MASTER OF BUSINESS ADMINISTRATION:

A STUDY ON DATA ANALYTICS IN OPERATIONS MANAGEMENT IN SOUTH EAST ASIA

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DECLARATION

I hereby declare that this thesis is my own work and effort and that it has not been submitted anywhere for any award. Where other sources of information have been used, they have been duly acknowledged.

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The appreciation would not be complete without acknowledging the contribution of my family and friends for the unlimited love and support in encouraging and inspiring me throughout the journey of this research paper.

RESEARCH ABSTRACT

The area of research aims to study and explore Data Analytics in regard to Operations Management in companies based in South East Asia. The research aims to investigate the awareness of Data Analytics in Operations Management in South East Asia, to evaluate the usage of Data Analytics in Operations Management in companies in the region and if there is significant improvement from the usage of data driven decision-making in Operations Management in companies in the region.

Data analytics has increasingly become important for companies to gain and maintain competitive advantage. It's usage in South East Asia however faces several issues as the adaptation is not well documented. In this research, technology companies will be included in the research to gain a better and more detailed view on Data Analytics in Operations Management and specifically in South East Asia.

This is a qualitative research. Qualitative research methods allow a researcher to understand the topic from a personal view as you get first-hand information on how the participants say and do (Tafara, 2016). Research on the adaptation of Data Analytics in South East Asia is important to the industry and academia and will provide a platform of further discussion on data analysis in Operations Management in the region.

Key Words: Operations Management, Data Analytics, Qualitative, Data Driven Decision-Making

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LIST OF ABBREVIATIONS

DDM – Data Driven Decision-Making

OM – Operations Management

SEA – South East Asia

1.0 CHAPTER ONE: INTRODUCTION

1.1 OVERVIEW

In this thesis, issues involving the use and effectiveness of data analysis in Operations Management within companies in South East Asia are discussed. The dissertation will focus in the use of advanced Data Analytics tools and techniques such as big data programming and advanced spreadsheet usage in assisting Operations Management decision making and processes. It assesses how this can result to the improvement in Operations Management within companies operating in South East Asia.

In this chapter, the reader will be introduced to the background of the research study and problem definition. The problem will then be analysed and used to formulate research questions and objectives. The significance of the study will be discussed and the limitations. Lastly this chapter will highlight the scope of the research study and research outline.

1.2 RESEARCH BACKGROUND

In both scholarly and practical worlds, Big Data & Analytics became progressively crucial in the last few years. Organizations try to use BD&A's advantages to better comprehend their company and industry and to create prompt company choices. Analytics is defined as the methods, technologies, systems, procedures, methodologies and apps that evaluate crucial company data and helps to create a better understanding and inform on decisions (Papadopoulos et al., 2017).

Singapore has now produced the biggest progress in analytics and artificial intelligence outside North America. The biggest centre for worldwide Data Analytics growth. Other nations such as Malaysia and Vietnam also produce beneficial results with Data Analytics implementation and have constructed a good profound technology start-up environment in the last five years (Bhatia, 2019).

Despite the prospective advantages, the implementation in activities and production chain leadership of Data Analytics is fairly unknown. According to (Papadopoulos et al., 2017) there is a growing need to bridge the gap and thus, management procedures, practical elements and difficulties, and company impacts are becoming more and more understandable when using Data Analytics instruments and methods from organisations and distribution channels.

In this emerging world, the use of data is becoming necessary for ensuring better utilization of resources. (Walker, 2019) argues that Data has become the most valuable commodity in the world powering the economy the same way oil powered the 20th century. The use of Data Analytics therefore is going to be paramount in improving operational efficiency when it is used in Operations Management. In this day and age, businesses face the challenges of unpredictable business environments, change requests during development or production and erroneous demand forecasting among other things that crucially influence the operations (Kozjek et al., 2019). This is easily caused by the lack of knowledge, incomplete information and other external factors such as supplier shortages. The necessity for solid and accurate data is enhanced as business aim to overcome these shortcomings and ensure operations run smoother than intended.

Therefore, the purpose of conducting this research is to investigate the relationship and associate Data Analytics and Operations Management have within companies in South East Asia.

1.3 PROBLEM DEFINITION

Analysing large sets of operational data enables enterprises to make more efficient, faster and better choices. This means that a company should have improved efficiency and performance when using Data Analytics techniques for its operational management. This is the ideal situation reflecting the relationship between Data Analytics and Operations Management. However, studies show that over 75% of

companies could not make major improvements to their organization while still investing in data analysis (Ghasemaghaei, Ebrahimi and Hassanein, 2018).

According to a research by the Economist Intelligence Unit (EIU), more than half of companies surveyed in the Asia-Pacific region have produced restricted strides in using the authority of big data. The primary obstacles were variables in your own business, according to 91% of participants in the study. The major difficulties mentioned were the absence of appropriate hardware (42%) and the absence of abilities (40%). The next biggest barriers were the absence of 36 percent of each department of data sharing and communication.

Our key research problem is to understand what the connection or relationship between Data Analytics and Operations Management in South East Asia is. Using companies as case studies in the region, this research paper will investigate the awareness, usage and impact of Data Analytics in Operations Management.

1.4 RESEARCH QUESTIONS & OBJECTIVES

Based on the problem definition and scope of the study, this research paper will assess the topic in the perspective of employees in operations or Data Analytics departments and their need to improve the Operations Management of their organizations. The research question therefore is:

RQ1 – What is the level of awareness of Data Analytics in Operations Management in South East Asia?

RQ2 – What is the level of usage of Data Analytics in Operations Management in South East Asia?

RQ3 – Does the usage of data driven decision-making result in significant improvement in Operations Management in the region?

Based on the scope of the study, research objectives of this thesis are:

RO1 – Identify the level of awareness of Data Analytics in Operations Management in South East Asia.

RQ2 – Identify the level of usage of Data Analytics in Operations Management in South East Asia.

RO3 – Identify the significance of Data Analytics in Operations Management in South East Asia.

1.5 SIGNIFICANCE OF THE STUDY

The study is both an academic study and industry study. The outcome of this research will provide the applications of Data Analytics and data driven decision-making in Operations Management for companies in South East Asia. Its purpose is to empirically assess how Data Analytics is used in Operations Management to influence decision making and planning.

The findings of the research will contribute to proper adaptation of Data Analytics in Operations Management for companies the ASEAN region. Research on Data Analytics in Operations Management is also important to the public service industry according to (Data Driven Government, 2017).

1.6 LIMITATIONS OF THE STUDY

Based on the nature of research which is the use of Data Analytics in Operations Management in South East Asia, the research is going to be largely a qualitative research. The study will be rigorously conducted but unfortunately the results will be limited by a small sample size.

The short period of time available would affect the quality of this research as the data would not be vast and thus a prominent conclusion is hard to make.

1.7 SCOPE OF THE STUDY

(Sedgwick, 2014) states that the unit of analysis is the 'who' a study is about. For this research paper, it is the operations team in the companies. This thesis will focus on investigating the importance of data driven decision-making in South East Asia. Data driven decision-making is based on big Data Analytics. The research will concentrate on the Operations Management of the companies where day to day running and decision making happens. The research methodology used in the dissertation is

qualitative. The data will be obtained from semi structured interviews. It will then be analysed for descriptive and statistical results.

1.8 THESIS OUTLINE

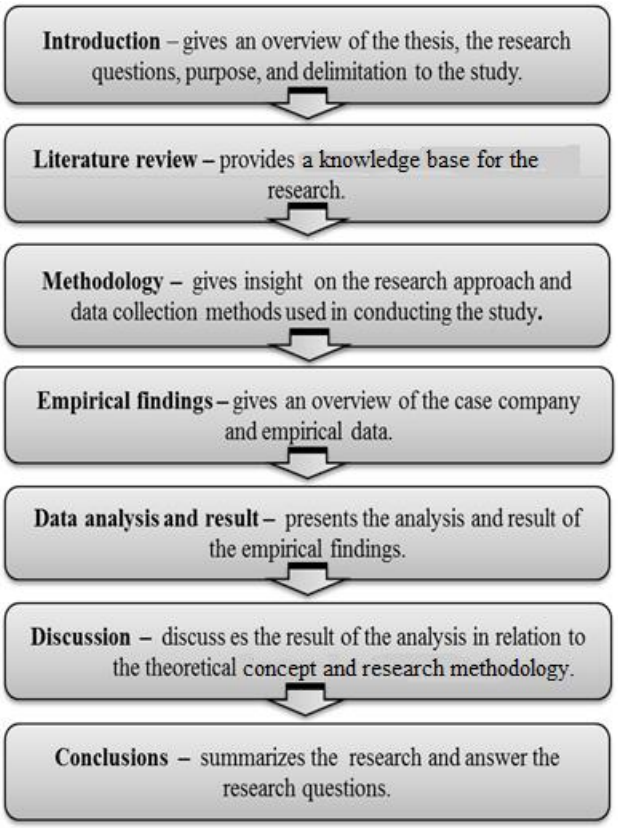

Figure 1 Thesis Outline

1.9 CONCLUSION

This chapter has explained the background, problem statement, research questions and objectives, significance of the study, the limitations and the scope. This chapter proves the reader with an introduction view of the thesis.

2.0 CHAPTER TWO: LITERATURE REVIEW

2.1 OVERVIEW

In this research paper, the literature review provides a sound knowledge base. The aim of this chapter is to explain the theoretical background for the reader to understand the research area of Operations Management, Data Analytics and Data Driven decision-making. It gives an overview of data driven decision-making in Operations Management using previous research articles and literature and presents the concept of Data Analytics in Operations Management across the globe and South East Asia.

2.2 OPERATIONS MANAGEMENT AREAS

In this research paper, we select operations model as the unit of analysis for which we can evaluate the use and effect of data analysis. It helps to understand how value is created by working resources, capabilities, processes or people within an organization (Li et al, 2016). The operations model defines the structure in which all this Operations Management areas deliver end products and services. According to (Slack and Lewis, 2017), there are four Operations Management decision areas. They are:

2.2.1 SUPPLY CHAIN MANAGEMENT

No organization can exist in isolation but must instead consider the more broadly-based network of stakeholders with whom it is connected at this age of globalization, mass adaptation and short product life cycles (Addo-Tenkorang and Helo, 2019). As business models became more global and customized; as a point of difference, the operational models adapt significantly how their supply network is shaped with a higher degree of supplier and customer collaboration in innovation, focus on agility and supply chain responsiveness, and control of the supply chain risk (Li and Liu, 2019).

2.2.2 CAPACITY MANAGEMENT

An organization's capacity strategy determines its productive potential or production level. The location of the capacity can influence the ability to offer flexibility and reaction for customers from a service delivery point of view. This is linked directly to the shape of an operations capacity and if the capacity is concentrated, it is spread over less sites or a more decentralized structure. The capacity determination is often closely linked to the forecasting demand level. Recognizing the inherent inaccuracies of many predictive technologies, together with dynamic and volatile consumer demand patterns, organizations strive to better understand demand on the market to enable them to respond with appropriate decisions on their capabilities.

2.2.3 PEOPLE DEVELOPMENT

An important element in this aspect of the operating model is how the operation works with stakeholders – both internally and externally. This aspect of an operational model includes activities that are continually improved, linked to enhanced or reformed direct operations, or updated to changing industry or market requirements (Roden et al., 2017). For numerous product and service platforms to be digitalised and customer processing technologies to be added to various industries that face customers; decision makers need to assess the scope of responsibility for parts of the process to consumers when they design or update their business models.

2.2.4 TECHNOLOGY AND PROCESS

The last aspect of the operations model concerns the design, configuration and layout of its processes and associated process technological decision-making. This includes integration degree, complexity, scalability, accessibility and feasibility. In terms of efficiency and operating capture of information; technology has a

profound influence on each operation, from the extent to which it involves customers and the expanded supply chain for the delivery of product or service. Traditional material processing technologies become less prevalent with the development of new digital business models.

2.3 DATA ANALYTICS AND Operations Management

The sheer volume of academic and industrial research shows the importance of big data in numerous functional business sectors such as marketing, management of human resources, production and operations and finance (Akter and Wamba, 2016). Data can be considered a strategic capacity that enables decision-makers to recognize value and use new information within or beyond their own organisation. The purpose of this paper is to examine not big data and new models of operations literally, but how big data can be employed as a form of resource to make changes in operational models easier (Barratt, Choi and Li, 2010). The comprehensive literature review connects articles, journals, books and other valuable sources from 2015 to 2019 using Google Scholar, Elsevier and Research Gate. The primary search parameters are on Data Analytics and its use in Operations Management.

Data Analytics is characterised by the five main attributes that influence its application. These attributes are more commonly known as 5Vs. They include Volume, Velocity, Variety, Veracity and Value (Addo-Tenkorang and Helo, 2019).

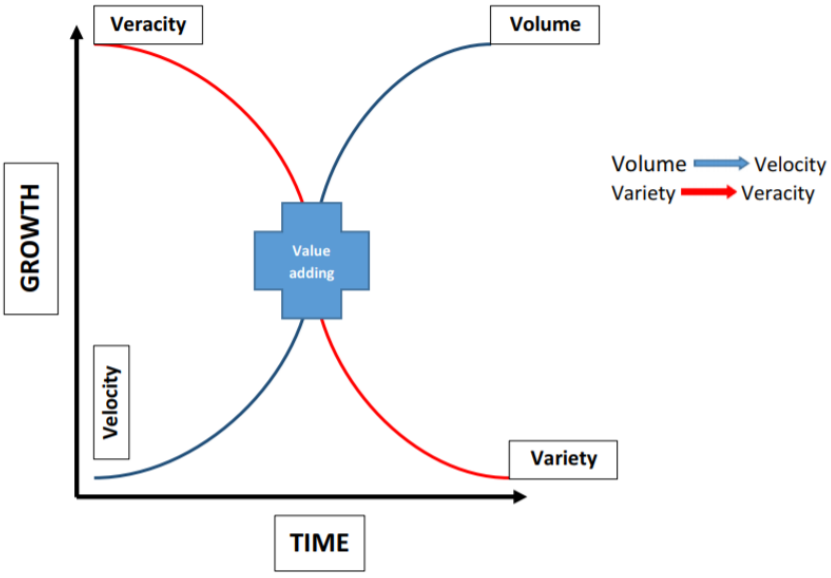

Figure 2 Five Vs of Big Data *Source: Elsevier*

Volume of data is what most people think about when they think of Data Analytics. It presents the most immediate challenge to Information technology infrastructure (Ishwarappa and Anuradha, 2015). Many companies already have large quantities of archived data in log form but are unable to process the data. The main attraction of Big Data Analytics is the benefit derived from the capacity to process large amounts of information.

Data velocity refers to the increasing speed at which data is created, the increasing speed at which data can be processed, stored and analysed by databases, the speed at which new data is generated by the systems and the speed at which it moves (Siewert, 2013).

The next aspect of Data Analytics is its variety. Data analytics does not always involve data that is structured and stored in a relational database. Because data can be structured or unstructured, this makes Data Analytics more complex and harder to store and analyse (JASIM HADI et al., 2015).

Veracity is the attribute that refers to the level of trust decision makers have in the data in order to make a decision. Because of the volume, velocity and variety of data

used to make insights, veracity presents the level of confidence needed to make decisions based on the analysis (JASIM HADI et al., 2015).

Value characteristic of Data Analytics refers to the add on value that the collected data brings to the intended activity. It is the most important attribute of Data Analytics. The potential value of Data Analytics is huge, but it is only useful when it can be turned into value for a company (Siewert, 2013). This is what Operations Managers review to justify their use of data analytic applications in their businesses.

2.3.1 INTERNATIONAL PERCPECTIVE

Inventory optimisation, operational planning, better predictability, distributary transparency, frequency of order and reduced lead time have been expanded in Data Analytics. All this improves Operations Management. The use of Data Analytics in operations should be done cautiously as there are a lot of obstacles of this new technology (Mikalef et al., 2019). The semantic difficulty of Data Analytics involves determining the significance of data from large amounts of unstructured data (JASIM HADI et al., 2015).

Proceeding to improving Operations Management, the research suggests that operations managers examine the model suggested below when deciding how to effectively use Data Analytics to improve the operational performance objectives (Choi, Wallace and Wang, 2018). Resources should be allocated accordingly to leverage improvements in the performance objectives of the organization's operations strategy while managing each area of the operations model (Roden et al., 2017).

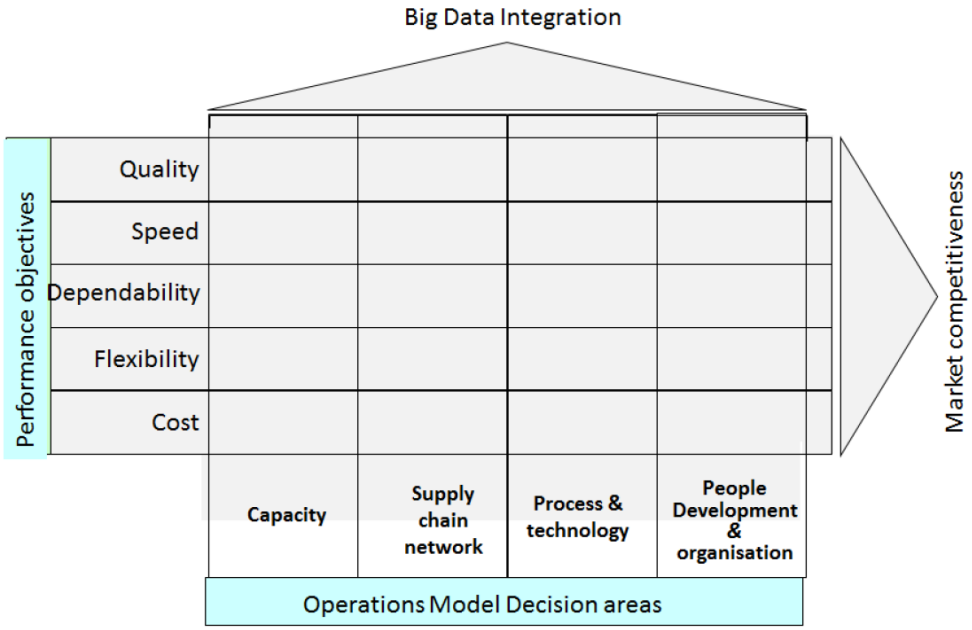

Figure 3 Operations Management Decision Areas Source: (Slack and Lewis, 2017).

Operational efficiency happens when the Operations Management areas are combined and deliver to their customers by organizing important process in response to changes in the market (Gay and Espino, 2016). Improvements in the operational management areas mentioned above are responsible to improved operational efficiency.

2.3.2 SOUTH EAST ASIA PERCPECTIVE

Despite this growing acknowledgement of data analysis in Operations Management, many Asian organisations have been lagging behind in real acceptance and risk giving businesses with sophisticated analytical skills a competitive edge (McKinsey & Company, 2019). The presence of key words in analytics (e.g. Big Data, machine learning and artificial intelligence) was used as a proxy in analytical awareness as a more focused approach to investor communication at least implies fundamental interest and investment in analytical capacity (Zhang et al., 2019). This measurement shows that knowledge has increased from 3% in 2011 to 27% in 2016 and is up to 40% with news releases from businesses connected with sophisticated analytics.

Advanced analytics in Operations Management can also generate value by enhancing decision making and visibility throughout the value chain and ensuring that management has a better understanding of activities. For example, the oil and gas industry accounts for nearly 60% of the total value of four categories of technology investment, including applications for reporting of capital expenditures, maintenance, inventory, and work capital (McInerney, Roth and Sinburimsit, 2019). This finding is all the more remarkable because the sector already employs three other technology kinds.

