherwise. However, in the current world, most of us are still working on a remote basis, thus this hiring process must be in place. Next, for virtual team selection, EI competencies should be developed in all the member of the virtual team and virtual team leaders in order for the team to have an established skill with EI competencies qualities, to ensure performance of the team outweighs cognitive skills team members. Hence, extensive research must be carried out to further prove this study between Emotional Intelligence and Virtual project management success.

Conclusion

In summary, the environment and situation we are in today, virtual project management relationships must be established swiftly. In addition to that, working relationship must be able to manage constant changing environment. It is important that virtual teams able to perform without any hesitation or trust issue throughout the project life cycle. Establishing Emotional Intelligence components with self-awareness, self-management, social awareness and relationship management must be in the minds of the virtual project manager, virtual team, and is a fundamental requirement in establishing and maintaining constructive relationships across organization and in the group. Virtual project leaders will need to master the EI set of competencies and set an example to everyone in the team. Each and every virtual team member must play their role in developing EI in order for their working relationships to be meaningful and productive among the team. Studies on EI have been very much focused on leaders and managers. It is really an area that worth further research and examining in especially in virtual project management, both leaders and team members. EI is widely adopted across many organizations, industries both locally and globally, and there are vast opportunities for studies to be carried out, both its application in virtual team communication, determining the best practices for EI in virtual project environment and resulting in successful virtual project management.

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Chapter 5

Competence Management Framework for Railway Operation of Keretapi Tanah Melayu Berhad

Shanmuga Sundaram¹, Kamran Shavarebi²

¹*School of Science and Psychology, Faculty of Arts and Science, International University of Malaya-Wales, Block A, City Campus, Jalan Tun Ismail, 50480 Kuala Lumpur, Malaysia*

²*Faculty of Engineering and Quantity Surveying, INTI International University, 71800 Nilai, Negeri Sembilan, Malaysia*

Abstract

The reliability of passenger train services provided by Keretapi Tanah Melayu Berhad often comes under pressure by public users. This apparently reflects the standard of efficiency in managing the operation of daily passenger train services. Therefore, this study presents organised an approach to develop and manage competence possess by operation department staff to operate and manage daily train services. In the initial part, this study analyses composition of competence within railway operation and derives an array of competence description using a suitable competency model. Differences between this and actual competence will indicate the presence of a competency gap. These differences are subject to further improvement to continuously maintain competence in managing railway operation. Following this, a suitable technique and effective method to develop competence are proposed for consideration. This whole process is summarised into process flow diagram as competence management framework responsible for overcomings efficiency problem within railway operation practice. Previous studies in this area mainly involved on non-Malaysian railway facility and from different type of railway network.

Introduction

Since introduction in 19th century, Malaysian railway transportation existed for more than 100 years and currently employing more than 12,500 workers throughout the nation (Humar et al., 2019). Specifically, Keretapi Tanah Melayu Berhad (KTMB) being a public limited company and as well national railway company is sole operator to manage heavy-rail transportation in Malaysia (Bachok et al., 2013). Being the sole player in this segment, KTMB is capable of providing 248 commuter services daily, serving 45 stations along 175 kilometres of routes at one time (Masirin et al., 2017). Apparently, throughout the globe, demand in railway service requires railway operation to become faster, more frequent, more comfortable, safer, and more economical (Dillmann & Orellano, 2016). In addition to these, the current railway system require to integrate more functionality in a complex environment with more stringent comprehensive requirements to meet the growing demand in railway service (Abdelatif et al., 2015). With these high expectations and demands, present railway operation requires a highly capable and competent team to operate, manage and maintain daily train travel services. However, in the Malaysian context, commuter train passenger is not satisfied with the punctuality of departure and arrival of commuter trains and recommend suitable improvement action (Ahmad Nazrul Hakimi Ibrahim et al., 2019). Adding to this, human error and lack of planning, scheduling and coordination contribute to unexpected events in railway system operation (Azadeh et al., 2018). Concurrently there is a gap in KTMB railway operation practice with regards to local capabilities and capacity (Humar et al., 2019). Taking all these into consideration, this present study aims to resolve efficiency issues with respect to the railway operation practice of KTMB in four stages. The initial stage is to assess the current competence standard of operation department staff responsible for daily operation and management of commuter train by using a suitable competency model. Following this, suitable technique to support competence development and method to develop competence is discussed. This is inclusive with topic

to determine suitability of both concepts within KTMB railway operation practice. Finally, a competence management framework (CMF) responsible for developing and managing competence within railway operation practice of KTMB is introduced as deliverable in this study.

Competence determination of operation department of KTMB

In railway organisations, competence refers as ability to accept responsibilities and perform duties to recognise standard on regular basis and can be acquired through dedicated learning process (European Union Agency for Railway, 2018). Apart from this, competencies refer to collective skill which depends upon the primary operation or services of respective organisations (Umar et al., 2018). The major significance of competencies in railway operational and management practice is within train dispatch activities and till present, this activity still mainly depends on the skill and experience of dispatcher (Schipper & Gerrits, 2018). On top of this, specific skills such as operating freight locomotives including examine, fault reporting and rectification as well dispatch activities is example of overall need for competence in railway operation environment (Heritage Railway Association, 2016). Apparently, the state of competence is acknowledged when someone is consider having necessary ability, knowledge, and skill to perform a is particular job function successfully (Potts, 2016). In a different view, competence considered beyond individual skills and inclusive of knowledge for achievement which is subject to improvement practice (Lumme & Tuomala, 2019). Most importantly, competence refers to the ability to use personal knowledge, social, and methodological abilities (Carracedo et al., 2018). The application of competence reflects an integration between knowledge, expertise, skill, and abilities of people whenever required to perform a job function successfully (Bohlouli et al., 2017). Therefore, throughout this study, competence is considered as integration between the components of ability, knowledge, and skill for specific functions of work. Following this, integration between ability, knowledge, and skill which produces competence is shown in Figure 1.

