

**LAND ACQUISITION PROCESS IMPROVEMENT FOR DEVELOPING
COMMUNICATION TOWER USING BUSINESS INTELLIGENCE
DASHBOARD**

REUBEN JAMES PAILUS

UNIVERSITI TEKNOLOGI MALAYSIA

**LAND ACQUISITION PROCESS IMPROVEMENT FOR
DEVELOPING COMMUNICATION TOWER USING BUSINESS
INTELLIGENCE DASHBOARD**

REUBEN JAMES PAILUS MBS201080

**A project reported submitted in partial fulfilment of the requirements
for the award of the degree of Master of Business Administration**

**Azman Hashim International Business School (AHIBS)
Universiti Teknologi Malaysia**

JANUARY

2022

DEDICATION

This thesis is dedicated to both of my parents, who taught me that the best knowledge is knowledge gained for one's own benefit and that one can share and benefit others. It was also addressed specifically to my supervisor, who taught me that even the most difficult task can be completed with dedication and determination. Also, not to forget my teammates in the Infrastructure Development Department, MCMC Sabah State Office, for your cooperation and support in making my thesis a successful one.

ACKNOWLEDGEMENT

First and foremost, I would like to thank God for His blessings throughout completing my research work successfully. I would like to express my heartfelt gratitude and appreciation to University Teknologi Malaysia (UTM) specifically Azman Hashim International Business School (AHIBS) for the opportunity given to me in carrying out my research project and finally I managed to complete my research with the guidance and encouragement from various individuals.

Secondly, I would like to thank my supervisor, Assoc. Prof. Dr. Ramesh K S @ Mohd Zaidi Bin Abd Rozan for giving me the opportunity and trusted me to do my research and offered invaluable guidance and advice. Despite his busy schedule, he is willing to spend his valuable time with me. I was profoundly influenced by his dynamism, motivation and spirit. Studying under his supervision was an honour and valuable experience. I am deeply thankful for what he has given me throughout the journey.

Thirdly, a very special thanks to my team Infrastructure Development Department, MCMC Sabah State Office including the branch offices for the contribution in providing such a wonderful co-operation in this research. I would also like to express my appreciation to all the primary and secondary stakeholders who dedicatedly spent their time and effort in the interview sessions and discussions made on improving the site acquisition process in Sabah. Their contribution and involvement brought a lot of impact and enabled me to collect relevant data and information within a short period of time.

Last but not least, I am forever thankful to both of my parents for their love and support, continuous care and unconditional prayers even though during the thesis completion journey, we were apart and barely saw each other due to the pandemic. Also, I would like to thank all my siblings and families for their valuable and continuous support throughout this journey.

ABSTRACT

This research focus on the improvement of the land acquisition process for the purpose of developing communication tower under the initiative of Malaysian Communication and Multimedia Commission (MCMC). Some of the JENDELA National Fiberisation and Connectivity Plan 1 (NFCP1) project are behind schedule mainly due to the Designated Universal Service Providers (DUSPs) are having issue with State Authority in acquiring land that requires coordination from MCMC State office. There are three objectives: To identify the factor that contributes to the delay in land acquisition process; to develop and implement a tactical dashboard accessible to all stakeholders that facilitate the DUSP to acquire land effectively; and to recommend the improvements required by measuring the perception of the DUSP on the usefulness and the information quality of the BI dashboard. The interview session was conducted involving 2 personnel and the data was analysed based on thematic analysis. The questionnaires were distributed pre-intervention and post-intervention to 20 personnel to assess usability of the dashboard, and data was analyzed using SPSS for descriptive analysis and to measure the effectiveness. It was found that the main factor contributing to the issue is the difficulty of DUSP to acquire state land effectively. From the analysis, the data from pre intervention and post intervention shows significant result that indicated using BI Dashboard as intervention has effectively improved the DUSP performance in terms of acquiring the state land. The BI Dashboard has alert function that allows DUSP to recognised sites that are at risk of delay and equipped with clear guidelines and information update from the state authorities. As a result, this dashboard helped DUSP to make timely decisions on appropriate actions. This dashboard will be a stakeholder management tool for the MCMC Sabah Infrastructure Development Department in providing better collaboration between different stakeholders. In conclusion, the research can be contributed to the body of knowledge and can be used as a reference for other authors to examine deeper into any research related to land acquisition for developing telecommunication tower.

Keywords: Productivity, Project Delivery, Dashboard

ABSTRAK

Penyelidikan ini memfokuskan pada peningkatan proses pemerolehan tanah untuk tujuan pembinaan menara komunikasi di bawah inisiatif Suruhanjaya Komunikasi dan Multimedia Malaysia (SKMM). Sebilangan projek JENDELA Pelan Gentian Optik dan Kesalinghubungan Negara (NFCP1) mengalami kelewatan kerana Pemberi Perkhidmatan Sejagat yang Dilantik (DUSP) menghadapi masalah berurusan dengan Pihak Berkuasa Negeri dalam pemerolehan tanah yang mana memerlukan penyelarasan dari Pejabat SKMM Negeri Sabah. Terdapat tiga objektif dalam penyelidikan ini iaitu untuk mengenal pasti faktor yang menyumbang kepada kelewatan proses pengambilan tanah; untuk membangun dan melaksanakan papan pemuka taktikal untuk DUSP memperolehi tanah dengan lebih berkesan; dan untuk mengesyorkan penambahbaikan yang diperlukan dengan mengukur persepsi DUSP mengenai kegunaan dan kualiti maklumat papan pemuka taktikal. Sesi temu ramah telah dilakukan dengan melibatkan 2 orang pegawai dan data dianalisis berdasarkan analisis tematik. Soal selidik pra-intervensi dan pasca-intervensi diedarkan kepada 20 personel untuk menilai kebolegunaan papan pemuka, dan data dianalisis menggunakan SPSS untuk analisis deskriptif dan untuk mengukur keberkesanannya. Faktor utama yang menyumbang kepada masalah dalam penyelidikan ini adalah kesukaran bagi DUSP untuk memperolehi tanah kerajaan dengan berkesan. Daripada analisis ini, data dari intervensi pra dan intervensi pasca telah menunjukkan hasil yang signifikan yang mana intervensi menggunakan papan pemuka taktikal telah berjaya meningkatkan prestasi DUSP dari segi pemerolehan tanah kerajaan. Papan pemuka taktikal mempunyai fungsi amaran yang membolehkan DUSP mengenalpasti tapak yang berisiko mengalami kelewatan dan dilengkapi dengan garis panduan yang jelas dan maklumat terkini daripada pihak berkuasa negeri. Hasilnya, papan pemuka ini berjaya membantu DUSP membuat tindakan yang sesuai pada tepat masanya. Papan pemuka ini akan menjadi alat pengurusan pemegang taruh kepada Jabatan Pembangunan Infrastruktur SKMM Sabah dalam memudahcara kerjasama di antara pemegang taruh. Kesimpulannya, penyelidikan ini dapat menyumbangkan kepada badan ilmu dan boleh dijadikan sebagai rujukan kepada penulis lain untuk meneliti sebarang kajian berkaitan pengambilan tanah untuk membangunkan menara telekomunikasi dengan lebih mendalam.

Kata kunci: Produktiviti, Penyampaian Projek, Papan Pemuka.

