Editorial

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Biographical notes: Ali K. Kamrani is an Associate Professor of Industrial Engineering, Director of the Industrial Engineering Accelerated BS to MS Program Studies and the Founding Director of the Design and Free Form Fabrication Laboratory at the University of Houston. He received his BS in Electrical Engineering in 1984, Master of Engineering in Electrical Engineering in 1985, Master of Engineering in Computer Science and Engineering Mathematics in 1987 and PhD in Industrial Engineering in 1991, all from the University of Louisville, Louisville, Kentucky. His research has been motivated by the fundamental application of systems engineering and its application in advanced design and complex systems.

Increasing opportunities in international markets have led to significant new competitive pressures on industry. Recently, these pressures have brought about changes to organisational structures at the level of product design and have altered the philosophies of engineering more toward innovation and technological innovation. Innovation makes a significant difference to how organisations operate in today's global market. A simplified model for managing innovation consists of generating new ideas, selecting the best one and finally implementing them. Generating new ideas could be from inspiration, listening to expert users, frontier research or by just by combining existing ideas and technologies into something new. Innovation is risky. Managers must strike a balance between the associated risks and the potential of success. Selecting the best idea is about a strategic choice and managers should ask questions such as:

1 Does this idea fit our business strategies and goals?

2 Is it being developed on something that the company would have the knowledge and the expertise?

3 What are the potential risks and consequences?

4 Does the company have the skills and resources to take it forward?

If an organisation does not change what they offer and how they offer it, it could risk their survival and to be overtaken by others that do. Implementing the innovation as part of an organisational culture is a complex process, which requires resources. Organisations must invest time, money and people to find out whether or not it will work for them. A systematic process should facilitate how organisation manages the innovation process. This process requires research and development, market studies and simulation,

competitor analysis, risk model development, testing, etc. to gradually improve their understanding of the innovation and its potential benefits. Innovation can take many forms but it summarised into to four categories: These are known as:

1 product innovation: products and services, which an organisation offers

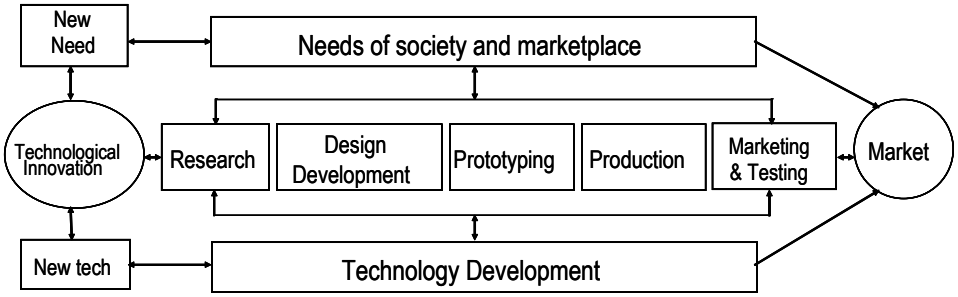
2 process innovation: methods that products and services are developed and delivered

3 position innovation: the environment which the products and services are introduced

4 paradigm innovation: the philosophy and the mental models, which define how the organisation does business.

Recent government, academic and private sector initiatives have sought to advance technologies for developing, as well as managing, innovative product development environments. Many companies have established a concurrent design process for their product development and have likely recognised a need for evaluating engineering risk factors for monitoring and measuring the effectiveness of the process. A product development process includes a set of activities arranged in a specific order with the clearly identified inputs and outputs. Each activity in a process takes an input and transforms it into an output of some value to a customer. The output of the process is either a product or a service. The objective of the process is to satisfy requirements and management objectives. Process is considered efficient when output of the process (product) satisfies general customer and product requirements, meets management objectives and customer deadlines and all these with less costs and resources. The diagram below illustrates a generic model for integrated TP and MP process for innovative design and development. It is well documented that incremental product innovation is managed by the cooperation of marketing and technological knowledge. A product is an embodiment of both market and technological knowledge. In case of emerging technology, technology seemed to serve as a major driving force to introduce the relevant new product and it is also recognised that market knowledge can stimulate successful new product development and assist accumulation of technological knowledge.

Figure 1 Integrated TP and MP process



Therefore, it is concluded that technology knowledge and market knowledge are able to serve as key factors that enhance successful new and innovative product development. The purpose of this special issue, entitled 'Technological innovation', is to promote and disseminate research that deals with this important issue. It offers researchers and

practitioners the most recent concepts, methodologies and techniques in the fields of innovative design including tool and technologies.

In the first article entitled 'The curse of the first-mover: when incremental innovation leads to radical change', Rayna and Striukova have established a strong link between radical innovation, first-mover advantage and market dominance. The article explains why radical innovation and first-mover advantage might fail to provide competitive advantage and weaken companies. It examines the key determinants of why first-movers may face a disadvantage in comparison to followers. In their article Badurdeen, Marksberry, Hall and Gregory presented the Toyota Production System (TPS) as an exemplary and valuable form of incremental innovation, point to the notorious difficulty other companies have in implementing lean manufacturing and then demonstrate that TPS, often misunderstood as stand-alone tools even though it is an integral part of an overall culture of innovation. Implication for future research is also discussed. Their article is entitled, 'No instant prairie: planting lean to grow innovation'. The third article is entitled 'A framework for developing a CSCW environment to improve concept-based decision making' and is written by McNicol, Monplaisir and Chinnam. This article describes how computer technologies can be applied to optimise decision making in concept development activities for the design process. The study results from a framework of features necessary within a computer system to improve the effectiveness of information. In his paper entitled, 'Examining the effect of learning orientation on innovativeness', Kayhan Tajeddini has concluded that higher levels of commitment to learning, shared vision and open-mindedness lead these small firms to be more innovative. His conclusion is supported using statistical modelling and regression analysis. In the fifth article entitled 'Innovations in collaboration in the design of a low mass vehicle', Shulze and Sengupta have discussed the scope of the Institute for Advanced Vehicle Systems and the low mass vehicle (LMV) project. This project involved innovative collaboration among faculty researchers, students from three institutions and industry partners in order to design and develop the next generation of vehicles. In 'Coupling product and manufacturing system design', Vosniakos, Gogouvitis and Stathatos have developed innovative methodology for design of complex products. This work examines the pathways leading from preliminary product and process development to detailed product design, with emphasis on analysis-based configuration issues and, finally to manufacturing system design focusing on performance prediction. In the last article is by Amasaka and is entitled as 'An intellectual development production hyper-cycle model; new JIT fundamentals and applications in Toyota'. The article will introduce a concept know as the 'intellectual hyper-cycle model for development of production strategy in automobile industry as a compliment to TPS.

I would like to thank the reviewers of this special issue. Without their assistance, this project would not have been possible. I would also like to thank Dr. Dorgham and Mr. Jim Corlett from Inderscience Publishers for their support and assistance. Finally, I would like to thank our contributors by allowing us to share the results of their research with the rest of the business and engineering communities.