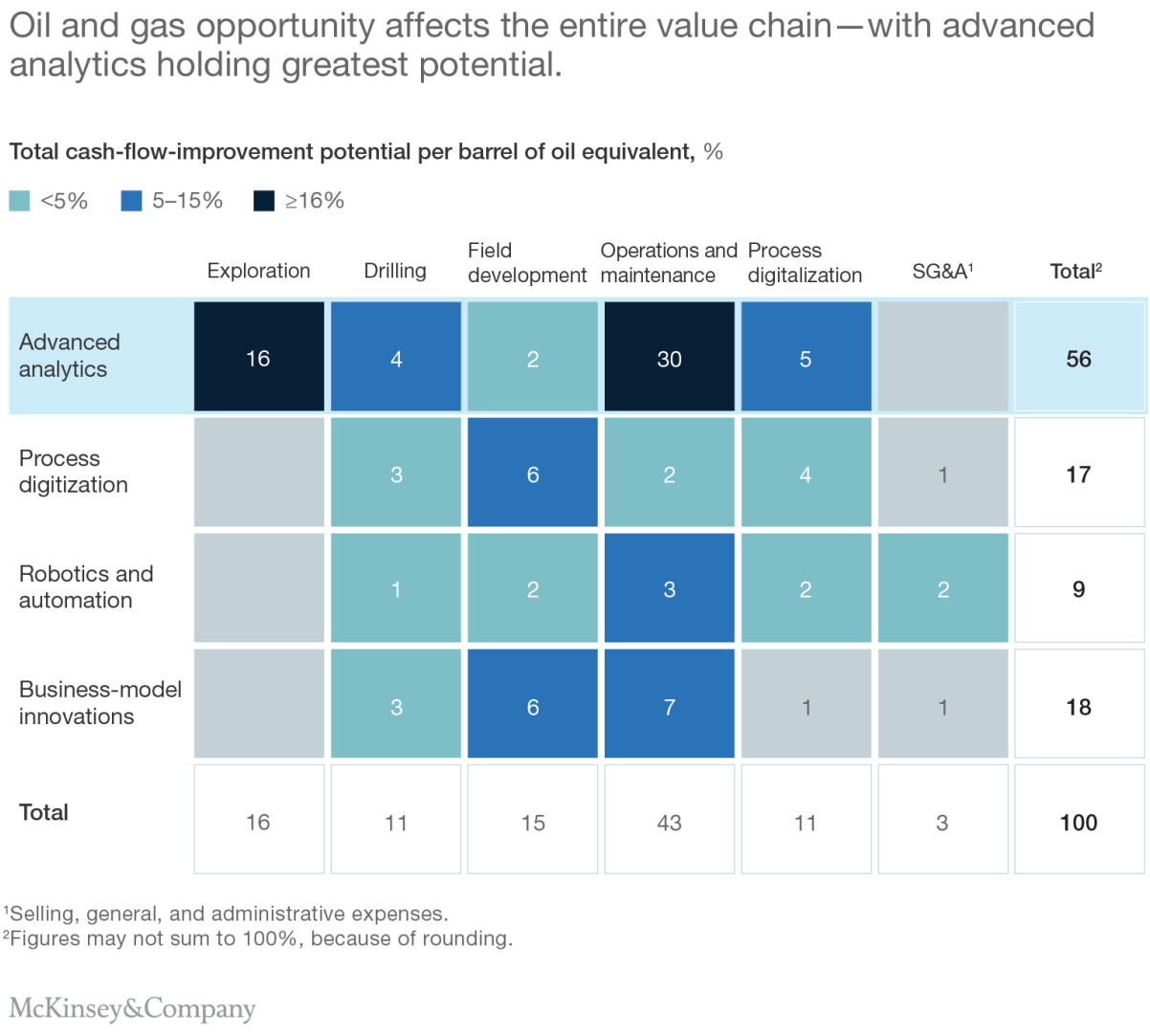

Figure 4 Performance across Value Chain Source: (McKinsey & Company, 2019).

In the figure above, the used of advanced Data Analytics in operations and maintenance resulted in a 30% improvement in cash-flow per barrel of oil for Oil and Gas companies in South East Asia. This is the highest percentage among the different business departments showing the importance to Operations Management.

A challenge for Data Analysis use in Operations Management in South East Asia is the expertise. As Asia grows quickly, it is always a task to attract, develop, and retain top talent. Fortunately, sophisticated analytical solutions today can reveal insight that even novice staff can enhance decision-making without years of analytical formation (McInerney, Roth and Sinburimsit, 2019).

Today, many conglomerates find methods to stimulate partnerships between their stocks and their businesses. In order to promote the development of monetary facilities, major Asian conglomerates are, for instance, using the wealthy store of available but unconventional information to guide the method of the credit assessment and authorization. These collectors analyse information gathered via mobile phones and applications and social networks in conjunction with new loan checking firms like the one KabBage, Lenddo and LendUp (Xu, Li and Feng, 2019). This strategy has both reduced the danger of lending and has expanded the breadth of lending to unbanked and underserved groups (McKinsey & Company, 2019).

2.4 GAPS IN LITERATURE

Literary assessments inform the viewer how the field stands by showing the scope and complexity of job performed until now and detect gaps in the need for additional research / work. They sum up, evaluate and evaluate research / knowledge on a subject (UVM Graduate Writing Center, 2019). Literature reviews enable you to

target your particular interests or questions and see how study in this way can guide your thoughts and techniques. Below are the research gaps for the research:

1. Current studies have concentrated on the use of Data Analytics on Multinational Companies that have a presence in South East Asia but do not operate from here. Therefore, there is limited data on the use of Data Analytics in majority of the companies in the region (Surbakti et al., 2019). This study aims to provide information about Data Analytics in Operations Management from a sample of small and medium enterprises.
2. Companies in South East Asia are already aware of the benefits of implementing advanced Data Analytics into their Operations Management. Current literature shows that there is a positive relationship between Data Analytics and improved Operations Management (Sheng, Amankwah-Amoah and Wang, 2019). However, little is investigated on the how the adaptation of Data Analytics affects the organisation as a whole. This study aims to get valuable input from stakeholders who are firmly aware of the challenges and benefits of the adoption.

2.5 RESEARCH FRAMEWORK

This research framework below is based on an input-output research model. The interviews are the inputs which include two groups of interviewers. These are Data Analysts and Operations Managers; the processing of the input is done according to the two areas of study which are Data Analysis in South East Asia and data driven decision-making in Operations Management. Finally, the output will be the acceptance or rejection of the hypothesis, obtaining the challenges and limitations of the topic and the contribution of the research into data analysis in Operations Management.

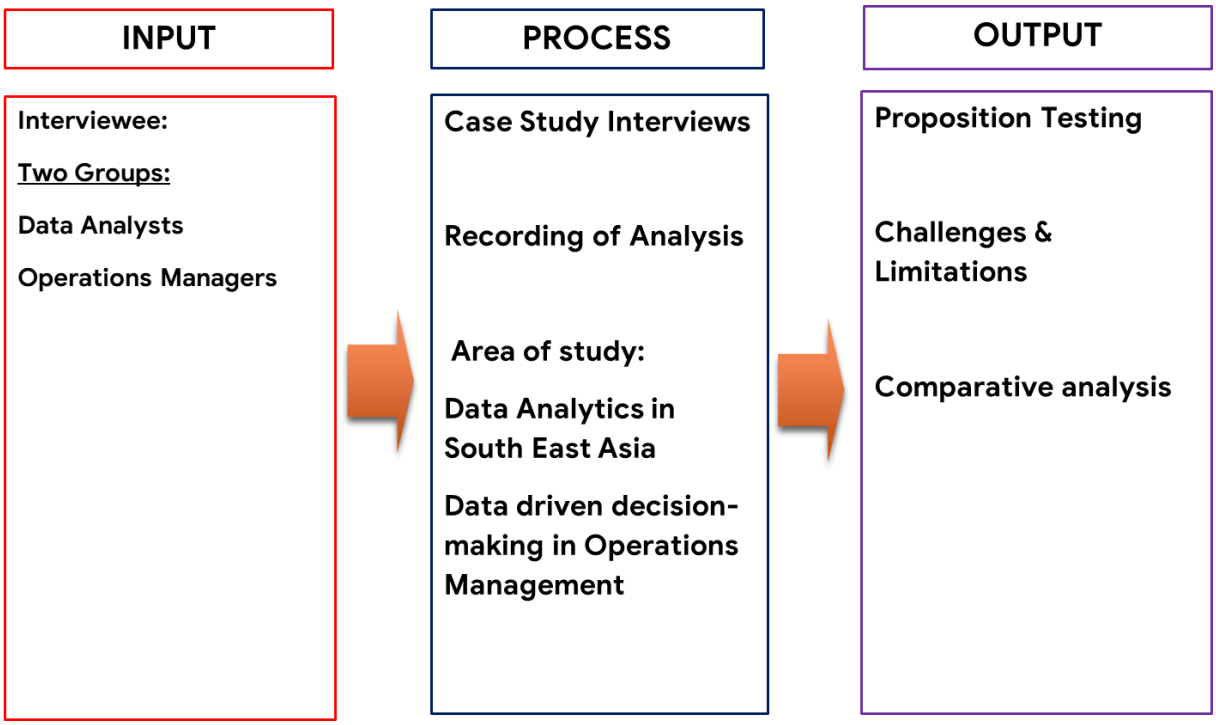

Figure 5 Research Model

The figure below is used to describe the three different areas of data analysis that will be investigated with regards to its connection to Operations Management in South East Asia. The first area is the awareness of Data Analysis in Operations

Management South East Asia, next is the adaptation of Data Analytics in Operations Management and lastly is the importance to Operations Management.

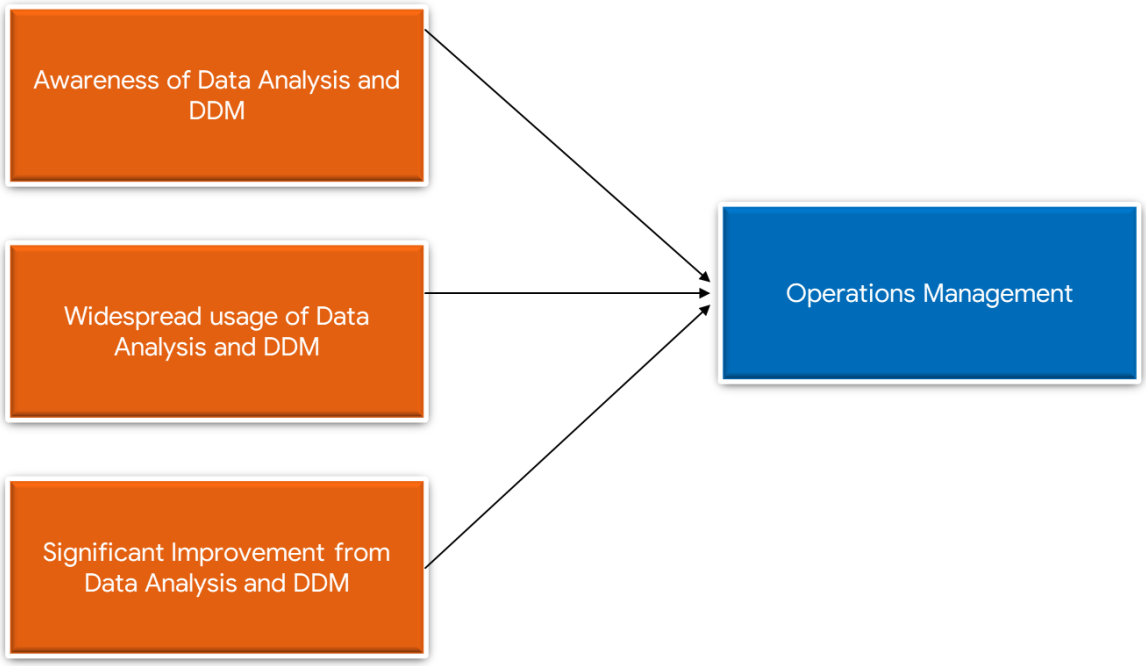

Figure 6 Research Framework

2.6 CONCEPTUAL FRAMEWORK

The figure below highlights the research model that will be used to investigate the effect of Data Analytics to Operations Management. Operations require a tighter set of targets, which specifically addresses their fundamental task of fulfilling customer requirements. There are five fundamental performance targets and they cover all operation types (Slack and Lewis, 2017). This model will guide the research on how the performance objectives can be related to the operations decision areas which are managed by Data Analytics.

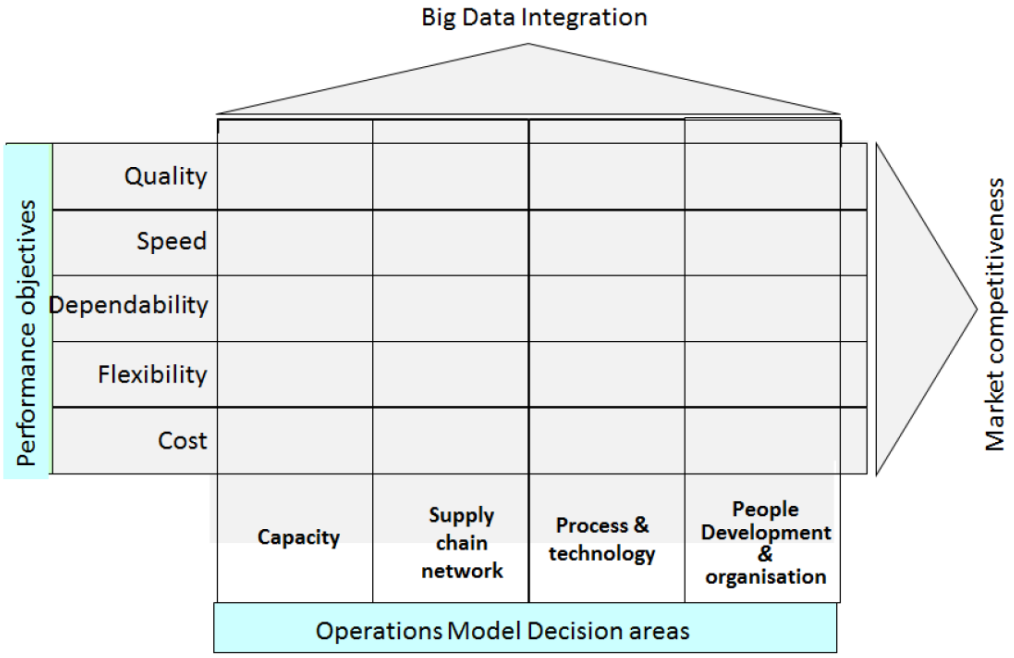

Figure 7 Conceptual Framework Source: (Slack and Lewis, 2017)

2.7 PROPOSITIONS

The words "proposition" and "hypothesis" refer both to a feasible response to a certain science issue (Sciencing, 2019). A proposition therefore is chosen for its specific qualities in tackling qualitative analysis. Therefore, the following are the propositions for this research:

P1 - *The level of awareness of data analysis in Operations Management in South East Asia is high.*

P2 – *Data Analysis in Operations Management of companies is widely used in South East Asia.*

P3 – *Data driven decision-making results into significant improvement in Operations Management in SEA.*

2.8 CONCLUSION

This chapter has given the reader an insight into the different literatures on Data Analytics and its relationship with Operations Management. It has given an international perspective but far more importantly a South East Asia perceptive which is the target population of the research. The Research and conceptual frameworks have been introduced as well has the gaps in literature that prompted the research and propositions used to evaluate the thesis. The next chapter is Research Methodology.

3.0 CHAPTER THREE: RESEARCH METHODOLOGY

3.1 OVERVIEW

The aim of this chapter is to expound on the research methodology used for the thesis. From strategy to reliability, this chapter aims to equip the reader with a great understanding on the specific tools, procedures and processes applied to meet the research objectives.

The research methodology explores the feasibility study (Sekaran and Bougie, 2013). Methodology is a system which comprises the principles, practices and procedures which are applied to a specific branch of knowledge. Methodology also refers to the way in which information is found or the way something is done and includes the methods, techniques and procedures which are used to collect and analyse information (Kothari, 2004).

3.2 RESEARCH STRATEGY

The research strategy is defined by (Datt, 2016) as the general plan in which a researcher plans to go about in answering the research questions and achieving the research objectives. A research strategy is essential to the research paper as it forms the flow and structure of the study that is being carried out. The chosen research strategy for this research is Case Study. Using companies based and operating in South East Asia, this research will investigate the research questions using them as the sources of evidence for the phenomenon in question.

3.3 RESEARCH DESIGN

The research question and objectives of this thesis clearly indicate a descriptive form of research design, as the research not only seeks to increase the understanding of the use of Data Analytics in Operations Management but also seeks to understand the importance of data analysis to enhance operational efficiency. It is paramount for a researcher to identify this before proceeding. To do so, this study will use qualitative techniques to allow the investigators to better comprehend individuals depending on what they say and do.

3.4 STUDY POPULATION, UNIT OF ANALYSIS, SAMPLE SELECTION AND SAMPLING TECHNIQUES.

This research will study five organizations in South East Asia. This is the population of the study. The Operations Management team is the unit of the organization to be analysed in this research paper. These are the departments that will be investigated on their use of Data Analytics techniques and how they use data to make decisions.

A group of senior operational staff will be selected to answer the interview questions to provide a qualitative representation. Sampling is important in research because it is not possible to investigate every member of the population of study. The aim of the sampling techniques used is to ensure that the sample is representative of the population characteristics to provide accurate data. Because this is a descriptive research, probability sampling is the most appropriate for the research. The chosen method appropriate is stratified random sampling which allows a heterogeneous population. This research needs one as it investigates different industries.

The research question and objectives of this thesis clearly indicate a descriptive form of research design, as the research not only seeks to increase the understanding of the use of Data Analytics in management but also seeks to

understand the importance of data driven decision-making to Operations Management in South East Asia. It is paramount for a researcher to identify this before proceeding. Most of descriptive researches are quantitative in nature however this research will use qualitative methods to collect data to evaluate the propositions.

3.5 DATA COLLECTION PROCESS

An important step in planning and conducting a research is identifying the method to be used in collecting the relevant data (Enofe, 2019). In this research, data will be collected in three different ways. Literature review of research that is within this specific area, interviews with respondents involved in Operations Management in order to get first-hand insight on the theory.

3.5.1 LITERATURE REVIEW

This thesis paper investigates how Data Analytics in Operations Management improves operational efficiency. It aims to identify firstly how data analysis is used in Operations Management and what is its significance to operational improvement. Performing a widespread literature review in the areas of Data Analytics and specifically in Operations Management context was the first step. To obtained useful journals, articles and books, Google Scholar, INTI International Library, Science Direct and Elsevier were used as the research databases. Keywords that helped to obtain said journals include big data in Operations Management, Data Analytics and operational improvement. This was needed in order to obtain concepts and theories that are relevant to the research. This also allowed to find past findings on similar research areas.

3.5.2 INTERVIEWEES

A semi-structured interview will be conducted with different respondents who are operational managers and or data analysts as a result of the research area's complexity. The main goal of a semi-structured interview is to engage in a discussion that could lead to numerous questions and answers rather than a direct answer (Enofe, 2019). Therefore, interviewing multiple staff in these areas will ensure the collection of required data.

Several interviews will be conducted with personnel from the different organizations. Personnel with deep knowledge and insight on the Operations Management such as the ones mentioned above will be interviewed. The interviews will be conducted face-to-face and through Skype with a mix of closed-and open-ended questions around the research topic with one respondent at a time. This will be complemented by follow-up questions (e.g. "what," "how," "why") via e-mail, which will clearly describe this research's descriptive nature. The interview will be conducted in a manner that observed ethical issues related to the research study.

3.6 INTERVIEW DESIGN

The interview questions were designed for the two groups of respondents in the study. Data Analysts in Operations Management and Operations Managers. The questions will be divided into three distinct groups that increasingly build the information obtained from the interviewees. The questions are designed to cover the three propositions of the research topic. These groups are: Basic, Probing and Depth. Basic questions are asked after a short ice breaking question period. Probing questions are then asked to give a light overview of the research area and in-depth questioning narrows down to the specific areas within the scope of the research.

