Cranfield Indonesian Scholars Community (CRISCOM)

2nd Research Workshop
6-7 May 2015
Satya Widya Yudha - Keynote Speaker
Satya is a Vice Chairman of Commission VII of the House of Representatives of the Republic of Indonesia overseeing Energy, Mineral Resources, Environment and Research and Technology sectors. With his background in Offshore Engineering, he has a remarkable career and held a number of high profile positions at British Petroleum (BP), including as a Vice President. Satya is an expert in the geopolitics and economics of global energy. He specialises in energy security, energy subsidy, US-Indonesia energy and strategic relations, national oil companies, climate change, and oil company country risk. As a Cranfield alumnus, Satya will share his experiences to his alma mater.

David Denyer - Keynote Speaker
David is Professor of Organisational Change and Director of Research at Cranfield School of Management. He has published many important and highly cited articles and book chapters. He is strongly committed to developing the next generation of researchers. David has a significant track record of successfully delivering research projects funded by the ESRC and EPSRC, the National Institute for Health Research Service Delivery and Organisation and the private sector. David designs, facilitates and delivers compelling learning events for senior executives. He was voted HR magazine’s 2012 “Most Influential UK Thinker”. David can be reached at: david.denyer@cranfield.ac.uk

Saryani Asmayawati
At the Safety and Accident Investigation Centre, Yani is involved in the design and delivery of various components of the accident investigation short courses and the MSc modules. In addition to delivering lectures and workshops on various aspects of transport safety and accident investigation, she is also responsible for managing students’ individual research projects. She is currently the Project Leader of a safety culture assessment research project being undertaken for the world’s largest charter airline based in the UK. Yani can be reached at: s.asmayawati@cranfield.ac.uk

Windo Hutabarat
Windo is a Research Fellow & Analyst. His current research interest is in Manufacturing Informatics. He pioneered the idea of using gaming technology for manufacturing, resulting in the department winning a number of Collaborative Research and Development grants from InnovateUK to implement his ideas, in close collaboration with leading UK companies such as Airbus Group Innovation Works, Jaguar Land Rover, Alstom Power, Aerotech Solutions, EnginSoft UK, Lanner Group, and Holovis. Windo can be reached at: w.hutabarat@cranfield.ac.uk

Irfan Madani
Irfan’s current teaching responsibilities include lecturing Aerospace Software Engineering with Ada, Global Navigation Satellite Systems (GNSS) and Air Traffic Control. He also delivers a Computing course module and tutors in Basic Control Theory for Cranfield's Pre-Masters programme. His current research interests include aircraft modelling and simulation, trajectory optimisation and CNS/ATM system. He is currently involved in EU’s Clean Sky Joint Technology Initiative programme as the Technical Manager. Irfan can be reached at: k.i.madani@cranfield.ac.uk

Benny Tjahjono
Benny is a Senior Lecturer in Supply Chain Operations, at Cranfield School of Management. His teaching and overarching research area focuses on supply chain & manufacturing systems. He has established a recognised research theme in the contemporary simulation and modelling. He has applied these techniques into emerging research areas in ‘servitization’ of manufacturing, Product-Service Systems and sustainable supply chain. He has been working with global clients on a number of industry funded projects. Benny can be reached at: b.tjahjono@cranfield.ac.uk

Hendro Tjaturpriono
Hendro is a faculty member of Prasetiya Mulya Business School, Indonesia and a doctoral candidate at Cranfield School of Management. His doctoral research topic is in the area of new product development portfolio management. In this respect, he explores the underlying routines constitute the portfolio decision-making processes. Prior to joining the business school, he had been a professional in the aviation industry. Hendro can be reached at: hendro.tjaturpriono@cranfield.ac.uk
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Programme

**Day 1 - Wednesday**

08.30 - 09.30 Registration
09.30 - 10.00 Welcome to Cranfield Prof Tom Stephenson
10.00 - 10.10 Opening speech H.E. Mr T.M. Hamzah Thayeb
10.10 - 11.00 Keynote speech Mr Satya Widya Yudha
11.00 - 11.45 Embarking on academic research Prof David Denyer
11.45 - 12.30 Formulating research aim and objectives Saryani Asmayawati & Irfan Madani
12.30 - 14.00 Lunch
14.00 - 14.45 Research for industry Windo Hutabarat & Benny Tjahjono
14.45 - 15.30 Roundtable discussion (silaturahmi) Participants, Mr Satya Yudha, H.E. Mr T.M. Hamzah Thayeb
15.30 - 15.45 Afternoon break
15.45 - 17.30 Cranfield research facilities tour Participants
18.00 - 20.00 Gala dinner