TABLE OF CONTENTS

DECLARATION	i
DEDICATION	ii
ACKNOWLEDGEMENT	iii
ABSTRACT	iv
ABSTRAK	v
TABLE OF CONTENTS	vi
LIST OF TABLES	xii
LIST OF FIGURES	xiv
LIST OF ABBREVIATIONS	xvi
LIST OF APPENDICES	xviii
CHAPTER 1 INTRODUCTION	1
1.1 Introduction.....	1
1.2 Case Company Introduction.....	2
1.2.1 External Environmental Analysis.....	4
1.2.2 Internal Environmental Analysis.....	7
1.2.3 SWOT Analysis.....	8
1.3 Problem Statement.....	11
1.3.1 Site Acquisition Milestone.....	13
1.3.2 Problem Diagnosis.....	15
1.3.3 Theoretical Gaps.....	18
1.3.4 Practical Gaps.....	19
1.4 Research Questions.....	20
1.5 Research Objective.....	20
1.6 Researcher’s Role.....	21
1.7 Research Ethics.....	21

1.8	Significance of the Research.....	22
1.9	Definition of Terms.....	23
CHAPTER 2 LITERATURE REVIEW AND ACTION RESEARCH PLANNING		
24		
2.1	Introduction.....	24
2.2	Issue and Context.....	24
2.3	Underpinning Theory and Models.....	25
2.3.1	Stakeholders theory	25
2.3.2	Dashboard Visualisation framework	28
2.3.2.1	Dashboard Definition	28
2.3.2.2	Type of Dashboard and its purpose	29
2.3.2.3	Dashboard design features.....	31
2.3.3	Usability evaluation model.....	33
2.4	Literature Review.....	34
2.4.1	Past and Contemporary Studies.....	35
2.4.2	Summary of Past Interventions	36
2.5	Proposed Intervention and Implication.....	37
2.5.1	Input.....	37
2.5.2	Transformation	38
2.5.3	Output.....	40
2.6	Planning Action Research.....	40
2.6.1	Cycle 1	40
2.7	Chapter Summary	42
CHAPTER 3 METHODOLOGY.....		
43		
3.1	Introduction.....	43

3.2	Philosophy of Research.....	43
3.3	Research Design.....	44
3.3.1	Time Horizon.....	44
3.3.2	Unit of Analysis.....	45
3.3.3	Degree of Researcher’s Interference	46
3.3.4	Population and Sampling.....	46
3.4	Data Collection Method.....	49
3.4.1	Qualitative	50
3.4.2	Quantitative method	52
3.5	Content Validity.....	55
3.5.1	Quality of Journal	55
3.5.2	Expert Opinion Analysis (EOA).....	56
3.6	Reliability.....	57
3.6.1	Cronbach’s Alpha.....	57
3.6.2	Triangulation	58
3.7	Data Analysis Method.....	59
3.7.1	Descriptive analysis.....	59
3.7.2	T- test.....	59
3.7.3	Coding	60
3.7.4	Data Analysis Tools and Techniques	60
3.8	Chapter Summary	61
CHAPTER 4	DATA ANALYSIS.....	62
4.1	Introduction.....	62
4.2	Fieldwork	62

4.2.1	Qualitative method	63
4.2.2	Quantitative method	63
4.3	Participant Profiling	64
4.4	Supporting Documents.....	66
4.4.1	Land Acquisition Process for State Land	66
4.4.2	Example letter of Approval Permit to Enter.....	68
4.4.3	Example letter of TOL application approval.....	69
4.4.4	BI Dashboard for Site Acquisition process	70
4.5	Mixed-Method Pre and Post Data Analysis.....	70
4.5.1	Qualitative method	71
4.5.2	Quantitative	77
4.5.3	Assessment of normality for numerical data	78
4.5.4	Descriptive analyses – Demographic analyses.....	78
4.5.5	Comparative analyses: Sample pair test.....	79
4.6	Findings and Discussion	82
4.6.1	Qualitative method	82
4.6.2	Quantitative	83
4.6.3	Summary of the Findings	84
4.7	Chapter Summary	84
CHAPTER 5	CYCLE ONE REFLECTION	85
5.1	Introduction.....	85
5.2	Overall Findings.....	85
5.2.1	Objective 1.....	85
5.2.2	Objective 2.....	87

5.2.3	Objective 3.....	89
5.3	Contribution	89
5.3.1	Theoretical Contribution.....	90
5.3.2	Practical Contribution.....	90
5.4	Action Research Reflection	90
5.4.1	Research Process Reflection.....	91
5.4.2	Research Reporting Effectiveness	92
5.4.3	Research Future Implications	92
5.5	Conclusion	93
5.6	Cycle Two Proposed Intervention and Implication	94
5.6.1	Input.....	94
5.6.2	Transformation	95
5.6.3	Output.....	95
CHAPTER 6	CYCLE TWO DATA ANALYSIS.....	96
6.1	Introduction.....	96
6.2	Fieldwork	96
6.3	Quantitative method.....	97
6.4	Participant Profiling.....	98
6.5	Supporting Documents.....	100
6.6	Land Acquisition Process for Reserved Land.....	100
6.7	Land Acquisition Process for Forest Land.....	101
6.8	BI Dashboard for Site Acquisition process (second intervention cycle)	103
6.9	Quantitative Method Analysis	104
6.9.1	Assessment of normality for numerical data	105

6.9.2	Descriptive analyses – Demographic analyses Cycle 2.....	106
6.9.3	Comparative analyses: Paired Samples T-Test	107
6.10	Findings and Discussion	109
6.10.1	Quantitative method	109
6.10.2	Summary of the Findings	110
6.11	Chapter Summary	111
CHAPTER 7	CYCLE TWO REFLECTION.....	112
7.1	Introduction.....	112
7.2	Overall Findings.....	112
7.2.1	Objective 1.....	112
7.2.2	Objective 2.....	113
7.2.3	Objective 3.....	113
7.3	Contribution	116
7.3.1	Theoretical Contribution.....	116
7.3.2	Practical Contribution.....	116
7.4	Action Research Reflection	117
7.4.1	Research Process Reflection.....	117
7.4.2	Research Reporting Effectiveness	118
7.5	Conclusion	118
7.6	Action Research Overall Reflections.....	119
7.7	Limitations	122
7.8	Future Recommendations	123
REFERENCE	125

LIST OF TABLES

Table 1.2.1: The PESTEL Analysis	5
Table 1.2.2: The Internal analysis	7
Table 1.2.3: The SWOT Analysis	9
Table 1.3.1: Overall activities during Part 1's Milestones.....	12
Table 1.3.2: Overall activities during Part 2's Milestones.....	12
Table 2.3.1: Primary and Secondary Stakeholders and their roles	26
Table 2.3.2: Dashboard's general and specific features according to their managerial level	32
Table 2.4.1: The summary of past interventions.....	36
Table 3.3.1: Population and Sampling	49
Table 3.4.1: Timeframe for Interview Process.....	50
Table 3.4.2: Interview Protocol for Problem Diagnosis Stage.....	50
Table 3.4.3: Survey Questionnaire.....	53
Table 3.5.1: Expert Opinion Analysis (EOA).....	56
Table 3.6.1: The Alpha Cronbach Value (Konting et al, 2009).....	57
Table 3.6.2: Pilot Test's Cronbach's Alpha Result	58
Table 4.3.1: The qualitative respondents	64
Table 4.3.2: The quantitative respondents	65
Table 4.5.1: Thematic Analysis	72
Table 4.5.2: Normality Test	78
Table 4.5.3: Paired Samples Statistics and Paired Samples Correlations	80
Table 4.5.4: Paired Samples Test.....	80

Table 4.5.5: Table of Critical Value.....	81
Table 4.6.1: Simplified Paired Sample T-Test Result for AR Cycle 1	83
Table 5.2.1: Simplified Paired Sample T-Test Result for AR Cycle 2	88
Table 6.1.1: The quantitative respondents	99
Table 6.1.2: Normality Test	105
Table 6.1.3: Paired Samples Statistics and Paired Samples Correlations for Cycle 2 ...	107
Table 6.1.4: Paired Samples Test for Cycle 2	108
Table 6.1.5: Simplified Paired Sample T-Test Result for Cycle 2.....	110