The interview may include other questions that are asked during the interview in case some of the questions are not clear and understandable to the participants.

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3.6.1 PROPOSED INTERVIEW QUESTIONS

Proposed Interview Question for Employees in Data Analytics Departments

BASIC

1. What is your position in the company?
2. How long have you been working in the company?
3. How long have you worked in Data Analytics?
4. Does your organization implement data driven decision-making in their Operations Management?

PROBING

1. When did you start using Data Analytics in Operations Management?
2. Why did you start using Data Analytics in Operations Management?
3. Do you think using Data Analytics in Operations Management is important?

4. What is the difference between traditional Operations Management and data driven decision-making in Operations Management?
5. What difference does your company realize from using data driven decision-making?
6. Which Data Analytics tools and methods do you use for data driven decision-making?

DEPTH

1. What expertise did your organization need to implement data driven decision-making in Operations Management?
2. What are the challenges you faced while implementing?
3. Can you highlight the biggest challenge that your organization has faced and how you overcame it?
4. After implementing Data Analytics in Operations Management, how soon where the results? Where they immediate or after 12 months?
5. Is implementing Data Analytics in Operations Management expensive in South East Asia?
6. Is implementing Data Analytics in Operations Management widespread in South East Asian companies?
7. Can you quantify the results of using data driven decision-making in your Operations Management?
8. In your opinion, what would be your advice to a company that is considering using Data Analytics in Operations Management?

Proposed interview to Employees in Operations Management Departments

BASIC

1. What is your position in the company?
2. How long have you been working in the company?

3. How long have you worked in Operations Management?
4. Does your organization implement data driven decision-making in their Operations Management?

PROBING

1. When did you start using Data Analytics in Operations Management?
2. Why did you start using Data Analytics in Operations Management?
3. Do you think using Data Analytics in Operations Management is important?
4. What is the difference between traditional Operations Management and data driven decision-making in Operations Management?
5. What difference does your company realize from using data driven decision-making?

DEPTH

1. Do you consider Operations Management Data Analytics part of your Operations Management?
2. Are you more comfortable to base your decisions on experience and expertise or data?
3. Is your above answer reflective across your organization and South East Asia?
4. Is implementing Data Analytics in Operations Management expensive in South East Asia?
5. Is implementing Data Analytics in Operations Management widespread in South East Asian companies?
6. After implementing Data Analytics in Operations Management, how soon where the results? Where they immediate or after 12 months?
7. Can you quantify the results of using data driven decision-making in your Operations Management?
8. In your opinion, what would be your advice to a company that is considering using Data Analytics in Operations Management?

3.7 MEASURING INSTRUMENT

The measuring instrument in this study are Interviews. According to (Scholtes, Terwee and Poolman, 2011) a good measuring instrument must have three quality domains. These are reliability, validity and responsiveness. Interviews are a meet the quality criteria of a measuring instrument as they allow the interviewee to offer their own response. Also, the responsiveness is great because they occur in real time.

3.8 RELIABILITY AND VALIDITY TEST

In a qualitative research, the manner in which a researcher tests reliability and validity is different to a quantitative method. Because of this, the researcher needs to maintain the integrity of the study throughout all the stages of research with all the relevancy of findings established at the beginning.

Validity in this research refers to the accuracy of how the collected data covers the area being investigated (Hamed, 2016). There are two out of the four different types of validity tests that will be used to ensure that the measuring instruments of the research are relevant and clear. The four are Criterion, Face, Content and Construct.

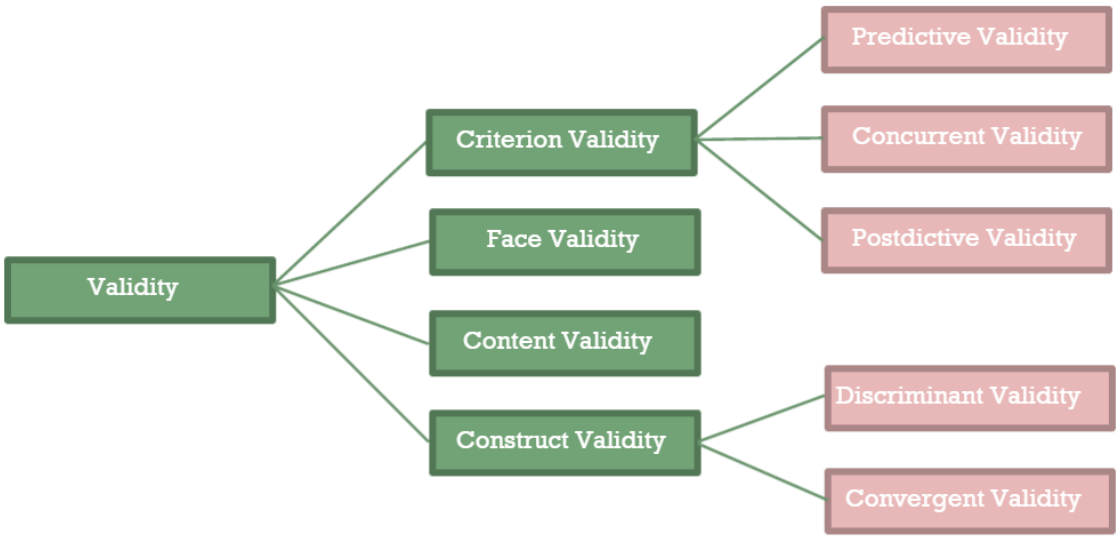

Figure 8 Types of Validity tests Source: (Hamad, 2016)

During the development of this new instrument, it is highly recommended to apply content validity. Generally speaking, content validity involves the evaluation of a new measuring instrument to make sure all essential elements are included and that undesirable items are eliminated in a particular building field. The approach to the validity of content involves the review of literature and then follow-up by expert judges or boards of directors (Hamed, 2016).

If the content of the test simply seems relevant to the test person, the test shall have face validity. It evaluates the feasibility, readability, style and formatting consistency, as well as the clarity of the language used to produce the interview questions. This process took place before the commencement of data collection. The follow up was done by Mr. Kavish Punchoo who is a working data analyst in Operations Management. He certified the questions to have met their validity.

3.8.1 RELIABILITY

Reliability is concerned with the repeatability of a test. Reliability test therefore concerns how stable and consistent a measurement of a phenomenon is (Hamad, 2016). Reliability testing is important since it refers to the consistency of the measuring instrument across parts. This test is therefore inevitable for the interviews. Reliability will be ensured with the participants of the interview given a transcript of their respective interviews and a draft of the proposition testing. This allows them to ensure that the information they provide is used in the context they intended.

3.9 ETHICAL CONSIDERATION

Ethics in research are important as they guide how researchers should carry themselves out when preparing and conducting a research. In this research, an appropriate methodology has to be employed to ensure that data that is collected is relevant. It is important that only the observed data are used to support the findings of the research.

To conduct this research, anonymity has to be granted to respondents where their personal details is not required. The information they give must be kept confidential and permission sought after if some information is to be released. Lastly, this research requires voluntary and informed consent from the respondents and parties involved (Ifedha Akaranga and Kavutha Makau, 2016). To ensure this, the respondents must knowingly, voluntarily and clearly accept to be part of the research before being included.

3.10 CONCLUSION

This chapter has highlighted how semi-structured interviews will be used to conduct the study. It has provided insight on the research strategy, research design and the study of the population. The next chapter will provide the results of the interviews conducted with regards to the research.

4.0 CHAPTER FOUR: RESEARCH RESULTS AND ANALYSIS

4.1 OVERVIEW

In this chapter, qualitative data is collected from employees who apply Data Analytics in Operations Management for companies based in South East Asia. There is a total of six interviews from different technology companies operating in South East Asia.

The interviews were conducted from 31st July 2019 to 15th August 2019. The respondents are from three different companies. Two respondents are from Mezza 9 Solutions Bhd Sdn, another two respondents are from iPrice Group Bhd and Asia Venture group, Happy Fresh Limited, Osome and Omniaz each have one respondent.

4.2 INTERVIEW PROFILES

The group selected for the interviews have broad knowledge and expertise in Data Analytics and Operations Management. Additionally, working in South East Asia makes their input crucial in understanding and studying Data Analytics in Operations Management in the region.

4.2.1 PROFILE OF ORGANIZATIONS

Osome is an online assistant for accounting, legal and secretarial services packaging it in a subscription (crunchbase.com, 2019). It serves the Asia Pacific Region of the South East Asian countries. It was founded on May 2017 by Victor Lysenko and is headquartered in Singapore. The solution provides company incorporation, corporate secretary, accounting, immigration services in Singapore. Osome is an online service that works 24/7, so users can set up a company in Singapore, manage

the compliance, and apply for visas through a secure portal remotely. It offers monthly and yearly packages based on the number of transactions.

Omniaz is a start-up in Singapore that is creating the first decentralized supply chain platform based on the Internet of Things (IoT) and Blockchain technology for worldwide alcoholic beverage (Omniaz, 2019). Their product is a comprehensive B2B traceability platform with all sector players including distributors, importers, manufacturers, commercial financiers and freight forwarders (crunchbase.com, 2019).

iPrice is a price aggregator that operates in South East Asia. It has a presence is 7 countries which are Malaysia, Indonesia, Singapore, Thailand, Vietnam, Philippines and Hong Kong. It is headquartered in Kuala Lumpur, Malaysia. It was founded by a venture capital company called Asia Venture Group (iPrice, 2019). They have more than 1300 partners who provide their products to be compared with other e-commerce websites in order to increase visibility. They also provide over 3000 coupons to their more than 16 Million monthly viewers. Their website has a catalogue of over 500 Million products.

4.2.2 PROFILE OF INTERVIEWEES

Among the eight respondents two work in Data Analytics departments and the rest work in Operations Management.

Department	**Name**	**Role in the company**	**Organization**
Data Analytics	Mr. Kavish	Data Analyst	Mezza 9 Solutions
	Mr. Danesh	Data Engineer	Mezza 9 Solutions
Operations Management	Ms. Amy	Vice President Operations and Marketing	iPrice Group Sdn Bhd
	Dr. Konstantin	Chief Operating Officer	iPrice Group Sdn Bhd and Osome Limited
	Ms. Eva	Head of Operations	Asia Venture Group and Happy Fresh Limited
	Mr. Marc	Chief Operating Officer	Omniaz Solutions Limited.

Table 1 Profile of the interviewees

The semi structured interviews for this research had four basic questions, five probing questions and eight in depth questions. This gives a total of seventeen questions posed to interviewees. These questions were designed to address and test the three propositions of the research.

The preliminary analysis shows:

Department	**Name**	**Role in the company**	**Organization**	**Aware of Data Analysis on OM**	**Use DDM in OM**	**DDM is significant to OM**
Data Analytics	Mr. Kavish	Data Analyst	Mezza 9 Solutions	Yes	Yes	Yes
	Mr. Danesh	Data Engineer	Mezza 9 Solutions	Yes	Yes	Yes
Operations Management	Ms. Amy	Vice President Operations and Marketing	iPrice Group Sdn Bhd	Yes	Yes	Yes
	Dr. Konstantin	Chief Operation Officer	iPrice Group Sdn Bhd	No	Yes	Yes
		Chief Operations Officer	Osome Limited	Yes	Yes	Yes
	Ms. Eva	Head of Operations	Asia Venture Group	Yes	Yes	Yes
		Operations Manager	Happy Fresh Limited	No	No	Yes

	Mr. Marc	Chief Operations Officer	Omniaz Solutions Limited.	Yes	No	Yes

Table 2 Preliminary Analysis of the research area

The preliminary analysis from the interviews show that all the respondents had a very good knowledge and understanding of Data Analytics in Operations Management and specifically in South East Asia. Also, an idea of the usage of Data Analytics in Operations Management in the region can be obtained from the responses.

4.3 PROPOSITIONS TESTING

Proposition 1:

P1 - The level of awareness of data analysis in Operations Management in South East Asia is high.

Although Data Analytics is considered as an effective tool in business in the last ten years, not every region is embracing it at the rate they should. This proposition intends to test the level of awareness of the use of data analysis in the Operations Management of companies based in South East Asia and the perception of implementing data driven decision-making. This preposition will relate to data from Data Analytics departments dealing with Operations Management and operations managers using Data Analytics.

In the Data Analytics group, the company was well aware of the Data Analytics in Operations Management in South East Asia. Mr. Kavish and Mr. Danesh both noted that since the company took interest in Data Analytics 4 years ago, their competitors took it up within 6 months. The awareness in the consulting tech industry is high because of seminars given by multinational corporations in the region. This was obtained from Mr. Danesh who said, *'' Most of the companies which we collaborate with in SEA have been implementing data analytics for the past year or so. However, having been to several data analytics related seminars in SEA, I have observed that a very large number of companies are not implementing it but are considering it.''*.

In the Operations group, the researcher observed that the respondents were proud of their awareness and use of Data Analytics. Further discussion led to the talk about their competitive edge. Four out of four respondents stated that the use of Data Analytics is in an all-time high. Ms. Amy and Dr. Konstantin stated that iPrice Group had a blog in which they posted articles about the state of Data Analytics in the region. The post highlighted that there is an increase year on year about mentions in

social media, seminars and workshops with Data Analytics as a keyword. Ms. Amy further said, *''iPrice collect data on the business practices of e-commerce companies in SEA and acknowledges the training an seminar on data driven decision-making increase year on year''*.

All the respondents comfortably agreed that there was a high level of awareness about Data Analytics and its use in Operations Management in the region. With the operations managers working in different nations in the region, they confidently stated that the awareness is reflective not only to their respective headquarters but to also all the countries they serve namely Thailand, Cambodia and Vietnam.

P2 – Data Analysis in Operations Management of companies is widely used in South East Asia.

In business, companies are run differently from each other due to many factors. Some may be because of their traditions but mostly it is to find a competitive advantage. In South East Asia, companies choose different reasons to adopt Data Analytics in Operations Management. This proposition aims to investigate the usage of Data Analytics in companies and data driven decision-making.

In the data analyst group, the interviewees stated that their companies have used data driven decision-making in their Operations Management for the last 2 years. Additionally, Mr. Kavish stated that MDEC Malaysia and the Ministry of Communication and Multimedia give incentives for the acquisition of data science talent which has dramatically increased the usage in the region. He stated this just before saying, *'' Most of the companies which we collaborate with in SEA have been implementing Data Analytics for the past year or so ''*. For their field, Mr. Danesh insisted that it was necessary for them and their competitors to use Data Analytics in order to maintain competitive advantage. Every piece of emerging technology was a game changer.

In the Operations Management group, three out of four of the interviewees were proud of their achievements in implementing the usage of Data Analytics in Operations Management. Mr. Marc however stated that their company did not use Data Analytics in Operations Management. He stated that acquiring talent in Data Analytics in Singapore was very expensive and was not high in the company's priority list. He also stated that the equipment such as server space and processing power required was in the thousands of dollars. The rest of the interviewees stated that the usage across the region was not as high as expected. Ms. Amy said this when asked about it, *'' I wish it was, but from my experience I have learned that it is not always the case. Southeast Asian companies tend to be quite hierarchical, where decision*

making is often done by a CEO/manager instead of together with the team. If one person is in charge of a decision and that person isn't experienced in data analytics, it leaves a big gap. ''. Ms. Amy and Dr. Konstantin noted that the use was only widely used in Singapore, Thailand and Malaysia. They noted that their company maintained competitive dominance in Indonesia, Philippines and Vietnam because they embraced and used Data Analytics from the first day of operations. Ms. Eva stated that the Happy Fresh Limited gained an advantage on the delivery service in Indonesia due to its low operating costs which improved their margins. A round of imitation products would come and go within their four years in the business, but none would maintain longevity and sustainability. This statement was to highlight that the usage of Data Analytics in Indonesia was not widespread and was only left to majority of foreign companies. Through probing she noted that the challenges that their competitors faced was the resistance from the managers in adopting data driven decision-making as they believed instinct and experience is far more valuable. Additionally, the respondents stated that a lot of their competitors in Vietnam, Cambodia and Thailand would not embrace data driven decision-making for the fear of losing their competitive performance by abandoning long standing traditions that work.

The respondents soundly agreed that the use of Data Analytics in Singapore and Malaysia was relatively high. However, this was not reflective of the entire region which lagged behind. There is therefore not enough to reject the proposition as the use is widespread but also not enough evidence to accept. Through further research, a lot of their findings were backed up by literature from (APEC, 2017), (Huang, 2019) who focus on the difficulty of adopting data driven decision-making in South East Asia.

P3 – Data driven decision-making results into significant improvement in Operations Management in SEA.

As mentioned before, the most important reason why companies adopt Data Analytics and therefore data driven decision-making is for improved firm performance. This proposition sets to evaluate if there is a significant improvement in Operations Management and firm performance when data driven decision-making is used.

In the data analyst group, the respondents had experience of around 2 years in the flied of Data Analytics in their companies. One interviewee stated that most of their usage of Data Analytics in operations was with regard to their customer support centres. Mr. Kavish further stated that there was a big difference in its usage that saw an increase in customer satisfaction success rate. The two went on to further state that the most gain on the use of Data Analytics was on the speed and accuracy of their decision-making. Mr. Danesh stated that apart from the documented benefits of data driven decision-making, it improved teamwork and staff engagement on the decisions. According to him, staff were more comfortable with decisions that were data based. The two analyst used Apache Spark Framework for the advanced Data Analytics processes. The improvement occurred within the operations cycle of three months. Mr. Kavish stated with confidence that. *For the past 3 quarters, we have made 60% quarterly savings compared to the years where we were not practising data driven decision-making*. This quantifies that there is a significant improvement on Operations Management.

In the Operations Management group, the respondents had more than 20 years combined in the Operations Management and they noted that Data Analytics and Internet of Things have been the greatest gamechangers. Dr. Konstantin stated that the use of Data Analytics at iPrice Group and Osome Limited was responsible for their constant growth in their fields. Being the first COO at iPrice he ensured that

the company used data driven decision-making from the onset and that was responsible for the company's expansion across the region within 4 years. As the COO of Osome Limited in Singapore, he brought on the use of Data Analytics in Operations Management and this contributed to the reduction of monthly operating costs by 30% on the first three months. Ms. Amy noted that iPrice being a very data conscious company, they could monitor daily improvements from the use of different Data Analytics techniques. This further supported the group's statements in support that there is significant improvement in Operations Management when using data driven decision-making.

All six of the respondents conclusively agreed that there is significant improvement in the use of Data Analytics in Operations Management. With most of the respondents describing the contribution, Mr. Kavish was able to quantify it to 60% improvement in operating savings over the last three quarters. He said," Definitely *one of the mandatory requirements of the Data Analytics endeavours (which contributed to data driven decision-making) that we partake in, is that the results should be quantifiable. For the past 3 quarters, we have made 60% quarterly savings compared to the years where we were not practising data driven decision-making."*

4.4 KEY FINDINGS AND DISCUSSIONS

This section provides for an outline of the propositions and propositions testing. It provides a detailed summary of the findings that are obtained from the proposition testing and interviews.

4.4.1 KEY FINDINGS AND DISCUSSION ON THE PROPOSITIONS

No.	Proposition	Accept/Reject	Supporting Literature
1	The level of awareness of data analysis in Operations Management in South East Asia is high.	Accept	(McKinsey & Company, 2019), (PWC, 2019)
2	Data Analysis in Operations Management of companies is widely used in South East Asia.	Not Reject	(APEC, 2019), (Huang, 2019)
3	Data driven decision-making results into significant improvement in Operations Management in SEA.	Accept	(Sheng, Amankwah-Amoah and Wang, 2017) (McKinsey & Company, 2019)

Table 3 Key Findings and Discussion

Below is the summarization and highlight of the key findings of the responses from the interviews regarding the research topic.