**Day 2 - Thursday**

09.00 - 09.45 PhD Research (students' perspectives) Hendro Tjaturpriono & PhD candidates
09.45 - 12.30 Academic Writing workshop Participants
12.30 - 14.00 Lunch
14.00 - 16.00 Research presentation Participants
16.00 - 16.30 Closing ceremony Mr Dino Kusnadi
CRISCOM Research Workshop is an annual event aimed at bringing together early stage researchers in a friendly research training atmosphere. Led by academic staff from Cranfield University, the event offers an avenue for sharing good practices in research, amongst PhD students and researchers alike. It offers participants advice on writing literature reviews or proposals for industry and an opportunity to showcase their work.

This year, we proudly present our keynote speakers, Mr Satya Widya Yudha, a Vice Chairman of Commission VII, the House of Representatives of the Republic of Indonesia; and Professor David Denyer, Director of Research at the School of Management.

We are grateful with the sponsorship from Cranfield University, Bank Indonesia, the Embassy of the Republic of Indonesia, London and Binus University, Jakarta, enabling this important event to take place. Our thanks also go to PPI Cranfield who have pulled together great efforts and showed excellent team work!

We hope you find the workshop interesting, thought provoking and useful!
A Decision Framework for non-OEM Aero-Engine Shops

Background
To remain competitive, many non-OEM aero-engines MROs have shifted their business models from solely providing MRO services to selling a bundle of aero-engines and MRO services. Despite the benefits, the shift has posed several challenges. Unlike OEM-MROs, the non-OEM MROs do not possess capabilities in design and manufacturing of aero-engines, spare parts or components. In addition, the non-OEM aero-engine MROs often have to maintain much wider range of aero-engines.

Aim & Objectives
This research aims to propose a framework that ultimately can assist non-OEM aero-engine MROs to make informed decisions in operations planning, supply chain design and demand performance assessment of the contracts. To achieve the aforementioned aim, the objective of this research have been set to: 1) Identify, and analyse decisions, factors and metrics involved in the MRO operations and supply chain; 2) Model using simulation technique how actors of the MRO make decisions; 3) Redefine and Validate the framework using real life data from the MRO industries.

Methodology
The Research will be conducted in several phases:
1. Conduct a state-of-the-art review of decision making in MRO operations and supply chain
2. Map out the key processes in MRO industries and identify decisions, factors and metrics involved in the MRO operations and supply chain.
3. Co-develop with industry a decision support framework based on the parameters identified before, based on the case studies in Indonesia.
4. Redefine and validate the framework using real life data from MRO industries.

Expected Outcomes
The focus of the research will be in development of a decision making framework to support the whole process towards providing the total maintenance service solution and ‘productization’ strategy. The novelty of this research lies in the proposition of a framework of a decision support system that can be used by the non-OEM MRO industries to commit a contractual agreement.
Future Development Options for Regional Airports in East Java

Background
Besides Juanda International Airport, there are four other domestic/regional airports in East Java namely Abdul Rachman Saleh, Blimbingsari, Noto Hadinegoro and Trunojoyo. These airports are owned and run by different operators. Juanda is operated by Angkasa Pura, Abdul Rachman Saleh is operated by East Java Provincial Government, Noto Hadinegoro is operated by Jember Regional Government while Blimbingsari and Trunojoyo are operated by the Ministry of Transportation. Effective operations of domestic airports require significant financial investment and robust strategic plans, and furthermore, future developments of these airports will need to take into account the potentials of the region where the airport is located.

Aim & Objectives
This project aims to investigate the potential opportunities of regional airports and to investigate the role of regional airports in East Java.

Methodology
The research methodology adopted in this research will largely be based on the thorough analyses of Strengths, Weaknesses, Opportunities and Threats (SWOT) of each airport. By using SWOT, it is expected that the feasible business development plan can be formulated. Furthermore, financial analyses such as Net Present Value (NPV), Internal Rate of Return (IRR) and Payback Period of every development project will also be carried out.