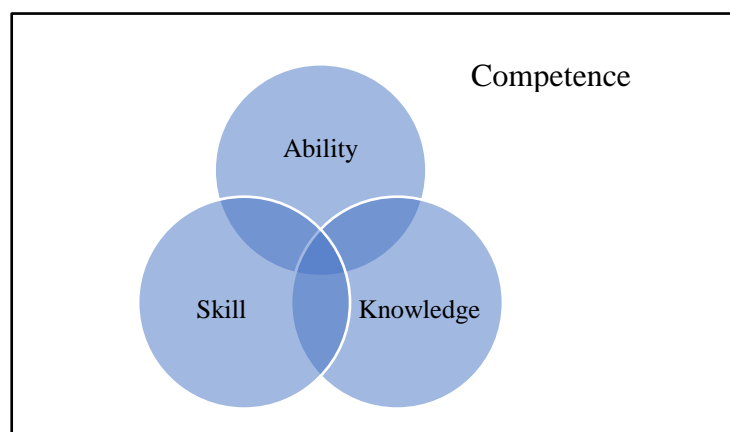


Figure 1: Integration between character of competence

Apparently, the most significant advantage of competence is that it represents the standard of a particular job function. In parallel it satisfies other requirements such as business objectives, health, and safety requirements in a particular organisation (Prosser, 2016). Following this, the next level discussion emphasises the condition to determine whether an organisation has sufficient or insufficient competence parallel with organisational requirements and standard of practice. It is important to determine present competence gaps as they accurately highlight the presence of deficiency in organisation (Lakshminarayanan et al., 2016). In broad assumption, the difference between the present state of competencies compared with standard competence for a target job function is referred to as competency gap (Bohlouli et al., 2017). Specifically, a competency gap arises when organisation does

not equip with the relevant current practice of industry skills especially in the technology base industry (Patacsil & Tablatin, 2017). It is advisable to assess organisational competence regularly as this will indicate strengths and weaknesses among staff (Poston & Dhaliwal, 2015). Knowing the importance of defining and aggregate presence of competency gap, the following section discuss the presently available method to assess competence especially for railway base organisation. In the first place, the competency model is defined as most a systematic instrument for organisation to learn on the present competencies practice with reference to the elements and desire range of competencies (Arifin et al., 2017). In terms of functionality and usage, the competency model represents a method that describe the combination of skills and knowledge required by an occupation (von Treuer & Reynolds, 2017). Within many currently available competency models, the Transportation, Distribution, and Logistics (TDL) competency model developed by the Department of Labour and the Department of Transport of United States (DOL) is principally suitable to identify competencies within the transportation sectors (Mary et al., 2015). One of the most significant characteristics of the TDL competency model is an arrangement of competence description segregated into six different tiers from personal effectiveness competence in tier one until occupation-specific competence in tier six (Leslie, 2016).

The primary advantage in using TDL competency model is because the characteristics is parallel with the competence arrangement of ability, knowledge, and skill. This indicates that the TDL competency model perfectly suits the analysis of competence discussed in the earlier section of this study. On top of this, the most prominent implication of the competency model is to indicate the broad ability, knowledge and skill required for a successful workforce in a particular engineering type of work function. In line with this, the operation and management of daily commuter train services within KTMB represents work functions in this research study. However, this standard TDL competence model still requires a detailed changeover process to perfectly correspond with the competence description of the operation department of KTMB. This changeover will make use of the focus group method with support from the local expert in railway operation and management practice. This ensures exact competence description parallel with the work function of the KTMB operation department is defined.

Suitable technique to support competence development

Competence and knowledge emerge to be gradually related, and this recommends having appropriate knowledge is the core element to develop competence (Charland et al., 2016). Knowledge acquisition refers to the process of integrating new technological ideas and know-how into existing knowledge base (Gómez-Ortiz et al., 2017). Learning Management Systems or widely addressed as LMS is a web-based system that enables both trainers and trainees to share materials and communicate on an online portal for learning purposes (Janson et al., 2017). LMS integrate web-based communication tools such as discussion forum, email, and video sharing concept which allow the learning process to extend beyond the wall of conventional classroom (Lochner et al., 2015). Therefore, LMS is considered the main vehicle to deliver and manage e-learning courses in an organisation for learning and training purposes (Zaharias & Pappas, 2016). In practical application, LMS is referred to as a framework that handles all aspects of the learning process (Liyana et al., 2016). In the railway industry application, LMS was introduced and implemented in London Underground Transit (Tube) and accessible to all staff with most courses and learning materials available on the online platform and regarded as an alternative to face – face courses (RSSB, 2013). Some LMS platforms is handled by the commercial base providers, however others operate as an open source such as Moodle application (Lochner et al., 2015). Therefore, this particular cloud-based LMS emerges as a low-cost solution with the advantage of convenience and flexibility without any need of an installation platform to directly access through internet connection (Dobre, 2015). In terms of application and security, LMS requires

all users to sign in using a unique username and password as a protection layer against unauthorized user (RSSB, 2013). LMS application is considered the most appropriate technique to enhance and maintain the knowledge base of operation staff and apparently parallel with the standard and practice required by KTMB.