Propositions	**Findings**
The level of awareness of data analysis in Operations Management in South East Asia is high.	• 6 out of 6 agree that the level of awareness of Data Analytics in Operations Management is high. • They all have in depth knowledge about the awareness among their competitors. • All of the respondents agree that the awareness growth is getting higher year on year.
Data Analysis in Operations Management of companies is widely used in South East Asia.	• 5 out of the 6 respondents agree that their companies use data analysis in their Operations Management. • 1 of the respondents do not use data analysis in Operations Management in their company. • 4 out of the 6 respondents agreed that most of the companies in South East Asia do not use data driven decision-making in their Operations Management. • Challenges and Limitations in the implementation include: ▪ Reluctant management attitude and perception of Data Analytics in Operations Management. ▪ Company's long-standing traditions and culture. ▪ The high expense of equipment.

	▪ Lack of affordable talent and expertise in the region. ▪ Fear of losing competitiveness with abandoning working techniques.
Data driven decision-making results into significant improvement in Operations Management in SEA.	• 6 out of the 6 respondents agreed that the there is significant improvement to Operations Management by using data driven decision-making. • One respondent was quoted saying "For the past 3 quarters, we have made 60% quarterly savings compared to the years where we were not practising data driven decision-making." • 5 out of 5 of the respondents who use data driven decision-making noted on the following: ▪ Shortened lead time. ▪ Shorter and efficient delivery of products. ▪ Reduced operating costs such as bills, overtime and miscellaneous costs.

Table 4 Summary of the findings

4.5 CONCLUSION

This chapter focused on the analysis of the interviews given. As stated, the researcher interviewed two different groups namely Data Analysts and Operations Managers. The interviewee and organization profile introduced the interviewees context. The preliminary analysis and proposition testing allowed the discussion of the topics discussed during the interview. The next chapter is the final one. It is designed for the conclusion and recommendations.

5.0 CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

5.1 OVERVIEW

This is the last chapter of the research paper. It will elude to the connection of the results to the literature by revisiting the important concepts of Operations Management and Data Analytics discussed. It explores the themes of the use in South East Asia and the challenges and limitations companies face. In order to address this, the chapter is divided into seven sections.

The first section discusses on the conclusions of the research and how it answered the research questions through proposition testing. The second section will highlight the contribution that the research paper has on the industry of Operations Management in South East Asia and the contribution to literature about the topic. The third section will provide the recommendations for companies to take and the other sections will highlight the limitations of the research, the potential areas of future research before providing a personal reflection on the completion of the research paper.

5.2 CONCLUSION OF FINDINGS

Before the beginning of the interview, the researcher only had a vague and loose idea about the state of Data Analytics in Operations Management in South East Asia. The three research questions were able to guide the research and obtain valuable insight onto the topic.

5.2.1 CONCLUSION OF PROPOSITION TESTING

The proposition testing indicated that there is recognition of the importance of Data Analytics in Operations Management in South East Asia. This is based on the findings that there is an overwhelming acknowledgment and awareness of Data Analytics in Operations Management in the region. Secondly, companies based in Singapore and Malaysia extensively use Data Analytics in their Operations Management which further illustrates the importance it plays.

The proposition testing was able to satisfyingly achieve the research objectives and hence answer the research questions. Through this, we established that there is a significant advantage to using Data Analytics and data driven decision-making in Operations Management despite the main concerns. The potential in savings and efficiency is great, and it is backed by the confidence of the six respondents who stated that they would advise a company to implement Data Analytics in their Operations Management.

5.2.2 CONCLUSION OF KEY FINDINGS

The main objective of the key findings was to conclude the proposition testing. From the key findings, the researcher was able to accept two out of three propositions of the study. With supporting references, the findings were consistent with some of

the literature that is existing. Regardless, there were a lot of concerns raised in the key findings about the adoption of Data Analytics in Operations Management in the region. These concerns referred to the difficulty in adopting the technology in Operations Management.

5.3 CONTRIBUTION

This section of the thesis allows the researcher to point out the areas in which the work is relevant to. The thesis on Data Analytics in Operations Management in South East Asia is relevant to the following two areas.

5.3.1 CONTRIBUTION TO ACADEMIA

The findings of this research highlight that there is a potential research on the need of Data Analytics in Operations Management in the region. Extensive study has been done on Data Analytics in Operations Management but unfortunately there is low implementation on the area. This study provides a good understanding on the state of data driven decision-making in South East Asia.

Research using qualitative strategy to the proposal testing and comparative assessment highlights the need for a suitable conceptual framework to cover the literature gap. Further research in the context of Data Analytics in Operations Management serves as a route for all subsequent researchers in this area.

5.3.2 CONTRIBUTION TO INDUSTRY

The findings of this research prove important for Operations Management as it helps create operational efficiency. Improving operational costs reduces wastage and

leads to greater profit. Furthermore, the research shows that by utilizing data, manufacturing organizations can realize benefits of up to $117 billion globally (Capgemini Consulting, 2016).

Lastly, the findings of the research will contribute to proper adaptation of Data Analytics in Operations Management for companies across South East Asia. The findings of the study will help companies in South East Asia in being aware of the risks and benefits involved in the use of Data Analytics and data driven decision-making in Operations Management. The testing and findings will be relevant to technology companies in the e-commerce and consulting industry in the region.

5.4 RECOMMENDATIONS

It is important for a research to offer recommendations based on the findings of the research.

For companies that are weighing whether they want to adopt Data Analytics in Operations Management, they should go to an analytics consultancy in order to be aware of the risks, barriers and benefits specific to their company. This is important in order for them to meet the full potential of data driven decision-making in Operations Management.

Secondly, adopting the use of Data Analytics and data driven decision-making in Operations Management requires a willingness to change company processes, procedures and traditions. Furthermore, the use might require the company to abandon long standing and unique techniques. A flexible management culture is required to fight the scepticism of data and its potential.

Lastly, based on the findings of this research, we have identified Data Analytics in Operations Management to be a powerful relationship. Additionally, for a company that is implementing data driven decision-making, there is benefit in leveraging this to other management mechanisms. Supplementary value can be discovered, created and realised in business development (Raut et al., 2019).

5.5 LIMITATIONS OF THE RESEARCH

Every research must compromise in their approach to meet the research objectives and answer research questions. For this research into Operations Management, the sample size of the research was a major limitation. The ability to interview more operation managers would create a more comprehensive data set that can be used in the proposition testing. This research however included interviews from six individuals who provided great content but unfortunately the number limited the extent of the research.

Time was a major concern with this research. Since this research is a university course, it has a time limit. The research is required to be complete within eight months being divided into two modules, Business Research Methods and MBA Project. The researcher being enrolled to other subjects as well resulted in limited time to perform the study to the best of his ability.

Lastly, the nature of the research is qualitative. This means that the responses from the interviews are largely dependent on the personal perception and experience of the interviewees. This possess a risk on the data being inaccurate and not the professional view of the researcher.

5.6 FUTURE RESEARCH

Since this is a qualitative research, there is largely that much information about the use of Data Analytics in Operations Management for companies in South East Asia. Research on a framework that aims to help companies transition from traditional Operations Management to one that uses data driven decision-making will help in the mitigation of the risks of adoption in the region.

Furthermore, a research on specifically the risks involved in the use of Data Analytics and data driven decision-making may provide a lot of context and information for potential and current companies in the region.

Lastly, data driven decision-making should not completely rule out intuition-based decisions. A research on the optimal situations to which the application of data driven decision making is better than experience and intuition would be helpful in improving Operations Management. Companies necessarily in data scarce environments cannot fully depend on Data Analytics to help in their decision making to name a few of the situations (Ram, Zhang and Koronios, 2016).

5.7 PERSONAL REFLECTIONS

This research proved to be an eye opener for me. As I started the research, I had a lot of conflicting ideas and completing it gives me great satisfaction on what I set my mind on. I have learnt a great deal on Operations Management and the difficulty it is in maintaining the day to day operations of organizations especially in South East Asia.

Not only did I learn about qualitative research, I was able to conduct one and this was a challenging but rewarding process. All through contacting operations managers who are extremely busy with their duties and reviewing dozens of literatures on Data Analytics and data driven decision-making in South East Asia.

Interpreting and transcribing the data from the interviews was time consuming and proves a great lesson for me. Patience and resilience proved to be a much-needed quality in conducting this research.

Lastly, I would like to thank my supervisor Dr. Sukjeet Kaur Sandhu in her distinguished guidance on conducting this research from my point of uncertainty to my completion. I would also like to largely thank the interviewers who committed half an hour to an hour of their busy days in providing the information necessary for this research.

5.8 CONCLUSION

An effective conclusion reinforces the points made in the paper and ensures that the position taken is firm (Ursinus.edu, 2019). This chapter concludes the research having determined that the awareness of Data Analytics in Operations Management in South East Asia is high, its usage moderate and its significance high. The chapter provides further information on the contribution, recommendation and limitations of the study.

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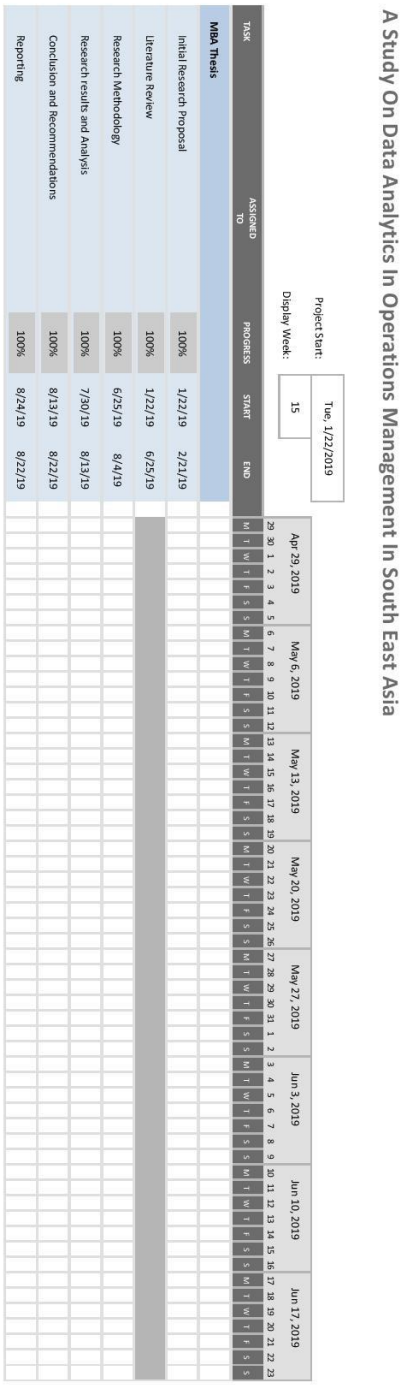
7.0 APPENDICES

APPENDIX A. PROJECT GANTT CHART



APPENDIX B. INTERVIEW QUESTIONS

1.B.1 Interview Questions for Employees in Data Analytics

Basic Questions

Interview Question	Follow-up Question	Relation to which Research Objective/ Proposition
What company do you work for and what do you do?		
How long have you been working in the company?		
How long have you worked in Data Analytics?		
Does your organization implement data driven decision-making in their Operations Management?		RO2, P2

Probing Questions

Interview Question	**Follow-up Question**	**Relation to which Research Objective/ Proposition**
When did you start using Data Analytics in Operations Management?		RO1/P1
Why did you start using Data Analytics in Operations Management?		RO1/P1
Do you think using Data Analytics in Operations Management is important?	Why do you think so?	RO3/P3
What is the difference between traditional Operations Management and data driven decision-making in Operations Management?		RO3/P3
What difference does your company realize from using data driven decision-making?	Was there any negative difference?	RO3/P3

Which Data Analytics tools and methods do you use for data driven decision-making?		

Depth Questions

Interview Question	**Follow-up Question**	**Relation to which Research Objective/ Proposition**
What expertise did your organization need to implement data driven decision-making in Operations Management?		RO2/P2
What are the challenges you faced while implementing?		RO2/P2
Can you highlight the biggest challenge that your organization has faced and how you overcame it?		RO2/P2

After implementing Data Analytics in Operations Management, how soon where the results?	Where they immediate or after 12 months?	RO3/P3
Is implementing Data Analytics in Operations Management expensive in South East Asia?		RO2/P2
Is implementing Data Analytics in Operations Management widespread in South East Asian companies?	Based on your answer, why do you think so?	RO1/ P1
Can you quantify the results of using data driven decision-making in your Operations Management?		RO3/P3
In your opinion, what would be your advice to a company that is considering using Data Analytics in Operations Management?		

1.B.2 Interview Questions for Employees in Operations Management

Basic Questions

Interview Question	Follow-up Question	Relation to which Research Objective/ Proposition
What is your position in the company?		
How long have you been working in the company?		
How long have you worked in Operations Management?		RO1/P1
Does your organization implement data driven decision-making in their Operations Management?		RO2, P2

Probing Questions

Interview Question	Follow-up Question	Relation to which Research Objective/ Proposition

When did you start using Data Analytics in Operations Management?		RO1/P1
Why did you start using Data Analytics in Operations Management?		RO1/P1
Do you think using Data Analytics in Operations Management is important?	Why do you think so?	RO3/P3
What is the difference between traditional Operations Management and data driven decision-making in Operations Management?		RO3/P3
What difference does your company realize from using data driven decision-making?	Was there any negative difference?	RO3/P3
When did you start using Data Analytics in Operations Management?		

Depth Questions

Interview Question	**Follow-up Question**	**Relation to which Research Objective/ Proposition**
Do you consider Operations Management Data Analytics part of your Operations Management?		RO2/P2
Are you more comfortable to base your decisions on experience and expertise or data?		RO2/P2
Is your above answer reflective across your organization and South East Asia?		RO2/P2
Is implementing Data Analytics in Operations Management expensive in South East Asia?	Where they immediate or after 12 months?	RO3/P3

Is implementing Data Analytics in Operations Management widespread in South East Asian companies?		RO2/P2
After implementing Data Analytics in Operations Management, how soon where the results? Where they immediate or after 12 months?	Based on your answer, why do you think so?	RO1/ P1
Can you quantify the results of using data driven decision-making in your Operations Management?		RO3/P3
In your opinion, what would be your advice to a company that is considering using Data Analytics in Operations Management?		

The following additional probes may be used as needed to elicit elaboration of answers to the interview questions. Probes will include:

• When did that happen?

• Where were you during that time?

• What was your involvement in that situation?

• How did that come about?

• Where did that happen?

APPENDIX C. INTERVIEW TRANSCRIPTS

Below shows the transcript of key discussion point during the interview sessions with the respondents of this research. Semi-structured interview approach was being used. The session was recorded by Audio Recording Smartphone Application by Sony and Transcribed by Google Live Transcribe Smartphone Application by Google.

1.C.1 The interview with Mr. Kavish Punchoo

Basic Questions

Interview Question	Follow-up Question	Mr. Kavish Punchoo
What company do you work for and what do you do?		I work for Mezza 9 Solutions Sdn Bhd and we are based in Bangsar South in Kuala Lumpur At the company I am a Senior Data Analyst in a team of five analyst and a team lead. Our team is responsible for analytics work in the company such as demand forecasting and predictive maintenance.

How long have you been working in the company?	What made you transition to Data analytics and why?	I have been at the company for 3 years now. I joined as an intern in 2016 being an Associate Technical Consultant before transitioning to Data Analytics. I was always passionate about it and it was never offered in my Computer Science degree. So, after I completed my bachelors, I joined University of Malaya and pursued my Data Science Master's degree. Around the same time is when I joined the Data Analytics team.
How long have you worked in Data Analytics?		So, this was 2 years back. This is when the company decided to use it for the operations.
Does your organization implement data driven		Yes, we do, I was one of the advocates for it as I

decision-making in their Operations Management?		had just started my master's in data science, and I was learning all about its benefits to companies.

Probing Questions

Interview Question	**Follow-up Question**	**Mr. Kavish Punchoo**
When did you start using Data Analytics in Operations Management?		We started using Data Analytics around 2 years ago here at Mezza 9.
Why did you start using Data Analytics in Operations Management?		Our current operations generate a relatively large volume of data from several sources including our distribution centres, customer support centres and social media sites. Our department was created to study and leverage on the data being collected.
Do you think using Data Analytics in Operations	Why do you think so?	I think it is very important to apply Data Analytics in Operations Management.

Management is important?		This statement is mostly based off the high success rate that our company has had when applying Data Analytics in our current operations.
What is the difference between traditional Operations Management and data driven decision-making in Operations Management?		Traditionally, our company applied business intelligence to historical sales data and adapted its operations based on the findings. However, we didn't have the predictive capabilities that our Data Analytics efforts currently provide. I would say the difference is the number of perspectives from which we view our business and which we consider when making changes to our operations. Instead of relying solely on history and experience, we also rely on these different

		perspectives in the form of data.
What difference does your company realize from using data driven decision-making?	Was there any negative difference?	The differences are mostly regarding the speed and accuracy at which we can detect trends in the market. Compared to previous practices, we can now identify trends and respond to the market changes a lot quicker. Almost all changes made to our operations are done as a result of the algorithms that we have implemented, which leverages on operational data. This means that we have a greater sense of control and understanding of the changes being made. Moreover, this approach has improved our teamwork and staff engagement.

		We haven't had any negative difference so far, but sometimes we've had less difference than projected. That's not really negative but still not great.
Which Data Analytics tools and methods do you use for data driven decision-making?		We perform most of our Data Analytics using the Apache Spark framework, which enables us to create massively parallel machine learning models and pipelines which drives our operations. We mostly use time series analysis for demand forecasting and clustering for market segmentation.

Depth Questions

Interview Question	**Follow-up Question**	**Mr. Kavish Punchoo**

What expertise did your organization need to implement data driven decision-making in Operations Management?		Machine learning and data engineering expertise was required. Pure analytics expertise was already present in the organisation, namely from the previous business intelligence department. So we were pretty prepared for the transition.
What are the challenges you faced while implementing?		When analysing the data that we have from several sources, we realised that some sources which could be very important had very unclean data. Another challenge we faced was the aggregation of data from several sources which don't necessarily work well together.
Can you highlight the biggest challenge that your organization has		The biggest challenge we faced was regarding unclean data from our customer support

faced and how you overcame it?		centres and distribution centres. While initial efforts were made to clean the data to the best of our capabilities, we ended up changing the way data was created and collected in those centres, focusing more on data that could be easily converted to quantitative data and introducing the least human error possible.
After implementing Data Analytics in Operations Management, how soon where the results?	Where they immediate or after 12 months?	The results were observed after around 3 months which is our internal supply-distribution cycle. While we were observing distribution and sales trends as predicted by our algorithms, we could only confirm the results at the end of our cycle.
Is implementing Data Analytics in Operations		In my opinion, it is expensive. The expertise

Management expensive in South East Asia?		required to implement Data Analytics is quite scarce and can be expensive when acquired. The software and hardware solutions required to create and maintain data lakes and machine learning pipelines are also relatively expensive.
Is implementing Data Analytics in Operations Management widespread in South East Asian companies?	Based on your answer, why do you think so?	Most of the companies which we collaborate with in SEA have been implementing Data Analytics for the past year or so. However, having been to several Data Analytics related seminars in SEA, I have observed that a very large number of companies are not implementing it but are considering it. Additionally, MDEC Malaysia and the Ministry of Communication and

		Multimedia give incentives for the acquisition of data science talent which has dramatically increased the use in companies.
Can you quantify the results of using data driven decision-making in your Operations Management?		Definitely. One of the mandatory requirements of the Data Analytics endeavours (which contributed to data driven decision-making) that we partake in, is that the results should be quantifiable. For the past 3 quarters, we have made 60% quarterly savings compared to the years where we were not practising data driven decision-making.
In your opinion, what would be your advice to a company that is considering using Data Analytics in Operations Management?		I would highly suggest acquiring the services of third-party Data Analytics consultancy to evaluate the current state of the company, its

		data and to identify the potential business use cases. While Data Analytics is very powerful in Operations Management, blindly investing in it might not be the right decision at first.