LIST OF FIGURES

Figure 1.2.1: Project Timeline for JENDELA NFCP1	3
Figure 1.3.1: The two main stages of constructing a telecommunication tower.....	11
Figure 1.3.2: Comparison between total site and site acquired by type of land	15
Figure 1.3.3: Fish Bone Diagram.....	16
Figure 1.3.4: The bar graph analysis from Web of science browser.....	18
Figure 1.3.5: The bar Treemap analysis from Web of science browser	19
Figure 2.3.1: Power Interest Grid for stakeholder prioritisation	27
Figure 2.3.2: Dashboard’s Feature Categories.....	31
Figure 2.3.3: Ratio of Lewis, Nielsen, and ISO 9241-11 dimensions	34
Figure 2.5.1: The Action Research Process according to the research topic	38
Figure 2.5.2: Research transformation plan: Development and Usability testing of Tactical Dashboard.	39
Figure 2.6.1: The research process.....	41
Figure 3.3.1: Time Horizon for Action Research Cycle 1	45
Figure 4.2.1: Fieldwork activities	62
Figure 4.2.2: Questionnaire design using Likert scale. Source adapted from Khalid et al. (2020).....	64
Figure 4.4.1: Flowchart of land acquisition process for state land	67
Figure 4.4.2: Example letter of Approval Permit to Enter	68
Figure 4.4.3: Example letter of TOL application approval	69
Figure 4.4.4: The BI Dashboard of Site Acquisition Milestone	70

Figure 4.5.1: Mix method of data analysis.....	71
Figure 4.5.2: Mind Map of Improving the Effectiveness of Land Acquisition Process ..	77
Figure 4.5.3: Demographic analysis – Gender and Age	78
Figure 4.5.4: Demographic analysis – Sector and Work Profession.....	79
Figure 5.6.1: Cycle Two Proposed Intervention and Implication	95
Figure 6.1.1: Fieldwork activities	97
Figure 6.1.2: Questionnaire design using Likert scale. Source adapted from Khalid et al. (2020)	98
Figure 6.1.3: Flowchart of land acquisition process for reserved land	101
Figure 6.1.4: Flowchart of land acquisition process for forest land.....	102
Figure 6.1.5: Example letter of Approval Permit to Enter	102
Figure 6.1.6: The updated BI Dashboard of Site Acquisition Milestone	103
Figure 6.1.7: The information update from the state authority	104
Figure 6.1.8: Demographic analysis – Gender and Age	106
Figure 6.1.9: Demographic analysis – Sector and Work Profession.....	106
Figure 7.2.1: Site acquisition milestone status by type of land.....	115

LIST OF ABBREVIATIONS

JENDELA	Jalanan Digital Negara
NFCP1	National Fiberization and Connectivity Plan Phase 1
MCMC	Malaysian Communication and Multimedia Commission
DUSP	Designated Universal Service Providers
USP	Universal Service Provision
LSD	Land and Survey Department
LC	Local council
OSA	One Stop Agency
SFD	Sabah Forest Department
PPHT	Assistant Collector of Land Revenue
PMO	Project Management Office
SESB	Sabah Electricity Sdn Bhd
BOMBA	Fire and Rescue Department
CAAM	Civil Aviation Authority of Malaysia
UPEN	State Economic Planning Unit
KSTI	Ministry of Science Technology and Innovation
TOL	Temporary Occupation License
LUC	Land Utilization Committee
OP	Occupation Permit
ID	Infrastructure Development
SFF	Site Finalization Form

LA	Land Application
DTF	Dashboard Tactical Features
TAM	Technology Acceptance Model
PU	Perceived Useful
PEOU	Perceived Ease of Use
BI	Behavior Intention
BSC	Balance Score Card
KPKT	Ministry of Housing and Local Governance

LIST OF APPENDICES

APPENDIX A SIMILARITY INDEX REPORT	129
APPENDIX B IMPACT REPORT.....	130
APPENDIX C SUPERVISOR CONSENT FORM	131
APPENDIX D INTERVIEW CONSENT FORM	132
APPENDIX E COMPANY LETTER OF INTENT	134
APPENDIX F COMPULSORY MEETING FORM – AR1.....	136
APPENDIX G COMPULSORY MEETING FORM – AR2.....	147
APPENDIX H PRESENTATION CONSENT FORM.....	158
APPENDIX I INTERVIEW PROTOCOL	159
APPENDIX J PRE & POST SURVEY INSTRUMENT	161
APPENDIX K INTERVENTION AR CYCLE 1	164
APPENDIX L INTERVENTION AR CYCLE 2	165

CHAPTER 1

INTRODUCTION

1.1 Introduction

This research focus on the improvement of the land acquisition process for the purpose of developing communication tower under the initiative of Malaysian Communication and Multimedia Commission (MCMC). MCMC is a regulatory body whose key role is to regulate and develop the communication and multimedia industry in Malaysia. MCMC oversees the government's initiative to bridge the digital divide and uplift the underprivileged groups across the country. One of the initiative is to expand the coverage of Internet connectivity at rural and remote area through the Jalanan Digital Negara (JENDELA) plan.

JENDELA plan is a government nationwide initiative through Malaysian Communication and Multimedia Commission (MCMC) to improve the coverage and quality of service through faster and more comprehensive infrastructure development. The significance of this plan is to achieve the national aspiration, enhance the people's experience on seamless connectivity to cater to the new norm as well as set a strong foundation for our country towards 5G technology.

Infrastructure Development (ID) Department is one of the department in the MCMC Sabah state office that play a very significant role in planning and implementing the development of communication infrastructure in Sabah. With an aim to expand the Internet connectivity to 90% of Sabah's populated area, the department is strive to

accomplish this goal through the enhancement of current practice and the usage of latest technology and methodologies.

This chapter will discuss the background of the company, the problematic situations that affect project implementation, the research questions and objectives, the researcher's role, ethics, the theoretical and practical significance of the proposed research, and term definitions.

1.2 Case Company Introduction

One of the core function of MCMC is to provide access of communication to the underserved group at the underserved area through the Universal Service Provision (USP) programme. The primary purpose of the USP initiative is to give collective and individual access to basic telecommunications and Internet services across the country. Service providers typically concentrate their efforts in commercially attractive areas, which has resulted in a divide between the urban "haves" and rural "have-nots." Often referred to as the Digital Divide, this disparity in communication availability has the potential to have social consequences if not handled adequately at the national level. Among the initiative conducted under USP are:

- i. Mobile Broadband Coverage Expansion
- ii. Fixed Broadband Expansion
- iii. Core Network Development
- iv. Community Access and Support Programme

Jalanan Digital Negara (JENDELA) is part of USP initiatives to meet the needs of digital connectivity. JENDELA aim to prepare the nation for a gradual transition to 5G technology and will also lay the foundation for comprehensive and high-quality broadband coverage facilities. The objective of this national digital infrastructure plan is to expand 4G mobile broadband coverage from 91.8% to 96.9% nationwide; increase mobile broadband speeds from 25Mbps to 35Mbps, and enables 83% premises nationwide

to access gigabit-speed of fixed broadband. The overall project is expected to complete by end of Quarter 4, 2022.

In Sabah, the targets of the JENDELA project are to construct 584 new towers, upgrade 3,377 existing towers from 2G/3G to 4G coverage, and enable 251,155 new premises to access gigabit-speed of fixed broadband.

