CONSULTANT ARCHITECT'S DILIGENCE IN RAIL INFRASTRUCTURE PROJECT

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Specially dedicated to Mak, Amir Zafran, my wife and Adik.

Thank you too to Pak Andak

Also never forgotten, Ayah

I really miss you Ayah.

Al-Fatihah to Ayah

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In the name of Allah the most gracious and the most merciful.

In the course of the preparation of this thesis, there is a lot of constraint and challenges that had to be dealt with and against the test of time, were overcame. Hence, it only strengthen the fact that this thesis is and can never be completed by an individual. It comes with teamwork, collaborations and partnering that witness the completion of this thesis.

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ABSTRACT

Rail infrastructure is part of construction works. Rail infrastructure is the building components that support the operation of trains.It can be very complicated and complex task. Often rail infrastructure projects by Prasarana is inundated with problems in term of design adequacies. Architect's are not providing enough design input while at the same time Prasarana are not happy with the product that they got. The problem is architect do not realise that they are obliged to comply fully with the Employer's design brief. Thus, the objective of the study is to identify the responsibility of architects based on relevant case laws and to develop guidelines that will ensure compliance of design brief by architect. The study established ten conditions that relate to architect's duties. The scope of study is limited to rail infrastructure projects by Prasarana completed between year 2010 to 2013. The projects itself are carpark complexes and pedestrian walkways are all using consultancy services which is now completed. The significance of this study is that it will be used by Prasarana in conducting better project governance. Methodology used for the study is documentary analysis which resulted in descriptive findings and comparison of cases. Further method includes interviews and reference to journals and articles. The study suggested that architects, while managing construction of rail infrastructure, could be held liable for any defects or inadequacies in designing and in terms of service level provided to the client. The study may contribute towards the enhancement of knowledge within the architect's community with regards to design diligence in rail infrastructure which also involves construction law.

ABSTRAK

Infrastruktur rel adalah sebahagian daripada aspek pembinaan. Ia merupakan komponen binaan yang menyokong operasi rel. Sesungguhnya ia merupakan tugas yang rumit dan kompleks. Kerapkali projek infrastruktur rel Prasarana dibelenggu masalah kekurangan di dalam rekabentuk. Arkitek didapati tidak memberikan maklumbalas yang memadai dan Prasarana pula tidak berpuas hati dengan mutu kerja yang dihasilkan. Masalah terjadi apabila arkitek gagal memenuhi kehendak rekabentuk. Objektif kajian ini adalah mengenalpasti tanggungjawab arkitek berdasarkan kes sediada dan membangunkan garis panduan yang akan memastikan kehendak rekabentuk dipenuhi oleh arkitek. Kajian ini telah mengenalpasti 10 situasi yang berkaitan dengan tanggungjawab arkitek terhadap rekabentuk, pemilik dan orang umum. Skop kajin ini terhad kepada projek yang disiapkan antara tahun 2010 hingga 2013, iaitu Komplek Parkir Kereta dan Jejantas Pejalan Kaki. Kesemuanya menggunakan khidmat perundingan ikhtisas. Kepentingan penemuan kajian ini akan digunakan oleh Prasarana untuk mentadbir urus projek dengan lebih baik. Kaedah kajian yang digunakan adalah analisis dokumentari yang menjurus kepada penemuan diskriptif dan perbandingan kes. Kaedah lain termasuk temubual dan rujukan terhadap jurnal dan artikel. Kajian ini mendapati ketika arkitek mengurus pembinaan infrastruktur rel, juga tertakluk kepada tuntutan kecacatan atau kekurangan dalam rekabentuk serta terhadap tahap perkhidmatan kepada Pemilik. Kajian in diharap dapat menyumbang kepada peningkatan pengetahuan di kalangan arkitek dari segi ketelitian rekabentuk untuk infrastruktur rel yang juga melibatkan undang-undang pembinaan.

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LIST OF ABBREVIATION

AIA	American Institute of Architects
ALJ	Australian Law Journal
All ER	All England Law Reports
ALR	Australian Law Reports
AMR	All Malaysia Reports
App Cas	Appeal Cases
ARB	Architectural Registration Board, UK
CA	Court of Appeal
CB	Common Bench Reports
CIDB	Construction Industry Development Board, Malaysia
CLJ	Current Law Journal (Malaysia)
Eq	Equity Case
EWHC	High Court of England and Wales Decisions
Exch	Exchequer Reports
FC	Federal Court
HGCRA	Housing Grants, Construction and Regeneration Act, UK
HKLR	Hong Kong Law Reports
IEM	Institute of Engineer Malaysia
IR	Irish Reports
ISM	Institute of Surveyor, Malaysia
KB	King's Bench
LAM	Lembaga Arkitek Malaysia
LJBM	Lembaga Jurukur Bahan Malaysia
LJM	Lembaga Jurutera Malaysia
Lloyd's Rep	Lloyd's List Reports

LR	Law Reports
MLJ	Malayan Law Journal
MOT	Ministry of Transport, Malaysia
NCARB	National Council of Architectural Registration Board, USA
NKRA	National Key Result Area
PAM	Pertubuhan Arkitek Malaysia
PWD	Public Work Department
QB	Queen's Bench
RIBA	Royal Institute of British Architect
SLR	Singapore Law Reports
UPT	Urban Public Transport Unit, NKRA
WLR	Weekly Law Reports
WR	Weekly Reports
LRT	Light Rail Transit
MRT	Mass Rail Transit
2D	2 Dimensional
3D	3 Dimensional

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

This thesis is regarding the standard of services for the performance of architect within the rail infrastructure projects in Malaysia. Rail infrastructure is commonly regarded as highly complex with the involvement of massive technology and advanced systems. Rail infrastructure refers to station for rail networks, terminals, warehouses and storing yards, maintenance depots, storage depots, engineering workshops, railroads, exchange hubs, signalling centre, operations control centre, rail network switch terminal, security control centre, car park complexes, personnel accommodations and many other types of rail related infrastructure.

Rail infrastructure is becoming more important in today construction industry, as Malaysia invest heavily on rail facilities by the year 2030. This is on the perspective of Malaysian context. Other nations are also spending in terms of millions of dollars to provide the best rail infrastructure for their capitals, especially in the South East Asia region. Phillippines and Indonesia, for example, is currently constructing MRT

in Jakarta[1] and Metro Manila for the capital of Phillippines. Both projects will definitely boost the local economy as well as providing economic spin-off to the local population. This shows that many nations are embarking on mega rail infrastructure development.

Thus, it is important that architects to prepare their familiarity with necessary rail related knowledge so that architects are better equipped to bid and manage rail infrastructure projects.Rail infrastructure projects in more established cities such as in Hong Kong are built into the commercial development of the rail node. This will provide the guaranteed customers to the rail service while at the same time provides recurring income for Mass Transit Railway Corp. (MTR), the Hong Kong MRT operator[2].

Managing rail infrastructure means managing various parties, consultants and stakeholders. As an example, the construction of Light Rail Transit system in Klang Valley involves the participation of Local Authorities, Consultants, Residents Association and Government Agencies. Hence, to manage a project of that size that also involves various Local Council, the Government introduce steering committee that is chaired by Ketua Setiausaha Negara to facilitate and coordinate the progress of submission and approval of drawings from Local Councils.

