

Preface

The *Cases in Technology Innovation: Entrepreneurial Successes and Pitfalls* is a compilation of theory, research, and practice in the areas of technology transfer, innovation, and commercialization. The book also contains illustrations and examples of entrepreneurial successes and pitfalls in university, industry, government, and international settings. The book is divided into three sections each of which is composed of chapters associated with a central theme. These sections include: *University, Community, and Institution Involvement in Technology Innovation and Entrepreneurship*; *Organizations, People, and Processes in Technology Innovation*; and *Innovations in Information and Communication Technologies*.

SECTION 1: UNIVERSITY, COMMUNITY, AND INSTITUTION INVOLVEMENT IN TECHNOLOGY INNOVATION

Alan Collier, University of Otago, and Fang Zhao, American University of Sharjah, present in their chapter titled, “Case Studies of North American University Performance in Technology Transfer and Commercialization,” a comprehensive overview of the characteristics of universities that appear to be successful in technology transfer and commercialization. They identify fourteen characteristics, or what they call “institutional enablers,” and analyze them for influences in the success of university technology transfer offices. Their findings identify common factors among universities with superior-performing technology transfer offices. One such factor is high-level administration, inclusive of the university president, having a strong commitment to technology transfer and commercialization. Another factor is leadership in working within the university structure; whereby, leaders have entrepreneurial and management abilities and stay abreast of what is happening in technology transfer and commercialization as it evolves and matures.

Collier and Zhao report on case studies covering four North American universities, as they develop benchmarks for which university technology transfer and commercialization performance can be measured. They conducted interviews and compiled data about the universities and the environment. Their data sources included the universities, venture capitalists, and consultants in the field. The authors provide a comprehensive discussion on their data finding in general and regulatory environments, commercialization structure, process, and incentives, industry links, intellectual property, entrepreneurial culture, and commercialization office performance. The authors conclude their chapter with the challenges facing North American Universities.

Nicholas Maynard, RAND Corporation, explains in the chapter titled, “The Evolution of ICT Institutions in Thailand and Malaysia,” that a country’s national technology strategies can be an important contributor to economic development through its support of technology adoption and by advancing the national technology capacity. Maynard points out that the development of a domestic information and

communications technology (ICT) sector within a developing country requires the creation of specialized institutions that carefully coordinate their initiatives with the private sector. The author presents research on Thai and Malaysian science and technology (S&T) institutions showing that institutional and policy reform process is directly influenced by regional activities as countries seek to match their regional peers for technology development. The author discusses ICT utilization as requiring governments to rapidly alter their policy goals and initiatives in response to shifts in technologies, global market demand, international investment, and local workforce capabilities.

S. Ann Becker, Bob Keimer, and Tim Muth, Florida Tech, describe in their chapter titled, “A Case on University and Community Collaboration: The Sci-Tech Entrepreneurial Training Services (ETS) Program,” an entrepreneurial training program provided by a university to the regional community as a means of promoting technology innovation and economic development. In their chapter, they profile the regional economic environment as an impetus to build university and community relations for technology transfer and business development. They outline the ETS program and identify unique features in promoting university and community outreach to entrepreneurs in the region.

The authors conclude the chapter by identifying benefits and initial successes from implementation of the ETS program. The overall objective is to provide a basis for further study of university and community partnerships in providing regional entrepreneurs technical assistance services. The authors summarize the challenges facing the university and local community in offering the ETS Program to a large and diverse group of entrepreneurs.

SECTION 2: ORGANIZATIONS, PEOPLE, PROCESSES, AND PARADIGMS IN TECHNOLOGY INNOVATION

Michael Workman, Florida Tech, presents in the chapter titled, “Technology Innovation Adoption and Diffusion: A Contrast of Perspectives”, various theoretical perspectives on how innovations are adopted and shaped by organizational processes and structure. The author reviews two seminal streams of innovation adoption theory through the introduction of the Technology Acceptance Model (TAM) and the Diffusion of Innovations Theory. He then categorizes the major theoretical perspectives on how innovations develop from, or are shaped by, organizational processes and structures (referred to as organizational innovativeness).