Effective competence development methodology

Competency can be considered a subject and attained from various formal and informal training (Hernández-López et al., 2016). Apparently, competence is sometimes referred to desirable attitude, however it serves as the essential requirement for those involved with development, maintenance, and operation especially when involving safety related systems (Sandom, 2016). In line with this, training and learning consider the most effective methods to build and develop competence (Hernández-López et al., 2016). In parallel, learning is considered as the initial process to build up competence (Gronau et al., 2017).

The commencement of specialised services to improve staff in railway-based industries occurred in the second half of the 19th century in Europe (Asaff et al., 2015). Eventually, a learning process that make the transition from experience gain to knowledge and re-utilise this in a similar situation is an effective learning process (Hadj-mabrouk, 2016). In principle, the learning factory method (LFM) concept, is a promising approach to ensure employees' requirements and capabilities are achieved (Schallock et al., 2018). A learning factory refers to an infrastructure facility that mimics a real working situation for education and training (Tisch et al., 2016). The primary purpose of LFM does not aim at a mere demonstration of state-of-art technology and systems but rather emphasizes participants' self-organise ability to act in a complex environment (Enke et al., 2015).

The railway operation research centre in Darmstadt (EBD) consists of a simulation centre for railway operation and dispatching training facility (Streitzig & Oetting, 2016). This facility consists of a railway model with almost 1,000 meters of track representing a railway network with 90km of lines and 13 stations and all operational elements like switches, signals and clearing points exist in this model railway. Another prominent learning factory facility for railway learning is the United Kingdom (UK) rail network. In this facility, the effective fault-finding process is carried out through involvement with the real lineside environment and simulated in a practical layout within the training centre (RSSB, 2013). Within the KTMB training facility, similar infrastructure but on a smaller scale known as Malaysian Railway Academy (MyRA) initiated in the year 2016 and located in Batu Gajah Perak. This facility is mainly responsible for transferring knowledge specific to railway signaling and communication within KTMB employees (Humar et al., 2019).

Therefore, a dedicated facility for learning and training purposes mimics the actual Train Control and Command Centre shall serve the purpose for competence development in the KTMB operation department.

Competence Management Framework for KTMB Operation Department

In times of globalisation and dynamics technological changes, strategic management of competencies becomes a highly relevant task as job requirements become more specialise especially with current digitalisation and industry 4.0 revolution (Julian Decius, 2017). Similar impact applicable in train operation and management services whereby latest trend and technological advancement influence overall concept and architecture of railway operating systems (Malaysian Industry-Government Group for High Technology [MIGHT], 2014). In view of this, a systematic method to

develop and maintain competence in parallel with KTMB needs to serve as the ultimate goal of this study. A competence management framework (CMF) is responsible for ensuring relevant staff is competent to perform up to the required standard and able to maintain skill and knowledge in all circumstances (European Union Agency for Railway, 2018). A formal CMF includes and independent means to check a practitioner's activities (Baker, 2018). The main purpose of CMF is to control logically and integrate all activities within organisation as to assure and further develop competent performance in work (Prosser, 2016). Therefore, an efficient CMF framework requires accurate assessment and representation of available competencies as well mapping of require competences for a specific job (Bohlouli et al., 2017). This is parallel with the intention of this study to access the present competence of KTMB operation department staff using a suitable competency model. Following this, a CMF involves process to identify and define competencies for a job function and systematically drive development measure as well implementation and evaluation measure (Julian Decius, 2017). Apparently, this is similar to the intention to generate competence description using the focus group method discussed earlier. Following this, suitable technique and method for competence development is introduce for usage in KTMB parallel with CMF cycle. Each section explained earlier in this study represent each layer of CMF cycle describe in Figure 2.

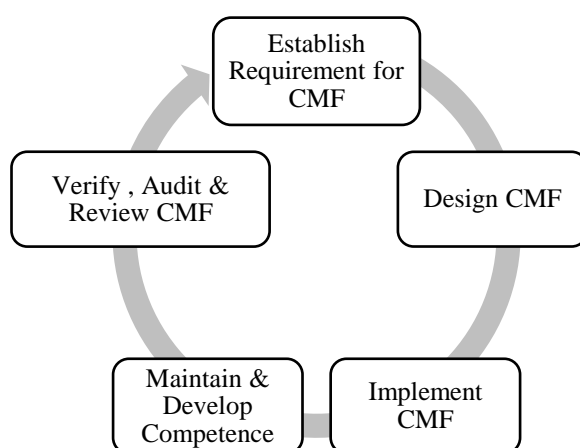


Figure 2: Competence Management Cycle

Source : European Union Agency for Railway (2018)

The outcome of this study represents CMF arrangement for adaptation within the KTMB environment. Importantly, the development and classification of CMF take consideration of work functional parameters of the KTMB operation department responsible for handling commuter train services. Each stage in Figure 2 represents each section discussion in this article. Therefore, each section of this study represents every stage of CMF.

Summary

This study uses the competency model as baseline approach to assessing the present state of competence among KTMB operational department staff. As competence determination serves as centre of attention in the development of CMF. Being the primary deliverable, CMF represents systematic method to manage the overall organisation standard of practice within the KTMB operation department. Particularly, this study suggests a complete CMF process to monitor and control competence

development and management activities. In parallel, the latest trend in learning techniques and training methods practiced in other railway organisations is suggested for implementation in KTMB as part of the overall development plan. This whole process serves as action plan to resolve efficiency issues within the railway operation practice of KTMB.