The JENDELA project's initial phase is called the JENDELA National Fiberisation and Connectivity Plan 1 (JENDELA NFCP1), which began in February 2020. JENDELA NFCP1 aims to expand the 4G coverage by developing 150 new telecommunication towers nationwide. 50 out of 150 sites were allocated in Sabah, which is under the supervision of the Infrastructure Development (ID) Department of MCMC Sabah State Office. The project timeline for JENDELA NFCP1 is shown below:

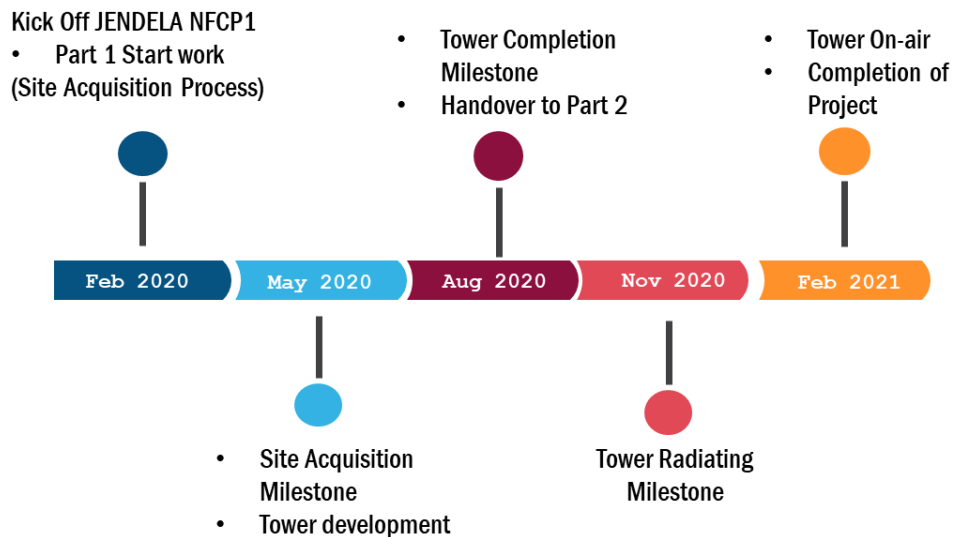


Figure 1.2.1: Project Timeline for JENDELA NFCP1

Based on the project timeline above, the duration for completing the project is only 1 year that begins in February 2020 and expected to complete by February 2021. It involves two main activities; Part 1 is developing the communication tower, and Part 2 is the installation of radio communication. The project consist of 4 milestones that consist

of site acquisition milestone, tower completion milestone, tower radiating milestone and completion of project milestone.

1.2.1 External Environmental Analysis

The telecommunications industry is one of the most dynamic sectors of the global economy. Products and services in this industry change at a rapid pace. As a telecommunications company grows, internal processes and technologies become increasingly important. The ability of a business to adapt to rapidly changing market needs is critical to its success in a volatile external environment (Balashova et al., 2017). Telekom Malaysia, Maxis, Celcom, Digi and TIME are among the main industry players in Malaysia that continuously expand their network infrastructure and improve according to the technology trend. However, the industry player strategic plans has to be in line with the government initiatives and also to follow the rules, regulations and policies sets by the respective ministry.

The telecommunication industry in Malaysia is primarily governed under the Ministry of Communication and Multimedia (MCM). As the regulator body under this ministry, MCMC regulate and develop the telecommunications and multimedia sector based on the powers provided for in the Malaysian Communications and Multimedia Commission Act (1998) and the Communications and Multimedia Act (1998). Pursuant to these Acts its role is also to implement and promote the Government's national policy objectives for the communications and multimedia sector.

Early 2021, the federal government has launched the MyDIGITAL initiative that is to bring forward the plan to roll-out of the next generation mobile technology, 5G from year 2022 to last quarter of 2021. The 5G deployment will provide the country with digital connectivity and robust infrastructure. Malaysian government decision to invest RM15 billion to build 5G infrastructure nationwide over 10 years period through a government-owned Special Purpose Vehicle (SPV) is a similar approach to High-Speed Broadband

(HSBB) project in 2008. 5G implementation is a highly CAPEX oriented investment and telecommunication infrastructure sharing will reduce the cost of mobile services, and it will also enable the mobile operators to shift their focus to provide enhanced products & services at an affordable rate. The government is dedicated in providing access to high quality mobile and fixed broadband to everyone in the country, through Jalinan Digital Negara (JENDELA) initiative.

The situation of the Malaysia telecommunication industry and the industry players specifically, can be further analyzed using the PESTEL Analysis, which consist of Political, Environmental, Social, Technology Economic and Legal factors. All these elements can be used to evaluate the impact to the appointed industry players also known as the Service Provider such as the Ministry of Communication and Multimedia sudden decision to award SPV to manage the development of 5G infrastructure nationwide has causes some impact to other Service Provider. The description for external environmental analysis using the PESTEL analysis is shown in Table 1.2.1 below.

Table 1.2.1: The PESTEL Analysis

Factors	Opportunity	Threat
<p>Social:</p> <p>The increase demand for fast internet at populated area for home based learning, business through online and working from home has encourage Service Provider to improve their coverage and quality</p>	✓	
<p>Technology factor:</p> <p>Rapid advancement in technology to deploy 5G network has demand Service Providers to invest more on</p>		✓

<p>fiberisation tower for strengthening 4G coverage and sunset its 3G network.</p>		
<p>Economy factor: The Malaysian government has allocated RM 9.4 Bil for developing JENDELA plan nationwide that involves commitment from the industry players</p>	<p>✓</p>	
<p>Environmental factor: Due to current Covid-19 pandemic and Movement control order (MCO), non-essential business are closed, thus has affected the progress of developing communication tower.</p>		<p>✓</p>
<p>Political factor: The change of government may cause impact to the direction of the previous initiative. Political interference to the current initiatives somehow may cause impact to the Service Provider's current improvement plan.</p>		<p>✓</p>
<p>Legal factor: The Service Provider need to obtain approval from the state authority in terms of acquiring land and permission to deploy communication infrastructure. Some process may took longer since it involves engagement with many stakeholders.</p>		<p>✓</p>

1.2.2 Internal Environmental Analysis

Internal environmental study of an organisation identifies both its strengths and weaknesses. What occurs within the organisation provides a wealth of data for internal examination. Internal elements include human resources, tangible and intangible assets, management, and operational efficiencies. The Infrastructure Development (ID) department's internal strengths and weaknesses in terms of coordinating the implementation of communication tower with the industry player can be analysed further in order to demonstrate the findings in the Table 1.2.2 below.

Table 1.2.2: The Internal analysis

Factors	Strength	Weakness
<p>Management Assessment</p> <p>The ID department and Service Provider uses excel as a tools to monitor the progress project in details.</p>		✓
<p>Marketing Assessment</p> <p>The ID department consist of several teams from all over Sabah (1 main office, 3 branch offices) that could evaluate consumer needs in terms of Internet connectivity.</p>	✓	
<p>Financial Assessment</p> <p>JENDELA initiatives is backed under the USP fund which is fully controlled and monitored by MCMC USP Division. Some JENDELA initiatives are commercially funded by the appointed Service Provider.</p>	✓	

<p>Operations Assessment</p> <p>The implementation of developing communication tower is depending on the performance of the appointed Service Provider. In NFCP1 project, all industry players involved are highly experience with over 15 years of experience in communication industry.</p>	✓	
<p>Management Information System (MIS) Assessment</p> <p>The ID team has lack of experience in using latest technology to conduct planning and monitoring the project implementation. There is no project management tools and data visualisation used for monitoring the project progress.</p> <p>The Service Provider faces difficulty in obtaining information and engagement with the state authority, thus leads to slow decision making.</p>		✓

1.2.3 SWOT Analysis

The SWOT analysis is conducted to those entity that are directly involved in the JENDELA project in Sabah, which consist of ID department and the DUSP. The strengths and weaknesses from the internal analysis and the opportunities and threats from the external analysis were tabled below for deeper analysis to identify the factor that causes problem for the DUSP to deliver the project. The table of summarised SWOT analysis is shown below.

