

**THE DYNAMICS OF INTEGRATED  
OFFSHORE CRANE OPERATION  
MANAGEMENT OF HANDAL ENERGY BHD**

**TENGGU BADERUL ZAMAN IBNI SULTAN  
MAHMUD**

**ASIA e UNIVERSITY  
2024**

THE DYNAMICS OF INTEGRATED OFFSHORE CRANE OPERATION  
MANAGEMENT OF HANDAL ENERGY BHD

TENGGU BADERUL ZAMAN IBNI SULTAN MAHMUD

A Thesis Submitted to Asia e University in  
Fulfilment of the Requirements for the  
Doctor of Business Administration

August 2024

## ABSTRACT

This study examines the factors and challenges of integrated offshore crane services in Malaysia. This is a qualitative study using in-depth interview methodology. A total of 13 informants from stakeholders were selected, which involved integrated offshore crane services, competitors, customers and government officials. Based on the literature review, the crane service faces various challenges and obstacles such maintenance, part availability, labour costs, talent recruitment, expertise and in addition to this, logistics units, finance and exchange rates are also being identified. This study has also discovered obstacles relating to the growth of the projects. Unstructured and semi-structured questions were asked of the informants who participated in these in-depth interviews. Information collected from interviews and in-depth observations was taken through mnemonic writing and analysed. The results of the study have been organized according to basic themes, organizational themes and global themes. In conclusion, this study has summarized a qualitative phenomenon about the business and its contribution to the country's economic growth. This study found that the contract, the services and maintenance, technological advancements, skilled shortages, environmental considerations, logistics and supply chain, cost management and asset management effect the integrated offshore crane business and also this study provides suggestions for future studies, implications, theoretical and practical issues for stakeholders in dealing with the services issues in Malaysia.

**Keywords:** Integrated offshore crane services, operation management, offshore economic growth, offshore engineering

## **APPROVAL**

This is to certify that this thesis conforms to acceptable standards of scholarly presentation and is fully adequate, in quality and scope, for the fulfilment of the requirements for the degree of Doctor of Business Administration

The student has been supervised by: **Professor Dr Juhary Ali**

The thesis has been examined and endorsed by:

**Professor Dato Dr Hj Mohamad Nasir Bin Hj Saludin**  
**Professor**  
**Universiti Geomatika Malaysia**  
Examiner 1

**Professor Dr Khairul Anuar Mohd Ali**  
**Professor**  
**Universiti Kebangsaan Malaysia**  
Examiner 2

This thesis was submitted to Asia e University and is accepted as fulfilment of the requirements for the degree of Doctor of Business Administration



.....  
Professor Dr Noor Raihan Ab Hamid  
Asia e University  
Chairman, Examination Committee  
30 August 2024

## **DECLARATION**

I hereby declare that the thesis submitted in fulfilment of the DBA degree is my own work and that all contributions from any other persons or sources are properly and duly cited. I further declare that the material has not been submitted either in whole or in part, for a degree at this or any other university. In making this declaration, I understand and acknowledge any breaches in this declaration constitute academic misconduct, which may result in my expulsion from the programme and/or exclusion from the award of the degree.

**Name: Tengku Baderul Zaman Ibni Sultan Mahmud**

**Signature of Candidate:**

**Date: 30 August 2024**



## ACKNOWLEDGEMENTS

The pursuit to obtaining DBA has been a daunting task. This is especially so considering my position as a Non-Executive Chairman, where I need to divide my time productively to cater for my job responsibility and academic work. I decided to undertake this challenge as I am a strong believer to lifelong learning where one needs to learn, unlearn and relearn the whole process of education and experience in order to reach a greater height of human achievement. As we know, the field of knowledge and practice is dynamic, and one needs to be well equipped with the latest challenging trends and be able to adopt and adapt to any change environment to be at the vanguard of competition. Alhamdulillah, I am able to complete this engaging task toward the completion of this thesis. This process could not have been possible without the support of my family, friends and my supervisor as well as the academic team from AeU who are untiringly giving me the moral support and encouragement.

Lastly, I would like to express my deepest appreciations to some of the people who have made my journey a fruitful one. They are namely my supervisor Professor Dr Juhary Ali, my mother YTM Tengku Besar Terengganu, Sharifah Nong Assegoff and father HRH Sultan Mahmud Al Muktaffi Billah Shah who are still my source of inspiration, my wife, To' Puan Seri Hidayah Wan Ismail and my children, Tengku Emira Shaza, Tengku Muhammad Ryan and Tengku Reyad Feysal as well as those who have assisted me directly or indirectly to reach the final destination towards the completion this DBA program. May Allah bless them and offer all of us his divine guidance and affection towards a better life in this world and the life hereafter.

