
Editorial

Tugrul U. Daim*, Dundar F. Kocaoglu and Timothy R. Anderson

Department of Engineering and Technology Management,
Portland State University,
Portland, OR, 97201, USA
E-mail: tugrul@etm.pdx.edu
E-mail: kocaoglu@etm.pdx.edu
E-mail: tima@etm.pdx.edu
*Corresponding author

Biographical notes: Tugrul U. Daim is an Associate Professor in Department of Engineering and Technology Management (ETM) at Portland State University and the Editor in Chief for *International Journal of Innovation and Technology Management*. His research areas include technology management, technology forecasting and R&D management. Prior to his current role, he was at Intel Corporation where he held several management positions. He received his BS in Mechanical Engineering from Bogazici University in 1989, MS in Mechanical Engineering from Lehigh University in 1991, MS in Engineering Management from Portland State University in 1994 and PhD in Systems Science-Engineering Management from Portland State University in 1998.

Dundar F Kocaoglu is Professor and Chairman of the Engineering and Technology Management (ETM) Department at Portland State University, and President and CEO of PICMET (Portland International Conference on Management of Engineering and Technology). His research areas include technology management, project management, R&D management, decision theory, hierarchical decision modelling, evaluation and selection of emerging technologies, and resource optimisation. He has received more than \$1 million in research grants and contracts from government agencies and industrial corporations. He has supervised more than 1,000 Masters students and supervised or participated in the doctoral committees of more than 30 PhD students.

Timothy R. Anderson is an Associate Professor of Engineering and Technology Management at Portland State University. He received his MSIE and PhD in Industrial Engineering from the Georgia Institute of Technology after receiving his BS in Electrical Engineering from the University of Minnesota. He has worked for and consulted with a variety of companies including Honeywell, Oki Electric, Menlo Logistics, and the US Postal Service. He is currently the Program Chair for PICMET (Portland International Conference on Management of Engineering and Technology). His current research interests are productivity analysis, operations research, service engineering, technology forecasting, and new product development. He is a Fellow in the American Indian Science Engineering Society.

1 Introduction

This special issue of the *International Journal of Technology Management* is borne from the papers presented and published from recent *Portland International Conference on the Management of Engineering and Technology Conferences*. It examines a range of topics related to the challenges of managing research and development in a variety of organisations and in many countries.

Chen, Farris and Chen examine the issue of how the stage of the technology cycle affects the form of strategic alliances used by companies. As compared to traditional case study methods, they used a less frequently used approach in this domain, logistic regression analysis, on a patent database relationship.

Thorn, Hunt, Mitchell, Probert and Phaal move into the area of valuing technology. While the mathematical benefits of sophisticated approaches such as real options are widely acknowledged and used in many applications, why is that these tools are not more commonly applied to value technology? They carefully consider a case of a small high technology company and the difficulties of valuing technology under uncertainty.

Klincewicz and Miyazaki explored patterns of innovation in the software industry across the five major South and East Asian economies of China, India, Japan, Korea, Singapore and Taiwan. The software industry is of key importance and underlies many other technology industries and thereby both influences and is influenced by both the technologies dominating the nations' industries and their governmental policies with respect to science, technology and innovation. Through a tech mining approach, interesting patterns were found including of Singaporean researchers accounting for seven times as many software related research papers as their Chinese and Japanese colleagues. While cautioning against over interpretation of the results due to the tech mining approach of the INSPEC database used, regional variations are important and explored further including at the level of specific software technologies such as Security and Web 2.0.

Walters and Millward focus on the challenges of small companies in Wales implementing advanced manufacturing technology. Much research focuses on the large companies or rapidly growing start-up companies when examining issues of technology implementation, but small companies face special challenges. Walters and Millward walk through ten case studies of companies ranging from five to 200 employees before turning their attention to a detailed case study of a company with 60 employees. Unlike many published cases, this technology implementation was unsuccessful and the authors spend considerable time investigating and explaining why. Consistent with the theme of this special issue, an important factor was related to people – in particular, the upper management's unfamiliarity with technical details of the manufacturing processes and technology being implemented.

Rarely can a company focus on just the next generation product, but instead, often be planning for many generations into the future. To address this, Kusaka, Nakamura and Brogan build an optimisation model for selections of features for future products. This tool helps companies operationalise technology roadmaps and is demonstrated with a numerical example.

Taking another perspective on the issue challenge of technology evaluation raised by Thorn et al. is the paper by Riddell and Wallace which uses a hybrid technique of genetic algorithms to generate a collection of 'good' solutions to be filtered using fuzzy logic

and expert opinion. The results are numerically tested against a previously published real-world case of project selection.

Kotnour and Bollo look at the issue of practical tools needed for an engineering manager to deal with how to plan for transforming an organisation. This is demonstrated through a recurring case study of NASA's response to a new initiative, the vision for space exploration, announced in 2004 by President Bush. The response to this new initiative required major changes throughout NASA and the authors provide a detailed view of the strategic planning tools used along with their rationale from the perspective of a practicing engineering manager.

While the size, scope and expense of R&D in general increases: is it necessary for the size of R&D teams to increase? Itaya and Niwa consider whether small-team R&D management can succeed in the highly competitive Japanese electronics industry. In a rare opportunity, they were able to conduct a controlled experiment of R&D personnel in an actual company and found that this resulted in both perceived and observed benefits.

Managing technical personnel is a challenge in any country for many reasons. Following in the idea of Kotnour and Bollo's practical managerial tool orientation discussed earlier, Shirahada and Niwa described the rigorous development and testing of a tool for engineering managers to evaluate both the technical potential of their staff and their motivation. Feedback from employees and managers attested to the usefulness of the provided survey tool.

How does the human resource management of a firm affect R&D team practices of knowledge sharing? This question is explored by Chen, Hsu, Wang and Lin's paper which uses a large survey of R&D personnel to test issues such as how the organisational flatness and rewards systems affects knowledge sharing. They found statistical support for six of their eight hypotheses and discuss the managerial implications.

This special issue fittingly concludes with Hsu, Wu and Yeh which explore how the personality characteristics of team members affect knowledge sharing on a team using a survey of teams. Among the results, it was found that characteristics such as conscientiousness, agreeableness and extroversion were positively associated with knowledge sharing.

Table 1 Research methods used by papers in this special issue

<i>Research method used</i>	<i>Papers principally employing this method</i>
Case studies	Thorn, Hunt, Mitchell, Probert and Phaal; Walters and Millward; Kotnour and Bollo
Mining of databases	Chen, Farris and Chen; Klincewicz and Miyazaki
Mathematical development	Kusaka and Nakamura and Brogan; Riddell and Wallace
Survey	Shirahada and Niwa; Chen, Hsu, Wang and Lin; Hsu, Wu and Yeh
Controlled experiment	Itaya and Niwa

2 Conclusions

Several themes run through this special issue including an emphasis in several papers on management of teams, the challenges faced by small companies, development of sophisticated tools and a concern for practical tools that can be readily used by practicing engineering and technology managers.

As a further interesting point for researchers, the breadth of research methods used to explore these challenging topics of technology management varied to fit the purpose and are summarised in Table 1.