Table 1.2.3: The SWOT Analysis

STRENGTH	WEAKNESS
<p>i. The ID department teams consist of staff from main office and 3 branch office that could evaluate consumer needs in terms of Internet connectivity.</p> <p>ii. JENDELA initiatives is backed under the USP fund which is fully controlled and monitored by MCMC USP Division.</p> <p>iii. The implementation of developing communication tower is depending on the performance of the appointed industry player. In NFCP1 project, all industry players involved are highly experience with over 15 years of experience in communication industry.</p>	<p>i. The ID department is lack of tools to monitor the progress project in details.</p> <p>ii. The ID team has lack of experience in using latest technology to conduct planning and monitoring the project implementation. There is no project management tools and data visualisation used for monitoring the project progress.</p> <p>iii. The Service Provider faces difficulty in obtaining information and engagement with the state authority, thus leads to slow decision making.</p>
OPPORTUNITIES	THREATS
<p>i. The increase demand for fast internet at populated area for home based learning, business through online and working from home has encourage industry players to improve their coverage and quality.</p> <p>ii. The Malaysian government has allocated RM 9.4 Bil for developing JENDELA plan nationwide that involves commitment from the industry players.</p>	<p>i. Rapid advancement in technology to deploy 5G network has demand Service Providers to invest more on fiberation tower for strengthening 4G coverage and sunset its 3G network.</p> <p>ii. Due to current Covid-19 pandemic and Movement control order (MCO), non-essential business are closed, thus has affected the progress of developing communication tower.</p> <p>iii. The change of government may cause impact to the direction of the</p>

	<p>previous initiative. Political interference to the current initiatives somehow may cause impact to the industry players' current improvement plan.</p> <p>iv. The industry players need to obtain approval from the state authority in terms of acquiring land and permission to deploy communication infrastructure. Some process may took longer since it involves many stakeholders.</p>
--	--

The SWOT analysis in Table 1.2.3 was done in this chapter to explore more about how ID department and the appointed Service Provider working together in carrying out the development of communication tower towards the improvement of Internet connectivity in Sabah. Matching the strengths, weaknesses, opportunities and threats could develop SWOT Matrix that could help to identify 4 strategies as below:

i. SO strategies:

Due to high demand of high speed broadband by the community, the service provider should take the opportunity to collaborate with the government to implement the initiatives that is to develop the JENDELA plan nationwide.

ii. WO strategies:

To manage, assist, and supervise the development of telecommunication infrastructure in Sabah in order to satisfy the demand for connectivity, the ID department's tools and people capabilities must be sharpened to minimise hiccups.

iii. ST strategies:

ID department is required to use its government-to-government advantage to assist the Service Provider in engaging with the local authorities so that to ensure Service Provider could deliver the project effectively.

iv. WT strategies:

ID department should use the latest technology such as data warehouse and data visualization to support the Service Provider in providing compiled and analysis information from the state agencies.

1.3 Problem Statement

The implementation of the JENDELA project is similar to other project development of telecommunication towers. The overall project is divided into two main parts, which Part 1 involves the construction of the telecommunication tower by the tower builders, and Part 2 will be the installation of the telecommunication equipment by the service providers. Both Part 1 and Part 2 is categorised as the Designated Universal Service Provider (DUSP). The two main stages of the overall process for constructing telecommunication tower can be illustrated as below:

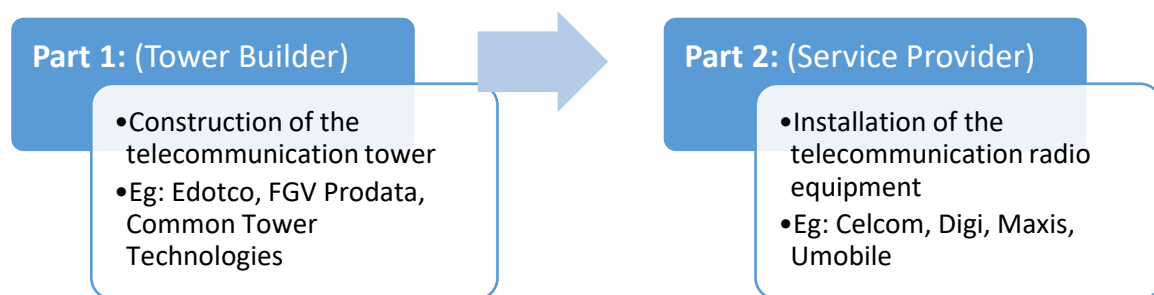


Figure 1.3.1: The two main stages of constructing a telecommunication tower

Part 1 is responsible to acquire the site according to the requirements sets by MCMC such as the coverage objectives and requirements sets by Part 2 such as the ability

to obtain line-of-sight (LOS) from the nearby existing towers and the source of power supply. Part 1 roles cover acquiring the site, erecting the tower, completion of CME works, and getting full approval from the respective local council. Each part will be given 180 days as their implementation period to complete the project according to the targeted milestones. The activities during the implementation period of Part 1 is as below:

Table 1.3.1: Overall activities during Part 1’s Milestones

Part 1’s Milestones (180 days)					
Site Survey & Acquisition	Submission to Local Council	Completion of Tower Foundation	Completion of Tower Erection	Completion of CME works	Site Handover, Official Notification to Part 2, and declaration site completion
60 days	20 days	30 days	20 days	30 days	20 days

After Part 1 has completed the site, they will officially handover the site to Part 2. As for Part 2, their roles begin from applying for electricity from SESB (or provide own power supply such as solar/genset), followed by the installation of the communication radio equipment until the communication tower is on-air. The tower will be continuously maintained by Part 2 until the end of tenure. The activities during the implementation period of Part 2 is as shown below:

Table 1.3.2: Overall activities during Part 2’s Milestones

Part 2’s Milestones (180 days)				
Completion of Transmission Survey and application	Completion of Equipment and Power Supply Installation works	Completion of Site Integration and Testing	Completion of Site Optimization	Declaration of site completion
60 days	60 days	30 days	30 days	

Based on Table 1.3.1 and 1.3.2, it can be understood that Part 2 will not be able to start work if Part 1 has not completed the tower development and handover the site to Part 2. Thus, Part 2 is very much dependent on the performance of Part 1. In addition, Part 1 will only be able to start work if only they have completed the site acquisition milestone and were permitted to enter site. Based on our observation from the past project, site will be completed on time if the site acquisition is completed according to the given timeline. Therefore, it is confirmed that the most crucial process in developing telecommunication tower is the site acquisition milestone. To gain a better understanding of the site acquisition milestone's procedure, the details will be explored in further detail in the following subtopic.

1.3.1 Site Acquisition Milestone

As previously discussed, the most critical milestone in this project is the first milestone in Part 1, which is the site acquisition process. This process requires engagement with secondary stakeholders such as government departments, private companies, and landowners. The site acquisition process may sometimes be complicated depending on the type of land. There are 5 types of land in Sabah which may require different documentation and process:

1. **Native land (land with title):** requires tenancy agreement with the landowner
2. **Country lease (land with title):** requires tenancy agreement with the corporate owner.
3. **Forest Land (land without title):** requires to apply Occupation Permit (OP) for both access and land acquisition from the Sabah Forestry Department (SFD)
4. **Reserved Land (land without title):** requires tenancy agreement with the state government under jurisdiction of the LSD.
5. **State Land (land without title):** requires to apply Temporary Occupation License (TOL) from the Land and Survey Department (LSD).

For land with title, the acquisition process is quite straight forward, that is to finalised Tenancy Agreement with the official landowner or the corporate owner. However, the land acquisition process for land without title may involve engagement with several state authorities or in this project known as the secondary stakeholders.

For Forest land, the land acquisition process requires engagement with the Sabah Forest Department (SFD) and the Forest Management Unit (FMU). The DUSP is required to apply for occupational permit from the Sabah Forest Department at the respective district. A joint site visit with the SFD and FMU officers is required before SFD issuing an offer letter to the applicant. Finally, the SFD officer will issue out the OP once the DUSP has reviewed, signed and return the offer letter to SFD.

For Reserve land, the land acquisition process will involve several secondary stakeholders, which are the Custodian office, the State Attorney General's Office, the LSD office, and. First, the service provider is required submit their intention to the custodian office to acquire the land. Upon getting consent letter from the custodian office, the DUSP is required to engage the LSD to apply for the land based on the Sabah Land Ordinance (Cap 69) Section 28. The process requires a tenancy agreement between the DUSP and the Sabah state government, which will be represented by the LSD. The tenancy agreement will be vetted and finalized by the State Attorney General's Office before both party could sign and stamp the agreement. Once the tenancy agreement is signed, the DUSP is authorised to access the land and begin work.