Aamin Ya Rab.

## TABLE OF CONTENTS

<b>ABSTRACT</b>	<b>ii</b>
<b>APPROVAL</b>	<b>iii</b>
<b>DECLARATION</b>	<b>iv</b>
<b>ACKNOWLEDGEMENTS</b>	<b>vi</b>
<b>TABLE OF CONTENTS</b>	<b>vii</b>
<b>LIST OF TABLES</b>	<b>x</b>
<b>LIST OF FIGURES</b>	<b>xi</b>
<b>LIST OF ABBREVIATION</b>	<b>xii</b>
<b>CHAPTER 1 INTRODUCTION</b>	<b>1</b>
1.0 Background of the Studies	1
1.1 Integrated Crane Services in Malaysia	3
1.1.1 HANDAL ENERGY BHD (HEB)	5
1.2 Problem Statement	6
1.3 Research Objectives	10
1.3.1 To Examine the Determining Factors Affecting the Operation Management of Handal Energy Offshore Integrated Crane	10
1.3.2 To Identify the Behaviour of Offshore Project Owner in Malaysia	10
1.3.3 To Identify the Challenges in Operation Management of Offshore Crane by Handal Energy Bhd	10
1.4 Research Questions	11
1.4.1 What are the Determining Factors Affecting the Operation Management of Handal Energy Offshore Integrated Crane?	11
1.4.2 What is the Behaviour of Offshore Project Owner in Malaysia?	11
1.4.3 What are the Challenges in Operation Management of Handal Energy Bhd. Offshore Crane?	11
1.5 Significance of the Study	11
1.6 Scope of the Study	12
1.7 Definitions Terms	12
1.8 Organisation of the Chapters	13
<b>CHAPTER 2 THEORETICAL DISCUSSION ON THE STUDY (LITERATURE REVIEW)</b>	<b>14</b>
2.0 Introduction	14
2.1 Importance of Operations Management	14
2.1.1 Efficiency and Productivity	14
2.1.2 Quality Control	14
2.1.3 Cost Reduction	15
2.1.4 Customer Satisfaction	15
2.1.5 Strategic Decision-Making	15
2.1.6 Adaptability and Risk Management	15
2.2 Integrated Crane Services Support	16
2.3 Services and Maintenance	19
2.3.1 Safety	19
	vii



2.3.2	Efficiency	19
2.3.3	Compliance	19
2.3.4	Cost-Effectiveness	20
2.3.5	Reliability	20
2.3.6	Crane Inspection and Testing	21
2.3.7	Preventive Maintenance	21
2.3.8	Safety Record	21
2.3.9	Safety and Compliance	22
2.4	Skill Workers Shortages	22
2.4.1	Aging Workforce	22
2.4.2	Impact of COVID-19	22
2.4.3	Skills Shortage	23
2.4.4	Industry Reputation and Job Security	23
2.4.5	Training and Certification Challenges	23
2.5	Cost Management	23
2.5.1	Budget Control and Profitability	26
2.5.2	Resource Optimization	26
2.5.3	Risk Mitigation	26
2.5.4	Enhanced Decision-Making	26
2.5.5	Compliance and Reporting	27
2.5.6	Long-Term Sustainability	27
2.6	Logistics and Supply Chain	28
2.7	Regulatory Compliance	29
2.7.1	Safety	30
2.7.2	Legal and Financial Risks	30
2.7.3	Operational Efficiency	30
2.7.4	Competitive Advantage	30
2.7.5	Continuous Improvement	31
2.8	Relationship Amongst Human Resource Management, Financial Management, Safety, Health Management, Technical Management, for Integrated Offshore Crane Operation Management is Very Significant	31
2.8.1	Human Resource Management (HRM)	31
2.8.2	Financial Management	32
2.8.3	Safety and Health Management	36
2.8.4	Technical Management	37
2.8.5	Marketing Management	37
2.9	Knowledge and Technology	43
2.10	Petronas Organization Behaviour (Petronas's Valves System Petronas)	45
2.10.1	Petronas Organizational Environment	46
2.11	Summary	50