However, with rail infrastructure projects, also the need for consultants is made available. Consultants such as architects, engineers, quantity surveyor, landscape architect and other disciplines benefitted through the expansion of this project. Many local architects have gained benefit and knowledge from designing rail infrastructure during the construction of Light Rail Transit (LRT) system beginning from 1994. This started with the construction of LRT by Syarikat Transit Aliran Ringan or STAR from Sultna Ismail Station to Bukit Jalil Station. The construction at that time was undertaken by Taylor Woodrowin 1995 to 1997. Afterwards, the line is extended to Sentul Timur from Sultan Ismail Station. Prior to that, Keretapi Tanah Melayu Berhad underwent revamp proses and upgraded the main rail network into double tracking and

[1] PT MRT Jakarta information pack, visit by Prasarana to PT MRT Jakarta in January 2013.

[2] MTR Corp (HK) Ltd. Study visit by Prasarana to MTR HK in November 2013.

started electrifying the tracks for the operation of KTM Komuter. Along with the creation of more rail networks, Malaysian professional consultants benefitted from the project, and gain opportunity to design stations, track switch posts, control centres as well as other support buildings.

1.2 Rail Infrastructure as Construction Growth Contributor

Construction industry is vital for the economy in any country especially developing economy. The construction industry is inter-related with other industries and services in and it has been established that construction is a sector that can spur growth for domestic economic ratings. The construction industry is one of the economic indicator for Malaysia. This is evident in the reports by the Statistics Department, and it has frequently been an industry identified to ensure domestic growth in times of recession and sluggish export market outlooks.

As in other labour intensive and manufacturer driven industry, construction is generates and support ancillaries business such as services, manufacturing, transportation and many other downstream services. Construction is also taking places across the South East Asians countries as the region is developing and progressing into the new future. As such, construction is an important industry and it is expected to stay relevant for the next 30 years as countries among the South East Asian region compete to deliver the best infrastructure to become sustainable and competitive cities while at the same time being recognised with the developed country status.

Construction is classified by a service to construct something or somewhat using specific technique or general technique. While complex structures require sophisticated technology and most knowledgeable set of consultants, many other construction works comprised of simplest utilitarian works in nature such as building general blocks of school, housing quarters or bridge structures. There is also the categorically divided construction works, with Light Rail Transit (LRT) and Mass

Rapid Transit (MRT) construction, airport and highways, port and infrastructure works being recognised as heavy construction and engineering works, while building school, housing quarters for government official and mass housing as light to medium construction works.

It is safe to consider that the construction of LRT and MRT is part of heavy enginnering and construction works. It is currently the biggest infrastructure works being carried out in Malaysia at the moment.

1.3 Description of Syarikat Prasarana Negara Berhad

Syarikat Prasarana Negara Berhad is a Government owned company via the Ministry of Finance Incorporated. Prasarana was established to lead, facilitate and improve public transport networks in major cities in Malaysia through the deployment of Light Rail System, Monorail System or urban bus networks. Prasarana being the leading asset owner and operator of public transport infrastructure in Malaysia, namely the Light Rail Transit (LRT) networks, Monorail line and bus services in Kuala Lumpur, Penang and Kuantan, is the major Employer in terms of rail support infrastructures. Prasarana was given the task to consolidate, manage, improve and enhance the public transport services and the image to the public. Since taking over of two major LRT lines from Projek Usahasama Transit Ringan Automatik (PUTRA) and Sistem Transit Aliran Ringan (STAR), Prasarana had managed to improve and create better public perception of the services.

Prasarana was formed in 2002 by the Government to take over the assets and liability of previous Light Rail Operator which is Projek Usahasama Transit Ringan Automatik (PUTRA) and Sistem Transit Aliran Ringan (STAR) which was unable to maintain service level to the public due to inability to service their loan amount as well as other operational issues. In 2005, Prasarana took over the city bus routes from Intrakota and Cityliner and put under Rangkaian Pengangkutan Integrasi Deras Sdn

Bhd or RAPID. Then, in 2007, both Prasarana and RAPID was merged with RAPID becoming the operator of public transport while Prasarana as the asset owner.

Prasarana was also the initiatior for Mass Rail Transit system from Sungai Buloh to Kajang which is now under construction. However, for better governance and ease of reporting, Government has decided to separated the MRT team from Prasarana and transferred to MRT Corp Sdn Bhd, another Government Owned Company. Hence, the agreed separation deal was that MRT Corp will become the asset owner and RAPID will be the operator.

In Malaysia, apart from the infrastructure of rail industry currently owned by Prasarana, the other asset owners are Express Rail Link (ERL) and Keretapi Tanah Melayu Berhad (KTMB) via Perbadanan Aset Keretapi (PAK). The companies that owned these assets are also the one responsible to maintain, operate, refurbish and develop new facilities or infrastructure as and when required. The network of infrastructure of KTM and ERL is already in place and requires maintenance and refurbishment, while Prasarana is more involved in integration and new projects which necessitates delivery of infrastructure development works.

1.4 Project Delivery Expectation from the Perspective of Prasarana

Proprietory rights are often the term linked to rail infrastructure as the technology is not locally available, most particularly for the systems, signalling, telecommunications and the train itself. All of this appliances are supplied by either US based companies, Canadian or European companies. However, for support infrastructure such as civil works, structural and architectural works, the experts can be procured domestically. As an example, the LRT Extension project that spans 17.7 km from Bukit Jalil to Putra Heights involved heavy construction and engineering works by local class-A contractors while the train, system, signalling and communications equipment by European and Chinese consortiums. The same

extension of 17 km from Kelana Jaya towards Putra Heights is using current Canadian-based technology while the construction is mainly by Malaysian contractor.

The project is itself a mega project that fulfils the criteria "initiatives that are physical, very expensive, and public"[3]

Other rail related infrastructure is parking complex, bus shelters, station building, commercial and retail area as well as passengers amenities such as surau, toilets and storage area.

Rail infrastructure is no different with other building structure. The drawings must first obtain approval from Local Authority before works can begin at site. Earthworks must be approved by Planning and Engineering Department, and the Station Plan must be endorsed by Building Department before works can commence. All these drawings need consultants to prepare, and often it involves the full team comprising of Professional Architect, Engineer, QS and other ancillary consultants.

Thus, in order to have a properly documented documents and drawing, the complete team is employed based on retainer system complete with multipliers, manhours scheme and in obligation towards the prevailing engagement rules for professional services in Malaysia.

However, as an Employer, there is a set of expectations that is required from the Consultants. The set of 'wants' are listed as below[4]:

1. Design with no suprises – certainty and sureness in the costing and design.
2. Reliable, durable and functional design while at the same time does not sacrifices the aesthetic factor of the building.
3. Practical design with no latent defects and able to last the life cycle costing.

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[3] Altshuler, Alan; Luberoff, David (30 April 2003). *Mega-Projects: The Changing Politics of Urban Public Investment*. Brookings Institution Press. ISBN 978-0-8157-0129-3.

