This thesis is concerning about hydrodynamic lubrication in journal bearing. The research covers three primary areas: the formulation of an alternative biodegradable bio-lubricant using renewable resources; the performance evaluation of the formulated oil through a true-scale versatile journal bearing test rig; and the modeling and prediction the behavior of bio-lubricant around the bearing circumference. The first part of the research is focused upon the formulation of an environmentally-friendly lubricant using vegetable oil with various composition of petroleum base stock. The physico-chemical and tribological properties of the formulated oil have been analyzed using multiple standards apparatuses. This study provides valuable data to conform an ISO VG 68 hydraulic industrial lubricant by blending 52.70 % (wt) soybean oil, 40.55 % (wt) mineral oil, and 6.75 (%) additive packages. The experimental results clearly demonstrated that the formulated green lubricant was far more efficient than the synthetic lubricant in terms of friction coefficient, wear rates, wear volume loss and worn surface morphologies. However, the green lubricant failed to outperform conventional lubricant with respect to degradation test and wear scar diameter performance. From this study, the use of bio-lubricants as ‘green’ alternatives for machine lubrications will be significant in the reduction of environmental pollution and depletion of natural resources. The second part is about evaluating the performance of this novel bio-lubricant under practical conditions.

Three specific manufacturing quality systems were found to be popularly adopted by the local manufacturers, namely; Total Quality Management (TQM), Lean Manufacturing (LM) and Environmental Management System (EMS). Application of the concepts independent of one another appears to be less effective and more often counterproductive toward achieving the desired quality output. This study was initiated towards identifying common parameters within the three systems with a view of formulating a valid Integrated Quality Management Model applicable to the automotive industry to enhance their quality management endeavours. The development of the integrated framework model was carried out in three phases of study. The first phase involved five prominent quality management parameters; Leadership, Information, Human Resource, Operational Control and Suppliers Organization and Customers Management. The parameters were used as the basis for assessing the current implementation standings among the automotive companies. A survey questionnaire was distributed to 30 active companies; MAJAICO and the Non-MAJAICO participants in Malaysia. The initial integrated framework model was developed based on the responses of the survey. In the second phase, the five common practices above were correlated to financial and non-financial performance measurement indicators (PMIs) using SPSS and Minitab. Based

Malaysia has undergone rapid development in many sectors. As the impact of fast economic growth, there will be an increase in land demand for sectors such as industries and housing area. The limitation of flat ground areas especially in urban areas such as Kuala Lumpur and Selangor has increased the demand for other alternatives such as in hilly areas. Landslides have caused large numbers of damages and losses especially in hilly development areas. Major landslide incidence that took place in Highland Tower, Ampang in 1993 was definitely an eye opener for the federal government and local authorities to properly manage hillside development especially in high risk areas. Although there are various methods and criteria used to determine landslide hazard zones, it is not clear which criteria and models are appropriate to be used in the Malaysian environment. The aim of this study is to explore the potential integration between Geographical Information System (GIS) and Multi-criteria Decision Making (MCDM) to model landslide hazard zonation. The objectives are: i) to identify the different techniques, models and criteria used to map landslide hazard zones, ii) to propose the best criteria to predict landslides hazard zones, iii) to develop/propose new models to predict landslides hazard zones, iv) to evaluate the accuracy of the developed models, and v) to generate landslide hazard zonation maps of the study areas. This study covers areas under the administration of Ampang Jaya Municipal Council (MPAJ) and
application conditions and also to design a new eco-friendly lubricant-bearing combination in which the end goal was to maximize friction coefficient reduction and safeguard the environment. Two different bearings made of conventional steel and green lead-free materials were tested at various operating conditions. The formulated blend proved its viability as a promising alternate for base oil lubricants for industrial use due to its better performance, lower friction, lower operating temperature and on top of all, its bio-degradability and environment friendliness. This can contribute to reduce the global demand of petroleum-based lubricant substantially.