### **CHAPTER 3 METHODOLOGY 51**

3.0	Introduction	51
3.1	Profile of the Informants	52
3.2	Qualitative Research in Crane Business Studies	57
3.3	Proposal Research Method	57
3.4	Research Design and Procedures	59
3.5	Ensuring Reliability, Validity and Objectivity	59

3.6	Ethical Considerations	62
3.7	In-depth Interviews	64
3.8	Designing In-depth Interview Questions	67
3.9	Participant Recruitment	72
3.10	Population and Sample	73
3.11	Conducting In-depth Interview	81
3.12	In-depth Interview Analysis	83
	3.12.1 Gaining Entry	85
	3.12.2 Data Collection	93
3.13	Data Analysis	105
3.14	Conclusion	112
<b>CHAPTER 4 FINDINGS AND DISCUSSION</b>		<b>114</b>
4.0	Introduction	114
	4.0.1 What are the Determining Factors Affecting the Operation Management of Handal Energy Offshore Integrated Crane?	114
	4.0.2 What is the Behaviour of Offshore Project Owner in Malaysia?	114
	4.0.3 What are the Challenges in Operation Management of Handal Energy Bhd. Offshore Crane?	114
4.1	The Thematic Explorations of the Issues	115
4.2	Operation Management and Maintenance	121
<b>CHAPTER 5 DISCUSSIONS AND CONCLUSIONS</b>		<b>137</b>
5.0	Introduction	137
	5.0.1 What are the Determining Factors Affecting the Operation Management of Handal Energy Offshore Integrated Crane?	137
	5.0.2 What is the Behaviour of Offshore Project Owner in Malaysia?	139
	5.0.3 What are the Challenges in Operation Management of Handal Energy Bhd. Offshore Crane?	141
5.1	Implications of the Study	143
5.2	Conclusions and Recommendations	145
<b>REFERENCES</b>		<b>150</b>
<b>APPENDICES</b>		<b>154</b>
	Appendix A- Interview Guides	154
	Appendix B- Figure	161

## LIST OF TABLES

<b>Table</b>		<b>Page</b>
3.1	Distribution of informants by gender and age	52
3.2	Marital status of informants	53
3.3	Highest education level of the informants	54
3.4	Religious belief of the informants	54
3.5	Occupational distribution by gender of informants	55
3.6	Steps for finding interviewees	66
3.7	Interview guide for director/management of Handal Energy Bhd	68
3.8	Interview guide for director, top management, authority, suppliers and agent of Handal Energy Bhd (Topic 1)	69
3.9	In-depth interview informants	74
4.1	Thematic framework	116

## LIST OF FIGURES

<b>Figure</b>		<b>Page</b>
2.1	Thematic network structure	48
2.2	Global theme and thematic network (Integrated crane)	48
3.1	In-depth interview analytical steps	84
3.2	Structure of a thematic network	112
4.1	TBAD thematic network model	136

## **LIST OF ABBREVIATION**

CAGR	THE COMPOUND ANNUAL GROWTH RATE
HEB	HANDAL ENERGY BERHAD
USD	US DOLLAR
US	UNITED STATES OF AMERICA
MP	MALAYSIA PLAN

# CHAPTER 1

## INTRODUCTION

### 1.0 Background of the Studies

According to Fateh Adilah's 2021 projections, the global cranes market is expected to expand at a Compound Annual Growth Rate (CAGR) of 4.5% between 2021 and 2028, rising from \$36.36 billion in 2021 to \$49.64 billion. COVID-19 is having an unprecedented and catastrophic worldwide impact, and the market is seeing a positive influence on demand throughout all regions during the pandemic. According to Fortune Business Insight's (2020) report, the global market experienced exceptional growth in 2020, growing by 2.7% year over year, in contrast to the typical increase experienced between 2017 and 2019. The market's demand and growth, which will eventually revert to pre-pandemic levels once the pandemic is gone, are responsible for the abrupt increase in CAGR (Fortune Business Insight, 2020).

A crane is a kind of machinery used for horizontal load transportation. It has hoist ropes, sheaves, and wire ropes to support raising and lowering of the large weights. The key elements of the structure are the operator cabin, turn table assembly, electric and hydraulic systems, boom system, and chassis.

The market is expanding as a result of the building industry's rising demand. It is anticipated that the high load-lifting capability and changing designs would meet the needs of diverse industries, such as shipbuilding, complicated manufacturing, and telecommunications installations.