1.C.2 The interview with Mr. Danesh Durairetnam

Basic Questions

Interview Question	Follow-up Question	Mr. Danesh Durairetnam
What company do you work for and what do you do?		I work in Bangsar South for a company called Mezza 9 Solutions. I am a Data Engineer at one of the departments of the company. Our department deals with computer hardware distribution throughout Malaysia including Borneo.
How long have you been working in the company?	What made you transition to Data analytics and why?	I joined as an intern in May 2017 being an Associate Technical Consultant and after was moved to the distribution division where I became a Data Engineer for our distribution business.

		There was a dying need for a data engineer at the company. I decided to give it a shot as I was willing to learn a completely new role. It ended up being a good decision as I enjoy the work we do a lot.
How long have you worked in Data Analytics?		I've worked in analytics for 2 years.
Does your organization implement data driven decision-making in their Operations Management?		Yes, we do. It has become a crucial piece of our operations at the moment.

Probing Questions

Interview Question	**Follow-up Question**	**Mr. Danesh Durairetnam**
When did you start using Data Analytics in Operations Management?		We started applying analytics in Operations Management at Mezza 9's distribution department around 2

		years. Same time the company decided to use Data Analytics across the board. Our work and the other teams are completely different as we work with different use cases.
Why did you start using Data Analytics in Operations Management?		The executive decision made to start implementing Data Analytics in Operations Management in our company was mostly driven by the large amount of data not being utilized in our operations.
Do you think using Data Analytics in Operations Management is important?	Why do you think so?	We have had great success implementing Data Analytics in Operations Management. We realised that data-driven decisions were significantly more effective than traditional decision-making in Operations Management.

		Based on the positive outcomes we obtained; I would say Data Analytics in Operations Management is very important.
What is the difference between traditional Operations Management and data driven decision-making in Operations Management?		Traditional Operations Management meant that we were always reacting after the fact. We would make decisions and implement solutions based on historical sales data. With our current Data Analytics pipelines and methodologies, we are able to be ahead of the current events and predict demands and make decisions accordingly.
What difference does your company realize from using data driven decision-making?	Was there any negative difference?	Data-driven decision-making enabled us to adapt to both past and potential future events and trends. Implementing predictive analytics

		meant that the speed at which we implement solutions and react to demands is significantly faster. Another difference we noticed is that other departments are more motivated to perform certain operational changes as these are backed up and motivated by concrete evidence which is our data. No not yet. I hope it stays that way.
Which Data Analytics tools and methods do you use for data driven decision-making?		We have a big data platform, powered by Cloudera, set up as a data lake which stores all our data from several sources. We then use the Spark framework to leverage on the high number of nodes of the platform and perform

		machine learning pipelines to achieve demand forecasting and other ad-hoc analytics.

Depth Questions

Interview Question	**Follow-up Question**	**Mr. Danesh Durairetnam**
What expertise did your organization need to implement data driven decision-making in Operations Management?		Expertise was required to provision and maintain the big data platform, set up solid machine learning pipelines and analyse the operations data in depth to identify potential use-cases. We ended up having two new guys join us including our team's lead engineer.
What are the challenges you faced while implementing?		The solutions and systems used throughout the company are numerous and very different from each other. The challenge was then to extract data from

		these systems which use different protocols, schemas and are in different network locations, and ingest them to a single data repository. Another challenge we faced was cleaning data once ingested.
Can you highlight the biggest challenge that your organization has faced and how you overcame it?		Once data is ingested, the analysts realised that a lot of the important data were missing or improperly recorded. Very large and lengthy operational changes were required in order to enable proper generation of data and eventual use of the data for analytics
After implementing Data Analytics in Operations Management, how soon where the results?		The results were obtained after around 85 days, where we could calculate the actual demand throughout the distribution/sales cycle

		against the predicted demand.
Is implementing Data Analytics in Operations Management expensive in South East Asia?		While open-source implementations are possible, those can be very risky and would come without support. The expertise required to properly maintain such implementations are expensive. An implementation with low risk would be very expensive whereas if not much is at stake, implementing Data Analytics in Operations Management can be relatively cheap using open-source software.
Is implementing Data Analytics in Operations Management widespread in South East Asian companies?	Based on your answer, why do you think so?	I am not sure how widespread Data Analytics in Operations Management is in SEA companies. However, a few of our partner companies have already

		implemented Data Analytics pipelines and methodologies in their operations.
Can you quantify the results of using data driven decision-making in your Operations Management?		One of the biggest achievements of the department is that using data-driven decision-making, the company was able to save around 60% of the budget previously allocated to supply distribution. Every cycle, we aim to increase this number of improve other aspects of the operations. Quantifying these events is the only way to measure the effectiveness of our implementations.
In your opinion, what would be your advice to a company that is considering using Data Analytics in Operations Management?		My advice would be to go for it. Data in Operations Management can be extremely powerful and needs to be leveraged. However, measures

		should be taken to make sure the data is being collected in a proper manner and the skills/expertise required is present. Data can be powerful but only in the right hands and in the right form and shape.

1.C.3 The interview with Ms. Amy Aanen

Basic Questions

Interview Question	Follow-up Question	Ms. Amy Aanen
What is your position in the company?		I am the Vice President of Operations and Marketing at iPrice Group. I started as a Marketing Manager and growing the team before being promoted to Vice President of Marketing and thereafter Vice President of Operations and Marketing. This is a position I have held for around a year now.
How long have you been working in the company?		I came to iPrice three years ago from Germany where I worked for Rocket Internet. It's been an amazing time here in South East Asia.
How long have you worked in Operations Management?		I have worked in Operations Management for about six years now. Besides being in

		marketing, I was heavily involved in operations both at iPrice and Rocket Internet.
Does your organization implement data driven decision-making in their Operations Management?		Definitely, we do it every day. It has come to a point in which all our decisions are data driven.

Probing Questions

Interview Question	**Follow-up Question**	**Ms. Amy Aanen**
When did you start using Data Analytics in Operations Management?		From day one. We try to collect as much data as possible and use data as our main decisive factor. We have KPIs set up that we measure on a daily, weekly or monthly basis. This gives us a clear overview of how the business is performing and what areas need improvement.
Why did you start using Data Analytics in		Because we are a company operating

Operations Management?		online, we have the ability to really understand on a detailed level what our customers do and want, by analysing how they are behaving or have behaved in the past. This is a great resource that we 100% want to use, because looking at actual data instead of guessing helps us grow much faster.
Do you think using Data Analytics in Operations Management is important?	Why do you think so?	Extremely important. I don't think any operational department could do without.
What is the difference between traditional Operations Management and data driven decision-making in Operations Management?		I must say I have never really worked in an environment where Operations Management was handled in a more traditional way, so it's hard for me to answer that question. But my assumption is that in traditional Operations

		Management, there was a lot more guesswork, which slows down business. It also probably gave most employees in those departments less decision power, as decisions often needed to be discussed instead of having the ability to just read the numbers.
What difference does your company realize from using data driven decision-making?	Was there any negative difference?	I believe we are capable of growing faster because we use data-driven decision making. I also believe we can much easier do experiments and for instance A/B testing - Data analytics can tell us very quickly whether an experiment worked or not. If not, we can shut it down easily and focus our efforts on something else.

Depth Questions

Interview Question	Follow-up Question	Ms. Amy Aanen
Do you consider Operations Management Data Analytics part of your Operations Management?		Yes! Our organisation does have a separate Business Intelligence/Data Analytics team, but we try to train all employees to have a basic understanding of Data Analytics. Our operation team also has separate data analysts, that help out more with the day-to-day operational analytics.
Are you more comfortable to base your decisions on experience and expertise or data?		I think a combination is probably the best. I think data should be the leading factor when it comes to decision making but having experience definitely does help. It's often also just knowing what you exactly want to analyse and having a better direction in what data

		sets really do make a difference.
Is your above answer reflective across your organization and South East Asia?		It is reflective across my organisation, but I don't think it's the case in Southeast Asia. Perhaps in the startup world, but definitely not in the more traditional corporations.
Is implementing Data Analytics in Operations Management expensive in South East Asia?		I don't think so! There are some great free, or very cheap tools out there that can help you set up a proper Data Analytics system. Even Microsoft Excel/Google Sheets can really make a difference, and it costs next to nothing.
Is implementing Data Analytics in Operations Management widespread in South East Asian companies?		I wish it was, but from my experience I have learned that it is not always the case. Southeast Asian companies tend to be quite hierarchical, where decision making is often

		done by a CEO/manager instead of together with the team. If one person is in charge of a decision and that person isn't experienced in Data Analytics, it leaves a big gap. In terms of awareness, it is pretty high in the region iPrice collect data on the business practices of e-commerce companies in SEA and acknowledges the training an seminars on DDM increase year on year.
After implementing Data Analytics in Operations Management, how soon where the results? Where they immediate or after 12 months?	Based on your answer, why do you think so?	Pretty much immediate. There's a lot of differences you can already see on a day-to-day basis.
Can you quantify the results of using data driven decision-making in		I think it's hard to quantify as we have decided to use Data Analytics from day one,

your Operations Management?		so we can't really compare it to a situation where we weren't using it. But we have seen on some projects that when we started to use more detailed Data Analytics, we could improve those respective KPIs by up to 100%.
In your opinion, what would be your advice to a company that is considering using Data Analytics in Operations Management?		Definitely go for it and let it be the leading factor in your decision making. Don't only measure the most common data points, but try to think outside of the box as well - Sometimes data points you never looked at can actually become very important for your business. Also, think well about the frequency of measuring some data points - There's data that fluctuates heavily on a daily basis, then there's KPIs that hardly change

		over a year. The first ones probably give you much more interesting insights. Then combine those data points with the experience/expertise that you have and great things can happen!

1.C.4 The interview with Dr. Konstantin Lange

Basic Questions

Interview Question	Follow-up Question	Dr. Konstantin Lange
What is your position in the company?		I am the Chief Operating Officer of Osome Ltd in Singapore. Before that I worked at iPrice as the Chief Operating Officer and co-founder and the Co-Founder and Chief Finance Officer of sister company HappyFresh. This was my first venture into Asia after working In Boston for a few years and it has been challenging but enjoyable.
How long have you been working in the company?		I have worked at Osome for around two years now and I was at iPrice for three years from the initial stages of the company. I joined iPrice from sister company HappyFresh where I was

		also the co-founder and Chief Finance Officer.
How long have you worked in Operations Management?		I have worked in Operations Management for about ten years now. I started working in operations as an intern at JPMorgan and Chase before joining Boston Consulting Group for two years. I later did my Doctorate degree and moved to Asia where I have continued to work in operations management.
Does your organization implement data driven decision-making in their Operations Management?		We certainly do it every day. It has reached a stage where all our choices are guided by information. We have done this in all the organizations I have worked at. This just shows how crucial it has been.

Probing Questions

Interview Question	Follow-up Question	Dr. Konstantin Lange
When did you start using Data Analytics in Operations Management?		At Osome, it has been used even before my time, at iPrice and HappyFresh from the first day, I advocated for it. We are trying to gather as much information as we can and we are using information as our key determinant. We have established main efficiency indexes that we evaluate on a daily, weekly or monthly basis. This gives us a clear overview of the performance of the business and the areas that need improvement.
Why did you start using Data Analytics in Operations Management?		This is a excellent tool that we want to use 100 percent, because searching at real information rather than imagining enables us

		develop much quicker. Because we are an internet business, we have the capacity to really comprehend what our clients are doing and wanting on a comprehensive basis by analyzing how they have acted or acted in the past.
Do you think using Data Analytics in Operations Management is important?	Why do you think so?	I believe no operational department is able to do without it. It is extremely important. As I said, Since we are an internet enterprise, we can really understand what our customers do and want to do, analyzing how they have acted or have acted in the past.
What is the difference between traditional Operations Management and data driven decision-		Our company has traditionally used historical sales information to provide business intelligence and

making in Operations Management?		adjust its activities on the basis of results. However, our information analysis attempts presently did not have the predictive capacities. I would like to say that the distinction is how many prospects we see our company from and take into consideration in changing our activities. We also depend on these distinct views in the form of information rather than relying exclusively on history and experience. There is a bit more guesswork in traditional operational management that slows down company. In those agencies it also likely offered most workers less decision-making authority, as choices often had to be debated

		rather than simply viewing the figures.
What difference does your company realize from using data driven decision-making?	Was there any negative difference?	I think we can grow quicker because we do decision-making that uses data. I also think that we can do tests much easier and, for example, the data analytics can show us very fast whether or not an experiment functioned. Otherwise we can readily close it down and concentrate our attempts on anything else. We had our operation costs this year reduced by 30% which was remarkable.

Depth Questions

Interview Question	**Follow-up Question**	**Dr. Konstantin Lange**
Do you consider Operations Management Data Analytics part of		Yes! We have a special Business Intelligence / Data Analytics squad in

your Operations Management?		our organization, but we are trying to educate everyone to have a fundamental knowledge of Data Analytics. We also have a distinct data analyst squad to further assist with operational analysis every day.
Are you more comfortable to base your decisions on experience and expertise or data?		Probably the finest mix, I believe. I believe that information should be the guiding variable in creating choices, but it certainly helps with knowledge. Often it is only understanding what you want to analyze precisely and to easier guide what the collections of information really do.
Is your above answer reflective across your organization and South East Asia?		It is clear in my organization, but in South-East Asia, I do not believe this is the situation. Maybe in the

		globe of start-ups, but certainly not in more traditional companies.
Is implementing Data Analytics in Operations Management expensive in South East Asia?		It's costly, in my view. There is very little skill needed to perform data analysis and it may be costly if obtained. Also comparatively costly are software and hardware alternatives needed to generate and retain information ponds and machine learn pipelines.
Is implementing Data Analytics in Operations Management widespread in South East Asian companies?		I wanted it to be, but I learned that this is not always the case from my experience. South-eastern Asian businesses are usually fairly hierarchical, where the choice taking often takes place in conjunction with the CEO / manager. When a individual has a choice and the data analysis does not allow

		that individual to make, there is a large difference.
After implementing Data Analytics in Operations Management, how soon where the results? Where they immediate or after 12 months?	Based on your answer, why do you think so?	There were some that are pretty much immediate. There's a lot of differences you can already see on a day-to-day basis. But there are others that findings were seen after approximately 3 months which is our inner supply-deployment period. While we observed delivery and marketing patterns as our algorithms expected, at the start of our period we could only verify the outcomes.
Can you quantify the results of using data driven decision-making in your Operations Management?		Yes as I mentioned earlier, this year alone we saw a reduction of 30% of our operating costs due to the use od data driven decision-making. We decided to use

		machine learning for our trends analysis this year.
In your opinion, what would be your advice to a company that is considering using Data Analytics in Operations Management?		Surely go for it and let your choice be the guiding variable. Don't just evaluate the usual information scores, but also attempt to believe outside the cabinet– information dots you never stared at can be very essential to your company. Furthermore, believe about how often certain information scores can be measured–there is information that varies significantly on a regular basis and then over one year, there are KPIs that hardly alter. The first ones are likely a lot more exciting for you. Combine the information marks with the expertise

		you have and excellent stuff can occur!

1.C.5 The interview with Ms. Eva Marbach

Basic Questions

Interview Question	Follow-up Question	Ms. Eva Marbach
What is your position in the company?		I am the head of operations of Asia Venture Group. We are a venture capital firm that has invested in successful companies such as iPrice, iMoney, HappyFresh and Kfit. Before that I was working as the operations manager in HappyFresh which is a subsidiary of Asia Venture Group.
How long have you been working in the company?		I have been working for Asia Venture Group from 2015. When I was working for HappyFresh I was still doing work for AVG before I made the permanent switch in 2016.

How long have you worked in Operations Management?		I have worked in operations management for four years now going to five. I think this was influenced by my Masters studies of economics.
Does your organization implement data driven decision-making in their Operations Management?		Yes, it is, we did quite a lot of it in AVG but not much at HappyFresh in my time.

Probing Questions

Interview Question	**Follow-up Question**	**Ms. Eva Marbach**
When did you start using Data Analytics in Operations Management?		We started using Data Analytics four years ago.
Why did you start using Data Analytics in Operations Management?		It became a necessity. We needed to grow exponentially, and the only way was through analytics.
Do you think using Data Analytics in Operations	Why do you think so?	Yes it s. Analytics helps companies save so much

Management is important?		on operations costs which result into bigger margins.
What is the difference between traditional Operations Management and data driven decision-making in Operations Management?		Traditional OM implied that after the reality, we always reacted. Based on historical marketing information, we would decide and execute alternatives. We are prepared to anticipate the current events and forecast requirements and take choices in line with our existing information analytical pipelines and methodologies.
What difference does your company realize from using data driven decision-making?	Was there any negative difference?	Through data-driven decision-making, we have adapted ourselves to previous and future occurrences and developments. Predictive analyzes have resulted in a much quicker pace at which we deploy

		alternatives and respond to requirements. Another distinction is that other agencies are more driven to make certain organizational adjustments because they are supported and driven by concrete proof which is our information.

Depth Questions

Interview Question	**Follow-up Question**	**Ms. Eva Marbach**
Do you consider Operations Management Data Analytics part of your Operations Management?		In our company we are only eight so yeah, everyone is almost on every department.
Are you more comfortable to base your decisions on experience and expertise or data?		I prefer using data, but I prefer using my experience then using data to confirm the decision. Helps me value my intuition and not disrespect the power of data.

Is your above answer reflective across your organization and South East Asia?		No not in the slightest. In Asia in general, companies trust their bosses since they don't want to be fired. So if they don't use data, the staff wont.
Is implementing Data Analytics in Operations Management expensive in South East Asia?		The skill necessary to keep these applications correctly is costly. While applications can be made in the open source environment, they can be highly dangerous and without assistance. As I just said the skill necessary to keep these applications correctly is costly. Implementing low-risk information would be very costly, but application of OM Data Analytics with open-source software would be comparatively inexpensive if not very much.

Is implementing Data Analytics in Operations Management widespread in South East Asian companies?		No, it's not. A lot of companies want to, but they simply can't afford it.
After implementing Data Analytics in Operations Management, how soon where the results? Where they immediate or after 12 months?	Based on your answer, why do you think so?	We get our results on a daily basis, so I'd notice the difference at the end of the next day.
Can you quantify the results of using data driven decision-making in your Operations Management?		Yeah. I would say the daily improvement isn't much. Since I have been using it a long time now I wont know how much is it now. But once we started it was around 10%. A lot of time saved as well.
In your opinion, what would be your advice to a company that is considering using Data Analytics in Operations Management?		Get it! No other way about it.

1.C.6 The interview with Mr. Marc Giovannini

Basic Questions

Interview Question	Follow-up Question	Mr. Marc Giovannini
What is your position in the company?		I am the Chief Operating Officer of Omniaz. We are supply chain management solutions provider for beverages. Really cool work we do. Before that I was the operations manager at an agency called Falcon Media.
How long have you been working in the company?		I am a cofounder and the COO. Been with it since inception in 2018. But I did work in KL for around two years.
How long have you worked in Operations Management?		I have worked in operations for about 7 years now.
Does your organization implement data driven decision-making in their	Why is that?	No unfortunately we don't.

Operations Management?		We are a very early stage startup so we don't need data analytics in our operations at the moment. And also talent in Singapore is crazy high and we kind of don't think we want that yet.