The established lubricant-bearing duo is capable of replacing typical lubricants and bearing materials that include lead with regards to its higher availability and superb performance. The third part of this research is the first attempt to develop high-fidelity mathematical models based on Response Surface Methodology (RSM), which can be used to predict the hydrodynamic lubrication behavior of the bio-oil around the journal bearing circumference. The study employed the response surface methodology (RSM) with Box-Behnken design to further refine. Two companies were selected for case study assessment in the third phase where the model was finalised based on the outcome of the assessment. It was revealed that EMS, LM and TQM are practiced separately by the high revenue, 100% locally owned companies having Research and Development (R&D) capabilities with only 10% product design capability. Years of establishment do not indicate the companies’ readiness for change, capability to design and increase export, despite possessing R&D capabilities and improvement initiatives. Statistical analyses were conducted to triangulate the relationship between Integrated Practices with financial PMIs and non-financial PMIs. Using Mann Whitney Test in the first statistical analysis demonstrates that there is no difference in implementation between MAJAICO and Non-MAJAICO companies as far as practices and performance measurements indicators are concerned except for non-financial PMIs. Using correlation and regression analysis, the statistical results suggest that some practices have significant positive relationships with financial and non-financial performance indicators, while others are significantly negative. The practices with high mean values in the first phase do not necessarily have positive significant relationship in the second phase. With statistically small size sample, finding a relationship or the lack of it is treated with caution. Not finding any relationship does not necessarily mean no relationship due to multitude of reasons inherent in any survey-based study. In the third phase, based on the results from the questionnaire and the case studies, four existing criteria are enhanced demonstrating respective improvement with added values. The proposed integrated framework model was finalised and renamed as the “Integrated Quality Management Model: Green Lean Total Quality Management: G-L-TQM” to mark the merger of the three main quality system. The model is therefore the main contribution of the work signifying the achievement of the thesis objectives.

Hulu Langat. Although there are various other methods such as deterministic, heuristic and statistical methods to map a landslide hazard zone, only heuristic method was considered in this study. Six (6) techniques in MCDM were considered to determine the weights for each of the criteria used. Twelve (12) criteria namely slope, elevation, aspect, drainage density, proximity to river, proximity to the road, lithology, geomorphology, soil type, land use, rainfall and flow accumulation were used in this research. Expert opinions from different agencies were gained to determine the criteria and score for each of the proposed criteria. Finally, nine (9) models were developed based on different criteria and techniques. Accuracies of different models were obtained by comparing the predicted results with the landslide historical data using two (2) methods. Different results were obtained when different methods and different models were used. Using Method 1, result for Model 1 (rank sum), Model 2 (rank reciprocal), Model 4 (rating) and Model 7 (pairwise comparison) were identified to have higher accuracies (i.e. 66.7%, 60.6%, 66.7% and 60% respectively). The accuracies of other developed models which are Model 3 (rank exponential), Model 5 (Analytical Hierarchical Process), Model 6 (pairwise comparison), Model 8 (Analytical Hierarchical Process) and Model 9 (Analytical Hierarchical Process) are 57.6%, 22.9%, 37.1%, 22.9% and 8.6% respectively. Using Method 2, accuracy for Model 1 is 97.1% and Model 2, Model 3 and Model 4 shows the same accuracies (i.e. 94.2%). The accuracies of Model 5, Model 6, Model 8, Model 9 and SINMAP are 94.2%, 80%, 97.1%, 80%, 57.1% and 42.8% respectively. Relationship between criteria have indicated that there are four (4) important criteria namely slope, lithology, soil properties and geomorphology that need to be considered in mapping landslide hazard zones. Three (3) models (i.e. Models 1, 4 and 7) are used to generate the landslide hazard zones maps of Hulu Langat and the results have shown that the hazard zones match with the landslide scars of the study area. As a conclusion, integration of GIS and MCDM can be an important technique to predict and map landslide hazard zones.