The outcome of this study serves as a benchmark practice in railway operation management. Whereby, operation standard is defined with reference to industry practice using the focus group method. This method guarantees a throughout consideration in terms of competency requirement in the train operation and management field of KTMB according to industry practice. In summary, CMF introduced in this study represents existing practice with mixture of industry standards and therefore serve as practical method to uplift the overall efficiency of train operation service of KTMB.

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Chapter 6

Elevation of Infection: The Correlation Between Malaysian Dengue Hotspots and Elevation

Hafiz Hassan

School of Science and Psychology, Faculty of Arts and Science, International University of Malaya-Wales, Block A, City Campus, Jalan Tun Ismail, 50480 Kuala Lumpur, Malaysia

Abstract

Dengue Fever is an arthropod borne disease which still plagues Malaysia. Despite the valiant control efforts of the Ministry of Health, areas in the Klang Valley remained as hot spots for cases. The high temperature and rainfall year-round plus high population density factored into this. The susceptibility of its spread in Malaysia lies in the geographical features of the country among other factors. According to previous studies, lowland areas are preferred by dengue mosquitoes compared to the highlands due to the Earth's lapse rate effect lowering the temperature with increased elevation. The hotspots of Malaysia's dengue cases were investigated geographically using i-Dengue Geographical Information System together with a topology map by Open Street Maps revealed that there is a correlation between the hotspots and the elevation, which were lowland areas below 100m over the sea level. With emerging development that might create suitable micro-climates in the Malaysian highland, the trends of dengue hotspots might spread to the higher elevations in the future.

Introduction

Dengue Fever is an arthropod (Insect) vector-borne disease which is caused by the DEN-1 to DEN-4 strains of viruses. The specific mosquito species *Aedes* sp. is the vector or host for the viruses to spread the disease among humans. Dengue manifests in a febrile fever, which may exacerbate into a systemic haemorrhagic which is fatal. The morbidity load of this disease continues, as it presently has no vaccine nor cure apart from blood transfusion according to Yauch and Shresta (2014).

Being a vector-borne disease, dengue heavily relies on its arthropod vector to be spread throughout the human population. The synchronicity between the biting behaviour, life cycle, and tropical climate optimizes its spread in the equatorial belt. Countries plagued with dengue are characterized with the same tropical climate – which is high average rainfall, high temperature, high humidity. Rainfall provides aquatic oviposition spots, hot temperatures increases mosquito activity, and high humidity increases biting frequency as they will not be susceptible to desiccation. This explains the reason mosquito-borne diseases are rarely found beyond the equatorial belt, or at extreme climate (high or low temperature). For example, at 10°C, they will simply lay inert. Temperatures lower than 15°C makes them lethargic and too weak to fly and an ambient temperature approximately between 14°C to 36°C is needed to permit development from newly hatched larva to adult (Bar-Zeev, M. 1958). In a research by Alto and Bettinardi (2013), it is proven that mosquitoes incubated in warmer larval rearing conditions (between 25-30°C) had greater significant survival.

Despite the uniformly hot tropical climate, the highlands have their own micro-climate. The temperature is milder, usually between 18-20°C. Surface air temperature fundamentally decreases with increasing elevation, which is called the lapse rate. Earth's average lapse rate is 6.5°C for every 1000 metres of elevation, which is 1°C per 153 metres (Jacobson, 2005). Malaysia's average temperature is around 25°C with a minimum of 22°C and maximum of 31°C. For a location with an elevation over

1150 above sea level, the chance of mosquitoes transmitting the virus is very low, and at 1400m all mosquitoes do not breed at all (Hidayati et al., 2007). A question is to be asked: what is the correlation between the dengue hotspots in Malaysia with their elevations? Are the cases in highland areas comparably lower than the lowlands?

Dengue Hotspots in Malaysia

In the Malaysian control of dengue, the terms which give weight on the seriousness of local infections are “cluster” and “hotspot”. A dengue cluster is defined as “the location where more than two dengue cases happening within 200 metre radii from the index case within 14 days of its notification (Ministry of Health Malaysia, 2014). A cluster’s date starts on the notification of the second case, while the cluster is declared ‘ended’ after 14 days of no cases past the last case (Ministry of Health Malaysia, 2014). It signifies the proximity of the infection and the presence of the vector still in the area, potentially infecting more humans. As prevention, full-fledged infection control in the locality which involves the spraying and fogging of pesticide around the 200m radius need to be conducted to kill the adult mosquitoes as suggested by the MOH (Figure 4).



Figure 1: Example of a Dengue Cluster as defined by MOH (MOH, 2014)

Afterwards, thorough house inspections are done to search and destroy any potential nesting areas so that the population of mosquitoes will not return. It is done within 24 hours, at least 50 premises in a 50 m radius. If the AI (*Aedes* index) > 1% BI (Breteau Index) >5 atau CI (Container Index) >10%, then the entire community has to undergo a mass sanitation activity (gotong royong) to clean out all the areas of trash or garbage that might harbor the insect. Abating by using the powdered larvicide ABATE is done on areas which cannot be cleaned out such as fishponds, pools, and other places containing standing water.

A hotspot dengue area is characterized by an area which has a dengue outbreak for more than 30 days, while a non-hotspot area is an area free from dengue outbreak for more than 30 days according to the MOH guideline (Ministry of Health Malaysia, 2014).

