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## Editorial

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**Biographical notes:** Vandana Mangal is the Executive Director for the Easton Technology Leadership Program and Research Director for Business and Information Technologies at UCLA Anderson School of Management. She has published several papers and articles in journals and magazines and is the Editor of two books. She has given talks at conferences and participated and chaired panel sessions. Before joining UCLA, she worked at Intel and at AE Business Solutions. She has taught at the School of Business at the University of Wisconsin, Madison. She completed her PhD from the Heinz School at Carnegie Mellon University; her undergraduate degree is in Electrical Engineering.

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The USA has become a true information economy with the size of the information sector as a percentage of the GNP increasing from 46% in 1967 to about 56% in 1992 and to 63% in 1997 (Apte and Nath, 2007). Korea has seen its shares of the information sector in total GDP increase from almost 52% in 1990 to 59% in 2000 (Choi et al., 2009). Studies have also found economies in Taiwan and Spain becoming increasingly oriented towards knowledge and information (Lee and Chu, 2009; Perez, 2009).

This information economy has resulted in extensive growth in information-intensive businesses that include telecommunications, financial services, biotechnology, media and publishing. Nath analyses the effects of information and communication technology (ICT) related capital investment on the employment of information workers in various industries. Annual US data from 59 industries in the private non-farm sector from 2002 to 2007 and a panel regression model are used to examine empirically the relationship between ICT capital assets and the employment of information workers. Findings indicate an inverse relationship between ICT capital assets and the employment of information workers. This suggests that ICT enabled business process innovations such as automation and outsourcing have a greater impact than does the demand for high-skilled workers on the employment of information workers.

Advances in information technologies in the information economy are resulting in the globalisation of businesses. Technological advances have made it feasible to manage geographically dispersed and even foreign operations, in many cases, with a cost and skill advantage. Companies, in addition to reaching out to geographically dispersed and foreign customers, are also locating operations in different parts of the world, often through partnerships with suppliers and even competitors. Businesses are now able to offer products and services that could not be offered before – such as online transaction processing for banks and underwriting of loans for mortgage. Sector value chains are restructuring with businesses ‘unbundling’ to focus on their core competencies and outsourcing, often off-shoring, non-core activities (Sabel in Lundstrom and Halvarsson,

2006). These businesses are able to form networks of organisations that come together for an activity and are connected by information sharing rather physical location. Such virtual networks have resulted in the reorganisation of operations. Automation of operations due to information technology, which allows self-service where customers are able to perform certain tasks themselves, is being adopted for value-enhancing activities such as package tracking for shipping companies and loyalty-enhanced services such as personalised marketing choices by online retailers. All of these have resulted in creating highly complex business environments (Hayes et al., 2004).

Mandelli studies several of the above changes. The study finds that various service sectors are experiencing partial standardisation of services and products, modularisation of processes and formation of strategic and business virtual networks. To explain the within-sector variances at the micro level, cultural and social factors should be considered.

Restructuring of operations and reformulation of business strategies are therefore impacts of technologies adopted which can lead to competitive advantage for the business with increasingly global competition, often from emerging economies, and dynamically changing industry value chains. Sahoo, Banwet and Momaya use two cases and conduct a longitudinal study in the Indian auto industry to analyse the impacts of technology in the auto industry, particularly with reorganisations such as joint ventures and technical alliances and, external pressures such as changing customer preferences, regulatory environment, safety, and growing inclination towards infotainment. They find that strategic technology management can speed up technology absorption in the organisation resulting in increased business performance.

Business strategy based on technology as well as operations strategy creates a culture that supports and encourages innovation, growth and value creation. Through an empirical study of manufacturing firms in India, Bhat, Sushil and Jain find top management commitment and alignment between technology and business strategies are important for organisations to manage innovation successfully. According to Schumpeter (1942), innovations lead to 'creative destruction' as innovations cause existing technologies, skills and equipment to become obsolete, which leads to continual progress and social improvement. Innovation can be incremental such as a better process or adoption of a newer technology for operations improvement. Innovation can also be revolutionary as with off-shoring a business unit or automation of a complete business function. An innovation can add value to the organisation by resulting in positive changes such as increased productivity or changed organisational form. However, innovation involves lack of certainty and therefore, risk. Patil presents a framework of theory, evidence and judgement as three key elements of effective decision-making and risk management in the face of uncertainty. This framework distinguishes between knowledge and judgement when managing socially, ecologically and economically different entities in the global information economy.

While some researchers believe innovation and entrepreneurship are similar (Shane and Venkatraman, 2000), others have differentiated between them with only innovations that result in the generation of a separate organisation such as a start-up company being truly entrepreneurial (Gartner and Carter, 2003). Traditionally, it was believed that innovations came from large, established enterprises because they have the R&D funds and know-how (Schumpeter, 1942). Acs and Audretsch in their 2005 study (Acs and Audretsch, 2005) conclude that, because of better measurement and the technology focused global economy, the start-up venture is an equally important contributor to

innovations. Whether innovation and technology change come from a start-up venture or a legacy firm could depend on several factors including the type of industry. Innovations in industries such as pharmaceutical and aircraft have usually come from the legacy firms while in industries such as computers and process control instruments, start-ups have led innovation and technological change (Acs and Audretsch, 2005). Whether legacy or start-ups, firms need to constantly innovate as they adapt to new technologies and demands for new products and services (Reynolds in Lundstrom and Halvarsson, 2006) as in today's information economy, Fortune 500 companies can be replaced in three years when the process took 15–20 years in the past (Birch in Lundstrom and Halvarsson, 2006).

Lassen and Laugen find that when firms make innovation and entrepreneurial culture a part of their corporate strategy, firms are able to benefit from their investments in innovations. Using data collected from 512 Danish engineers, Lassen and Laugen find that firms that combine strategic advantage-seeking behaviour and entrepreneurial opportunity-seeking behaviour are successful in exploiting their innovations within the existing organisational framework while also growing and adapting the organisation to changes.

Entrepreneurial organisations are also creating societal wealth including productivity enhancement, national competitiveness and quality of life in terms of enhancing national health, quality of work life, national education, efficiency of government services and personal wealth creation leading to philanthropy (MacMillan in Lundstrom and Halvarsson, 2006). With increasing awareness of sustainability in terms of society and the environment, a greater number of entrepreneurial social initiatives are cropping up. Bhardwaj, Sushil and Momaya use examples and cases from India to develop a framework to guide emerging social entrepreneurial ventures in strategic decision making to understand the critical success factors for the firms' sustainability. The framework also hopes to help set realistic criteria to evaluate the performance of socially entrepreneurial firms.

Entrepreneurial organisations also need to train their managers appropriately if they want to maintain an innovative culture. Neirotti and Paolucci study management training and development in 131 medium-sized Italian firms and find that managers who can delegate technical and operational tasks, are involved in peer networking and, have a more specialised human capital in management, have a greater aptitude for training. Entrepreneurial propensity is found to be marginal in importance to the work of most managers in this study.

In conclusion, an innovative and entrepreneurial culture in organisations combined with factors including decision making and strategy, the structure and operations of the organisation and, technology advancement, can all be used as pathways by start-ups ventures and legacy firms to gain competitive advantage. This special issue of the *International Journal of Engineering Management and Economics* compiles a collection of papers covering the areas of innovation and entrepreneurship in new and existing firms related to technology, operations and strategy.

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