[4] Notes from Dr Rosli Abd Rashid, 2013 UTM – Project Management

4. Easy maintenance with realistic and affordable cost for the operational budget at later years.
5. Swift ratification of defects without the needs for litigation.
6. Value for money – accountability for public funds.
7. Acceptable quality with pleasing performance.

In essence, Employer would require something that is fulfilling the requirement of:

On time – the project must be delivered on time
On budget – the project must be able to meet forecasted cost
High quality – the final product must consist of high quality.

Prasarana is a partner in development projects especially in delivering high impact national projects, such as National Key Result Area or NKRA initiatives under the Ministry of Transport. The intention of NKRA is to improve public transport modal share from current figure of 11% to 15% by end of 2010 and subsequently increased to 25% by 2012 during the morning peak hours between 7am to 9am in the area of Kalng Valley. The successful initiatives will be separately adapted in stages to Penang and Johor Bahru. The NKRA Urban Public Transport (UPT) is also aiming at improving the reliability and journey times of passengers while at the same time enhancing and improving the comfort and convenience of commuters. Menawhile the service reliability is increased, the accessibility to public transport needed to be improved so much so that population living within 400 meters of a public transport route increases to 80% in 2012. Currently, Malaysia have a total of 1,660 km of railroad network.[5] To become a developed nation, Malaysia will need another 3,000 to 5,000 km of railroad network. This will means that transport efficiency can increase especially in towns such as Georgetown, Johor Bahru, Kota Kinabalu and Kuching.

There is a due diligence for the development of Rapid Transit System that will link Tanjung Puteri and Woodlands that is now being studied by Prasarana.

[5] Data compiled from research by The GlobalEconomy.com, by the World Bank

This resonates with the significance of cities as highly productive centres of an ever increasing service oriented econmomy that the country is heading towards by 2020. Transport networks must be able to support the economic growth, expanding populations and diversified expectations of urban populace and activities including tourism. Global examples have shown that cities with comprehensive and well performing urban transport system is a highly competitive city and becomes part of an importnant enabler of sustained economic properity.

Traffic congestion is not only provides inconvenience to passengers, but also resulted in huge losses in terms of productivity and will affect the competitiveness of cities globally. In an effort to overcome this problem, many cities tend to built more roads. However, the cost incurred including financial, social and environmental impact will increase when the urban populace reached a saturated level. Thus, it is very important that private cars be shifted to public transport. However, public transport in Klang Valley is ridden with inefficient services, delays and cancellation, limited network, loss of connectivity and continuity of public transport modes as well as serious congestion issues in rail network. These issues lead to an unrewarding usage of public transport and makes the city less appealing while creates a more serious overcrowding issue.

If we are unable to address the public transport issue in the Klang Valley, the roads will become overly congested and will start to affect the productivity of surrounding satellite cities, lowers down quality of life and hampers the ability to catapult Malaysian cities as world class cities. Considering this problem and the fact that public transport is a key contributor to achieving better employment, health services, education and social services, the mode of transport in Klang Valley is rapidly changing faces with the introduction of new projects. Thus, by the year 2030, when full rail scheme has been implemented, Greater Klang Valley can enjoy a rapid transit system that is well complemented with feeder bus services, intra urban bus service, urban bus services and express transit buses.

According to the challenges faced by NKRA, the Government had tasked Suruhanjaya Perkhidmatan Awam Darat (SPAD), Prasarana, ERL, other stakeholders and NKRA to collaborate together to formulate initiatives to improve the delivery of

public transport services. The areas are improvements of bus services, rail services, integration between public transport modes and network and the expansion of public transport network.

The initiatives are directly involved in this research is as follows:

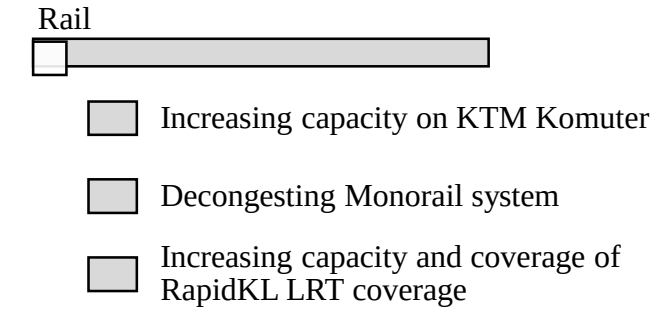

Figure 1.1: Rail Transport Intitiative in Malaysia

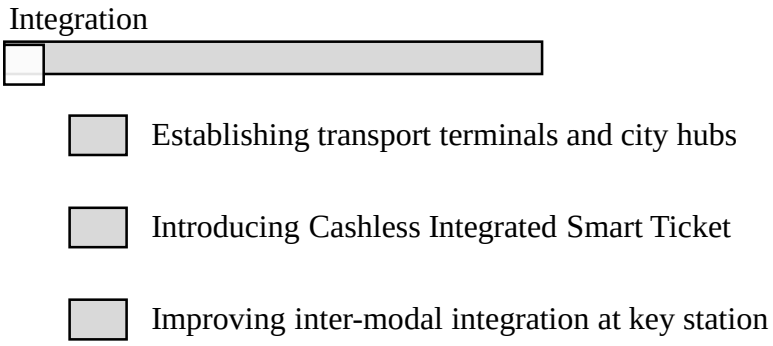

Figure 1.2: Service Integration Intitiative by NKRA

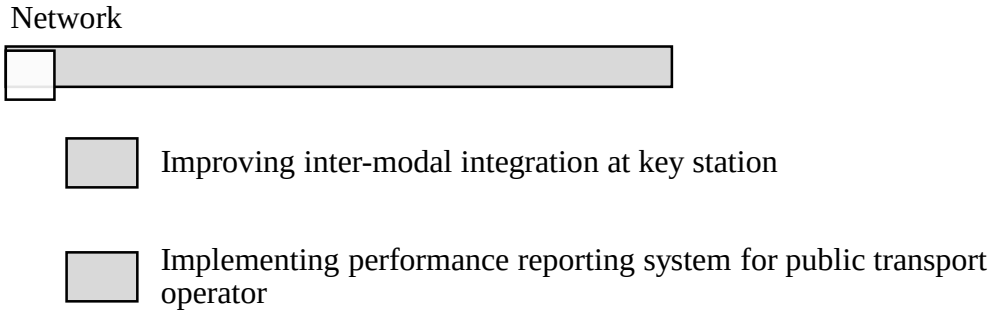

Figure 1.3: Network Integration Initiative by NKRA

Efficient public transport is key to national growth, while a complete and well managed public transportation system is crucial for the people, business and subsequently for the country to achieve high growth[6]. In Greater KL, a major initiative to improve the capacity of the Light Rail Transport (LRT) system, is the 34km extension to the existing lines. The full delivery of 35 sets of new four-car trains have increased the capacity of the Kelana Jaya LRT line from 24,000 passengers to 98,000 per hour and reduce waiting time from 3.3 minutes to 2.0 minutes during peak hours. Currently, a total of two (2) billion passangers has been transported via the two Kuala Lumpur's LRT systems.