Additionally, as this has become a market trend, manufacturers are concentrating on renting or leasing the hoist. India, Italy, Vietnam, Turkey, and other countries are placing greater emphasis on renting services, even in the face of economic constraints.

Global market expansion is also being fuelled by rising government and private sector investments in the infrastructure sector. The market share is being further propelled by large expenditures in technology advancements to construct smart factories for manufacturing. (Insight from Fortune Business, 2020).

With the expansion of offshore exploration and production activities, cranes have become increasingly complicated and significant. As a result of the company's increased emphasis on safety laws and guidelines, routine maintenance and inspection schedules for cranes on platforms and oil rigs were created.

One of the most important pieces of equipment used in oil and gas drilling and exploration efforts is the crane. The project's profitability is somewhat impacted by the precision of the crane selection. Because cranes are so useful for lifting, moving, and manipulating materials, they are often used in petroleum drilling (Faten Adilah, 2010). As technology progressed and the need for economy and effectiveness grew, integrated crane services became a notion. Crane maintenance is just one component of integrated crane services; other associated services include lifting equipment, rigging, safety inspections, and other related services. These integrated services were frequently rendered by specialised businesses that could provide the oil and gas industry with a variety of services and expertise.

The oil and gas industry has embraced technology developments in recent years to further enhance crane services and maintenance. Using sensors and Internet of Things (IoT) devices to monitor crane performance, identify any problems, and more effectively schedule maintenance is one example of data-driven maintenance programs. With the increasing use of predictive maintenance, operators may now address issues before they result in expensive downtime.

With the expansion of offshore exploration and production activities, cranes have become increasingly complicated and significant. As a result of the company's increased emphasis on safety laws and guidelines, routine maintenance and inspection schedules for cranes on platforms and oil rigs were created.

## **1.1 Integrated Crane Services in Malaysia**

For the oil and gas industry, integrated crane services and maintenance have a history of constant evolution in response to the industry's expanding demands and obstacles. For many years, cranes have been an essential part of the oil and gas industry. As time goes on, the need of incorporating cranes into complete service and maintenance plans has grown in order to ensure safe and effective operations. The history of integrated crane services and maintenance for the oil and gas industry is summarised here, as it is referenced in the CRANECO history (<https://www.craneco.com/about/history/>).

The development of crane technology and the founding of businesses that produce and market cranes are key aspects of the history of the integrated crane industry. This timeline, which focusses on important figures and technologies, illustrates important advances in the crane industry.

### **Early Developments**

**Ancient Cranes:** Cranes have been around since the dawn of civilisation. The oldest cranes were rudimentary lever devices for raising water, like the shadoof, which was employed in Mesopotamia circa 3000 BCE. By the sixth century BCE, the Greeks had created increasingly sophisticated cranes that could lift larger objects because they used winches and pulleys in their construction.



**Roman Innovations:** By creating treadwheel cranes, which could raise much greater loads than previous designs, the Romans advanced the field of crane technology. The Romans' mastery of engineering is demonstrated by these cranes, which were in service from about 1225 until the 17th century.

### **Industrial Revolution and Modernization**

**Hydraulic Cranes:** Crane technology advanced significantly with William Armstrong's discovery of the hydraulic crane in 1838. By lifting loads using hydraulic power, this crane improved construction efficiency and capacity.

**Emergence of Crane Manufacturing Companies:** Businesses that were dedicated to the production of cranes started to appear in the late 19th and early 20th centuries. To improve their capacity for producing cranes, Sumitomo Heavy Industries and Hitachi Construction Machinery, for instance, forged partnerships and founded joint ventures. During this time, numerous production facilities were established, and sophisticated crane models were introduced.

### **Key Players in the Crane Industry**

**Sumitomo Heavy Industries:** Sumitomo, a well-known participant in the crane industry, has a track record of developing business partnerships and growing its product portfolio. With certifications such as ISO9001 and ISO14001, the company has demonstrated that it is committed to quality and environmental management while developing completely hydraulic cranes.

**Crane Company:** Crane Company has been a leader in the production and innovation of crane technology for more than 150 years. Through the development of cutting-

edge manufacturing techniques and products, the company has made a substantial contribution to a number of industries, including construction and aerospace.

**Morgan Engineering:** Morgan Engineering was established during the first industrial revolution and has progressed through several technological developments, incorporating computer and electric systems into crane designs. The business has led the way in automating crane operations, especially in the steel sector.