For State land, the land acquisition process may involve with many secondary stakeholders, which are the Assistant Collector of Land Revenue, LSD (Land Alienated Section), Secretary of State Revenue Office, Registered Private or District Surveyor, and LSD (Valuation Section). To acquire the land, the DUSP is required to apply for Temporary Occupation License (TOL) from the LSD. TOL is basically defined as a form of tenure which grants an allotter temporary occupation of vacant public land, including reservations, way-leaves and public utility, with the condition that only temporary

materials will be used for construction of any building on the allocated plot (Mazlan, M. H., 2008). The process of TOL application in Peninsular Malaysia is based on the National Land Code 1965. The process however differ in Sabah where TOL application in Sabah is based on the Sabah Land Ordinance (Cap 69) Section 18. In the beginning of this research, there is no written guideline on the overall process of applying TOL for the purpose of acquiring land that falls under the state land.

Without getting consultation from ID department, the DUSP had approached the local community who have applied for the land application for quite some time and have arranged tenancy agreement with them. After this approach has come to ID department’s attention, we have advice for the DUSP to follow the right process that is to approach the Assistant Collector of Land Revenue of the respective district for TOL application process.

1.3.2 Problem Diagnosis

Referring to the JENDELA NFCP1 project, based on the department’s observation after 10 months, 20 out of the 50 sites (40%) are still pending under the site acquisition process. This can be illustrated in the Figure 1.3.2 below. Furthermore, a total of 13 sites, which is more half of the site acquisition issue falls under the state land that is yet to have land title. Thus, sites under the category of state land can be seen the most critical issue that cause project to be behind schedule.

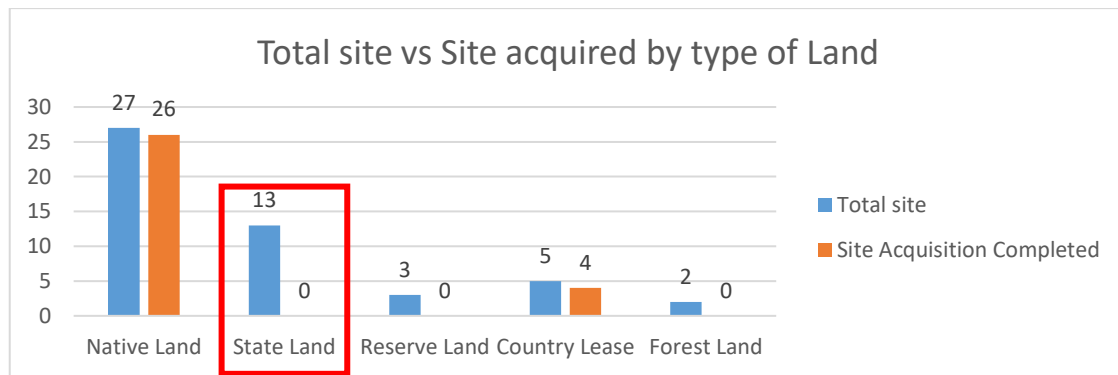


Figure 1.3.3: Comparison between total site and site acquired by type of land

To further understand the problem, we should explore further on the factor that contribute to the issue of project behind schedule. The Fish bone diagram in Figure 1.3.4 below shows the possible factors that causes the project to be behind schedule.

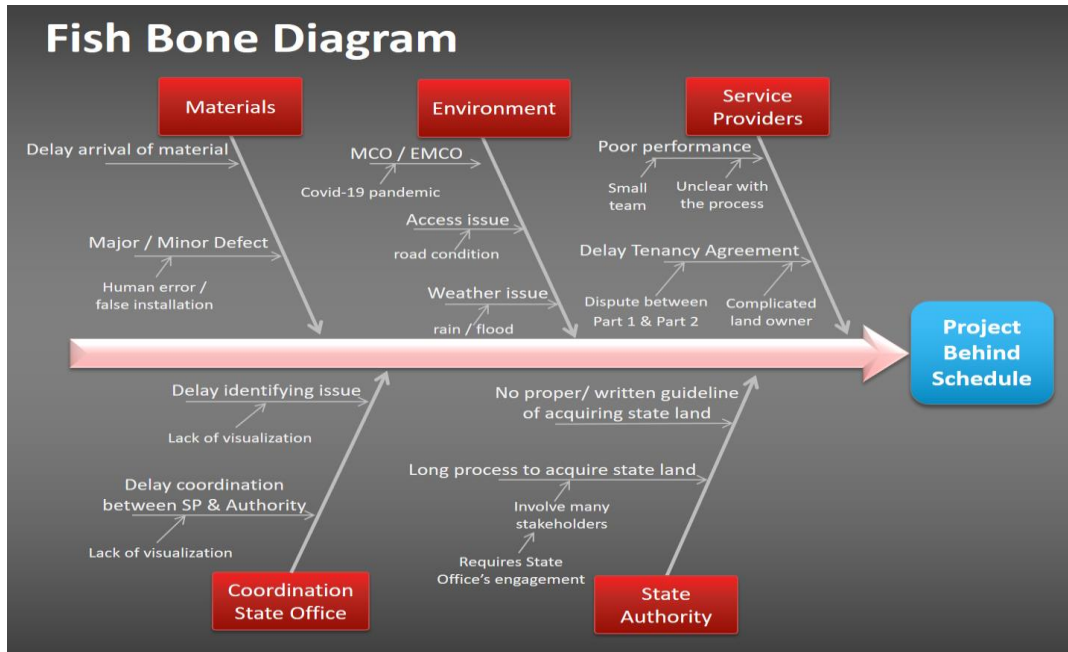


Figure 1.3.5: Fish Bone Diagram

One of the major problems that cause a delay in the previous project was due to a lack of visualization of the overall project. Even though the project progress was updated by the DUSP during the monthly meeting at every end of the month via presentation and excel file, however, delay in terms of the DUSP reporting the issue and MCMC to propose a solution to that problem has already occurred. Until now there is no proper monitoring tools that could support the DUSP to acquire land in effective way. ID department is currently depending on the excel file that is updated by DUSP at every end of the month. Due to that, ID department faces difficulty in identifying the foreseeable problem which may arise later in the project, such as the issue in obtaining the site acquisition by the state authority.

There are several other factors that have contributed to the delay in completing each milestone of the NFCP1 project. Among other factors are:

- i. Miscommunication between primary and secondary stakeholders, due to lack of knowledge of the right procedure to acquire state land.
- ii. No proper process or guidelines to acquire state land sets by LSD.
- iii. There is no client charter for LSD to process the land application.
- iv. Environmental issue: COVID-19 pandemic & MCO restriction

After identifying the factor that causes delay to the overall project, ID department has conducted validation of all the root causes through meeting with the DUSP. Based on the validation, the root cause of Service Provider performance, Environmental and Materials can be solved by the DUSP themselves. Thus, the main root cause of the problem are focused on the issue with State Authority and coordination of MCMC State office.

For that reason, intervention from ID department, Sabah State Office is important to align both primary and secondary stakeholders to have a similar understanding to meet the project goals. ID department believes that proper visualization monitoring tools will provide clear information and solve the miscommunication issues. One of the main purposes of this study is to solve issues or challenges faced by the primary stakeholders' faces when dealing with the secondary stakeholders.

Based on the research problem, this study aims to develop a dashboard as a visual management tool for the state office to monitor the project milestone and to provide solution by stakeholders immediately. In line with the government initiatives towards digital transformation, this dashboard will be expected to transform the way Sabah State Office managed the JENDELA project effectively. However, due to time constraints, this project will only focus on the dashboard development for the site acquisition milestone which has been identified to be the most crucial part of the overall JENDELA NFCP1 project.

1.3.3 Theoretical Gaps

Any study undertaken should contribute to the advancement of knowledge in a particular sector or industry. The findings or outcome should have an influence on industry and be relevant outside the context of the research.