1.5 What Prasarana is Getting from Consultant Architect

Being in the construction industry requires certain conduct and professionalism. Such was the case and manner that prevent anybody from venturing into the anonymous and darkside of construction industry. Thus, Malaysia implemented Construction Industry Development Board Act (CIDB) since 1994. These acts were meant to bring a new level of professionalism into the construction industry. Once regarded a shady and dull industry where money is widely used to

[6] Tan Sri Syed Hamid Albar, Chairman, SPAD, Bernama, June 10,2010, KL

facilitate almost everything, the perspective is taking change, whether dramatically or slowly, with the implementation and enforcement of these acts as well as other prevailing acts such as Architects Act 1967, Engineers Act 1967 and other acts as well.

Currently, with the set of expectations, Employer are still deprived of the full performance of the building. This has happened due to the inability of architect to deliver the full ambit of the needs of Employer. This relates back to the discussion of what Employer want from their designers and the ability by the consultant to accomplish the needs. The responsibility of architect is mainly:

- discussing the objectives, requirements and cost constraint of a project;
- consulting with other allied professionals about design;
- preparing and presenting feasibility analysis and design proposals with the client;
- consulting the client on the practicality of the project;
- using IT in design and project management, specifically using computer-aided design software;
- keeping within financial budgets and deadlines;
- producing detailed working drawings and specifications;
- specifying the nature and quality of materials required;
- preparing tender documents, analysis and presentations;
- negotiating with contractors and other allied parties;
- preparing applications for planning and building control departments;
- preparing tender documents for contracts;
- manage project and assist to coordinate the work of contractors;
- controlling a project from start to finish;
- regular site visits to monitor progress, ensuring that the project is running on time against approved budget;
- resolving problems and issues that arise during construction;
- ensuring that the environmental impact of the project is mitigated.

In most projects delivered to Prasarana, the end results are often needed to be repaired since there is a number of defects discovered. This rectification often involves other budget that needed to be taken from other expenditure or new budget to be

approved. In the end, the Employer ended up with a bigger expenditure rather than a projected cost. This will create a bad governance in terms of project management and delivery as well as accountability and integrity issue. The problem can be perceived as hidden elements of power abuse although it is not necessarily be the case. Most of the time, it happens due to inexperienced architects or other consultants. The problem are happening due to lack of knowledge and designs that are never been crossed in the consultant's portfolio.

Basically, Employer are not getting the actual intention of their design when architect failed to deliver the optimum design required from them. In other words, the architect has not fully deliver the reasonable standard of care and duties to the client. This is what make Employer to be dissatisfied with the performance of Consultants.

1.6 Consultant Architect Engagement in Prasarana

Procurement of architectural services in Prasarana is governed by Government policies as well as circulars from Treasury. It simply means that engagement of an architect must be made via proper channel which is using the Memorandum of Appointment that is part of contract formation in the Architect Rules 1996. Being a tried and tested method of engagement, this process has been repetitively exercised by Architect's in procuring government projects.

The Memorandum of Agreement is readily available from Lembaga Arkitek Malaysia's website or can be obtained inside the Architects Act 1967.

1.7 Problem Encountered by Prasarana in Engaging Architect

Being a party involved in the construction industry, one would realised that there is a myriad of problems. There is supplier issues, consultant's problems as well

as client related matters. However, specifically in the consultants and clients perspective, there has been a gap in the dictating of performance of the consultant. While consultant is directly governed and regulated by various professional bodies such as Pertubuhan Arkitek Malaysia (PAM), Institute of Engineers Malaysia (IEM) and Institute of Surveyor Malaysia (ISM) among others, there is still undone matters that involves the performance of consultant that bothers client. As most consultant perform in their respective required employment intention, some are definitely requiring assistance to deliver. Constructing a building is never an easy feat. As Nigel stated in his book[7], architect is subject to various design duties and delegations of design works in every stage of construction works. Traditionally, architects are involved in design stage and engaged by the Client to implement the design intention while engineer provides the structural, mechanical and electrical analysis and contractor is the one who carry out construction works at site until the completion of the project. As with any multi party relation, problems can happen right from inception until after the practical completion stage. Probably there is miscommunication between the consultants. There is also instances of contractor completed the works but the building suffer problem due to defects caused by errors. Apart from that, maybe the authority is holding up much precious time, and withhold the completion supporting documents. The issue is compounded if novel construction method is being used. The project itself may suffer from late delivery, moving date of completion and potential loss of returns for the Employer for the delay. Employer may also face cost inflation, bulding material volatility and market sluggishness. All these are the risk factored by the Employer when embarking on a construction project.

Defects and failure will cause sizeable amount of money and downtime to the Employer as well as the end users. If the failure is major, it may cause loss of human life, injuries or damages to private property. Public who use the facilities may consider legal action against the owner of the building for causing grievous harm to them. This will in turn put the building owner into some sort of financial quaqmire. The Employer too, may felt that they have been shortchanged for getting a building and spend so much to procure the building, but yet need to request additional budget to rectify the

[7] Nigel M. Robinson (1996) in his book Construction Law of Singapore and Malaysia

defects or incomplete works. This would in turn raise question on the competencies of the designer.

There is cases in which consultant failed to deliver what is required to successfully complete a project. More often that not, these consultants cited that inexperience is their major disadvantage. Thus, they are not able to deliver in full what the design intention requires. When these circumstances occurs, Employer again feel that they are not getting the worth of what they spend.

Design inadequacies are the most critical problem that can happen in a building, especially for rail infrastructure, such as problem below:

Problem 1: Consultant architect has been appointed for the consultancy services of designing and specifying for a multi storey carpark complex. The complex is five storey with an open rooftop. The consultant architect appoints supplementary consultant under his payroll such as consultant engineer and quantity surveyor. When completed, it was found out that the roof top level is missing various rain water downpipes. When asked, they inform that they have miscalculated and it is the duty of the contractor since it is modular design proposed by the contractor and the engineer is denied checking fee. The contractor contested that the drawing they submitted to engineer showing that rainwater downpipes terminates on the floor is accepted by the engineer. The problem continues and was made worse during heavy downpour. Rain spilled to the floor below and damaged the flooring system.

The problem persists and upon checking the contract, contract administrator found that clauses available in the contract are subject to argument and are not easily enforced. The underlying fact remains that the consultants have miscalculated surface water run off.

Thus, the client engages third party and repair the problem using money from other budget. Problem is solved but the question persist. Why in the first place the issue was not sighted. The consultant reiterates they are never used to designing carpark complex before. The client argue that if experience is the item consultant is lacking, the consultant should have embark on fact finding to see other carparks in

operation. Client had also argued that as person professing a technical knowledge and demand themselves professionals, the consultant should adequately equip themselves with the required knowledge. Not all consultant have the opportunity to design everything there is in the world, but when the design segment is encountered, designer have to read, search, survey and observe the same design that has been in place and realised the strength and weaknesses of each designs.

Problem 2: Architects and a team of consultants are engaged to design, supervise and advise the client with regards to a walkway construction spanning across from old Kuala Lumpur Railway Station to the LRT Pasar Seni Station, connecting Dayabumi and Pos Malaysia building along the way. The walkway is completed, however, with a glaring defect. The midsapn of the walkway is deflecting. After a while, it was concluded that despite concerns by the client's representative during construction regarding the midspan, the assurance given by the consultants are unsubstantiated. Thus, the client engaged third party engineering calculation for the structure and it was proven that the structure is requiring additional support for the bending midspan. After a series of negotiation, the consultant engineer agreed to compensate the client for the repairation works and the cost deducted ffrom the professional fees.