Elevation Vs Dengue Hotspots in Malaysia 2021

By using the online case tracker “iDengue Untuk Komuniti” by the MOH, we can view the location of the dengue hotspots (as of recent viewing, June 2021, Figure 5).

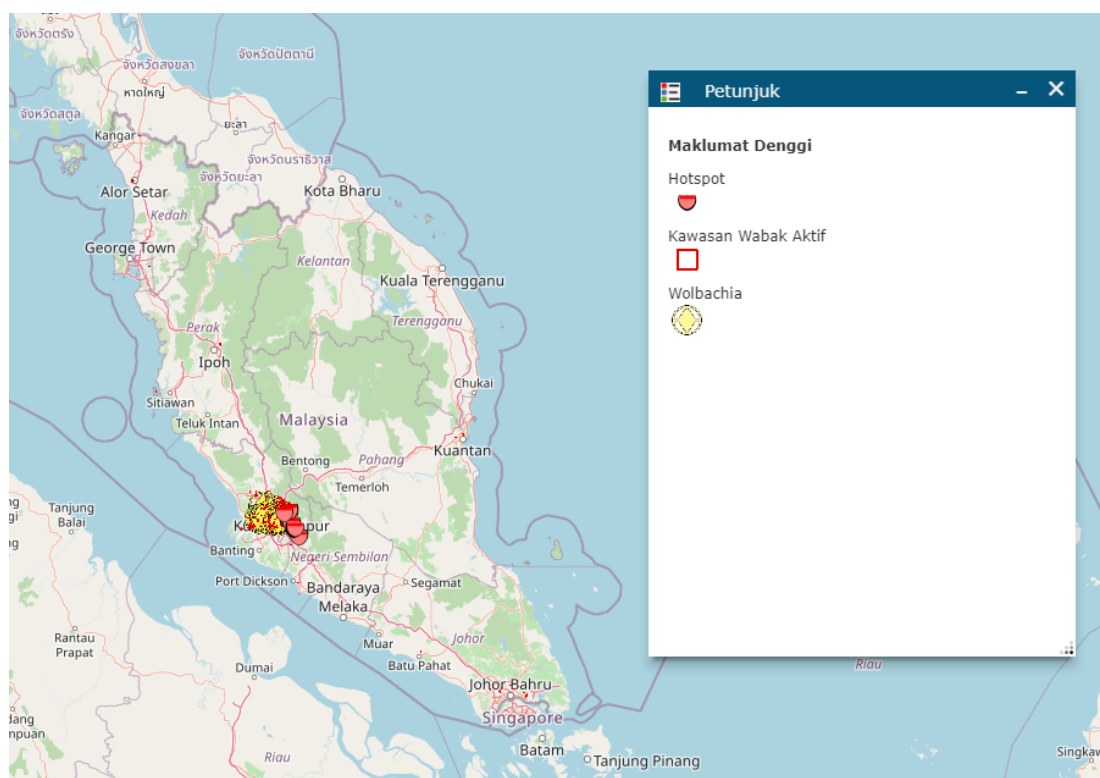


Figure 2: iDengue Untuk Komuniti case tracker, displaying hotspots and outbreaks. (MOH, 2021)

According to this view, it is visibly clear that there is a concentrated outbreak of dengue cases in the middle of Selangor and in Kuala Lumpur, collectively called the Klang Valley / Greater KL Area. The ‘Shield’ logo signifies a Hotspot based on the MOH definition (30 days with consecutive cases), red lines encircling the areas signify areas with active outbreaks, and the Diamond logo is for Wolbachia, a parasitic bacterium which competes with the viruses of mosquito borne diseases such as dengue, Zika, chikungunya and yellow fever which is one biological prevention measure for dengue and malaria. Interestingly enough, the only hotspots in the entire Peninsular Malaysia are in the Klang Valley area.

Zooming in, we can view the hotspot and outbreak areas much more clearly. According to the map, there is a lot of outbreaks near the western border of Hulu Langat district neighbouring Kuala Lumpur city (Figure 6).