Probing Questions

Interview Question	**Follow-up Question**	**Mr. Marc Giovannini**
When will you start using Data Analytics in Operations Management?		We will start within the year when our team and customer base has grown by at least 500%. We project this to happen before April 2020.
Do you think using Data Analytics in Operations Management is important?	Why do you think so?	Yes, it is so. We see what it does for others, and we want it to happen to us too.
What is the difference between traditional Operations Management and data driven decision-		I wouldn't know exactly since we haven't implemented that before but its definitely less

making in Operations Management?		guesswork and reacting to external situations.
What difference does your company intend to realize from using data driven decision-making?	Was there any negative difference?	We expect to have a 40% reduction in our operating costs in the first month.

Depth Questions

Interview Question	**Follow-up Question**	**Mr. Marc Giovannini**
Will you consider Operations Management Data Analytics part of your Operations Management?		Yes, I will.
Are you more comfortable to base your decisions on experience and expertise or data?		Right now I'm confident in my experience and intuition but that may change.
Is your above answer reflective across your organization and South East Asia?		Yeah I think so. A lot of companies avoid changing their structure because they have absolute confidence in their ability.

Is implementing Data Analytics in Operations Management expensive in South East Asia?		Yes it is I think we mentioned this earlier.
Is implementing Data Analytics in Operations Management widespread in South East Asian companies?		No unfortunately it's not. I think by now you probably understand why. Costs, Talent and the culture here.
After implementing Data Analytics in Operations Management, how soon where the results? Where they immediate or after 12 months?	Based on your answer, why do you think so?	I think we answered this. We target the first quarter as our target.
Can you quantify the results of using data driven decision-making in your Operations Management?		Yeah, we've already gone through this. We will measure it in percentages against the previous year.
In your opinion, what would be your advice to a company that is considering using Data Analytics in Operations Management?		Yes if you can. For us we cant know but we wish we could.

APPENDIX D. INITIAL RESEARCH PAPER PROPOSAL

MASTER OF BUSINESS ADMINISTRATION

Course Name	Business Research Methods	Course Code	MGT 6202
Course Instructor	Dr. Arasu Raman	Initial Research Paper Proposal Dual Award	
Student's Name	Andrew Mark Odielo Okelo	Student's ID	I18016377

Broad Area	Management of an Organization
Concise Title	Data Analytics in Operations: A Quantitative Study on How Data Analytics Can Improve Operational Efficiency
Problem Definition	According to (Ghasemaghaei, Ebrahimi and Hassanein, 2018), the analysis of large sets of operational data allows companies to make faster and better decisions increasing efficiency. This means that if a firm uses data analytic techniques in their operational management, they ought to see improvements in efficiency and performance. However according to studies, more than 75% of companies were not able to obtain significant improvements on their organization while still investing in data analysis (Ghasemaghaei, Ebrahimi and Hassanein, 2018). The theory behind the reason this; is, any change in business practices will create a few challenges and only when addressed will it pay off. Ordinary data analytic abilities and mere possession of data is more likely to generate conditions for business failures (Amankwah-Amoah and Adomako, 2019). Identifying these challenges and eliminating them is key. This will lay the ground for potential research on how to effectively use data analytic capabilities in business. According to (Akter and Wamba, 2016) in the past few years, there has been a plethora of studies both in academia and businesses on the value of big data and data analytics. The journal adds that this is because of the gains that have been realized in real world businesses. Our key research problem therefore is how can we use data analytics appropriately in operational management? This is the problem that the companies stated above in the study could not overcome. Finding ways to use data analytics effectively to improve operational efficiency within companies will undoubtedly increase profits while still managing costs and improving decision making quality.
Research Objectives	What kind of association exists between data analysis and improved operational efficiency? ● How to appropriately use data analysis? ● What ways can data analytics be used in Operational management?

	• How does operational efficiency improve performance and profitability?
Scope of the study	The research will focus on investigating how big data analytics can be used in Malaysian companies in different industries. The research will focus on the operations management, where day to day running and decision making happens, of an Industrial Company and a Food Delivery Service. (Sedgwick, 2014) states that the unit of analysis is the 'who' a study is about. For this research paper, it is the operations team in the companies. The research methodology will be a quantitative report. The quantitative data derived from Interviews and Questionnaires will be analyzed using SPSS Software.
Significance of the study	This research will complement the numerous studies into the advantages of using data analytics in business. However, it will focus on Operations which adds valuable research to the archives. According to (Data Driven Government, 2017)), data and analytics in government has the potential to allow them to improve their services to citizens. They argue that this is the main factor that led to operational gains in Thane, India's public transit network. This research is meaningful for the data analytics industry and it will provide much needed information of how data analytics can be associated with operational management to improve efficiency.
Literature review	Research paper by (Ghasemaghaei, Ebrahimi and Hassanein, 2018) studies and validates the theory that data analytics has a significant positive relationship with decision making results. It also highlights the specific area of data analysis that increases decision efficiency. Research paper by (Akter and Wamba, 2016) studies why data analytics is poorly used and why this hampers its use in the real world. This paper gives greater insight on how data analytics can be applied in business. Research paper by (Data Driven Government, 2017) investigates the areas in government in which data analytics may be used to meet the demands of government. The paper gives ideas that can be used to obtain similar results in businesses. Research paper by (Dhillon and Vachhrajani, 2012) studies the impact of operational efficiency on the profitability of GI Power Company. It sets to

	establish the association and correlation of operational efficiency and profitability of the company. **Null Hypothesis** - Use of data analytics in operations does not improve operational efficiency. **Alternative Hypothesis** - There is an association between use of data analytics in operations and improved operational efficiency.
Research Methodology	This will be an empirical study. This research will be a quantitative study and as it is most suited to prove the theory the alternative hypothesis. Surveys and Interviews will be used because they are appropriate for covering a large data collection spectrum. They are also appropriate because their interpretation is objective. Two interviews will be conducted on Operations personnel to gather information. They will be face to face interviews. A questionnaire will also be issued to other members of operations teams in other companies. We will expect at least 100 respondents. The questionnaire will be posted on professional social media channels such as LinkedIn and Blogs. The Researcher will ensure that the privacy and security of the responses is preserved by not collecting personal information of the respondents. The questionnaire and interview questions will be sourced from ideas found in the literature used for this research. The responses will then be analyzed statistically using SPSS and presented visually using charts and graphs. The variables are Operations, Data Analytics, Decision Making, Operational Efficiency.

References

Akter, S. and Wamba, S. (2016). Big data analytics in E-commerce: a systematic review and agenda for future research. Electronic Markets, 26(2), pp.173-194.

Amankwah-Amoah, J. and Adomako, S. (2019). Big data analytics and business failures in data-Rich environments: An organizing framework. Computers in Industry, 105, pp.204-212.

Data Driven Government. (2017). @gov, (Spring-Summer 2017), pp.2-11.

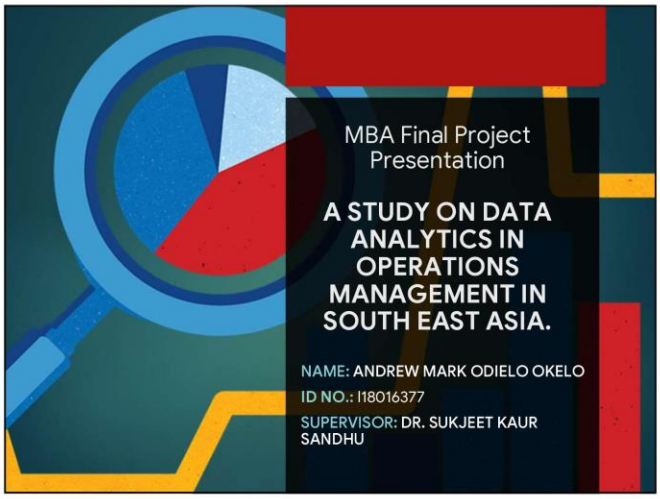
Dhillon, A. and Vachhrajani, H. (2012). Impact of Operational Efficiency on Overall Profitability- A Case Study of GIPCL. Working Paper. [online] Tamil Nadu, India: Amrita School of Business, pp.5-19. Available at: https://www.researchgate.net/publication/273127465 [Accessed 2 Mar. 2019].

Ghasemaghaei, M., Ebrahimi, S. and Hassanein, K. (2018). Data analytics competency for improving firm decision making performance. The Journal of Strategic Information Systems, 27(1), pp.101-113.

Sedgwick, P. (2014). Unit of observation versus unit of analysis. BMJ, 348(jun13 4), pp.g3840-g3840.

APPENDIX E. PRESENTATION SLIDES

20/08/2019



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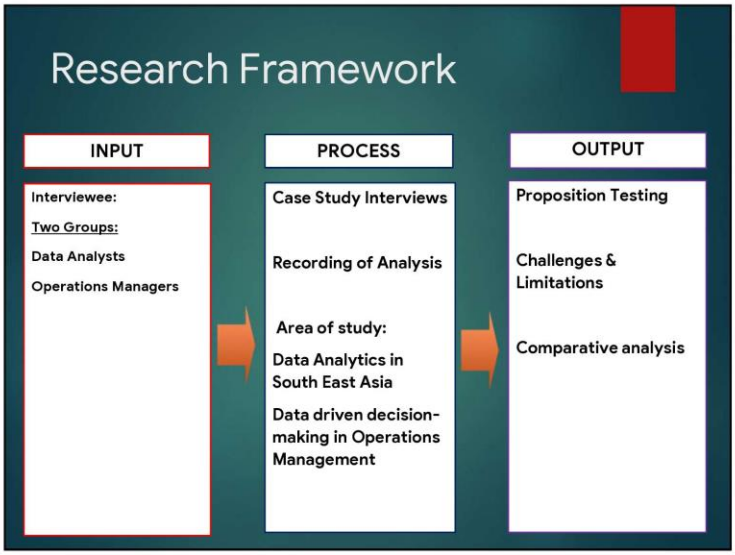
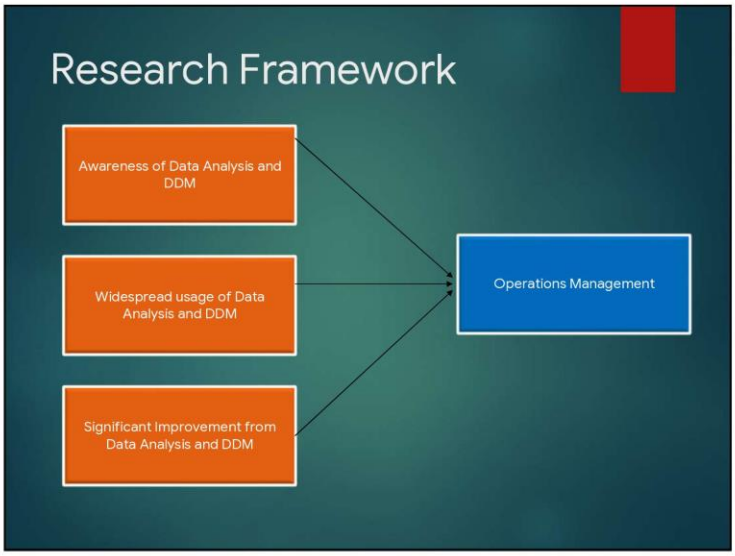

Research Framework
INPUT
PROCESS
OUTPUT
Interviewee:
Two Groups:
Data Analysts
Operations Managers
Case Study Interviews
Recording of Analysis
Area of study:
Data Analytics in South East Asia
Data driven decision-making in Operations Management
Proposition Testing
Challenges & Limitations
Comparative analysis

3


Research Framework
Awareness of Data Analysis and DDM
Widespread usage of Data Analysis and DDM
Significant Improvement from Data Analysis and DDM
Operations Management

4

Propositions

- P1: The level of awareness of data analysis in operations management in South East Asia is high.
- P2: Data Analysis in Operations Management of companies is widely used in South East Asia.
- P3: Data driven decision-making results into significant improvement in operations management in SEA.

5

Demographic Data of Interviewees

6

Department	Name	Role in the company	Organization
Data Analytics	Mr. Kavish	Data Analyst	Mezza 9 Solutions
	Mr. Danesh	Data Engineer	Mezza 9 Solutions
Operations Management	Ms. Amy	Vice President of Operations and Marketing	iPrice Group Sdn Bhd
	Dr. Konstantin	Chief Operating Officer	iPrice Group Sdn Bhd
		Chief Operating Officer	Osome Limited
	Ms. Eva	Head of Operations	Asia Venture Group
		Operations Manager	Happy Fresh Limited
	Mr. Marc	Chief Operating Officer	Omniaz Solutions Limited.

6

Preliminary Analysis

Dpt	Name	Role in the company	Organization	Aware of Data Analysis on OM	Use DDM in OM	DDM is significant to OM
Data Analytics	Mr. Kavish	Data Analyst	Mezza 9 Solutions	Yes	Yes	Yes
	Mr. Danesh	Data Engineer	Mezza 9 Solutions	Yes	Yes	Yes
Operations Management	Ms. Amy	Vice President Operations and Marketing	iPrice Group Sdn Bhd	Yes	Yes	Yes
	Dr. Konstantin	Chief Operation Officer	iPrice Group Sdn Bhd	Yes	Yes	Yes
		Chief Operations Officer	Osome Limited	Yes	Yes	Yes
	Ms. Eva	Head of Operations	Asia Venture Group	Yes	Yes	Yes
		Operations Manager	Happy Fresh Limited	Yes	No	Yes
	Mr. Marc	Chief Operations Officer	Omniaz Solutions Limited.	Yes	No	Yes

7

Propositions Testing

- P1: The level of awareness of data analysis in operations management in South East Asia is high.
- P2: Data Analysis in Operations Management of companies is widely used in South East Asia.
- P3: Data driven decision-making results into significant improvement in operations management in SEA.

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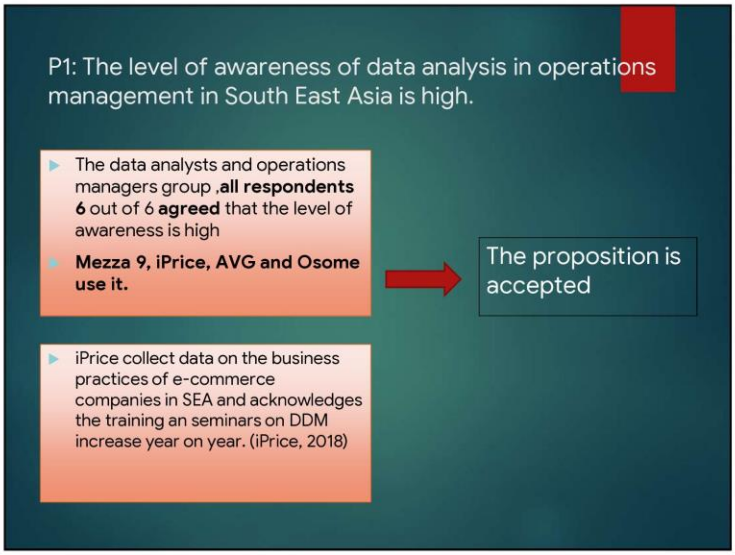
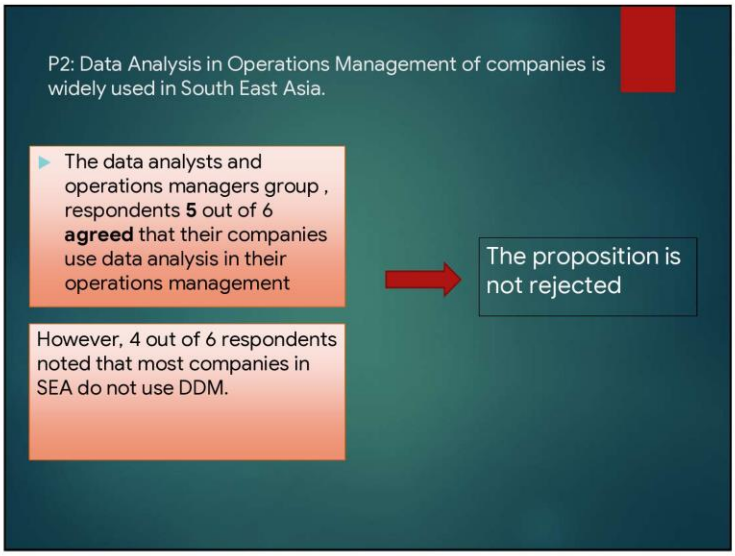
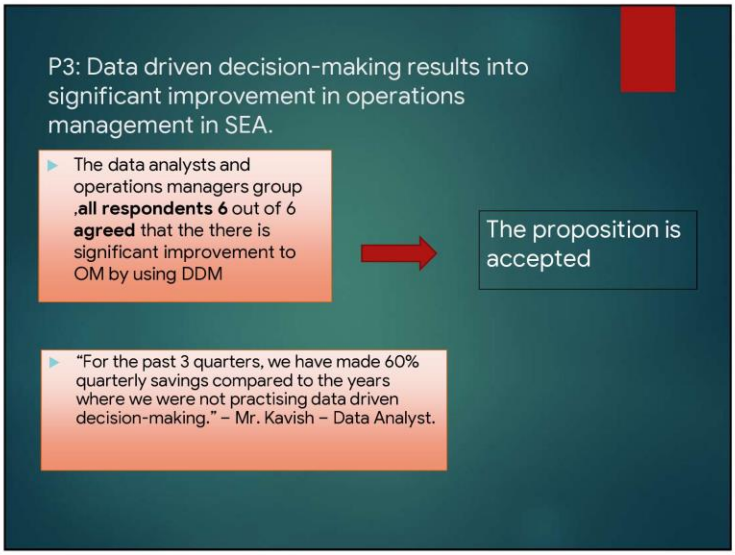

P1: The level of awareness of data analysis in operations management in South East Asia is high.
The data analysts and operations managers group ,all respondents 6 out of 6 agreed that the level of awareness is high
Mezza 9, iPrice, AVG and Osome use it.
The proposition is accepted
iPrice collect data on the business practices of e-commerce companies in SEA and acknowledges the training an seminars on DDM increase year on year. (iPrice, 2018)

9


P2: Data Analysis in Operations Management of companies is widely used in South East Asia.
The data analysts and operations managers group , respondents 5 out of 6 agreed that their companies use data analysis in their operations management
The proposition is not rejected
However, 4 out of 6 respondents noted that most companies in SEA do not use DDM.

10



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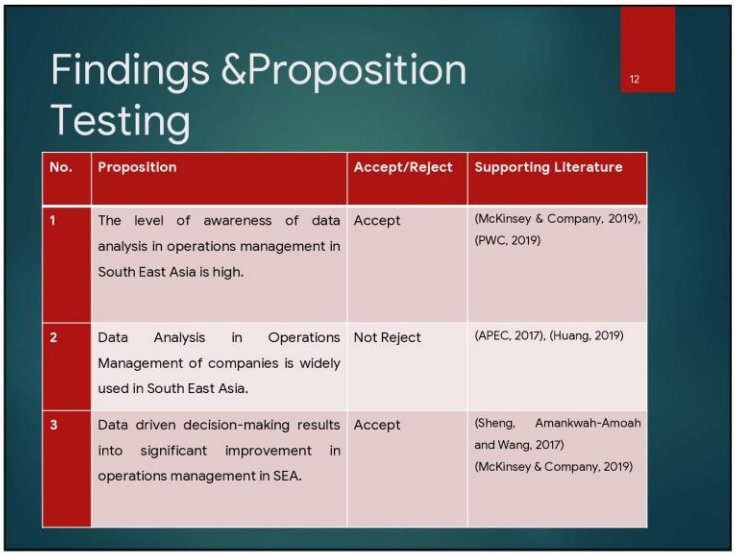

No.	Proposition	Accept/Reject	Supporting Literature
1	The level of awareness of data analysis in operations management in South East Asia is high.	Accept	(McKinsey & Company, 2019), (PWC, 2019)
2	Data Analysis in Operations Management of companies is widely used in South East Asia.	Not Reject	(APEC, 2017), (Huang, 2019)
3	Data driven decision-making results into significant improvement in operations management in SEA.	Accept	(Sheng, Amankwah-Amoah and Wang, 2017) (McKinsey & Company, 2019)

12

Recommendations

- Consult an analysis consultancy in order to be aware of the barriers.
- Adopting DDM requires willingness to change style.
- Leverage DDM into management mechanism, additional values can be discovered, created and realised in business development.