When the circumstances arises, the question in mind is how best to harness the contract to ensure that such problem does not occur again. The problem is again, put into perspective against a professional who[8]:

1. possesses a special skill and knowledge acquired after a course of intensive study and a period of practical training
2. has a code of ethics governing his conduct
3. is self regulatory
4. is responsible for his actions
5. is committed to continuous improvement and advancement of his craft
6. is competent in the performance of his duties
7. practices with integrity and honesty

[8] *http://lampart3.blogspot.com*

The statement of problem above has streamlined to two issues that manifest itself so much so it has become the core of this research which is:

a. what do the Employer really want from the Designer and the project itself
b. how can the owner get what they want from their project and consultant
c. how can the consultant ensure that they have the right knowledge for the right project
d. if Consultant are lacking in design, what can Employer do to mitigate the matter

1.8 Objective of the Research

Based from the indepth statement of problem discussed above, it is clear that the objective for this research is divided into two:

1. To identify the case law relevant to the Designer's role
2. To develop a checklist of Clients Needs for reference of Designer in the implementation of Rail Infrastructure Project

Thus, the objectives brings question that need to be answered by this research. That question is whether Employer really get what they want, and how best Employer can be certain that they get what they want.

1.9 Scope of Study

The scope of study for this thesis is regarding rail infrastructure that is under the purview and management of Syarikat Prasarana Negara Berhad. The study is

scoped to ancillaries buildings that is being constructed as support building for rail operation.

The scope may not get in depth towards other rail infrastructure currently being undertaken in Malaysia, namely the Electrified Double Tracking Project that is being embarked by Keretapi Tanah Melayu Berhad, the proposed High Speed Railway network from Malaysia to Singapore, and the Mass Rapid Transit works by MRT Corp. Sdn Bhd.

Rail infrastructure that is being taken into study is the pedestrian walkway from terminal to station and multi storey carpark complex.

The study is limited to projects supporting rail operations such as multi storey carparks and pedestrian walkways that has been fully completed and currently in operation. The projects are completed between 2010 until 2013. All this projects are procured using consultancy services and are now fully completed, which means the consultants at this moment has no design works and are monitoring defect liability period.

Current major project that is undertaken by Prasarana which is the Light Rail extension is not considered in this study althought references and examples might be related to that project.

1.10 Literature Review

The literature review done was documentary review which includes comparative study and analysing the Contract Documents drafted by Pertubuhan Arkitek Malaysia (PAM), Royal Institute of British Architects (RIBA) and American Institute of Architects (AIA). Apart from these documents, the Code of Professional Conduct is also put to comparison to ascertain that whether the clauses and sections inside the documents were able to provide full guidance towards the consultant

architect in dispensing the duties as required. Apart from collecting information from these documents, another source for the input in the research is via case law.

1.10.1 Who are Architect?

A architect is tasked to identify the best design language for the pleasure of the client who engages him, and translate that language into 2 Dimensional (2D) drawing and 3 Dimensional (3D) images for better apprehension, and then to get involved with the client in advising the best method of procurement, construction, buildability as well as monitoring the progress until its completion. This view has been shared by Chappel and Willis[9]. As Gill mentioned it in his book, The Law Relating to the Architect[10], an architect is a skilled person professing the art of building, while possess both academic and practical knowledge, whose business is tasked to prepare the plans and drawings of edifices and disembark on a general supervisory roll over the course of the construction.

The profession of architect and the architecture business it represent is a combination of science and art. A unique business as it is, the profession is governed almost everywhere in the world via acts or rules. In the case in Malaysia, it is governed by Architects Act 1967 and enforced by Lembaga Arkitek Malaysia under Kementerian Kerja Raya Malaysia. By comparison, in the United Kingdom, the registration of architects is maintained by the Architects Registration Board. The same arrangement is applicable to Australia and New Zealand.

In Malaysia, to be an architect, a person needs to obtain a good result in the Malaysian Certificate of Education examination (SPM). After obtaining that, one can enrolled into various architecture school in Malaysia. After a stint of four years in official architecture training, one can be exempted from LAM Part 1 examination. An additional two years of formal architectural education after the first four will enable a person to be exempted from LAM Part II examination. LAM has enshrined that a person are eligible to sit for Part III examination after working for two years under a

[9] David Chappel and Andrew Willis, 2000, The Architect in Practice, Blackwell Science Ltd., 8th Ed

[10] Willian H Gill, 1964, The Law Relating to the Architect, Stevens & Sons Ltd., 2nd Ed.

practising architect. The process begins with the submission of application form and logbook. After an interview, the candidate will sit for a two paper test. Passing these papers and the interview qualifies the person to be a professional architect. Current practice in Malaysia is that most of architecture graduate registers with LAM under the Architect Act to enable them to undertake certain jobscope and be eligible to sit for Part III test. The Board of Architect (LAM) clearly defines the meaning of Professional Architect as a person registered under sub section 10 (2)[11]. In this sub section, it stated that subject to this Act, the following persons shall be entitled on application to be registered under Section A of the Register as Professional Architects:

(a) any person who-

(i) is a Graduate Architect

(ii) has obtained the practical experience as prescribed by the Board and had passed the examinations as may be determined by the Board under paragraph (1)(b) and

(iii) is a corporate Member of the Pertubuhan Akitek Malaysia or has obtained a qualification which the Board considers to be equivalent thereto.

Being a qualified expert in environmental science and building art, an architect enjoys a priviledged association within the construction industry. The job context specifies a certain degree of coordination of engineering and environmental supports prerequistes for the design to achieve the objectives spelt out by a client. Combined with the know-how in site analysis, legislative requirements and aesthetic design, an architect can made clear a client's needs in relation to the project, analyse possible solutions that can be sourced and propose a design solution. As an architect, part of it he acted as adviser. He must be familiar with building construction constraints, the material available in the market, problems at site to be avoided, best tools and technique to get the building erected, and prepare the most probable cost of development as well as the construction timing and milestone.

[11] Architect Act 1967, Lembaga Arkitek Malaysia

An architect play the role of clients's agent when he represent the client for drawing submission, attended to local authorities for site visit, planning approval and building endorsement. An architect also call for tender, award tender, administer contracts and issue out Certificate of Compliance and Completion (CCC). In building contract administration, an architect acted as client's agent but with impartiality and just. He may still be needed to advise the client on his rights and responsibility towards the Contractor.[12] This relationship is commonly known as Agent and Principal or servant-master demography.Basically, it is about agent dispensing contractual powers on behald of the principal and by accepting the agent to do so, the principal is bound by the agent's acts.

1.10.2 What Services do Architect Offer?

In the Architect Act 1967, Architect Rules 1996 and Architect (Scale of Minimum Fees) Rules 2010, there is provisions and listing of services usually offered to Clients. The most frequently used are the normal services. There is incidents of additional services being used, but the data is nominal.