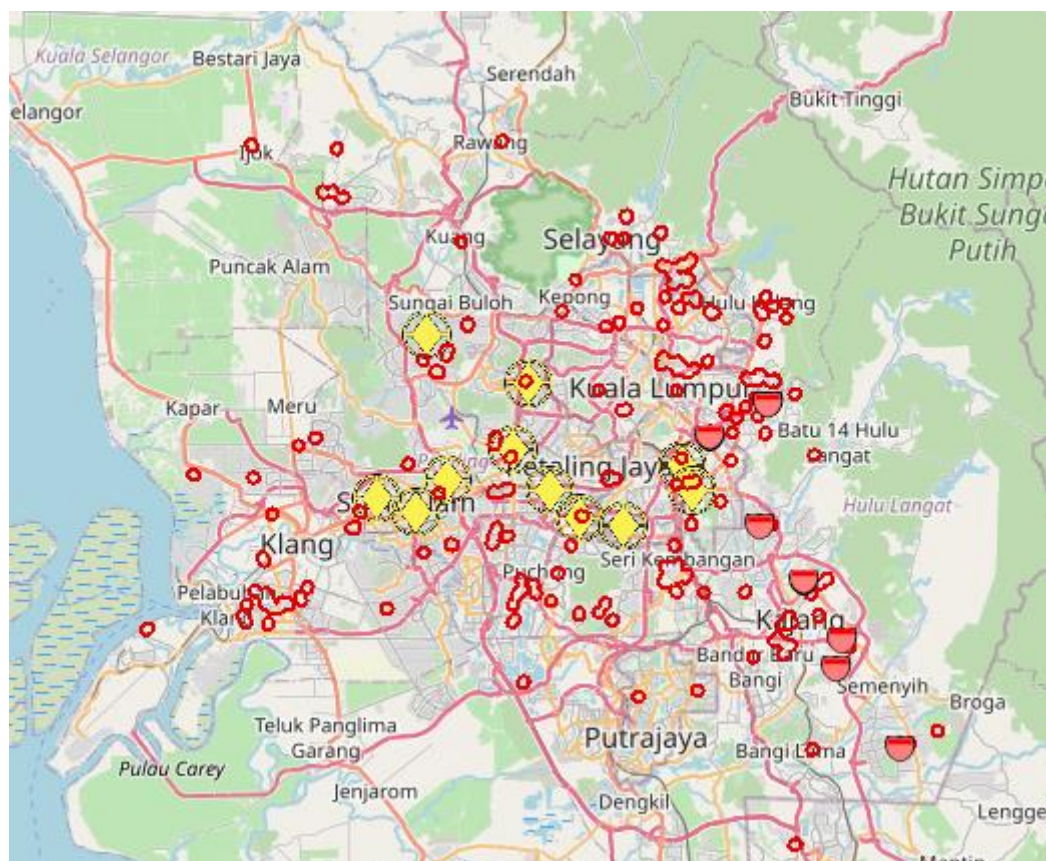


Figure 3: Hotspots and outbreaks of Dengue in Malaysia (MOH, 2021)

In this view too, there are 7 hotspots. Using the Attributes table from the view, the details and list of the hotspots are displayed.

Table 1: Dengue Hotspots list (MOH, 2021)

Cumulative cases	Days	District	Township	Hotspot name
9	37	Hulu Langat	Ampang	Flat Sri Nilam Bandar Baru Ampang
9	37	Hulu Langat	Ampang	Flat Sri Nilam Bandar Baru Ampang
6	38	Hulu Langat	Semenyih	Appt Taman Prima Cempaka
33	90	Hulu Langat	Kajang	Jalan Impian Murni Saujana Impian
10	34	Hulu Langat	Beranang	Blok N-X Pangsapuri Baiduri Bandar Tasik Kesuma
23	36	Hulu Langat	Cheras	Jalan Suasana 3 Bandar Tun Hussein Onn
9	53	Hulu Langat	Semenyih	Appt Seksyen 5 Bandar Teknologi

Using a topographic map sourced by USGS viewed on Open Street Map, the elevations of the hotspot areas are obtained. Figure 7 shows an overview of the area in question:

topographic maps > Malaysia > Selangor > Kajang Municipal Council > Bandar Tasik Kesuma
Click on the map to display elevation.

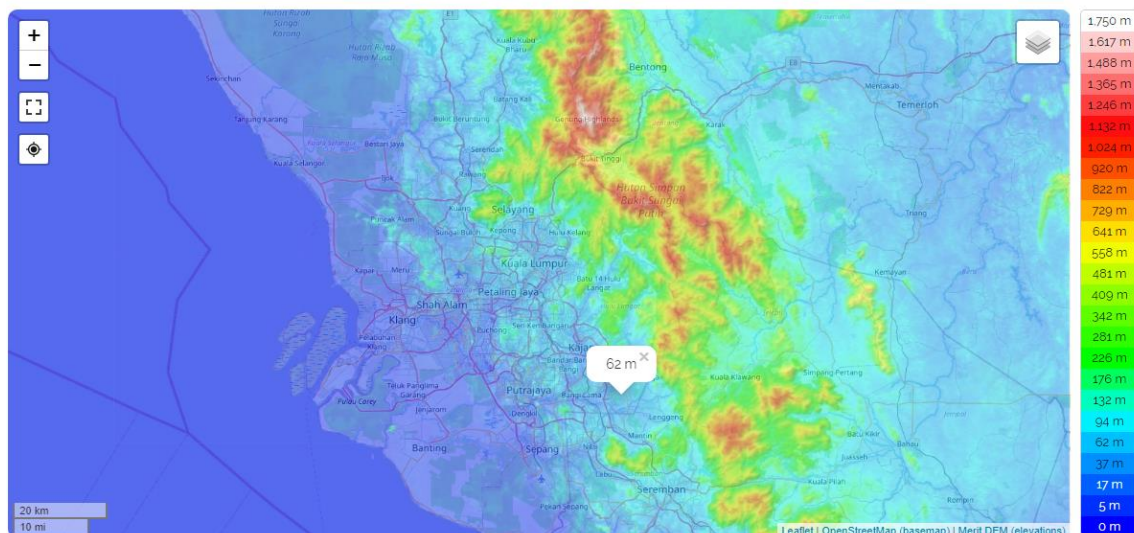


Figure 4: Topographical map, displaying the elevation in the hotspot area (source: OpenStreetMaps, 2021)

Clicking directly on the coordinate of any point on the topography map will reveal its height. With that, the hotspot areas were pinpointed and their elevations confirmed. All hotspot locations in this study are located below 80 metres above the sea which suitable condition for spreading of the virus. 2 hotspots in Flat Sri Nilam Bandar Baru Ampang are situated at 62 metres (above sea level), Apartment Taman Prima Cempaka is at 70 metres, Jalan Impian Murni Saujana Impian at 64 metres, Blok N-X Pangsapuri Baiduri Bandar Tasik Kesuma at 62 metres, Jalan Suasana 3 Bandar Tun Hussein Onn at 79 metres, Apartment Seksyen 5 Bandar Teknologi at 50 metres and Flat Sri Sabah B(Blok 62-70) at 54 metres.

