

An Indian-Australian research partnership

Project Title: The role of executive functioning skills in decision-making under risk and uncertainty:
 Testing the influence of time pressure, distraction, and multitasking

Project Number IMURA0834

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IITB Department:

Research Clusters:

Research Themes:

Highlight which of the Academy's CLUSTERS this project will address? (Please nominate JUST one . For more information, see www.iitbmonash.org)		Highlight which of the Academy's Theme(s) this project will address? (Feel free to nominate more than one. For more information, see www.iitbmonash.org)	
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

Define the problem

Managers take decisions under risk and uncertainty, while evaluating the risk/reward trade-offs and facing time pressures. This demands higher-order cognitive skills. One of the key sets of mechanisms involved in higher-order cognition is referred to as executive functioning (EF), a term originating in cognitive neuropsychology literature to describe a multidimensional construct incorporating higher order cognitive processes such as planning, organisation, problem-solving, inhibition, mental flexibility, initiation and monitoring of action. The growing body of literature in the fields of clinical and developmental neuropsychology has reliably demonstrated that distinct domains of EF (also referred as ‘the management system of brain’) have substantial impact on strategic decision making under risk or uncertainty. EF and decision making under uncertainty are well-researched areas of investigation that have been developed independently in the fields of neuropsychology and behavioural operations management, respectively. As a result, literature on classical operations management problems such as newsvendor problem, bullwhip, scheduling and project management, largely miss out on rich and real behavioural insights known to psychologists. In particular, almost everything we know through behavioural operations management is limited to certain ideal conditions that rarely hold out in the real world. Specifically, not much is known about the influence of distinct EF domains upon the successful execution of managerial decisions, which are subject to risk and uncertainty. Moreover, a range of environmental factors, such as time pressure, distraction, and multitasking, that commonly go hand in hand with managerial decision-making, are extremely important for maintaining the relevance of the research enquiry and are yet to be tested in the context of the aforementioned research problem.

Project aims

Define the aims of the project

The current project aims to:

- (i) investigate the relationship between high order cognitive skills (aggregated under the umbrella of EF) and decision making outcomes in operations management through pioneering applications of neuropsychology tools and techniques (such as eye tracking and EEG) in operations management.
- (ii) develop a typology of managers based on a set of EF skills that can help more focused training (as also better assignment of people to tasks requires different demand on the various components of EF skills; for example, finding the right persons for tasks that require performance under high time pressure and multi-tasking, as opposed to those that require careful, unhurried thought for strategic decisions).
- (iii) test and transfer these insights in real organizations.

Expected outcomes

Highlight the expected outcomes of the project

- A description and an understanding of *EF skills*, decision making under the risk and uncertainty in the area of OM.
- Methodological as well as substantive contribution to the state of the art in understanding human behaviour and its neurocognitive underpinnings in operations management, while such behaviour is affected by a range of environmental factors, such as time pressure, distraction, and multitasking.

- Uptake of these contributions by the industry.

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

Describe how the project will address the goals of one or more of the 6 Themes listed above.

The insights and contributions of the proposed study will help in testing theories of the underlying cognitive processes involved in decision making under risk and uncertainty. It will also help practitioners and researchers alike, in understanding the factors needed for controlling inappropriate managerial risk-taking behaviour as well as to take into consideration the environmental factors, including time pressure, disturbance and multitasking, which may further deteriorate the quality of decisions.

Capabilities and Degrees Required

List the ideal set of capabilities that a student should have for this project. Feel free to be as specific or as general as you like. These capabilities will be input into the online application form and students who opt for this project will be required to show that they can demonstrate these capabilities.

Required:

Strong undergrad degree in engineering OR Masters degree in management/industrial engineering

Desirable:

A few years of work experience in managerial or consulting roles

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.

Modelling and Simulation
Miscellaneous/Uncategorised
Humanities