Workman points out that technology innovation adoption and diffusion have been actively researched. But, given the vast body of literature it can be difficult to determine under what circumstances innovations are adopted and diffused and what factors may lead to resistance. In addressing this, he organizes major streams of theory and perspectives on innovation and adoption and diffusion. The author uses structuration agency as a framework for a case study to show how actors and structures play out in the adoption and diffusion of an innovative technology.

Francisco Chia Cua, University of Otago, presents in the chapter titled, “The Challenge of a Corporate Matchmaker,” the process by which a new enterprise system is introduced and adapted by a university. The author uses Everett Rogers’ Diffusion of Innovations (DOI) theory as the primary model for evaluation criteria during the matchmaking phase. Cua describes how deploying new enterprise systems or replacing old ones requires problem-solving intervention under conditions of incomplete information.

The case study illustrates how innovations depend on reasoned action for success. Cua points out that “reasoning” is often based on a subjective set of beliefs and motives held by the executives sponsor, the opinion leaders, and other supporters of the innovation. These beliefs, motives and other assumptions are called a “mindset,” and the case study showed that they play a bigger role in procurement than the

rigid structure of the process would suggest. Cua describes a proactive mindset among those involved in the innovation process as a positive influence for fostering relationships with opinion leaders, change agents, project team members, and other stakeholders. The same mindset influences some vendors to develop relationships with prospective customers and to understand more thoroughly their needs. Successful matchmaking depends on an alignment of these mindsets.

Brian O’Flaherty and John O’Donoghue, University of College Cork, explore in their case study, “The Development of Emerging Medical Devices - The Lead-User Method in Practice,” the application of the Lead-user method in the development of medical applications based on Wireless Sensor Network (WSN) technology. The authors point out that the Lead-user process has been successfully adopted within a diverse range of application domains such as development of medical equipment technology, medical infection control devices in 3M, weblog technology, and extreme sports communities. The authors chose the Lead-User process to help guide each of three student teams in developing potentially successful commercial products or services.

The authors describe how student research teams, utilizing the Lead-User process, produced surprising results in the emergence of diverse WSN technology product concepts applied to Geriatric Falls Detection and Analysis, Sport Cardiac Screening, and Critical Care Vital Signs within accident and emergency environments. The authors highlight in their case study the segmented nature of medical areas and the difficulty in applying a generic WSN technology to meet the functional requirements of individual medical domains. The authors point out that the Lead-user method is useful in teaching technology entrepreneurship, as it sensitizes the students to alternative sources of innovation and encourages them to interact with domain experts in niche areas.

Roman Boutellier, Mareike Heinzen, and Marta Raus, ETH Zurich, explore in their chapter titled, *Paradigms, Science, and Technology - The Case of E-Customs*, the concept of paradigms, science, and technology in the context of information technology (IT). They review the linear model of Francis Bacon and Thomas Kuhn’s notion of scientific paradigms recommending that the linear model be advanced. The authors introduce a five-level concept for deriving managerial implications and guidelines taking into account that IT paradigms transform business processes. The chapter contributes to the diffusion and adoption of innovation using science progress and the interplay of science and technology as dominant concepts.

The chapter introduces a case on e-customs, a European-funded project that tries to ease border security and control by adopting a common standardized e-customs solution across the public sector in Europe. The authors provide an overview of the rise of the IT paradigm within customs and its effect on business operations. The technological progress of the adoption of a common standardized e-customs system in Europe is explained. The authors discuss resistance in adopting e-customs. They point out that although the paradigm has changed, the culture has not and that an information technological paradigm shift from customs to e-customs is irrevocable.