In construction, the process involved are sometimes tedious while others are straight forward. The services for architectural consultancy are divided into three service package, as follows:

[12] David Chappel and Andrew Willis, 2000, The Architect in Practice, Blackwell Science Ltd., 8th Ed

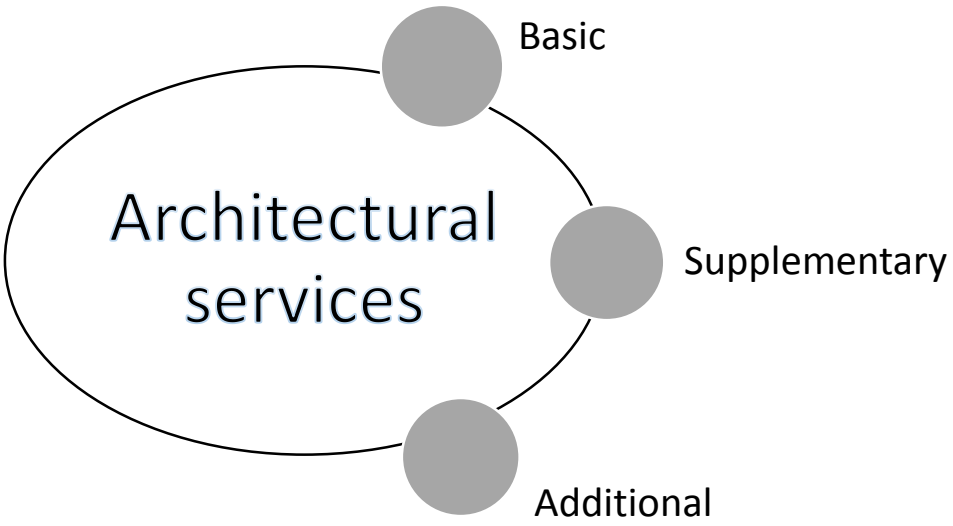

Figure 1.4: Types of Architectural Services in Malaysia

Each phases require specific attention and time commitment. The most common services offered to consultants are the Basic Services. This amounts to about 90% of architects engagement in Malaysia[13].

The phases contained in Basic Services are separated into five phases. Each is distinctively categorised to reflect the nature of works involved. The phases are as per diagram below:

[13] Statistics from Pertubuhan Arkitek Malaysia

Schematic Design	• taking the client's instructions and analyzing the project brief; and preparing preliminary conceptual sketch proposals to interpret the project brief; • developing the preliminary conceptual sketch proposals into sketch designs to a stage sufficient to enable an application to be made for planning approval or approval in principle as required under any relevant laws; • preparing preliminary estimates of the probable construction costs based on the current area, volume or other unit costs; • where applicable, preparing and submitting drawings and other necessary documents to the relevant approving authorities for either town planning approval or approval in principle as required under any relevant laws.
Design Development	• upon approval of the sketch designs by either the relevant approving authority or the client, developing schematic design drawings to a stage to enable other consultants to commence their detailed design work; • preparing working drawings and submitting the same together with all the necessary particulars to the relevant approving authorities to obtain building approval; • updating the preliminary estimates of construction costs and submitting the same to the client for his approval; • updating the project planning and implementation schedule and submitting the same to the client for his approval.
Contract Documentation	• upon approval by the client of the updated preliminary estimates of construction costs and the project planning and implementation schedule, preparing and finalizing detailed drawings and other particulars necessary to the stage of completion sufficient to enable bills of quantities to be prepared; • in collaboration with other consultants, preparing all documents necessary for obtaining competitive tenders for the works; • inviting, on behalf of the client, tenders for the works or collaborating with other consultants engaged by the client to do so; • evaluating the results of the tenders and submitting a report and recommendation to the client; and awarding the contract on behalf of the client; • preparing the building contract documents, either alone or in collaboration with other consultants appointed by the client, for signature between the client and the contractor.
Contract Implementation and Management	• performing all functions and duties of the architectural consultancy practice under the terms and conditions of the building contract; • advising the client on the site staff required for the project and estimating the cost and duration of their employment; • providing information and issuing instructions to the contractor as required under the terms and conditions of the building contract to enable the contractor to proceed with the works; • examining the works programme submitted by the contractor and to be satisfied that the works can reasonably be completed within the contract period; • inspecting the works at periodic intervals so as to ensure that the works are being executed in accordance with the building contract and to issue a certificate of practical completion.
Final Completion	• issuing a certificate of completion and compliance for building after being satisfied that the building is fit and safe for occupancy; • certifying as-built drawings and submitting maintenance manuals together with all warranties to the client; • issuing a certificate of making good defects after being satisfied that all defects to the building have 'been rectified; • preparing final accounts for the contract and issuing a final certificate of payment to the contractor.

Figure 1.5: Stages of Architectural Services in Malaysia[14]

[14] LAM Architect Act 1967, Architect Rules 1996, Architect (Scale of Minimum Fees) Rule 2010

The Supplementary Services is divided into nine items are works not inclusive in the Basic Services scope, however are needed for complete execution of the construction works.

Supplementary Services
• ascertaining the client's objectives, brief and constraints for the project and advising the client on how to achieve the objectives; • inspecting and advising the client on the selection and suitability of proposed sites, and conducting or taking part in negotiations connected therewith; • preparing and refining the brief in consultation with the client and interpreting the client's objectives to arrive at an agreed brief for the project; • preparing an outline project plan which may include a preliminary estimate of construction costs, a preliminary project planning and implementation schedule, a preliminary cash flow projection and a resource plan; • preparing a master plan for housing development or other schemes, including preliminary layout plans, for discussion with the relevant approving authorities that leads to the preparation of detailed development plans implemented; • preparing the drawings for sale and purchase agreements, where relevant; • certifying and issuing certificates of stage completion under the sale and purchase agreement between the client and the purchasers; • providing interior design services, including preparing sketch layouts, working and construction drawings, details and tender documents, managing the contract, supervising the works during the stages of implementation, issuing certificates of payment and accepting on behalf of the client such works upon its completion; • designing graphics and signage in connection with the project and providing all the necessary services for their execution.

Figure 1.6: Supplementary Architectural Services in Malaysia

The third portion of the fee structure is additional services. This part of services are catered for any work scope not included in both Basic and Supplementary services jobscope.

Figure 1.7: Additional Architectural Services in Malaysia[15]

1.10.3 RIBA Plan of Work Description

Royal Institute of British Architect (RIBA) has formulated the sequence or jobscope for architect. Using these jobscope or guideline will make an architect and client regulated as it stipulates all the tasks and the description of the task. Since Britain and Malaysia had shared previous linkage in terms of administration and case of law, these guidelines can as well be adapted and referred to apart from the available local guidelines.

[15] LAM Architect Act 1967

In comparison, RIBA Plan of Work 2013 separated jobscope into various specific and detailed stages including[16]:

(a) Appraisal – important function for architect to obtain client's brief regarding the available budget, site condition, timeframe, and the intention of the building to ascertain that the project is feasible.

(b) Strategic briefing – strategic brief is prepared by the client but most of the time it is prepared by the architect. The brief records all the client decision as well as preparatory works involved.

(c) Outline Proposal – better known by its other name "sketch design" or basic design. Here, the brief is better formulated as the client is now more clear of what he wants via the presentation of design sketch by the architect. A better estimate of the cost is made available by the QS and client should approve the cost to proceed further.