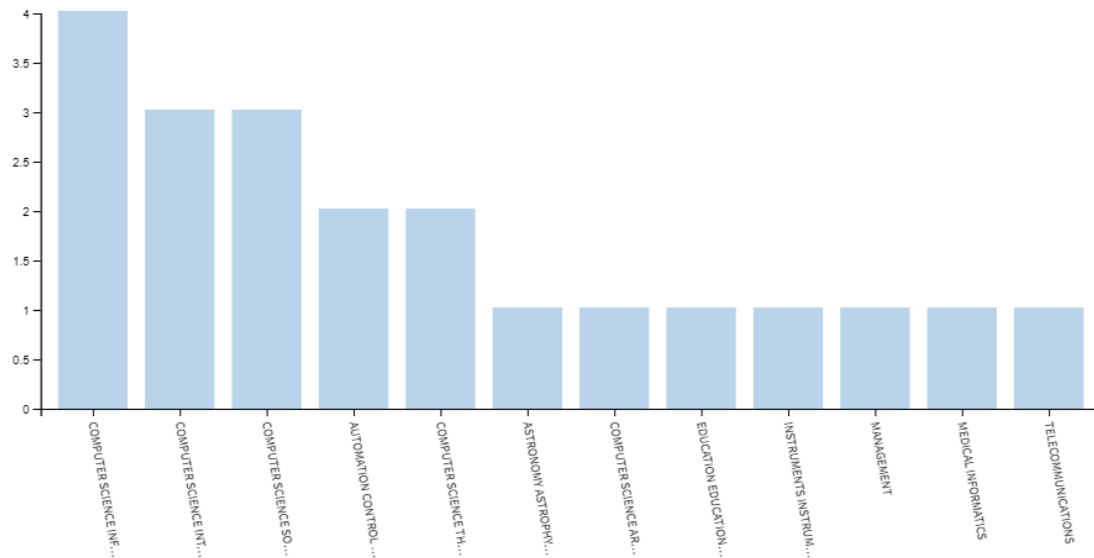


Figure 1.3.6: The bar graph analysis from Web of science browser

The finding in Figure 1.3.7 above shows the total number of the proposed study in field of improving productivity of project management by using dashboard. From the graph above, it can be seen that from the past there are not many studies conducted in this field. The highest portion of the analysis box is only with 4 studies and the total number of 21 records for the search of the study title. Although the number of previous study is small however the topic is still relevant as the topic of modern data management to improve the productivity of project management is still new.

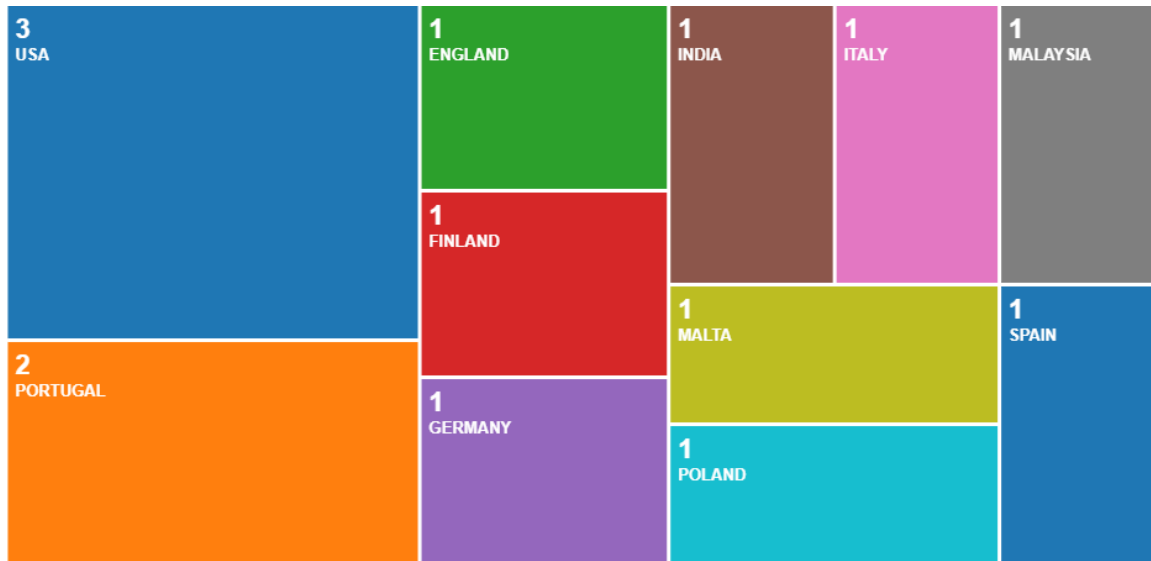


Figure 1.3.8: The bar Treemap analysis from Web of science browser

Further analysis on the country involve from the Web of science shows that the highest research publications are from the USA and Portugal. The rest of country listed in Figure 1.3.9 have contributed 1 research topic each including Malaysia. Malaysia is also in the list with 1 publication, indicating that there is a need to contribute more publication in this research topic for our country. The publication from Malaysia is about Business Intelligence Dashboard for driver performance in Fleet Management. According to the results of the search, there has yet to be a publication from UTM on this topic.

1.3.4 Practical Gaps

Based on the environmental analysis, SWOT matrix and the problem statement explained above, there is no study conducted specifically to solve the problem of delay in land acquisition process for the purpose of developing communication tower. Therefore, it is significant for the researcher to conduct research on this topic to resolve this issue. If this research is not conducted, the same issue will happen again in the future. Therefore, to overcome the problem, it is necessary for the ID department to work together with the primary and secondary stakeholder to fill up the practical gap.

1.4 Research Questions

Following the establishment of the problem description, the research questions were regarded an active phase in this study. It is critical to direct the study's flow, indicate what to look for, and provide a clear aim. As a result, the research questions for this research include the following:

Research Question 1:

With regards to JENDELA NFCP1 project, what are the current practice of the DUSP in acquiring land and what factor contribute to the delay?

Research Question 2:

What needs to be done that could facilitate the DUSP to be able to acquire land in more effective way?

Research Question 3:

What recommendations can be made for the benefits of the DUSP to maintain their performance in delivering JENDELA NFCP1 project?

1.5 Research Objective

The development of research questions is closely linked to the research objectives. The research objectives should be attainable, clear, and verifiable, as it contribute directly to addressing the research questions. As a result, the study's objectives are as follows:

(a) To understand the issue faced by the DUSP and to identify the factor that contributes to the delay in land acquisition process

(b) To develop and implement a tactical dashboard accessible to all stakeholders that facilitate the DUSP to acquire land effectively

(c) To recommend the improvements required by measuring the perception of the DUSP on the usefulness and the information quality of the tactical dashboard

1.6 Researcher's Role

A researcher must undertake transformative change in order to provide good study results, by taking action and doing research at the same time. This action research project is useful as the intervention tools able to assist the department from all office including branch offices to monitor and facilitate the project. In this study, the researcher plays an important role as the head of the department which responsible to several matters as below:

- a) The researcher is responsible for the successful implementation of the project according to agreed timelines and for the timely submission of the report.
- b) The researcher is responsible in terms of work, discipline, and all other matters to ensure the smooth progress of the research.
- c) The researcher will remain responsible to carry out the research until completed.
- d) The researcher will present the research to UTM upon request by the lecturer.

1.7 Research Ethics

Generally, research ethics is referring to the guidelines for the responsible for conducting the research. Thus, below is the general summary of some ethical principles:

- a) The researcher shall honestly report all the data, findings, and methodology. The report is purely written by the researcher where it does not fabricate, falsify, or misrepresent data.
- b) The researcher shall avoid bias in methodology, findings, interpretation, analyses, and other aspects of research
- c) The researcher shall avoid careless errors and negligence; carefully and critically assess the research works.

1.8 Significance of the Research

This research is significantly important especially in ensuring the JENDELA plan in Sabah state to be implemented according to the given timeline. In line with the MCMC's key initiatives to enhance digitalization and connectivity in Malaysia, it is essential to improve the visualization of the project implementation, especially when dealing with a national project like the JENDELA plan. Furthermore, should the delay occur to the future JENDELA plan, its chain effect will cause a delay for our country to achieve the national aspiration. Therefore, there is a need for ID department, Sabah State Office to closely monitor and facilitate both primary and secondary stakeholders in each milestone of the JENDELA plan via the newly developed monitoring dashboard.