Preliminary Outcomes
Preliminary investigation has indicated that the four airports analysed in this project can be further developed as a cargo, a business airport or a base of flying schools that will increase revenues on top of the landing charges.
European-Brazilian NETwork on Energy Planning (NETEP)

Background
European-Brazilian NETwork on Energy Planning (NETEP) is a joint research project funded by the European Commission under the 7th Framework Programme (FP7), within the Marie Curie Actions International Research Staff Exchange Scheme (IRSES). The project brings together consortium members with different expertise in the field of energy analysis operating in four different countries: Portugal, UK, Spain and Brazil. The project allows the members to share knowledge on models and methodologies and on the possibility of implementing them to different energy systems.

Aim & Objectives
Envisaging a significant contribution to the development of sustainable energy planning strategies, the research programme has the following objectives:

- Analyse energy planning models and methodologies used in different countries, in different research groups and real industrial settings, e.g. factories, creating new frameworks and methodologies and recognising the multidisciplinary characteristics of the theme.
- Transfer knowledge between partners creating synergies between the participants with complementary research expertise, developing long term collaboration.
- Propose measures and tools that can contribute to the reduction of the negative impacts of energy related activities.

Methodology
The research activities include 5 work-packages, and Cranfield coordinates Work-package 3 (Energy sustainability in manufacturing and supply chain). In this respect, the work aims to apply the energy planning models and the risk and uncertainty to the context of the design of sustainable manufacturing operations and to devise a novel sustainable manufacturing systems design process based on the concept of production ecosystem. In this work-package, the impacts of energy conservation measures to the overall performance of the supply chain operations will also be analysed.

Preliminary outcomes
To date, the consortium has been able to compare the energy systems and energy planning models commonly used in the literature, and has provided a critical review on the models and methodologies used in both European and Brazilian markets. Future work will address the overall framework of energy sustainability, taking into account the economic, environmental and social dimensions.
LINE-TRACK: technology to improve overall yield during the manufacturing process

Background
The overall goal of this project is to increase the efficiency in food and drink processing and manufacturing. Process yield losses are commonly identified by the mass balance method; at the end of the production run, the output is compared to the input of the various process ingredients and materials. This method unfortunately only identifies the losses after the event and does not determine where the losses have occurred and so the improvements are difficult to pin-point.

Aim & Objectives
Co-funded by EPSRC and TSB, the project is in collaboration with a major drink manufacturer in the UK. The aim of the project is to devise novel and innovative technologies, engineering solutions & process automation that allow true monitoring, measurement and management of yield, as well as reducing the waste, energy and water consumptions. The proposed tracking technology called LINE-TRACK adopts the principles of prognostics to measure the yield losses in real time. LINE-TRACK can be used to 1) identify the points where losses occur; 2) help identify root causes of the losses; 3) alert the operators as soon as the losses are above specified targets & 4) directly intervene in the system with the ultimate goal to avoid losses occurring.

Methodology
The technical approach adopted in this project follows a spiral, rapid application development method that enables LINE-TRACK to be implemented at a truly industrial-strength. A case-based experimental approach is adopted allowing scientific discovery can quickly be translated into robust solutions. The project is split into four work-packages:

1. Formulate technical requirements that match the scope,
2. Develop the prognostics algorithms,
3. Develop and validate the prototypes by integrating algorithms into the software and hardware platforms
4. Adopt/transfer LINE-TRACK to similar production lines and other industry sectors.

Preliminary outcomes
Preliminary investigation has revealed a new definition and understanding of ‘prognostics’ in the context of bottling lines. The term ‘prognostics’ constitutes at least 3 layers: optimisation of process parameters, alert and prediction. Work is currently on-going to develop the algorithms for the abovementioned layers.
Background
In response to the environmental concern with respect to the growing aviation demand, a new concept of commercial aircrafts is being defined. Referring to NASA’s goal, there are four corners of the technical trade space: noise, emissions, aircraft fuel burn and field length. The new concept enables the designers to come up with distributed hybrid electric vehicle ideas. The concept of distributed hybrid propulsion is to separate non-electric power generator into multiple electric embedded propulsions. Its goal is to increase the performances in terms of fuel efficiency, emission, noise and handling, in comparison to the use of single large propulsion. For such aircrafts, it will be necessary to emphasis on propulsion–airframe integration.