13

Contribution to the Academia

- The findings show that more education is needed in SEA about the value and barriers of DDM.
- Due to lack of research on the region, this research provides a better understanding on the state of DDM in SEA.

14

Contribution to the Industry

- This research is important to operations management. Improving operations management reduces associated costs thus greater profit margins.
- Research shows that by utilizing data, manufacturing organizations can realize benefits of up to $117 billion globally (Capgemini Consulting, 2016).
- The findings of the research will contribute to proper adaptation of data analytics in operations management for companies across South East Asia.

15

Future Research

- Research on the risks involved with the introduction of DDM in operations management in South East Asia.
- Research of a framework to help companies transition to data-driven operations management.
- Optimal combinations for the application of DDM and experience and intuition.

16

Conclusion

- Data Analytics in OM plays a significant role in reduction of costs
- Most companies are aware but need to be taught on how to implement DDM.
- Major barrier in SEA is the investment cost, expertise and culture.
- In conclusion, companies should implement DDM as the benefits are significantly high.

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Thank You

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APPENDIX F. ETHICS FORMS

1.F.1 FORM EC1A: APPLICATION FOR ETHICS APPROVAL OF A STUDY INVOLVING HUMAN PARTICIPANTS

UNIVERSITY OF HERTFORDSHIRE

FORM EC1A: APPLICATION FOR ETHICS APPROVAL OF A STUDY INVOLVING HUMAN PARTICIPANTS (Individual or Group Applications)

Please complete this form if you wish to undertake a study involving human participants.

Applicants are advised to refer to the Ethics Approval StudyNet Site and read the Guidance Notes (GN) before completing this form.

http://www.studynet2.herts.ac.uk/ptl/common/ethics.nsf/Homepage?ReadForm

Applicants are also advised to read the FAQ General Data Protection Regulation (GDPR) before completing this form.
http://www.studynet2.herts.ac.uk/ptl/common/ethics.nsf/Frequently+Asked+Questions/4AD88CD88D0F3F2D8025829800300621

Use of this form is mandatory [see UPR RE01, 'Studies Involving Human Participants', Sections 7.1-7.3]

Approval must be sought **and granted** before any investigation involving human participants begins [UPR RE01, S 4.4 (iii)]

If you require any further guidance, please contact either hsetecda@herts.ac.uk or ssahecda@herts.ac.uk

Abbreviations: GN = Guidance Notes UPR = University Policies and Regulations

THE STUDY

Q1 Please give the title of the proposed study

A Study On Data Analytics In Operations Management In South East Asia.

THE APPLICANT

Q2 Name of applicant/(principal) investigator (person undertaking this study)

ANDREW MARK ODIELO

Student registration number/Staff number

I18016377

Email address

I18016377@student.newinti.edu.my

Status:

☐Undergraduate (Foundation) ☐Undergraduate (BSc, BA)

☒Postgraduate (taught) ☐Postgraduate (research)

☐Staff ☐Other

If other, please provide details here:

Click here to enter text.

School/Department:
School of Business, Communication and Law

If application is from a student NOT based at University of Hertfordshire, please give the name of the partner institution: INTI International University

Name of Programme (eg BSc (Hons) Computer Science): Master of Business Administration

Module name and module code: MBA PROJECT MGT7998

Name of Supervisor: Dr. Sukjeet Kaur Sandhu Supervisor's email:
sukjeetkaur.sandhu@newinti.edu.my

Name of Module Leader if applicant is undertaking a taught programme/module:

Dr. Sukjeet Kaur Sandhu

Names and student/staff numbers for any additional investigators involved in this study (students should read GN Sections 1.5 and 2.2.1 concerning responsibilities of all members of the group)

Click here to enter text.

Is this study being conducted in collaboration with another university or institution and/or does it involve working with colleagues from another institution?

☒Yes ☐No

If yes, provide details here:

It involves collaboration with University of Hertfordshire

DETAILS OF THE PROPOSED STUDY

Q3 Please give a short synopsis of your proposed study, stating its aims and highlighting where these aims relate to the use of human participants (See GN 2.2.3)

The study plans to investigate how data analytics is used in operations management. It will require interviews to collect data regarding the research area.

Q4 Please give a brief explanation of the design of the study and the methods and procedures used. You should clearly state the nature of the involvement the human participants will have in your proposed study and the extent of their commitment. Ensure you provide sufficient detail for the Committee to, particularly in relation to the human participants. Refer to any Standard Operating Procedures SOPs under which you are operating here. (See GN 2.2.4).

The study will be conducted via Interview. Human participants are required to give their expert opinion and observations on the topic area. Their commitment only extends to data collection and will not be

used in analysis. The analysis will be done by the researcher based on the data collected from the participants.

Q5 Does the study involve the administration of substances?

☐Yes ☒No

PLEASE NOTE: If you have answered yes to this question you must ensure that the study would not be considered a clinical trial of an investigational medical product. To help you, please refer to the link below from the Medicines and Healthcare Products Regulatory Agency:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/317952/Algothrim.pdf

To help you determine whether NHS REC approval is required, you may wish to consult the Health Research Authority (HRA) decision tool: http://www.hra-decisiontools.org.uk/ethics/

If your study is considered a clinical trial and it is decided that ethical approval will be sought from the HRA, please stop completing this form and use Form EC1D, 'NHS Protocol Registration Request'; you should also seek guidance from Research Sponsorship.

I confirm that I have referred to the Medicines and Healthcare Products Regulatory Agency information and confirm that that my study is not considered a clinical trial of a medicinal product.

Please type your name here: Andrew Mark Odielo

Date: 18/07/2019

Q6.1 Please give the starting date for your recruitment and data collection: as soon as ethics approval is received.

Q6.2 Please give the finishing date for your data collection: 18/08/2019
(For meaning of 'starting date' and 'finishing date', see GN 2.2.6)

Q7.1 Where will the study take place?

For the participants based in Kuala Lumpur, the interviews will take place in their offices. For the participants not available in Kuala Lumpur, a video call interview will be conducted in a private discussion room in the university library.

Please refer to the Guidance Notes (GN 2.2.7) which set out clearly what permissions are required;

Please tick all the statements below which apply to this study

Q7.2 **Permissions**

This question is about two types of permission you may need to obtain. Depending on the study you may need more than one of each of these:

i Permission to access a particular group or groups of participants to respond to your study
ii Permission to use a particular premises or location in which you wish to conduct your study

If your study involves minors/vulnerable participants, please refer to Q18 to ensure you comply with the University's requirement regarding Disclosure and Barring Service clearance.

TICK THE APPROPRIATE BOXES IN EACH COLUMN

(i) Permission to access participants	(tick)	(ii) Permission to use premises/location	(tick)

	I confirm that I have obtained permission to access my intended group of participants and that the permission is attached to this application		Permission has been obtained to carry out the study on University premises in areas outside the Schools and the agreement is attached to this application.
✓	I have yet to obtain permission but I understand that this will be necessary before I commence my study. For student applicants only: I understand that the original copies of the permission letters must be verified by my supervisor before data collection commences		Permission has been obtained from an off-campus location to carry out the study on their premises and the agreement is attached to this application
	This study involves working with minors/vulnerable participants. I/we have obtained permission from the organisation (including UH/UH Partner Institutions when appropriate) in which the study is to take place and which is responsible for the minors/vulnerable participants. The permission states the DBS requirements of the organisation for this study and confirms I/we have satisfied their DBS requirements where necessary	✓	I have yet to obtain permission but I understand that this will be necessary before I commence my study. For student applicants only: I understand that the original copies of the permission must be verified by my supervisor before data collection commences
	Permission is not required for my study. **Please explain why:**		Permission is not required for my study. **Please explain why:**

HARMS, HAZARDS AND RISKS

Q8.1 It might be appropriate to conduct a risk assessment (in respect of the hazards/risks affecting both the participants and/or investigators). **Please use form EC5, Harms, Hazards and Risks, if the answer to any of the questions below is 'yes'.**

If you are required to complete and submit a School-specific risk assessment (in accordance with the requirements of the originating School) it is acceptable to make a cross-reference from this document to Form EC5 in order not to have to repeat the information twice.

Will this study involve any of the following?

Invasive Procedures/administration of any substance/s? ☐YES ☒NO

IF 'YES' TO THE ABOVE PLEASE COMPLETE EC1 APPENDIX 1 AS WELL AND INCLUDE IT WITH YOUR APPLICATION

Are there potential hazards to participant/investigator(s) from the proposed study? (Physical/Emotional or other non-physical harm) ☐YES ☐NO

Will or could aftercare and/or support be needed by participants? ☐YES ☐NO

Q8.2 Is the study being conducted off-campus (i.e. not at UH/UH Partner?) ☒YES ☐NO

It might be appropriate to conduct a risk assessment of the proposed location for your study (in respect of the hazards/risks affecting both the participants and/or investigators) (this might be relevant for on-campus locations as well). Please use Form EC5 and, if required, a School-specific risk assessment (See GN 2.2.8 of the Guidance Notes).

If you do not consider it necessary to submit a risk assessment, please give your reasons:

The proposed location will be in the offices of the participant who are based in Kuala Lumpur. Also as the nature of the study requires just information of work related procedures and technologies, the participant is less likely to suffer any emotional harm.

ABOUT YOUR PARTICIPANTS

Q9 Please give a brief description of the kind of people you hope/intend to have as participants, for instance, a sample of the general population, University students, people affected by a particular medical condition, children within a given age group, employees of a particular firm, people who support a particular political party, and state whether there are any upper or lower age restrictions.

My intended participants are mid to senior level employees in the line of operations management within their companies. They will also have to have knowledge on the use of advanced data analysis in use at their company.

Q10 Please state here the maximum number of participants you hope will participate in your study. Please indicate the maximum numbers of participants for ***each*** method of data collection.

Interviews – 4 Maximum - 10

Q11 By completing this form, you are indicating that you are reasonably sure that you will be successful in obtaining the number of participants which you hope/intend to recruit. Please outline here your recruitment (sampling) method and how you will advertise your study. (See GN 2.2.9).

I will use interviews to obtain responses. I will advertise the study on popular professional Data Analytics and Operations Management social platforms such as Kaggle, Quora, LinkedIn, Reddit and Yahoo Answers. I will also send interview requests to a list of potential interviewees via email.

CONFIDENTIALITY AND CONSENT

(For guidance on issues relating to consent, see GN 2.2.10, GN 3.1 and UPR RE01, SS 2.3 and 2.4 and the Ethics Approval StudyNet Site FAQs)

Q12 How will you obtain consent from the participants? Please explain the consent process for each method of data collection identified in Q4

☒ Express/explicit consent using an EC3 Consent Form and an EC6 Participant Information Sheet (or equivalent documentation)

☒ Implied consent (participant information will be provided, for example, at the start of the questionnaire/survey etc)

☐ Consent by proxy (for example, given by parent/guardian)

Use this space to describe how consent is to be obtained and recorded for each method of data collection. The information you give must be sufficient to enable the Committee to understand exactly what it is that prospective participants are being asked to agree to.

I will also use the EC3 and EC6 Consent forms for the interviews.

If you do not intend to obtain consent from participants please explain why it is considered unnecessary or impossible or otherwise inappropriate to seek consent.

Click here to enter text.

Q13 If the participant is a minor (under 18 years of age) or is unable for any reason to give full consent on their own, state here whose consent will be obtained and how? (See especially GN 3.6 and 3.7)

N/A

Q14.1 Will anyone other than yourself and the participants be present with you when conducting this study? (See GN 2.2.10)

☐YES ☒NO

If YES, please state the relationship between anyone else who is present other than the applicant and/or participants (eg health professional, parent/guardian of the participant).

Click here to enter text.

Q14.2 Will the proposed study be conducted in private?

☒YES ☐NO

If 'No', what steps will be taken to ensure confidentiality of the participants' information. (See GN 2.2.10):

Click here to enter text.

Q15.1 Are personal data of any sort (such as name, age, gender, occupation, contact details or images) to be obtained from or in respect of any participant? (See GN 2.2.11) (You will be required to adhere to the arrangements declared in this application concerning confidentiality of data and its storage. The Participant Information Sheet (Form EC6 or equivalent) must explain the arrangements clearly.)

☒YES ☐NO

If YES, give details of personal data to be gathered and indicate how it will be stored.

Age, Gender, Occupation, Email.
The data will be stored on Google forms database.

Will you be making audio-visual recordings?

☒YES ☐NO

If YES, give details of the types recording to be made and indicate how they will be stored.

Audio recording will be used to store the interview findings to be included in the report.

Q15.2 If you have made a YES response to any part of Q15.1, please state what steps will be taken to prevent or

regulate access to personal data and/or audio-visual recordings beyond the immediate investigative team, as indicated in the Participant Information Sheet.

Indicate what assurances will be given to participants about the security of, and access to, personal data and/or audio-visual recordings, as indicated in the Participant Information Sheet.

The consent form will be used to give the participant assurances on the usage of the audio recording. Moreover, the recording will be stored in a secured University server.

State as far as you are able to do so how long personal data and/or audio-visual recordings collected/made during the study will be retained and what arrangements have been made for its/their secure storage and destruction, as indicated in the Participant Information Sheet.

The recordings will be retained until the release of the project results.

Q15.3 Will data be anonymised prior to storage?

☒YES ☐NO

Q16 Is it intended (or possible) that data might be used beyond the present study? (See GN 2.2.10)

☐YES ☒NO

If YES, please indicate the kind of further use that is intended (or which may be possible).

Click here to enter text.

If NO, will the data be kept for a set period and then destroyed under secure conditions?

☒YES ☐NO

If NO, please explain why not:

Click here to enter text.

Q17 Consent Forms: what arrangements have been made for the storage of Consent Forms and for how long?

Consent forms will be physically handed to the University and be stored in their storage location.

Q18 If the activity/activities involve work with children and/or vulnerable adults satisfactory Disclosure and Barring Service (DBS) clearance may be required by investigators. You are required to check with the organisation (including UH/UH Partners where appropriate) responsible for the minors/vulnerable participants whether or not they require DBS clearance.

Any permission from the organisation confirming their approval for you to undertake the activities with the children/vulnerable group for which they are responsible should make specific reference to any DBS requirements they impose and their permission letter/email must be included with your application.

More information is available via the DBS website - https://www.gov.uk/government/organisations/disclosure-and-barring-service

REWARDS

Q19.1 Are you receiving any financial or other reward connected with this study? (See GN 2.2.14 and UPR RE01, S 2.3)

☐YES ☒NO

If YES, give details here:

Click here to enter text.

Q19.2 Are participants going to receive any financial or other reward connected with the study? (Please note that the University does not allow participants to be given a financial inducement.) (See UPR RE01, S 2.3)

☐YES ☒NO

If YES, provide details here:

Click here to enter text.

Q19.3 Will anybody else (including any other members of the investigative team) receive any financial or other reward connected with this study?

☐YES ☒NO

If YES, provide details here:

Click here to enter text.

OTHER RELEVANT MATTERS

Q20 Enter here anything else you want to say in support of your application, or which you believe may assist the Committee in reaching its decision.

Click here to enter text.

DOCUMENTS TO BE ATTACHED

Please indicate below which documents are attached to this application:

☐ Permission to access groups of participants from student body

☐ Permission to use University premises beyond areas of School

☐ Permission from off-campus location(s) to be used to conduct this study

☐ Form EC5 (Harms, Hazards and Risks: assessment and mitigation)

☒ Consent Form (See Form EC3/EC4)

☒ Form EC6 (Participant Info Sheet)

☐ A copy of the proposed questionnaire and/or interview schedule (if appropriate for this study). For unstructured methods, please provide details of the subject areas that will be covered and any boundaries that have been agreed with your Supervisor

☐ Any other relevant documents, such as a debrief, meeting report. Please provide details here:

Click here to enter text.

DECLARATIONS

1 DECLARATION BY APPLICANT

1.1 I undertake, to the best of my ability, to abide by UPR RE01, 'Studies Involving the Use of Human Participants', in carrying out the study.

1.2 I undertake to explain the nature of the study and all possible risks to potential participants,

1.3 Data relating to participants will be handled with great care. No data relating to named or identifiable participants will be passed on to others without the written consent of the participants concerned, unless they have already consented to such sharing of data when they agreed to take part in the study.

1.4 All participants will be informed **(a)** that they are not obliged to take part in the study, and **(b)** that they may withdraw at any time without disadvantage or having to give a reason.

(**NOTE**: Where the participant is a minor or is otherwise unable, for any reason, to give full consent on their own, references here to participants being given an explanation or information, or being asked to give their consent, are to be understood as referring to the person giving consent on their behalf. (See Q 12; also GN Pt. 3, and especially 3.6 & 3.7))

Enter your name here: Andrew Mark Odielo Date 18/07/2019

2 GROUP APPLICATION

(If you are making this application on behalf of a group of students/staff, please complete this section as well)

I confirm that I have agreement of the other members of the group to sign this declaration on their behalf

Enter your name here: Click here to enter text. Date Click here to enter a date.

DECLARATION BY SUPERVISOR (see GN 2.1.6)

I confirm that the proposed study has been appropriately vetted within the School in respect of its aims

and methods; that I have discussed this application for Ethics Committee approval with the applicant and approve its submission; that I accept responsibility for guiding the applicant so as to ensure compliance with the terms of the protocol and with any applicable ethical code(s); and that if there are conditions of the approval, they have been met.

Enter your name here: Dr. Sukjeet Kaur Sandhu Date 18/07/2019

1.F.2 FORM EC6: PARTICIPANT INFORMATION SHEET

UNIVERSITY OF HERTFORDSHIRE

ETHICS COMMITTEE FOR STUDIES INVOLVING THE USE OF HUMAN PARTICIPANTS ('ETHICS COMMITTEE')

FORM EC6: PARTICIPANT INFORMATION SHEET

1 **Title of study**

A Study On Data Analytics In Operations Management In South East Asia.

2 **Introduction**

You are being invited to take part in a study. Before you decide whether to do so, it is important that you understand the study that is being undertaken and what your involvement will include. Please take the time to read the following information carefully and discuss it with others if you wish. Do not hesitate to ask us anything that is not clear or for any further information you would like to help you make your decision. Please do take your time to decide whether or not you wish to take part. The University's regulations governing the conduct of studies involving human participants can be accessed via this link:

http://sitem.herts.ac.uk/secreg/upr/RE01.htm

Thank you for reading this.

3 **What is the purpose of this study?**

The study plans to investigate how data analytics is used in capacity management to improve operational efficiency. It will require questionnaires and interviews to collect data regarding the research area.

4 **Do I have to take part?**

It is completely up to you whether or not you decide to take part in this study. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. Agreeing to join the study does not mean that you have to complete it. You are free to withdraw at any stage without giving a reason. A decision to withdraw at any time, or a decision not to take part at all, will not affect any treatment/care that you may receive (should this be relevant).

5 **Are there any age or other restrictions that may prevent me from participating?**

Only participants in the field of Operations Management and/or Data Analytics are eligible to participate. They have also have to be 21 years and above.

6 **How long will my part in the study take?**

If you decide to take part in this study, you will be involved in it for 30 minutes.

7 **What will happen to me if I take part?**

The first thing to happen will be to fill up a consent form the an interview session with the researcher will be arranged..

8 **What are the possible disadvantages, risks or side effects of taking part?**

None.

9 **What are the possible benefits of taking part?**

Aid in the research on data analytics and operations management.

10 **How will my taking part in this study be kept confidential?**

The data will be stored on a secure University server. The personal data regarding Age, Gender, Occupation and Contact Details will be anonymized before storage.