From these findings, all the hotspots are situated less than 100m from sea level. 6 of the 9 were in apartments or condominiums that have high population densities. The other areas of note with outbreaks were also situated in the Greater Klang Valley area which were lowlands (based on Figure 6 and 7) which were tinted blue which signifies areas no higher than 100m. The green (176m – 409m), yellow (558m-641m) areas on the map which are higher than 100m above sea level have no outbreaks or cases at all.

Other Related Studies

In a Nepali study (Gyawali et al. 2020), a comparison was made in terms of dengue cases between the lowlands and highlands of Nepal (an already high-altitude country). A significant negative relationship between dengue incidence and increasing elevation (metres above sea level) driven by temperature was observed ($p < 0.05$) with dengue risk being greatest below 500 m. Risk was moderate between 500 and 1500 m and decreased substantially above 1500 m (figure 1).

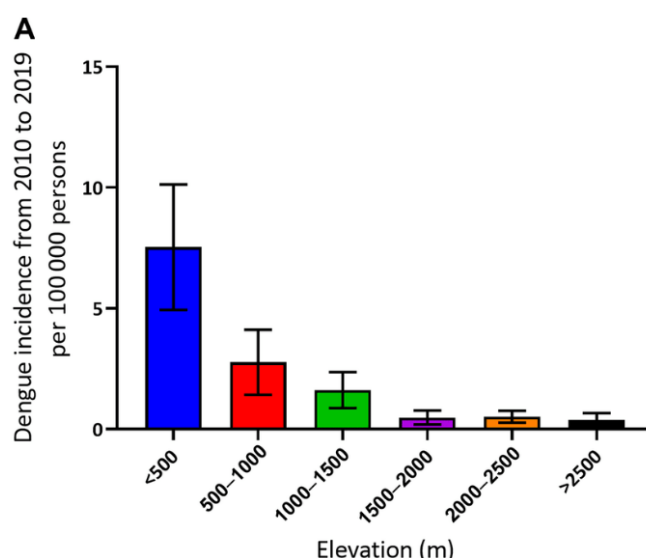


Figure 5: Dengue incidence from 2010 to 2019 at different elevations in Nepal (Gyawali et al.,2020)

The region of central Terai has been a focal area for dengue transmission, accounting for 40% of the total cases followed by the middle mountains (500-1500m) with a low dengue incidence (<2 per 100,000). The study has shown a trend, where the Generalized Linear Model (GLM) showed that the dengue risk decreases 7% for 100m of increase in elevation (Figure 2). The higher the area is, the more the elevation (and its micro-climate) suppresses dengue cases. At areas higher than 1000m where the climate is not suitable for the vector (*Aedes* sp. mosquitoes), cases are concentrated only in areas with concentrated human dwellings.

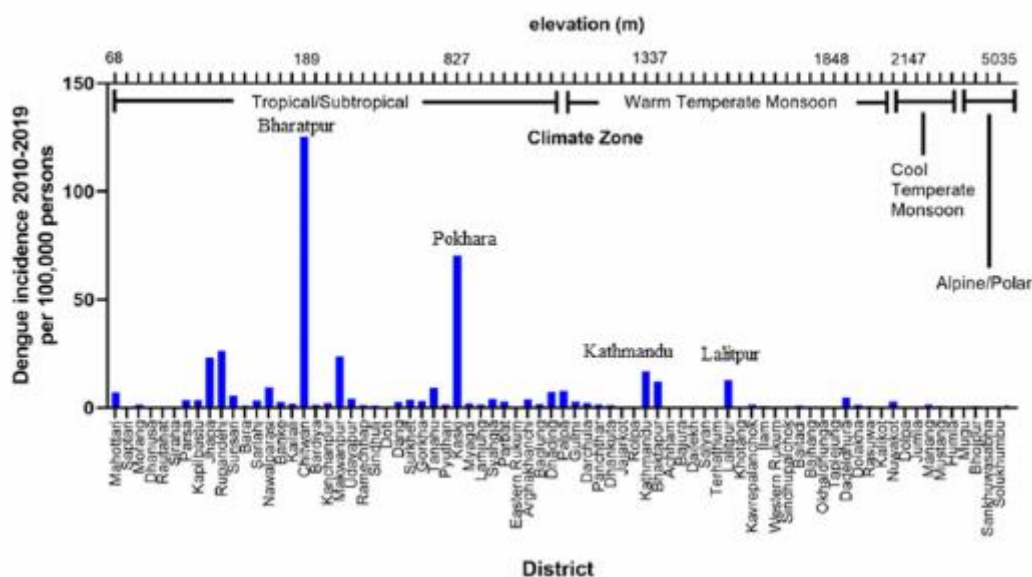


Figure 6: Dengue incidence per 100,000 persons at towns of different elevations in Nepal (Gyawali et al.,2020)

In a research on dengue transmission based on temperature and elevation in Subang Jaya (Roslan, 2016) a geographical analysis was done to map the density of the cases (Figure 8). In the following figure, the analysis' output determined the high-risk areas around dengue cases with the density of point

features around each raster cell. The darker the tone, the higher the incidents are at the location. The maximum density in the map is situated in Subang Height and PJS9 (circled).