Aim & Objectives
This concept has been developed by NASA since 2006 by utilising 12 small high-bypass-ratio turbofan engines. NASA research continues with blended wing body (BWB) aircrafts namely the N3-X project. Although BWB shows potential for being a highly integrated airframe and propulsion, it still has some issues with human factors and certifications. This research will therefore assess the possibility of incorporating the distributed hybrid electric propulsion system into a conventional aircraft configuration.

Methodology
The most crucial stage in the design process is to define the specifications for the aircraft. The specifications were captured from a set of requirements and objectives along with a comparative study of typical aircrafts in the same class. Initial sizing was then conducted to analyse the estimated concept in order to satisfy the defined requirements. Following those steps, the aircraft performance was then calculated to assess its capability.

Expected outcomes
The concept will be applied to the conventional configurations in Boeing 737 or Airbus A320 class of aircrafts. The expected outcome from this research is the fundamental conceptual design of an aircraft with distributed hybrid electric propulsion, including sizing and performance estimation. Basic modelling will also be performed in a CAD model.
A Circular Economy Based Decision Support System to Design, Implement and Control Reverse Logistics Operations

Background

Reverse Logistics (RL) is considerably more complex than the forward logistics in the context of a traditional supply chain. Circular Economy (CE) can be defined “as an industrial system that is restorative or generative by intention and design”. Unlike the linear economy model of ‘take, make, dispose’ industrial processes; the CE, in industrial and economical scale, supports: replacing “end of life” concept, conserving energy and promoting the use of renewable energy, and eliminating the use of toxic chemical and waste through the intelligent design of materials, products, systems and business models. The CE-based Decision Support System (DSS) is envisaged to support decision making processes along the RL flow where there are many critical decisions that might be made by industries, government agencies or any other stakeholders.

Aim and Objectives

This research focuses on supporting decision makers (industries, government and other stakeholders) in designing, implementing and controlling Reverse Logistics by adopting the Circular Economy principles. The DSS is therefore one of the important deliverables in this research.

Methodology

The methodology adopted in this research will largely be a case-study based. This qualitative approach allows the enquiries into the problem domain and enables exploration into phenomena that are not straightforward to resolve using quantitative approaches. Within this research framework, there are a number of lower level activities to ensure the achievement of the objectives. Depending on the deliverable in each objective, other research approaches (literature review, observation, analysis, survey, model design and validation) will also be employed.

Expected outcomes

This research contributes primarily to the reverse logistics research area, in particular in the CE-based DSS to support the design of reverse logistics with practitioners and governmental organisations as the target beneficiaries. This research is a new application of CE in reverse logistics offering a better design process of reverse logistics capable of compiling and evaluating different design scenarios. It is envisaged that the CE-based DSS delivered in this research will be sufficiently flexible to allow customisation for specific product types and activities within the reverse logistics, e.g. reuse, repair, recycling, etc.
Establishing Design Standards for Regional Airports in Indonesia

Background
With over 13,000 islands, there is a growing need to improve the transport network across the Indonesian archipelago. Despite the existing sea transport network connecting the main islands, regional airlines remain vital to passenger transports and physical distributions of goods and commodities to many rural areas in many smaller, relatively remote islands. The increased number of local carriers operating a large variety of small to medium size aircrafts, however, requires infrastructures (including runways) of many regional airports to be standardised to accommodate these varieties of aircraft.

Aim & Objectives
The project aims to develop a standard for the design of regional airports in Indonesia that inline with the requirements of the international standards.

Methodology
The research methodology consists of the following stages:
1. Analyse the characteristic of regional airport
2. Identify the requirements of planned aircrafts
3. Forecast the traffic trends and demands
4. Calculate the airside and landside design of the airport
5. Simulate the regional airport design
6. Recommend the standard model of local airports

Expected Outcomes
The design standard developed in this project is expected to accommodate the future growth of traffic and distribution of goods at regional airports in Indonesia.
New Product Development Portfolio Management: Unravelling the Routines in the Decision-Making Processes

Background
Product innovation is a key driver of any company’s growth. The biggest challenge in managing product innovation is determining the most promising new product development (NPD) projects from the many ideas generated. This is known as portfolio management. The study of portfolio management has been extensive; nevertheless, it focuses mainly on project selection rather than the management of the entire process. A study that looks into portfolio management using different perspectives therefore is needed.