11 **Audio-visual material**

Any audio recording will be stored safely in a password protected Dropbox account until the writing of the final report. It will then be permanently destroyed. The audio recording will only be used to improve documentation or transcription of the interview.

12 **What will happen to the data collected within this study?**

- *The data collected will be stored electronically, in a password-protected environment, for 2 months, after which time it will be destroyed under secure conditions;*
- *The data collected will be stored in hard copy by INTI International University in a locked cupboard for months, after which time it will be destroyed under secure conditions.*
- *The data will be anonymised prior to storage.*

13 **Will the data be required for use in further studies?**

- *The data collected will be stored in hard copy by INTI International University in a locked cupboard for months, after which time it will be destroyed under secure conditions.*

14 **Who has reviewed this study?**

This study has been reviewed by:

- *The University of Hertfordshire Social Sciences, Arts and Humanities Ethics Committee with Delegated Authority*

The UH protocol number is <enter>

15 **Factors that might put others at risk**

Please note that if, during the study, any medical conditions or non-medical circumstances such as unlawful activity become apparent that might or had put others at risk, the University may refer the matter to the appropriate authorities.

16 **Who can I contact if I have any questions?**

If you would like further information or would like to discuss any details personally, please get in touch with me, in writing or by email: ***Andrew Mark Odielo macandreokello@gmail.com***

Although we hope it is not the case, if you have any complaints or concerns about any aspect of the way you have been approached or treated during the course of this study, please write to the University's Secretary and Registrar at the following address:

Secretary and Registrar
University of Hertfordshire
College Lane
Hatfield
Herts
AL10 9AB

Thank you very much for reading this information and giving consideration to taking part in this study.

1.F.3 FORM EC3: CONSENT FORMS

UNIVERSITY OF HERTFORDSHIRE
ETHICS COMMITTEE FOR STUDIES INVOLVING THE USE OF HUMAN PARTICIPANTS ('ETHICS COMMITTEE')

FORM EC3
CONSENT FORM FOR STUDIES INVOLVING HUMAN PARTICIPANTS

I, the undersigned *[please give your name here, in BLOCK CAPITALS]*
EVA MARBACH
of *[please give contact details here, sufficient to enable the investigator to get in touch with you, such as a postal or email address]*
eva.marbach@asiaventuregroup.com
hereby freely agree to take part in the study entitled

A Study On Data Analytics In Operations Management In South East Asia.

(UH Protocol number BUS/PGT/CP/04267)

1 I confirm that I have been given a Participant Information Sheet (a copy of which is attached to this form) giving particulars of the study, including its aim(s), methods and design, the names and contact details of key people and, as appropriate, the risks and potential benefits, how the information collected will be stored and for how long, and any plans for follow-up studies that might involve further approaches to participants. I have also been informed of how my personal information on this form will be stored and for how long. I have been given details of my involvement in the study. I have been told that in the event of any significant change to the aim(s) or design of the study I will be informed, and asked to renew my consent to participate in it

2 I have been assured that I may withdraw from the study at any time without disadvantage or having to give a reason.

3 In giving my consent to participate in this study, I understand that voice, video or photo-recording will take place and I have been informed of how/whether this recording will be transmitted/displayed.

4 I have been told how information relating to me (data obtained in the course of the study, and data provided by me about myself) will be handled: how it will be kept secure, who will have access to it, and how it will or may be used.

5 I understand that if there is any revelation of unlawful activity or any indication of non-medical circumstances that would or has put others at risk, the University may refer the matter to the appropriate authorities.

6 I have been told that I may at some time in the future be contacted again in connection with this or another study.

Signature of participant..... Date 08th August 2019

Signature of (principal) investigator..... Date 08th August 2019

Name of (principal) investigator ***ANDREW MARK ODIELO***

Form EC3

UNIVERSITY OF HERTFORDSHIRE
ETHICS COMMITTEE FOR STUDIES INVOLVING THE USE OF HUMAN PARTICIPANTS ('ETHICS COMMITTEE')

FORM EC3
CONSENT FORM FOR STUDIES INVOLVING HUMAN PARTICIPANTS

I, the undersigned *[please give your name here, in BLOCK CAPITALS]*
DR. KONSTANTIN LANGE
of *[please give contact details here, sufficient to enable the investigator to get in touch with you, such as a postal or email address]*
80 Robinson Rd, Singapore
hereby freely agree to take part in the study entitled

A Study On Data Analytics In Operations Management In South East Asia.

(UH Protocol number BUS/PGT/CP/04267)

1 I confirm that I have been given a Participant Information Sheet (a copy of which is attached to this form) giving particulars of the study, including its aim(s), methods and design, the names and contact details of key people and, as appropriate, the risks and potential benefits, how the information collected will be stored and for how long, and any plans for follow-up studies that might involve further approaches to participants. I have also been informed of how my personal information on this form will be stored and for how long. I have been given details of my involvement in the study. I have been told that in the event of any significant change to the aim(s) or design of the study I will be informed, and asked to renew my consent to participate in it

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6 I have been told that I may at some time in the future be contacted again in connection with this or another study.

Signature of participant Konstantin Date 03/08/2019

Signature of (principal) investigator Date 03/08/2019

Name of (principal) investigator ***ANDREW MARK ODIELO***

Form EC3

UNIVERSITY OF HERTFORDSHIRE
ETHICS COMMITTEE FOR STUDIES INVOLVING THE USE OF HUMAN PARTICIPANTS ('ETHICS COMMITTEE')

FORM EC3
CONSENT FORM FOR STUDIES INVOLVING HUMAN PARTICIPANTS

I, the undersigned *[please give your name here, in BLOCK CAPITALS]*

MARC GIOVANNINI

of *[please give contact details here, sufficient to enable the investigator to get in touch with you, such as a postal or email address]*

OMNIAZ, 8 Cross Street, Singapore

hereby freely agree to take part in the study entitled

A Study On Data Analytics In Operations Management In South East Asia.

(UH Protocol number BUS/PGT/CP/04267)

1 I confirm that I have been given a Participant Information Sheet (a copy of which is attached to this form) giving particulars of the study, including its aim(s), methods and design, the names and contact details of key people and, as appropriate, the risks and potential benefits, how the information collected will be stored and for how long, and any plans for follow-up studies that might involve further approaches to participants. I have also been informed of how my personal information on this form will be stored and for how long. I have been given details of my involvement in the study. I have been told that in the event of any significant change to the aim(s) or design of the study I will be informed, and asked to renew my consent to participate in it

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5 I understand that if there is any revelation of unlawful activity or any indication of non-medical circumstances that would or has put others at risk, the University may refer the matter to the appropriate authorities.

6 I have been told that I may at some time in the future be contacted again in connection with this or another study.

Signature of participant..... Date 2/08/19

Signature of (principal) investigator..... Date 03/08/19

Name of (principal) investigator ***ANDREW MARK ODIELO***

Form EC3

UNIVERSITY OF HERTFORDSHIRE
ETHICS COMMITTEE FOR STUDIES INVOLVING THE USE OF HUMAN PARTICIPANTS
('ETHICS COMMITTEE')

FORM EC3
CONSENT FORM FOR STUDIES INVOLVING HUMAN PARTICIPANTS

I, the undersigned *[please give your name here, in BLOCK CAPITALS]*

MR. DANESH DURAIRETNAM

of *[please give contact details here, sufficient to enable the investigator to get in touch with you, such as a postal or email address]*

M9, VERTICAL BUSINESS SUITES, KL

hereby freely agree to take part in the study entitled

A Study On Data Analytics In Operations Management In South East Asia.

(UH Protocol number BUS/PGT/CP/04267)

1 I confirm that I have been given a Participant Information Sheet (a copy of which is attached to this form) giving particulars of the study, including its aim(s), methods and design, the names and contact details of key people and, as appropriate, the risks and potential benefits, how the information collected will be stored and for how long, and any plans for follow-up studies that might involve further approaches to participants. I have also been informed of how my personal information on this form will be stored and for how long. I have been given details of my involvement in the study. I have been told that in the event of any significant change to the aim(s) or design of the study I will be informed, and asked to renew my consent to participate in it

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6 I have been told that I may at some time in the future be contacted again in connection with this or another study.

Signature of participant..... Date 30th July 2019

Signature of (principal) investigator..... Date 30th July 2019

Name of (principal) investigator ***ANDREW MARK ODIELO***

Form EC3

UNIVERSITY OF HERTFORDSHIRE
ETHICS COMMITTEE FOR STUDIES INVOLVING THE USE OF HUMAN PARTICIPANTS ('ETHICS COMMITTEE')

FORM EC3
CONSENT FORM FOR STUDIES INVOLVING HUMAN PARTICIPANTS

I, the undersigned *[please give your name here, in BLOCK CAPITALS]*

KAVISH PUNCHOO

of *[please give contact details here, sufficient to enable the investigator to get in touch with you, such as a postal or email address]*

kavish.punchoo@gmail.com

hereby freely agree to take part in the study entitled

A Study On Data Analytics In Operations Management In South East Asia.

(UH Protocol number BUS/PGT/CP/04267)

1 I confirm that I have been given a Participant Information Sheet (a copy of which is attached to this form) giving particulars of the study, including its aim(s), methods and design, the names and contact details of key people and, as appropriate, the risks and potential benefits, how the information collected will be stored and for how long, and any plans for follow-up studies that might involve further approaches to participants. I have also been informed of how my personal information on this form will be stored and for how long. I have been given details of my involvement in the study. I have been told that in the event of any significant change to the aim(s) or design of the study I will be informed, and asked to renew my consent to participate in it

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4 I have been told how information relating to me (data obtained in the course of the study, and data provided by me about myself) will be handled: how it will be kept secure, who will have access to it, and how it will or may be used.

5 I understand that if there is any revelation of unlawful activity or any indication of non-medical circumstances that would or has put others at risk, the University may refer the matter to the appropriate authorities.

6 I have been told that I may at some time in the future be contacted again in connection with this or another study.

Signature of participant..... Date 1st August 2019

Signature of (principal) investigator..... Date 1st August 2019

Name of (principal) investigator ***ANDREW MARK ODIELO***

Form EC3

UNIVERSITY OF HERTFORDSHIRE
ETHICS COMMITTEE FOR STUDIES INVOLVING THE USE OF HUMAN PARTICIPANTS
('ETHICS COMMITTEE')

FORM EC3
CONSENT FORM FOR STUDIES INVOLVING HUMAN PARTICIPANTS

I, the undersigned *[please give your name here, in BLOCK CAPITALS]*
AMY AANEN
of *[please give contact details here, sufficient to enable the investigator to get in touch with you, such as a postal or email address]*
amyaanen@gmail.com
hereby freely agree to take part in the study entitled

A Study On Data Analytics In Operations Management In South East Asia.

(UH Protocol number BUS/PGT/CP/04267)

1 I confirm that I have been given a Participant Information Sheet (a copy of which is attached to this form) giving particulars of the study, including its aim(s), methods and design, the names and contact details of key people and, as appropriate, the risks and potential benefits, how the information collected will be stored and for how long, and any plans for follow-up studies that might involve further approaches to participants. I have also been informed of how my personal information on this form will be stored and for how long. I have been given details of my involvement in the study. I have been told that in the event of any significant change to the aim(s) or design of the study I will be informed, and asked to renew my consent to participate in it

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5 I understand that if there is any revelation of unlawful activity or any indication of non-medical circumstances that would or has put others at risk, the University may refer the matter to the appropriate authorities.

6 I have been told that I may at some time in the future be contacted again in connection with this or another study.

Signature of participant..... Date 05/08/019

Signature of (principal) investigator..... Date 6th August 2019

Name of (principal) investigator ***ANDREW MARK ODIELO***

Form EC3

APPENDIX G. UH ETHICS APPROVAL

University of Hertfordshire UH

SOCIAL SCIENCES, ARTS AND HUMANITIES ECDA

ETHICS APPROVAL NOTIFICATION

TO: Andrew Mark Odielo

CC: Dr. Sukjeet Kaur Sandhu

FROM: Dr Brendan Larvor, Social Sciences, Arts and Humanities ECDA Vice Chairman

DATE: 30/07/19

Protocol number: BUS/PGT/CP/04267

Title of study: A Study On Data Analytics In Operations Management In South East Asia.

Your application for ethics approval has been accepted and approved by the ECDA for your School and includes work undertaken for this study by the named additional workers below:

This approval is valid:

From: 30/07/19

To: 18/08/19

Additional workers: **no additional workers named**

Please note:

If your research involves invasive procedures you are required to complete and submit an EC7 Protocol Monitoring Form, and your completed consent paperwork to this ECDA once your study is complete. You are also required to complete and submit an EC7 Protocol Monitoring Form if you are a member of staff. This form is available via the Ethics Approval StudyNet Site via the 'Application Forms' page http://www.studynet1.herts.ac.uk/ptl/common/ethics.nsf/Teaching+Documents?Openview&count=9999&restricttocategory=Application+Forms

Any necessary permissions for the use of premises/location and accessing participants for your study must be obtained in writing prior to any data collection commencing. Failure to obtain adequate permissions may be considered a breach of this protocol.

Approval applies specifically to the research study/methodology and timings as detailed in your Form EC1A. Should you amend any aspect of your research, or wish to apply for an extension to your study, you will need your supervisor's approval (if you are a student) and must complete and submit form EC2. In cases where the amendments to the original study are deemed to be substantial, a new Form EC1A may need to be completed prior to the study being undertaken.

Should adverse circumstances arise during this study such as physical reaction/harm, mental/emotional harm, intrusion of privacy or breach of confidentiality this must be reported to the approving Committee immediately. Failure to report adverse circumstance/s would be considered misconduct.

Ensure you quote the UH protocol number and the name of the approving Committee on all paperwork, including recruitment advertisements/online requests, for this study.

Students must include this Approval Notification with their submission.

APPENDIX H. TURNITIN RESULTS

Thesis Draft

ORIGINALITY REPORT

7%	2%	0%	6%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to South Bank University Student Paper	1%
2	Submitted to University of Maryland, University College Student Paper	1%
3	Submitted to University of East London Student Paper	1%
4	epubl.luth.se Internet Source	1%
5	www.papercamp.com Internet Source	<1%
6	Submitted to University of Reading Student Paper	<1%
7	Submitted to Universiti Teknologi MARA Student Paper	<1%
8	Submitted to Mount Kenya University Student Paper	<1%
9	Submitted to UT, Dallas	

	Student Paper	<1%
10	Submitted to Islamic University of Gaza Student Paper	<1%
11	Submitted to University of Strathclyde Student Paper	<1%
12	Submitted to Laureate Higher Education Group Student Paper	<1%
13	Submitted to University of Birmingham Student Paper	<1%
14	Submitted to Nilai University College Student Paper	<1%
15	Submitted to De LaSalle University - College of Saint Benilde Student Paper	<1%
16	Submitted to Queensland University of Technology Student Paper	<1%
17	Submitted to The International College Student Paper	<1%
18	info.paiwhq.com Internet Source	<1%
19	Submitted to Kenyatta University Student Paper	<1%

20	Submitted to London School of Business and Finance Student Paper	<1%
21	Submitted to VIT University Student Paper	<1%
22	Submitted to City of Glasgow College Student Paper	<1%
23	Submitted to Intercollege Student Paper	<1%
24	Andrew Whitmore, Anurag Agarwal, Li Da Xu. "The Internet of Things—A survey of topics and trends", Information Systems Frontiers, 2014 Publication	<1%
25	Ian Rae, Morgen Witzel. "The Overseas Chinese of South East Asia", Springer Nature, 2008 Publication	<1%
26	S GRASLUND, B BENGTSSON. "Chemicals and biological products used in south-east Asian shrimp farming, and their potential impact on the environment — a review", The Science of The Total Environment, 2001 Publication	<1%

APPENDIX I. MBA PROJECT LOG

APPENDIX 1

PROJECT PAPER LOG

This is an important document, which is to be handed in with your dissertation. This log will be taken into consideration when awarding the final mark for the dissertation.

Student Name:	ANDREW MARK ODIELO
Supervisor's Name:	DR. SUKJEET KAUR SANDHU
Dissertation Topic:	A STUDY ON DATA ANALYTICS IN OPERATIONS MANAGEMENT IN SOUTH EAST ASIA.

9

SECTION A. MONITORING STUDENT DISSERTATION PROCESS

The plan below is to be agreed between the student & supervisor and will be monitored against progress made at each session.

Activity	Milestone/Deliverable Date							
	17/05	24/05	07/06	05/07	12/07	02/08	8/08	23/08
Kick off meeting	✓							
Submitting my IRPP		✓						
Ethics form sub			✓					
Chapter 1				✓				
Chapter 2				✓				
Chapter 3				✓				
Proposal Defense					✓			
P.D Feedback						✓		
Chapter 4-5						✓		
Project Viva							✓	
Ch 1-5 Final Version								✓
Final Submission								✓

SECTION B. ETHICS

Ethics form protocol number:- BUS/PGT/CP/04267

SECTION C. RECORD OF MEETINGS

The expectation is that students will meet their supervisors up to seven times and these meetings should be recorded.

Meeting 1

Date of Meeting	17 May 2019
Progress Made	Discussion of Dissertation Title and Meeting
Agreed Action	Draft potential titles
Student Signature	
Supervisor's Signature	Dr. Sukjeet Kaur Sandhu

Meeting 2

Date of Meeting	24 May 2019
Progress Made	Discussion on IRPP
Agreed Action	Submit previous IRPP
Student Signature	
Supervisor's Signature	Dr. Sukjeet Kaur Sandhu

Meeting 3

Date of Meeting	4 June 2019
Progress Made	Change Chapter 1-3 content
Agreed Action	Change elements of chapter 1-3
Student Signature	
Supervisor's Signature	Dr. Sukjeet Kaur Sandhu

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Meeting 4

Date of Meeting	6th June 2019
Progress Made	Ethics form submission
Agreed Action	Submit ethics form
Student Signature	
Supervisor's Signature	Dr. Sukjeet Kaur Sandhu

Meeting 5

Date of Meeting	9 June 2019
Progress Made	Prepare for Proposal Defense
Agreed Action	Change Problem Statement and slide contents
Student Signature	
Supervisor's Signature	Dr. Sukjeet Kaur Sandhu

Meeting 6

Date of Meeting	13 June 2019
Progress Made	Proposal Defense Feedback
Agreed Action	Change content using Dr. Wong's advice
Student Signature	
Supervisor's Signature	Dr. Sukjeet Kaur Sandhu

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Meeting 7

Date of Meeting	30 July 2019
Progress Made	Ethics Approval
Agreed Action	Proceed with data collection after approval
Student Signature	
Supervisor's Signature	Dr. Sukjeet Kaur Sandhu

Meeting 8

Date of Meeting	2 Aug 2019
Progress Made	Chapter 4 - 5 progress
Agreed Action	Confirmation that data collection happened smoothly
Student Signature	
Supervisor's Signature	Dr. Sukjeet Kaur Sandhu

Meeting 9

Date of Meeting	9 Aug 2019
Progress Made	Preparation for Project Viva
Agreed Action	Changes made satisfactory for viva
Student Signature	
Supervisor's Signature	Dr. Sukjeet Kaur Sandhu

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Meeting 10

Date of Meeting	19th Aug 2019
Progress Made	Final version discussed
Agreed Action	Confirmation of go ahead
Student Signature	
Supervisor's Signature	Dr. Sukjeet Kaur Sandhu

Section D. Comments on Management of Project

(to be completed at the end of the dissertation process)

Student Comments

The entire dissertation process was challenging but rewarding. It has been a pleasure going through the journey with my supervisor and colleagues.

Supervisor Comments

Clear to Submit.

Signature of Student		Date	
Signature of Supervisor	Dr. Sukjeet Kaur Sandhu	Date	22 Aug 2019
Ethics Confirmed		Date	30th July 2019

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