Arvind Karunakaran, Jingwen He, Sandeep Purao, and Brian Cameron, The Pennsylvania State University, focus in their chapter titled, “Growth Trajectories of SMEs and the Sensemaking of IT Risks - A Comparative Case Study,” on two small to medium enterprises (SMEs) located in the same region and sharing an industry sector. The authors describe how these two firms, at different growth stages and at different levels of maturity with respect to their information systems, perceive the usefulness of information systems differently. The authors discuss sub-sections within SMEs, which are at different stages of growth, and how the nature of information systems’ risks is likely to differ depending on these growth stages. They emphasize the importance of the owner or manager’s “sensemaking of risks” as a key variable that influences the demarcation between entrepreneurs and small business owners, beyond

the oft-discussed variables such as “achievement motivation,” “risk-taking propensity,” and “preference for innovation.”

The authors discuss the proposition that SMEs should not be considered as unitary entities. They point out that Risk Management studies, within the IS/IT stream, should not ignore “organizational context” and move beyond the development of ideal frameworks for abstract organizations. They recommend focusing on contextual and structural dimensions such as, enterprise size and age, growth rate, formalization, centralization, and number of organizational levels, among others. The authors suggest that there are likely to be different varieties of risks that SMEs face, and also suggest growth stage and organizational filters as key determinants of the owner or managers’ understanding of these risks.

Suryadeo Vinay Kissoon, RMIT University, introduces in the chapter titled, “Use of the Concern-Task-Interaction-Outcome (CTIO) Cycle for Virtual Teamwork,” the CTIO Cycle as a means of studying team member interaction using face-to-face and virtual interaction media in retail banking. Kissoon discusses the importance of teams using virtual communication for increased productivity in retail banking organizations. The author also discusses the type of team interaction in terms of conceptual cycles in the framework of the CTIO Cycle.

Kissoon addresses different problem-solving cycles, each of which relates to the mode of interaction medium (whether face-to-face or virtual) used by team members, facilitators, or managers to resolve problems in the workplace. The author focuses on understanding the relationship between direct (face-to-face) and virtual interaction variables and as they relate to retail banking trends in hybrid teams and virtual group networks. The author discusses the use of virtual team interactions in data life cycles linkages as gaining importance from perspectives of data and information quality. Kissoon identifies current trends in the triangulation of continuous improvement, routine teamwork, and virtual teamwork to support retail banking organizations in achieving efficiencies in performance.

SECTION 3: INNOVATIONS IN INFORMATION AND COMMUNICATION TECHNOLOGIES AND SOFTWARE SYSTEMS.

Divakaran Liginlal, Carnegie Mellon University, Lara Khansa, Virginia Polytechnic, and Jeffrey P. Landry, University of South Alabama, describe in their case study titled, “Collaboration, Innovation, and Value Creation – The Case of Wikimedia’s Emergence as the Center for Collaborative Content,” the entrepreneurial vision and business model of Wikimedia, particularly the successes and challenges of its innovations, the wiki, and Wikipedia. They compare the Wikimedia business model to other Internet business models inclusive of Knol and Google’s open encyclopedia. The authors use a modified version of Weill and Vitale’s model schematics, which prove useful in visualizing the flows of information, resources, and revenues among Wikimedia’s contributors and consumers. The authors discuss the use of Kaplan and Norton’s Balanced Scorecard to analyze the value generated by Wikimedia’s business model.

The authors use the case as a means of exploring the wiki model from societal and ethical perspectives. Based on the principles of collaborative innovation, self-organization, democratization, and leadership by merit, the authors discuss how wikis can generate value for businesses. They also discuss innovativeness in the collaborative philosophy of Wikimedia as both a contributor to success and a challenge to credibility. The case explores this concept, its controversy, and the associated ramifications to society, along with an illustrative example of its use for collaborative work in a funded academic research project.