### **Recent Developments**

**Industry 4.0:** The advancement of crane technology is currently characterised by the integration of artificial intelligence and enhanced automation. Leading the way in this effort are businesses like Morgan Engineering, which concentrate on utilising contemporary technologies to increase crane operations' efficiency and safety.

From rudimentary lifting devices in antiquity to sophisticated, automated systems that are essential to contemporary industrial and construction operations, the integrated crane sector has seen significant evolution. This development is a reflection of both the continuous demand for effective material handling solutions and more general technological developments.

#### **1.1.1 HANDAL ENERGY BHD (HEB)**

A team of professionals with decades of experience committed to pushing the boundaries of offshore crane technology with knowledge, versatility, and innovation makes up Handal Energy Bhd, a public company HEB that was incorporated in 2011 and deals with oil and gas companies. Handal Energy Bhd is a trusted one-stop solutions provider for offshore cranes, offering innovative solutions that will shape the

future of the energy landscape. Handal Cranes is a company that specialises in the manufacturing.

HEB is a group of experts with decades of combined experience that are dedicated to using our expertise, adaptability, and inventiveness to push the limits of offshore crane technology. In South East Asia, HEB is the top supplier of rental cranes for API 2C. Currently, nearly all of the oil and gas producers in the area use HEB rental cranes. In Malaysia, HEB is one of the two manufacturers of API 2C cranes.

Value-added solutions from HEB meet even the strictest deadlines and requirements. The design of HEB products and integrated solutions enables them to quickly address the needs of clients seeking maximum productivity, cost-effectiveness, and safety. Our clients have locked us into long-term contracts after decades of effective delivery.

Moving forward, HEB continue to evolve with advanced technology, integrated expertise and innovative solutions by combining capabilities across the globe.

Through strategic and meaningful collaborations, we are able to achieve synergies that unlock new and sustainable possibilities for our clients.

## **1.2 Problem Statement**

The integrated crane services company provides services to the offshore wind energy, oil and gas, and maritime construction industries. The oil and gas industry has embraced technology developments in recent years to further enhance crane services and maintenance. Using sensors and Internet of Things (IoT) devices to monitor crane performance, identify any problems, and more effectively schedule maintenance is one example of data-driven maintenance programs. Though more often used, predictive maintenance still has challenges in maintaining profitability and growth in the present

market conditions. This is because it enables operators to fix issues before they result in expensive downtime (Fortune Business Insight, 2020).

Due to the COVID-19 pandemic, there have been partial or total lockdowns, which have severely hampered numerous manufacturing operations. The Covid-10 pandemic has a negative impact on the world market (fortune business insight, 2020).

The covid-19 outbreak has an impact on the mining, oil and gas, construction, and industrial sectors where cranes are most commonly used. Business study indicates that the construction equipment industry as a whole saw a decline in machine production of roughly 43,000 units, or over 4% of the approximately 1.07 million units produced globally in 2019. On the other hand, rental businesses are making use of the shutdown to dedicate time to maintenance tasks so they can reopen project sites.

In light of the aforementioned information, the challenge of industrial recovery in the current year is difficult. Manufacturers are hopeful about a potential comeback, but the real test will come in the first quarter of 2021 due to extremely erratic demand (Fortune Business Insight, 2020).

As a result, modifications to dealers' inventories and manufacturing closures are also having a detrimental effect on the world market. Lockdowns have also caused operators to become unavailable, which has decreased income from continuing commercial, industrial, and residential operations. (Forbes Business Intelligence, 2020).

In the 18-month financial period ending December 31, 2022, Handal Energy Berhad's integrated crane services business was unable to meet performance targets despite the modest improvement in the oil and gas business's performance. This was because of unexpectedly low work orders related to various call out contracts (Handal Energy Berhad, Annual report, 2022).

With the help of our devoted clients, the group was able to secure several new contacts and renew current contracts, as was reported on a regular basis throughout the year. However, because they are call-out in accordance with corporate protocol, these contracts lacked distinctive contractual value. But as a result of less activity than anticipated in the pipeline and crane maintenance services. The estimated work orders were only partially received by the company. As a result, revenue decreased by 25% in FYE 2022 from RM70–5 million to RM52.8 million (Handal Energy Berhad, Annual report, 2022).

From RM273. million to RM49.6 million, the group's administrative and other operational expenses increased by RM22.4 million, or 82%, over the prior year. This year, the group's intangible rights were further impaired to the tune of RM6.1 million. As a result, the group's loss after tax in FPE 2022 was RM35.2 million, while it was RM 3.1 million in the financial year prior.