Aim
Portfolio management primarily deals with dynamic decision-making processes, involving not only selection decisions, but also decisions to delay, continue or even terminate projects. This research thus aims to uncover the underlying mechanisms and structures of these processes which lead to portfolio decisions. It uses an organisational routines theoretical perspective to reveal the underlying behavioural patterns which build an organisation’s portfolio management capabilities.

Methodology
This research is a case study research which will employ four case companies from different sectors in Indonesia. In the data collection process, it will use multiple data sources, designed for strengthening the data validity, including: (1) interviews; (2) meeting observations; (3) documents; (4) physical artefacts, and (5) simulation. The research is exploratory in nature; nevertheless, it should also work towards an explanatory analysis through carrying out a cross-case comparison.

Preliminary Outcomes
At present, three stages have been completed: (1) literature review; (2) research design development, and (3) data collection. The first stage resulted in identification of research gaps and research questions, whereas the latter provides a research protocol, which contains the guidelines for conducting data collection and data analysis. Finally, the data collected comprises transcripts of interviews, meetings and simulation, field notes, videos and pictures.
Twin Crises: Early Warning of Currency and Banking Crises

Background
Despite a long history of currency and banking crises, the formal models of currency crises and of banking crises are relatively new and mostly investigate currency and banking crises as individual events. Therefore, despite an increasing number of twin crises and the severe implications to economic growth, the literature of twin crises is still underdeveloped.

Aim & Objectives
This study aims to identify the drivers that help banks survive currency crises and use them to predict future banking crises. Banks might employ this study as a tool for managing the impact of currency crises. At the same time, a greater understanding by investors of the bank's ability to deal with currency crises is expected to reduce the possibility of bank runs. Furthermore, policy makers can take the findings of this study into account while devising their policies, thereby ensuring that banks have adequate risk mitigation against currency crises.

Methodology
This study employs parametric and non-parametric methodology with following stages:
1. Conducting a positioning study and systematic literature review
2. Developing a conceptual model
3. Employing an econometric model to identify the drivers
4. Employing a non-parametric signalling model to calculate its predictability
5. Writing a thesis

Preliminary outcomes
Preliminary analysis has indicated that literature explaining the impacts of currency crises to banking crises appears to be lacking. The model of twin crises, so far, is not well explained, thus, it is difficult to understand, to predict, or to mitigate the twin crises. Therefore, many countries are still exposed to the devastating currency and banking crises.
Clean Sky’s Systems for Green Operations: Management of Trajectory and Mission

Background
Clean Sky is a European Joint Technology Initiative (JTI) project with a budget of €1.6 billion that aims to develop and mature breakthrough “clean technologies” for Air Transport to significantly increase the environmental performances of airplanes and air transport, resulting in less noisy and more fuel efficient aircraft, hence bringing a key contribution in achieving the Single European Sky environmental objectives.

Aim and Objectives
Clean Sky will demonstrate and validate the technology breakthroughs that are necessary to make major steps towards the environmental goals sets by ACARE - Advisory Council for Aeronautics Research in Europe - the European Technology Platform for Aeronautics & Air Transport and to be reached in 2020:

- 50% reduction of CO2 emissions through drastic reduction of fuel consumption;
- 80% reduction of NOx (nitrogen oxide) emissions;
- 50% reduction of external noise; and
- a green product life cycle: design, manufacturing, maintenance and disposal / recycling

As part of Clean Sky’s Systems for Green Operations (SGO) – Integrated Technology Demonstration (ITD), the project aims to develop a flight optimisation tool allowing management of new flight profiles (Departure, Cruise and Approach) with high precision multi-objective optimised trajectories to also minimise noise and emissions impacts especially in the airport vicinity.

Methodology
The technical approach adopted in this project is to allow aircraft to fly a green mission from gate to gate with minimum environmental impacts. Cranfield’s major tasks include:

- Development of a trajectory optimisation framework – GATAC (together with other partners within GSAF cluster)
- Models development: Aircraft Performance Model, Engine Emission Model, Aircraft Systems Model, Database Model Integrations as well as Contrails formation modelling
- Power and thermal management concept at aircraft level, including study of novel thermal management architectures towards more electric aircraft. Modelling and Simulation of ECS, EPS, IPS, Actuator and Hydraulic Technologies in support of green aircraft trajectory concept.