Besides that, it will help Sabah State Office to provide an instant progress report of the JENDELA implementation to the Project Management Office (PMO), MCMC's top management, as well as to the Sabah state government.

The improvements also aim to:

- ensure the internal team at Sabah State office and internal primary stakeholders have a similar understanding and better visualization on the overall JENDELA project,

- allow everyone who has the access to the monitoring dashboard to obtain the information at anytime, anywhere and from any device with Internet connectivity,
- be implemented in the physical monitoring room for future development in Sabah State Office.

1.9 Definition of Terms

Terms	Definition
Line-of-sight (LOS)	Line of sight (LOS) is a type of propagation where transceiver stations can see each other without any obstacle between them.
USP Division	A division in MCMC that in charge of planning, provide funding, and the project owner of the JENDELA project
CME Works	To supply, deliver and construct the tower and its ancillary services
JSS	Part 1 and Part 2 to conduct a joint site survey to identify suitable tower location based on the nominal point
JSV	Part 1, Part 2, and MCMC to conduct a joint site visit to finalize the tower location is meeting with the KPKT guidelines 2002.

REFERENCE

- Alpkaya S, Sakarya C (2013) User experience transformation in telco companies: Turkcell Case. In: Marcus A (ed) Design, user experience, and usability. Web, Mobile, and Product Design. DUXU 2013. Lecture Notes in Computer Science, vol 8015. Springer, Berlin, pp 84–93
- Buttigieg SC, Pace A, Rathert C. Hospital performance dashboards: a literature review. *J Health Organ Manag.* 2017 May 15;31(3):385-406. doi: 10.1108/JHOM-04-2017-0088. PMID: 28686130.
- Chinyio, E.A. and Olomolaiye, P. (2010), “Construction Stakeholder Management”, Wiley-Blackwell, Oxford.
- Conover, W.J. (1980), *Practical Nonparametric Statistics*, New York: Wiley & Sons, ISBN: 978-0-471-16068-7
- Coulibaly, A.D. (2004), “La défaillance des PME belges: Analyse des déterminants et modélisation statistique” No. 437, Unpublished doctoral dissertation, Presses univ. de Louvain.
- Davis, F.D., Bagozzi, R.P. and Warshaw, P.R. (1989), “User acceptance of computer technology: A comparison of two theoretical models”, *Management Science*, Vol. 35 No. 8, pp. 982-1003.
- De Oliveira, M., Mattedi, A. P., & Seabra, R. D.. (2021). Usability evaluation model of an application with emphasis on collaborative security: an approach from social dimensions. *Journal of the Brazilian Computer Society*, 27(1). <https://doi.org/10.1186/s13173-021-00108-8>
- Dix A, Finlay J, Abowd G, Beale R (2004) *Evaluation techniques. Human-computer interaction.* Pearson Education Limited, England

- Dowding, D., Randell, R., Gardner, P., Fitzpatrick, G., Dykes, P., Favela, J., Hamer, S., Whitewood- Moores, Z., Hardiker, N., Borycki, E. and Currie, L. (2015), “Dashboards for improving patient care: review of the literature”, *International Journal of Medical Informatics*, Vol. 2 No. 2, pp. 87-100.
- Eckerson, W. (2011), *Performance Dashboards. Measuring, Monitoring and Managing your Business*, John Wiley & Sons, NJ.
- Few S., and Edge P. (2007), “Dashboard Confusion Revisited,” pp. 1–6.
- Freeman, R.E. (1984), *Strategic Management: A Stakeholder Approach*, Pitman, Boston.
- Freeman, R.E. (1994), “The politics of stakeholder theory: some future directions”, *Business Ethics, Quarterly*, Vol. 4 No. 4, pp. 409-422.
- Harun, P. (2016), “Design guideline for UTM academician personal research and publication dashboard”.
- Huemann, M., Eskerod, P. and C. Ringhofer, (2016), “Rethink! Project Stakeholder Management”, Newtown Square, Project Management Institute, Inc.
- Janes, A., Sillitti, A. and Succi, G. (2013), “Effective dashboard design”, *Cutter IT Journal*, Vol. 26 No. 1, pp. 17-24.
- Karami, M., Safdari, R. and Rahimi, A. (2013), “Effective radiology dashboards: key research findings”, *Radiology Management*, Vol. 35 No. 2, pp. 42-45.
- Khalid, A.S. et al. (2020), Business Intelligence Dashboard for Driver Performance in Fleet Management. 347-351. 10.1145/3377571.3377642.
- Nielsen J (1993) Usability Engineering. Morgan Kaufmann, California
- Pauwels K. et al. (2009), "Dashboards as a service: why, what, how, and what research is needed?," *Journal of Service Research*, vol 12, no. 2, pp. 175-189.
- Person, R. (2013), *Balanced Scorecards and Operational Dashboards with Microsoft Excel*, John Wiley & Sons, NJ.

- Preece J, Rogers Y, Sharp H (2002) Interaction design: beyond human-computer interaction. Wiley, Inc., Crawfordsville
- Prethus W., and Canales C. A. (2015), "*Business Intelligence Dashboard Design. A Case Study of a Large Logistics Company*," Norsk konferanse for organisasjoners bruk av IT, Vol. 23, No. 1.
- Rahman, A. A., Adamu Y. B., and Harun P., "Review on dashboard application from managerial perspective," 2017 International Conference on Research and Innovation in Information Systems (ICRIIS), Langkawi, 2017, pp. 1-5,
- Rasmussen, N. (2009), *Business Dashboards*, John Wiley & Sons, NJ.
- Roseke B. (2008), "Project Stakeholder Management According to the PMBOK, (PMBOK fourth edition)
- Schultz, A.L. (2017), "Integrating lean and visual management in facilities management using design science and action research", Built Environment Project and Asset Management, Vol. 7 No. 3, 2017, pp. 300-312
- Shapiro, J. (2017), "3 Ways Data Dashboards Can Mislead You", Harvard Business Review, available at: <https://hbr.org/2017/01/3-ways-data-dashboards-can-mislead-you> (accessed 26 December 2020).
- Stadler J. G., Donlon K., Siewert J. D., Franken T., and Lewis N. E. (2016), "Improving the Effectiveness and Ease of Healthcare Analysis Through Use of Data Visualization Dashboards," vol. 4, no. 2, pp. 129–135.
- Staron M. (2015), "Dashboard development guide How to build sustainable and useful dashboards to support software development and maintenance,"
- Vasnier, J., Maranzana, N., Messaadia, M., & Aoussat, A. (2020). "*Preliminary Design and Evaluation of Strategic Dashboards through the Technology Acceptance Model*". Proceedings of the Design Society: DESIGN Conference, 1, 777-786. doi:10.1017/dsd.2020.18

- Venkatesh, V. and Davis, F.D. (1996), “*A model of the antecedents of perceived ease of use: Development and test*”, *Decision Sciences*, Vol. 27 No. 3, pp. 451-481.
- Weiner, J., Balijepally, V. and Tanniru, M. (2015), “*Integrating strategic and operational decision making using data-driven dashboards: the case of St. Joseph Mercy Oakland hospital*”, *Journal of Healthcare Management*, Vol. 60 No. 5, pp. 319-331.
- Yigitbasioglu O. M., and Velcu O. (2012), “*A review of dashboards in performance management: Implications for design and research*”, *International Journal of Accounting Information Systems*, Vol. 13, Issue 1, Pages 41-59, ISSN 1467-0895.
- Zulyadi, A. Lubis, and B. H. Hayadi (2016), “*Designing architecture of information dashboard system to monitor implementation performance of economic census 2016 in Statistics Indonesia*,” 2016 4th Int. Conf. Inf. Commun. Technol. ICoICT 2016, vol. 4, no. c.