(d) Detailed Proposal – Architect should be able to consider all of client's feedback regarding the preliminary proposal, and completes a full brief document while elaborate on other consultants to produce a much more detailed proposal for client to approve. At the end of this stage, the architect should be able to furnish a schematic design for Planning Permission and advise the client that any changes from here may incur additional time and money.

(e) Final Proposal – Once the client approve the schematic design, each part of the scheme must be design thoroughly with highest degree of detail. Working drawings can begin production complete with dimensions, notes, building codes and technicality.

[16] David Chappel and Andrew Willis, 2000, The Architect in Practice, Blackwell Science Ltd., 8th Ed

(f) Production Information – At this time, the architect and other consultant will be busy preparing all information which is required for tendering and additional information necessary for the construction of the building.

(g) Tender Documentation – Bill of quantites are prepared during this stage by the QS with architect furnishing the required information that the QS requires. The final cost estimate will be prepared by the QS and architect.

(h) Tender Action – The client is advised on the most appropriate way to procure the work by the architect. In some circumstances, pre-qualification is done to select the list of suitable contractors. Architect and QS will assess the tenders submitted and produce a report for client to approve.

(i) Mobilisation – Architech shall advise the client on the most suitable form of contract and necessary insurance requirements.

(j)

(k) Construction to Practical Completion – Apart from amking regular and diligent site visit, the architect is required to inspect progress, certify bill for payment, cooperate with the contractor by supplying informations and handle site meetings.

(l) Post Practical Completion – The architect carry the duty to ensure that all defects are made good and all accounts are settled accordingly. The client is given maintenance and operation manual with a set of as-built drawings showing the building, M&E installations and other services.

The RIBA Plan of Work is comprehensive in that it create clear demarcation and limitation of work for the architect. It also assist client with this job demarcation so that the client does not require more than the guidelines.

1.11 Research Methodology

Data inputs from external references necessitates a proper and regulated methodological approach to carry out the research. Without the method, the research cannot be substantiated and justifiable and it will not become an academic evidence that can be used for further studies as well as reference in classes.

Research methodology is very important as it determines the way and manner a research is carried out. Sometimes, an inappropriate research methodology can cause detrimental effect towards the research.

1.11.1 Identification of Research Methodology

The research methodology to be deployed for this research is more towards documentary evidence of case law study as well as collecting data from experts and project owners. The input gained from direct project owner is crucial to determine the level of design liability issues that had occurred. It will also illustrates the design inadequacies that had happened. The project owners will also give perspective on how design brief were communicated to the architect during design stage, and how the process to get the design brief and the proposed plans and details to be approved by Prasarana.

The research methodology is important as it defines the product of the research. In this case, literature review, documentary study, observation and unstructured interview is used interchangeably to derive to the conclusion of the study.

1.11.2 Outline of research methodology

In the process to reach to the research objective, an organised and systematic mode of research required to be drawn in place. An indepth elaboration of the research methodology is described for clear understanding.

The preliminary literature review was carried out to obtain the extent and actual concept of the architect's work and the liability that he carries together with his designing, and with the drawing that he endorsed. In this stage, many discussion session been held with project owner, supervisor, coursemates and fellow consultants, both in the practising industry as well as the client side, mainly from PAM, JKR and contractor. The discussions were held both in formal and informal ways, some with structured question while the remaining is done in a casual coffee table style of discussion. The feedback and input from the discussion, as well as suggestions were used to enhance the issue and problem statement of the research. Current issues are collected via desk research, magazines and articles such as via Entrusty website[17]. After the actual feedback from project owner is analysed, the objective of this research can be fully comprehended.

After the initial information finding has concluded, the second stage is the data collection. This is only done after the identification of research issue and objectives have been fully complied. During this period, documentation from various professional conducts will be analysed and compiled to meet the objective expectation of the research. Information from various sources are compiled including from UTM Library (PSZ) online data, Lexis-Nexis Cases Database and Malayan Law Journal will be considered primary data while secondary data is derived from articles, newspaper, seminar and studies in the internet. The internet holds thousands of information with regards to the performance of architects and other construction professionals. There are cases recorded, digital paper archives and group discussion such as in the online forum of linkedin.com that had been discussing the conduct of construction professionals and in some extent provided the answers. Previous case law will be

[17] http://www.entrusty.com/?m=201405

collected and analysed for the connection in the conduct of professional architect. The responsibility and duties of architect can be identified from the case laws produced.

Another source of information is from casual interview with the project owners who are directly involved in the rail infrastructure. They are the key person that experienced the occurrence of design inadequacies in the course of delivering rail projects. A structured interview may get too boring as the project owners are also preoccupied on other projects at the same time. Another point worth noting is that via unstructured interview, the project owner is engaged in a more friendly manner and able to share more information rather than the rigid interview structure. The session can be considered good information sharing session over teatime. The session will have sharing points that acknowledges the defects that had happen which was caused by design insufficiencies and how the project owner execute reparation programme to overcome the design insufficiencies.

Subsequently, once the data has been collected, it will be subject to further analysis and interpreataion for easier consumption in research writing. The collection of data includes cases, opinions and comments. Analysis for the report writing will be carried out by reviewing the data inputs and the liability extent on each design stage. At the later stage of the analysis, the findings and recommendations will be recorded as well as the conclusion. The recommendation will look into steps or guidelines to be formulated for future use in order to avoid design insufficiencies from recurring.

The Research Process and Methodology is as per diagram below:

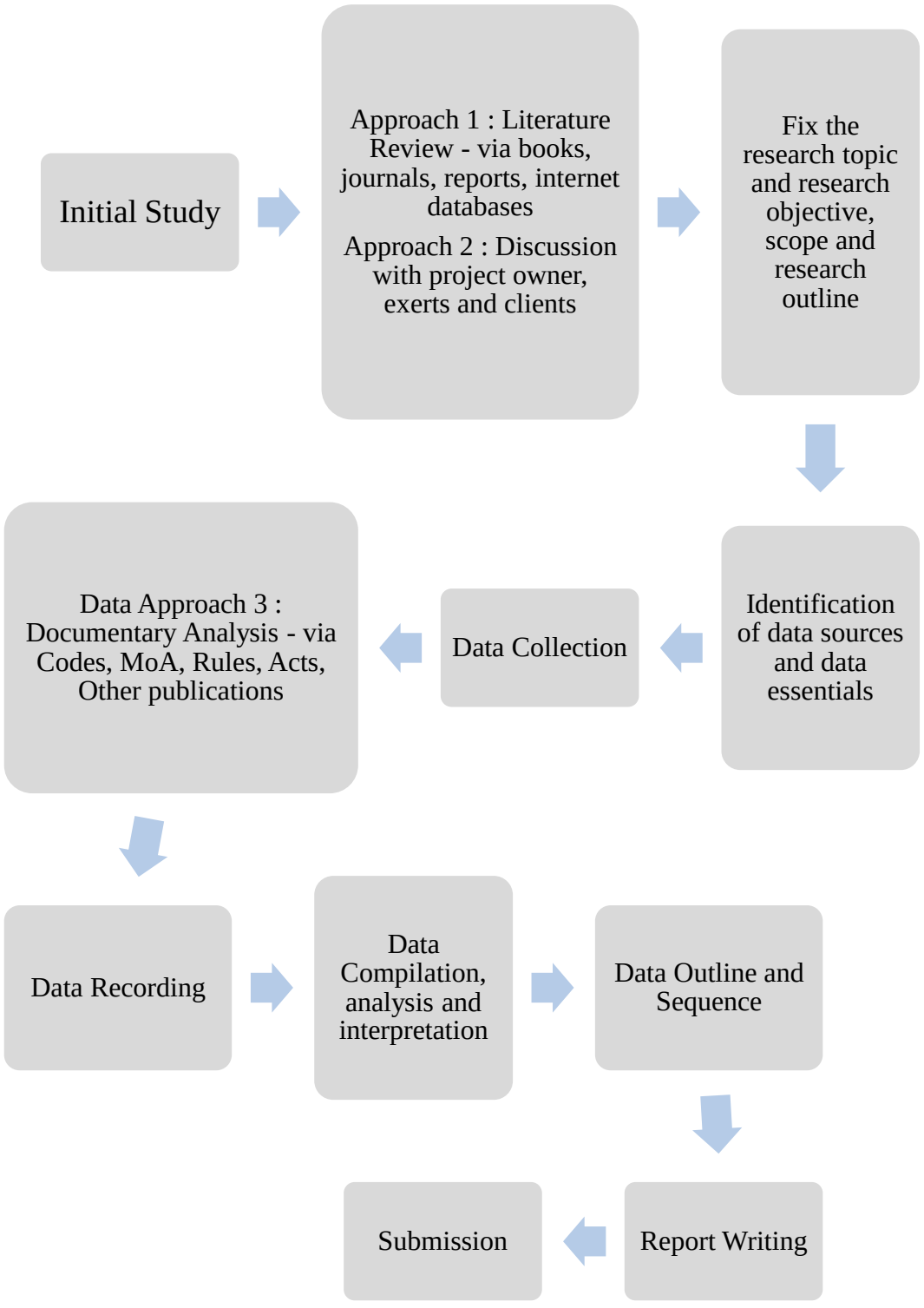

Figure 1.8 Process and methodology of research

1.12 Expected Findings

From the accumulated reading and analysis, it is expected at the end of this research, there is adequate solution that can be provided to ascertain the most appropriate remedy or pre-emptive measure that Employer can put in place to avoid design inadequacies from happening, while at the same time put into place a system of disseminating information on what actually the Employer required and as a reminder to Designer that the works that they design must be fully in compliance with the ambit of fit for purposes while fully exercisisng their embedded duty of care and skill for the benefit of the project.

In the future, the research might serve as an additional source for professional bodies who strive to alleviate the services of their trades by looking into the conclusion provided in this research.

This research is also intended to become an external reference for Prasarana in determining knowledge and service level of architect before procuring their services for rail infrastructure development purpose. This will ensure that the architects engaged is those who are able to dynamically reporgramme their knowledge base and adapt to the design brief that has been designated for them.

The research may also find that in the end, in a big organisation such as Prasarana, there is various departments that is looking after rail infrastructure projects. These departments develop their own design brief. Hence, the need to have a single entity that can develop design brief for various needs of department is important. It not only creates uniformity, it also creates expert and specialisation, as those who are used to develop design brief may understand what is required and what is not. The experience in formulating design brief, coupled together with experience in delivering project will enable the team to further understand the importance of having a comprehensive design brief.

1.13 Structure of Thesis

Reporting structure for this research contains five (5) chapters. Each chapter encompass the related issues and concerns of the research with a simple summary of each chapter, as listed below:

Chapter 1 : Introduction

Being the first chapter, this chapter contains the overall outline of the research. It also serves as the introduction of the research and the direction that the research will leads to. Among other contents of Chapter 1 is the research background, problem statement, objectives, question,research methodology and the intended method to accomplish the objective. The first chapter also discussed about Prasarana in a summary and the nature of projects that Prasarana normally does. It also discuss on the results delivered by the consultants, and Prasarana's project requirement.

Chapter 2 : Standard of Services for Project Architect

This chapter explains on the appointment, tasks, duties and responsibilities of Architect. It also elaborated basic needs to become an architect. Professional architect's nature of dispensing his obligations are discussed in this chapter. Among other things the chapter will also defines the duties, responsibility and liability of Professional Architect, both towards the Employer and the Contractor. Roles of Architect, in and out of site, as Contract Administrator is also discussed here. The appointment of architect via Memorandum of Appointment and its elements are discussed. Design inadequacies as the main focus of this chapter is deliberated here, and the possible solution is discuused so that the research is accomplished.

Chapter 3 : Prasarana and rail infrastructure development

This chapter shall allow understanding on what is Prasarana role in Rail Infrastructure development and what is Prasarana in total. It will also discuss the nature of project undertaken by Prasarana and the method of appointing architects. It also

outlines the intention of Prasarana as Employer towards the Architects. The chapter will also discuss on the requirements by Prasarana that is not fully complied by Architects. The chapter includes departments that is involved in Rail Infrastructure inside Prasarana.

Chapter 4 : Data Analysis

Cases from journals and relevant databases are studied which is directly related to the subject matter. Relevant memorandum such as Architect Act 1967, Architect Rules 1996 and Architect (Scale of Minimum Fee) Rules 2010 is also dissected to reveal the issue of design inadequacies and discussed to determine the possible way forward.

Chapter 5 : Conclusion and Recommendation

Recommendation and conclusion will be made based on the findings of previous chapters and finalised for report. Finally, recommendations will be made so that future utilisation of the research can be made by taking the points and incorporating it into existing appointment framework. Those who find the research as an interesting scope of knowledge may want to escalate the findings further and evolve it into other form of studies, which in turn may prove to be beneficial for the profession as well as the industry.

1.14 Conclusion of This Chapter

In essence, this chapter discussed on the basis of architect appointment, and the nature of works in the Rail Infrastructure development. The discussion shall ring forth the cass that have been analysed and identified to be the responsibility of Architect. These cases will put into perspective the repercussion of unfulfilment of architect’s duties and responsibilities. Apart from the cases, the design brief preparation by

Prasarana will also be looked into to form a guideline on how to ensure architects can be knowledgeable when they obtained a design task.

Focus of this research is to find the best solution to design responsibility and the conducts to circumvent it from occurring or repeating. The research will have a limitation, and it is limited to only traditional system. Traditional system is where Client or Employer appoints a Designer to lead a team of consultants. This will be the basis of the research.

i. The research is based on the Code of Professional Conduct or Retainer's Clause in the contract which is the Memorandum of Appointment in particular Rule 28 under the Architect Rules 1996.

ii. The research shall focus on the Conditions of Engagement as per Rule 29 of the Architect Rules 1996.

iii. The research scope is defined within the duties and service of professional architect under Part IV of the Architect (Scale of Minimum Fees) Rules 2010.

iv. The research shall compare the rules in Architect Act 1996 to those available inside the RIBA Code of Professional Conduct 2005 and AIA Code of Ethics and Professional Conduct 2012.

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