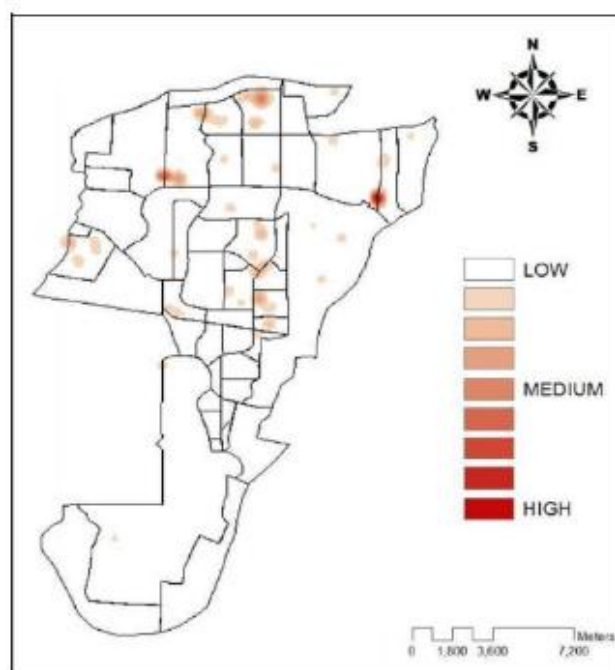


Figure 7: Kernel estimation of the distribution of dengue cases in Subang Jaya (Roslan et al, 2016)

For elevation, the LiDAR satellite image of Subang Jaya was reprocessed using the analysis software to display the elevation of the locality. The topography was displayed in a gradient map, with the lighter areas signifying higher elevations opposed to the darker ones for lower elevations (Figure 9).

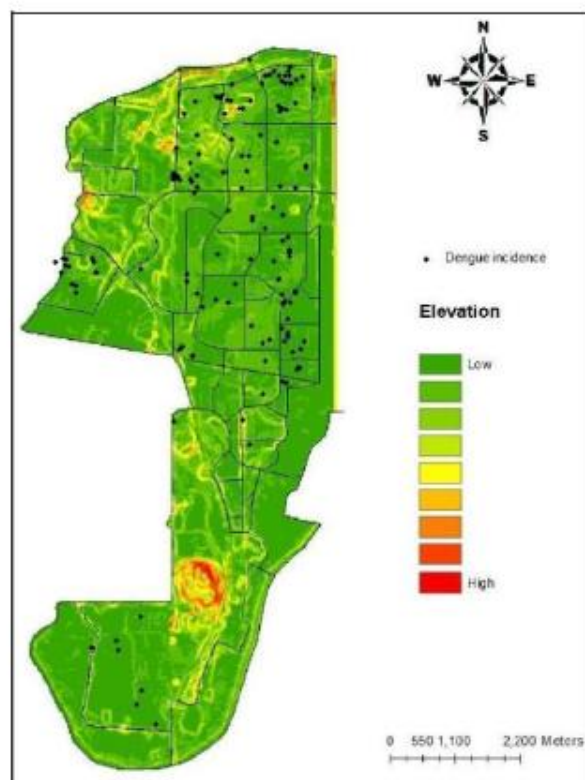


Fig 4. Elevation and dengue incidence

Figure 8: Elevation and dengue incidence

Findings from this study has shown that case hotspots are concentrated in the low-lying areas as opposed to the high elevation areas. In this case, it is proven again that low elevation favours dengue cases.

If the factor of urbanization and other variables that come with it is removed (e.g. built environment, transportation, and heat island) is removed, would elevation still play a factor? That question has been answered by a study in the Orang Asli settlements in Pahang (Abdul-Jamil et al, 2020). The areas are devoid of urbanization and is situated in the fringe of the thick Belum jungle. The land elevation of the study area was determined using the digital elevation model (DEM) which produces a 3d model of the area in question. The findings concluded that elevation less than 50 m above sea level (Odds ratio/OR = 2.210, 95% Container Index / CI = 1.51–2.63,) were significantly associated with >20% dengue infection (measured in IgG seropositivity) especially as in Sungai Perah, Gurney, Sungai Bumbun, and Pos Iskandar villages.

The correlation between dengue cases and elevation in Kendari City Indonesia also yielded similar results (Istiqamah et al, 2020) on. Kendari City is 21.23m above sea level, and the correlation between incidence and elevation showed a p value of $0.014 < 0.05$, which implies a significant correlation. This study also echoed another Indonesian research in Kota Padang, which showed that the elevation and dengue incidence has a negative pattern $r = -0.659$ ($p = 0.038$), which indicates that the lower the elevation, the higher the incidence of dengue fever (Handayani et al, 2017).

Conclusion

The Malaysian dengue hotspots are found to be in low lying areas below 100m, in line with the studies in Subang Jaya (Roslan et al. 2016) and in Kendari, Indonesia (Istiqamah et al. 2020). Elevation is proven to be one significant factor in dengue cases due to its vector's biological preference to it. With elevation, comes other factors in play which positively influence the spread of the disease. Being a tropical country, Malaysia is hot all year long, but the extra variable of elevation unlocks the full infection potential of this tropical febrile disease. Among all the districts in Malaysia, the Klang Valley has the best combination of both human and environment factors, which makes it the often-occurring centre of outbreak. Highlands are not known to harbour any mosquitoes, and dengue cases are few and far between.

Despite the dissociation between elevation and this vector borne disease, conditions may change and favour the *Aedes* mosquitoes. Uncontrolled development, low sanitary conditions, mismanagement of solid waste and unplanned housing in the highlands may create suitable micro-climate for the *Aedes* sp. to live in.

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