Preliminary outcomes
GATAC Optimisation Framework has achieved TRL 5 gate in 2014 and reports on the analysis of the performance of trajectory optimisation for a few flight routes have been submitted to the Clean Sky Joint Undertaking (JU), underlining the environmental impacts and green benefits from the new flight profiles.

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Simulation of Integrated Reforming Combined Cycle Power Plant

Background
Power generation industry produces almost a quarter of the total human CO\textsubscript{2} emissions and therefore significantly contributes to global warming. The Integrated Reforming Combined Cycle (IRCC) is a recent low emission power plant which reforms natural gas to into syngas, separates out the carbon content as CO\textsubscript{2} and finally produces hydrogen-rich as the fuel for a gas turbine. This technology has been proven capable of producing high efficiency power with relatively low carbon emissions. However, power plants nowadays have become more complex with the considerable integration between the power generation section and the reforming process.

Aim and Objectives
The aim of this project is to assess different options of integration between the power cycle and the reforming process. The analysis will also look at the impact of degradation of turbomachinery components to the performance of the power plant. The main objective of the research is to get the most effective integration configuration with a minimum degradation of the turbomachinery components.

Methodology
ASPen PLUS software is used as modelling and simulation tool within this project. Brief stages of the research methodology include:
1. Reviewing latest literatures concerning IRCC technology research and development;
2. Developing simulation model;
3. Analysing various integration configuration by simulation;
4. Evaluating economic aspect;
5. Reporting and communicating the result.

Preliminary outcomes
Preliminary investigation has identified several integration models in effective performance power plant. Parameters of these models could further be analysed as a basis for the development of a simulation model which will be used in this project.
Identifying the Ideal Blood Stock Level: A Statistical Analysis of the Blood Supply Chain in the UK

Background
Over the two years 2012 & 2013, the overall demand for red blood cells (RBCs) in the UK has decreased by 5%. Stock levels in the blood centres, however, have been maintained at their pre-2012 levels regardless of this demand fluctuation. Blood is perishable. The National Health Service Blood and Transplant (NHSBT) are concerned that holding more blood than required will increase the age of the blood stock and thus the probability that it will be wasted in the blood centres and the hospitals.

Aim
This study aims to identify the ideal stock levels of the red blood cells of all blood groups in the blood centres across England and North Wales in order to minimise wastage due to obsolescence.

Methodology
Descriptive statistics are used to analyse the current demand, stock levels, and wastage in 15 blood centres and 258 associated hospitals. The stock covers for all blood groups are also examined against a threshold set by the organisation. The correlation between the average stock level and wastage is then identified. Using linear regression, the expected wastage is then predicted for the blood groups, which demonstrates a strong and positive correlation between the average stock level and wastage.

Findings
This study finds that the blood groups can be classified into three classes based on their demand characteristics – fast-moving blood groups with relatively predictable demand (Class I), moderate-moving blood groups with less predictable demand (Class II), and slow moving blood groups with unpredictable demand (Class III). Based on these findings, a significant reduction in the current average stock levels of the Class I groups – O+ and A+ – can be achieved without compromising the alert level of 3 days’ stock. A significant potential reduction in the average stock levels is also identified for some of blood groups in the Class II – B+ and A– and Class III (AB+). This study also identifies the ideal blood stock levels at blood centre level by considering the relationship between demand, average stock levels, and wastage both in the blood centres and the hospitals.
Development of Dynamics Model for a Hybrid Marine Vehicle over Wavy Surfaces

Background
The goal of this research is to understand the stability of a hybrid high speed marine vehicle operating over wavy surfaces. The term hybrid in this case related to aerodynamic and hydrodynamic lifts combination in sustaining the weight of the vehicle. At present the discussion in this matter is very limited that leaves a substantial gap of knowledge in the area of stability. The importance of understanding behaviour of the vehicle over wavy surfaces strongly related to many aspects including safety and human factor. Operation in waves may cause the reduction of the transverse stability and undesirable large roll angles; these should be the important considerations in designing marine vehicles. Inconvenience behaviour of human beings in seaway and also the shifting of the cargo during operation are the examples that may occur to the vehicle when operating in waves.

Aim and Objectives
Currently, the equilibrium state and equations of motion for a hybrid high speed marine vehicle has been developed but with limitations. When waves come into account of analyses, the behaviour of the vehicle would show differences. The aim of this project is therefore to investigate the equilibrium state and stability of the vehicle operating in waves and represent it in mathematical expression. The new equation will be implemented into a software tool to capture the behaviour of the vehicle and instabilities that may occur.