S. Ann Becker, Florida Tech, examines in the chapter titled, “Social Networking for Distance Caregiving and Aging in Place: A Case on Web 2.0 Technologies for Virtual Support,” the business development process for a social network targeting older adults and unpaid caregivers. Becker proposes technology

for seniors to share daily entries on health with family and friend caregivers some of whom may be geographically distant.

A focal area of the case is Web site design in terms of usability by older adults. The author points out that many Web sites, inclusive of social media sites, meet the online needs of younger adult users. However, some do not take into account usability needs of older adults in terms of vision, cognition, and motor skills associated with normal aging. The case provides an overview of these factors to be considered in the design of a social network Web site. The case concludes with a discussion of challenges facing online startups given rapid changes in technology, minimal barriers to market entry, and a near saturation point for Web sites with social networking capabilities.

L-F Pau, Copenhagen Business School and Rotterdam School of Management, presents in the chapter titled, “Case ‘Mobile-INTEGRAL’”, a case on how a multinational company specializing in machinery goods uses high technology in its field support and mandated safety solutions to migrate its customer relationships into partnerships of growing scope and with new revenue streams. The key technologies are in-situ equipment monitoring and wireless communications. The key management ingredients are top management’s understanding and respect for operational issues. The history of the case illustrates the importance of the strategic choice of the in-house vs. in-sourced nature of the needed technical expertise and of a gradual deployment compatible with the fast technology evolution.

Sherif Kamel, The American University in Cairo, presents in the chapter titled, “The Egyptian National Post Organization: Past, Present and Future - The Transformational Process Using ICT,” an in-depth look at how information and communications technology (ICT) has improved the quality and range of services offered by the Egyptian National Post Organization (ENPO), while asserting the magnitude of its impact on the country’s emergence as a competitor in today’s global postal market. Kamel points out that the international postal sector over the last 20 years has changed drastically due to several forces, including globalization, changing technology, greater demands for efficient services and market liberalization. He explains that for Egypt, keeping up with the changing atmosphere in the global market meant investing in information and communication technology.

Kamel describes how Egypt has been gradually building its information society since the mid 1980s, adapting its strategy and approaches to the evolution of the global ICT sector. The steps taken included supplying accurate and timely information, encouraging private investment, formulating effective economic reforms, improving productivity, providing programs for lifelong learning, making public services more efficient, improving health care, optimizing the use of natural resources and protecting competition.

Desai Narasimhalu, Singapore Management University, describes in the chapter titled, “Redefining Medical Tourism,” a case on the use of information and communications technology (ICT) in the medical tourism industry. The author explains that medical tourism is a term coined by tour agencies to facilitate travel across international borders to get either affordable or specialized healthcare. Narasimhalu describes challenges in the medical tourism industry inclusive of quality control. Several innovative uses of ICT (e.g., iMedical Butler) are introduced as a means of serving an international market.

Biswatosh Saha, Indian Institute of Management Culcutta, describes in the chapter, “Institutional Innovation and Entrepreneurial Deployment of a Software Product: Case of Financial Technologies Group in India,” entrepreneurship as a temporal evolution of the creation and control over assets. The author explains that the value of an asset lies in its transactional relations with other assets in the ecosystem. Saha introduces the chapter by explaining how assets generated by entrepreneurs derive value as part of wider ecosystems, which in turn can be viewed as an architecture of inter-related and inter-connected assets.

Saha outlines a case on a software firm called Financial Technologies (FT). It is argued that the deployment of financial trading software, as a product in brokerage houses in the emerging securities trading

ecosystem in India by FT, hastened institutionalization of new rules governing transactions embedded in the software design. The case explains how FT implicitly collaborated with the regulator and other ecosystem participants who coordinated the innovation in design of the ecosystem. The software firm went on to expand the market for its own products (trading software) by incubating exchange ventures. The author explains that this was achieved through a strategy of spawning of linked subsidiaries that led to both a growth of the trading ecosystem and further entrenchment of the innovated ecosystem.