

An Indian-Australian research partnership

Project Title: Sustainability based recycling planning using multi-criteria decision making

Project Number IMURA0742

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Research Clusters:
Research Themes:

Highlight which of the Academy's CLUSTERS this project will address? <i>(Please nominate JUST <u>one</u>. For more information, see www.iitbmonash.org)</i>		Highlight which of the Academy's Theme(s) this project will address? <i>(Feel free to nominate more than one. For more information, see www.iitbmonash.org)</i>	
1	Material Science/Engineering (including Nano, Metallurgy)	1	Advanced computational engineering, simulation and manufacture
2	Energy, Green Chem, Chemistry, Catalysis, Reaction Eng	2	Infrastructure Engineering
3	Math, CFD, Modelling, Manufacturing	3	Clean Energy
4	CSE, IT, Optimisation, Data, Sensors, Systems, Signal Processing, Control	4	Water
5	Earth Sciences and Civil Engineering (Geo, Water, Climate)	5	Nanotechnology
6	Bio, Stem Cells, Bio Chem, Pharma, Food	6	Biotechnology and Stem Cell Research
7	Semi-Conductors, Optics, Photonics, Networks, Telecomm, Power Eng	7	Humanities and social sciences
8	HSS, Design, Management	8	Design

The research problem

The advantage of sustainable planning in our day-to-day life echoes economic benefits, environmental advantages and social welfares. Every action, no matter how effective it is, that contributes to better sustainability is helpful. Recycling preserves the resources consumed by society and is one of the most important operations towards the development of a sustainable environment. Recycling, in accordance with sustainability, though familiar but the depth of its action is subtle and often ignored. The scientific research of sustainability planning through recycling and the impacts assessment in sustainability performance are necessary in the process of leading more meaningful and responsible delivery to the society.

In managing and planning recycling operations, multi-criteria decision making approaches have been proposed for sustainability performance evaluation. However, whether it is e-waste, commercial or healthcare recycling, there is little evidence yet of available frameworks and methodologies for supporting much-needed sustainable decisions consistently and knowledgeably. Thus, how to integrate sustainability into the operational and strategic decision-making and planning processes of an organisation remains an important yet unresolved problem in sustainability and decision analysis research. To address this challenging research problem, this project will develop innovative methodologies based on multi-criteria decision making. Research issues to be addressed may include the following:

- (a) how to identify industry-specific and/or organisation-specific quantitative and qualitative criteria under economic, environmental and social dimensions for measuring the sustainability performance of decision alternatives or courses of action;
- (b) how to assess the sustainability performance of decision alternatives or courses of action consistently;
- (c) how to weight the multi-level sustainability criteria for maximising the sustainability performance of decision alternatives or courses of action;
- (d) how to aggregate weighted economic, environmental and social impacts of decision alternatives or courses of action effectively for supporting sustainable decisions;
- (e) how to plan and manage the implementation of sustainable courses of action toward maximising sustainability performance.

Project aims

The aim of this project is to develop new sustainability based planning methodologies using multi-criteria decision making to help India's industries or organisations integrate sustainability into their operational and strategic decisions. The methodologies developed will facilitate the sustainable planning of decision alternatives or courses of action for maximising sustainability performance in a specific application context. The case studies conducted will enable Indian organisations to have a proactive mechanism for supporting planning decisions in a sustainable manner, that is, economically viable, environmentally friendly, and socially responsible.

Expected outcomes

- Innovative sustainability based planning methodologies that can be used to maximise the sustainability of operational and strategic decisions in an evidence-based manner;
- Case studies that help India's organisations improve their planning decision quality for maximising corporate sustainability;
- Publications in highly regarded refereed journals and conferences.

How will the project address the Goals of the above Themes?

This project fall under the following two themes:

- (a) Advanced computational engineering, simulation and manufacture, and
- (b) Humanities and social sciences (Management)

Capabilities and Degrees Required

M.Tech. in Industrial Engineering or MBA or Master degree in related disciplines.

It is highly desirable to have candidates

- with a strong knowledge in industrial engineering/operations research;
- who have undertaken courses in statistics/business analytics;
- who are aware of operations management/business research methods;
- who have experience in coding in any programming languages.

Potential Collaborators

Please visit the IITB website www.iitb.ac.in OR Monash Website www.monash.edu to highlight some potential collaborators that would be best suited for the area of research you are intending to float.

Select up to **(4)** keywords from the Academy's approved keyword list (**available at <http://www.iitbmonash.org/becoming-a-research-supervisor/>**) relating to this project to make it easier for the students to apply.

Data Science, Optimisation, Algorithms; Modelling and Simulation; Smart Manufacturing; Management