Methodology
The technical approach adopted in this project comprises several pieces of work. The main piece is to develop a program that can identify the equilibrium state and provide dynamic analyses. Prior to that, data collection of aerodynamic forces and moments in ground effect over wavy surface needs to be done and a CFD approach is chosen to meet the needs.

Preliminary outcomes
Preliminary investigation has revealed general behaviours of longitudinal stability. At present, the developed software tool not only can be used for AAMV but also for ordinary planing boats by disregarding the aerodynamic parameters within.
Optimising Air Cargo Supply Chain Network Design at Indonesia’s Airports

Background
With more than 13,000 islands, Indonesia continues to face distinctive challenges in the logistics and physical distributions of goods to every part of the country. According to the Presidential Decree Number 26/2012 about the National Logistic Systems, the Indonesia’s air cargo infrastructure and network have not been developed efficiently. Nonetheless, through the Masterplan for Acceleration and Expansion of Indonesia’s Economic Development (MP3EI), the Indonesian Government has acknowledged that connectivity amongst airports is of utmost importance for the economic development of the nation.

Aim & Objectives
This project aims to analyse the existing air cargo supply chain network in Indonesia. The main objective is to design an optimised airport network of the cargo supply chain by considering the shortest total distance.

Methodology
This project will be supported by various data, e.g. cargo production and traffic at every airport, distance between airports, flight frequency, Gross Domestic Regional Product (GDRP) and commodities of each province. The data will be analysed by using the Minimum Spanning Tree (MST) technique.

Expected Outcomes
The technique developed in this project combined with the traffic benchmark data from other Southeast Asian countries may be used by the authority to further improve the air cargo supply chain in Indonesia.
Marketing Consultation Project: Increasing the number of current accounts for Co-operative Bank UK

Background
The Co-operative Bank has a unique heritage as an offshoot of the UK’s co-operative movement. It has a strong reputation of being ‘for its members’ and ethical banking, in spite it has suffered from the events of the past few years which resulted in today’s current account (free-to-use account) loss. There are several challenges in current circumstances:

1. The Banking sector in UK is highly regulated restricting one’s freedom to devise strategies.
2. The Co-operative Bank’s competitors are much larger, better financed, have larger branch networks and appeal to a much broader range of customers.
3. The Co-operative Bank’s turbulent past few years.

Aim & Objectives
This project aims to increase the number of Co-operative Bank’s current accounts by either ‘stealing’ customers from competitors or creating new target markets. The new strategy must ensure that 50% of the new accounts generated are prime account (the account in which customers’ salary is paid). Advanced technologies to increase the customers’ convenience and new brand positioning may be applied.

The new strategy
The new strategy is proposed to transform Co-operative Bank from a traditional bank to the low cost digital bank without losing its ethical orientation. The proposed strategy consists of the following main ideas:

1. Reconstruction of new target segments
2. Creation of one simple standard account
3. Availability of small loans
4. Replacement of bank branches to Digital Kiosk Banking (self service banking)
5. Rebuilding a mobile Co-op Bank App (enabling contactless payment via mobile phone, personal chat advisor, open an account via mobile app)

Expected outcomes
The new strategy focuses on long-term sustainability, considering current circumstances that force company to take a bold decision. The strategy exhibits its feasibility by expecting Return on Investment to increase by the second year. By applying this new strategy, Co-operative Bank will be able to compete in the UK banking sector.
Underpricing of Initial Public Offering in London AIM Stock Exchange

Background
Initial Public Offering (IPO) marks the public listing of a company to the stock exchange with the main aim of raising capital through equity issuance and enhancing corporate credibility. In many cases, after the first trading day on the IPO date, the price of the stock closed higher or premium compared to the initial IPO offering price set by Underwriters. These cases are known as “underpricing” and have been resulting in varying degree range of premium.

Aim & Objectives
This project aims to determine the variables that contribute a significant factor to stocks underpricing and construct a regression model as a predictor to the degree of a stock’s IPO premium after the first trading day closing. Our observation revolves on IPOs in the London Alternative Investment Market (AIM) Stock Exchange (Sub-market of London Stock Exchange) which has raised a total of £600m in 2014. The period under our study is 2005-2012.