The company maintained positive operational cash flow of RM78 million despite the adverse climate in which the group operated, demonstrating our dedication to prudent financial management.

### **Theoretical Aspect of Inadequate Studies on Integrated Offshore Crane Model**

In Malaysia there were inadequate integrated crane services studies. Rauch et al. (2009) found that the existing research does not provide enough inputs into developing a common global understanding of marketing environment of integrated cranes services. Vanesa, Francisco and Juan Carlos (2014) argued that a well-integrated framework on develop environmental business model through empirical research are still needed. However, an integrated mechanism, by which how the environment led to performance outcome is unresolved issue and further empirical research are

essential (Eriksson, 2014). Therefore, this study should contribute the theoretical contribution to the body of knowledge.

Another meta-analysis conducted by Philip and Anna (2014), the conceptual relationship of environmental issues was identified, but further research is needed to extend the operationalization of the existing conceptual frameworks.

In order for the organisation to maintain and increase its long-term financial performance, proper cash flow management is an essential technique. (Annual report, 2022, Handal Energy Berhad).

A large number of second-hand cranes are still in use throughout Asia, especially in Malaysia, Taiwan, Thailand, India, Pakistan, Indonesia, and the Philippines. This is because new crane imports are subject to strict registration rules and significant import charges. However, this tendency is starting to reverse as more sophisticated Chinese cranes are becoming more affordable than used cranes.

### **Practical Aspect of Different Opinion in the Market Driven Factor**

According to Eric & Hamish (2012) in an academic study, business environment is also indicators of positional advantage. Adopting the right orientation enable the detection and seizing of opportunities, as well as the making of timely and market-oriented decisions (ElNaggar et al, 2023). As well as environmental issues as the frequency and unpredictability of the market, technology, health and competitive intensity that influence the performance (Calantone, Garcia, & Droge, 2003). Wang and Fang (2012) argued that unanticipated environmental issues create the negative impact of environment on the firm required performance. Therefore, it is necessary for to study and to make further engagement.

According to Cranes Today (2022), the number of problems facing crane operators is increasing. For example, restricted market exposure, the absence of regional safety rules (in Asia is becoming more of an issue since the region's markets depend heavily on second-hand, frequently broken cranes). Regarding this matter, a safety specialist noted that "there is no regional consensus." Multilingual crews continue to present training issues for Asian businesses, highlighting the significance of leader-led, practical training. According to Brian Cronie, regional training director for Mammoet Singapore, there is an extra safety risk during a recession since managers are under more pressure to complete tasks with fewer employed workers and because operators are more likely to take on tasks outside their training.

According to him, overloading can lead to mechanical issues and is only utilised by manufacturers for controlled load chart calculations and to relieve material strains. It is not a reliable way to confirm crane safety. "Every overload test will shorten the crane's lifespan," stated Stenger. More planning is required offshore. ONA Engineering principal engineer Mike Priestly demanded more rules and regulations.

### **1.3 Research Objectives**

The following objectives were focus at, while concentrating on elements influencing the integrated crane business:

**1.3.1 To Examine the Determining Factors Affecting the Operation Management of Handal Energy Offshore Integrated Crane**

**1.3.2 To Identify the Behaviour of Offshore Project Owner in Malaysia**

**1.3.3 To Identify the Challenges in Operation Management of Offshore Crane by Handal Energy Bhd**

## **1.4 Research Questions**

There are three research questions addressed in this study as follows:

**1.4.1 What are the Determining Factors Affecting the Operation Management of Handal Energy Offshore Integrated Crane?**

**1.4.2 What is the Behaviour of Offshore Project Owner in Malaysia?**

**1.4.3 What are the Challenges in Operation Management of Handal Energy Bhd. Offshore Crane?**

## **1.5 Significance of the Study**

This study would be a significant contribution to knowledge advancement, and any additional useful applications that could be drawn from it would benefit upper management and any business operating in a comparable environment to the one under study.

This study also advances our knowledge of the theoretical justifications for the challenges and difficulties encountered by Malaysia's integrated crane industry. The outcomes provide additional insight into how to handle this.

This study has clarified how other elements affect this sector from a practical and administrative perspective. Without a doubt, our research assists government organisations and decision-makers in coming to fact-based public policy decisions. This is particularly relevant to the future development and improvement of Malaysian engineering. In addition to addressing significant research issues, the analysis offers creative and promising new directions for future investigation into connected enterprises.