Methodology
The data were sourced from Thomson Financial Securities Data Corporation and the sampling method was stratified sampling. Data from our selected sample pool of companies were tested by running several linear regressions. The samples were further tested and variables were selected by using several methods to ensure that they were normally distributed and were free from issues such as multicollinearity, autocorrelation and heteroscedasticity.

Final outcomes
Our sampling shows that the premium mean of the London AIM Stock Exchange is around 100.4%. After running through several regressions to explain a stock’s IPO underpricing, we constructed our model with four variables: Age of company on IPO date, IPO Offer price, Market Capitalisation, Price-to-book (P/B); and two dummy variables: Pre/Prior 2008 crisis and Location base of the company (UK/Non-UK). IPO Offering price and Market Capitalisation of the company have significant and negative correlation towards a stock’s premium, while P/B and Dummy variable of crisis have a significant and positive correlation. The following is our final regression model:

\[
\text{Premium} \% = 159.6 + 11.7P/B - 5.8\text{offer} - 6.8\text{Market cap} + 0.1\text{Age} + 3.9\text{Dummy}_{\text{country}} + 32.4\text{Dummy}_{\text{Crisis}}
\]
The use of consumer-grade motion sensing technology for monitoring flight crew performance and cognitive parameters

Background
A considerable amount of research has explored various methods in measuring cognitive states (e.g. situational awareness, mental workload) and alertness levels of drivers and pilots using their physical, neurophysiological and behavioural variables (e.g. ocular measures, heart rates, facial expressions, other behaviour patterns). A real-time monitoring system of flight crew’s cognitive and functional state could provide valuable information in aircraft accident investigation, flight deck design, pilot training and checking, and may in the future be incorporated into an autoadaptive cockpit system. Unlike many conventional physical and neurophysiological measurement tools, the use of a motion sensing technology does not require the pilot to wear any equipment that might hinder operational activities, and is therefore more desirable in commercial aircraft operations.

Aim & Objectives
The aim of the research is to evaluate the use of motion sensing technology in monitoring flight crew performance and cognitive parameters for accident investigation, training, and design. Phase 1 objectives are focused on investigating the feasibility of the concept and developing the system, and Phase 2 objectives address the implementation and validation of the system.

Methodology
The initial literature review will identify motion-sensing system capabilities, establish cognitive/performance parameters that could be captured by such a system, and compile the state-of-the-art measurement methodologies. Much of the work in Phase 1 will involve developing and testing the system to capture the necessary variables for each cognitive/performance parameter in a generic setting.

The next phase of the project will test the system in a flight deck environment. The system’s validity and reliability will be evaluated against conventional measurement equipment (e.g. head-mounted eye-trackers, EEG, EMG), along with subjective measurement techniques such as NASA-TLX.

Finally, interviews, workshops and/or focus groups will be carried out to investigate opinions, perception and attitudes of flight crew, flight instructors, accident investigators, designers and other safety professionals with regard to the use of such system for accident investigation, training and design.

Preliminary outcomes
(Literature review is currently under way.)
Equity Trading in Dark Pools

Background
Dark Pools (also known as black pools) are alternative equity trading forums that privately display orders and are typically used by large institutional investors and operate outside the traditional “lit” pools or exchanges. Unlike the “lit” pools, the identity and amount of individual trades are concealed. The pools typically privately display quotes or provide prices at which orders will be executed. Dark pools, and dealing in dark pools, have increased in recent years due partially to the ‘fragmentation of financial trading venues’ joined with technology upgrading, including online trading.

Aim & Objectives
The work briefly examines the Equity Trading in Dark Pools. The purpose is to provide the Financial Conduct Authority with the information necessary for assessing the importance of ruling the dark pools in the UK.

Methodology
The report outlays the following outlines:
1. Introduction
2. History of Dark Pools
3. Types and examples of Dark Pools
4. Dark Pools advantages and disadvantages
5. Controversy in Dark Pools
6. The Regulators’ concerns of Dark Trading and Dark Pools
7. The Dark Trading and Dark Pools Regulation in US, Europe, Australia and Canada
8. Recommendation

Conclusion
Recommendations have been proposed to the Financial Conduct Authority that they should take no action for the time being whilst awaiting the EU’s market response to the MiFID II implementation.
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