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Editorial

Standing at the crossroad of knowledge: Technology, innovation, entrepreneurship and the small business management – Policy perspectives

This is the first of a pair of special issues in the *Journal of Small Business Management* (April 2017) and *Technovation* (Volume 57–58 November–December 2016) that explore the interface between Technology Innovation Management and Small Business Management. No longer are scholars and researchers looking at only one field of scholarship in examining issues and offering solutions but in fact, are adopting a more holistic, interdisciplinary approach. Universities are struggling with how to successfully integrating the hard sciences – physics, biology and engineering with technological breakthroughs of their faculty resulting in viable commercial products and services. This issue in *Technovation* considers policy that is aimed at Technology-intensive small business activity. Such activity might be government policy to encourage either the development and growth of technology intensive start-ups and small firms or for small business to make greater utilization of technology and innovation in either their current operations or in the enhancement and development of new goods and services.

As the interface between technology and small business is a critical issue that sits on the edge of the mission of the *Journal of Small Business* and *Technovation*, a joint decision was made to tackle this together. Furthermore, technological innovation and small business are subject to certain phenomena that are unusual in management and as such it makes sense for cooperation and integration that helps with recognizing and addressing this. Technology-intensive firms, start-ups and growing small business face events that create rapid challenge and change over a short period of time. These changes leads to either an abnormally fast increase in the organization's economic value and future prospects or a rapid decline in firm health – perhaps even dissolution.

In the case of a small business these changes may, for example, involve growth to a size that the owner/entrepreneur can no longer make decisions on her/his own and must rely on professional management support. Alternatively, a small business receives their first big order and must simultaneously scale-up finance, operations, service support and other dimensions to fulfill this requirement. Having considered rapid changes in prospects that occur commonly in small businesses, the same will be considered for technology-intensive firms.

In the case of technology intensive firms, sudden changes in a firm's prospects and value occur due to failures/successes of the underlying technology. When it was determined in the early 1990s that Sildenafil Citrate (Viagra) did not provide benefits as an

angina and high blood pressure medication, the value of the medication for its initial application quickly changed to be at or near zero. However, the medication was noted to have a positive correlation with male erection. Consequently, the value of the medication for the erection marketplace quickly took shape. A patent in 1996; FDA approval in 1998; and the efforts of Penthouse Magazine, Bob Dole and others assisted in taking a product that was at one point seemingly valueless to an enormous market size of US\$ 2 billion in 2012 (Wilson, 2013). Similarly, technology failures can have a deflationary effect. The first fire reported for a Tesla vehicle is said to have immediately erased 6.2% of the market value of the firm – a loss of US\$ 600 million for the firm founder – Ouch! (Young, 2013). Similar examples of rapid expansions or implosions in value do exist for entrepreneurial and small firms that are non-technologically based, however, as the firms are not market-listed and lack the spectacular sort of stories offered by Tesla and Viagra these firms remain understudied and underreported.

While expansions and implosions of individual small businesses may not be eye-catching on an individual basis, the cumulative social and economic benefits provided by entrepreneurial and small firms engaging with technology and innovation is substantial. Consequently, this subject has, is and will be an important part of the future of government policy. It is a topic that has been addressed both in *Technovation* (Bach et al., 2014; Brown and Mason, 2014; Cirone and Urpelainen, 2013; Cohen and Amorós, 2014; Dolfsma and Seo, 2013; Fan and Garnsey, 2014; Hobday et al., 2012; Kapsali, 2011; Lopez-Berzosa and Gawer, 2014; Wonglimpiyarat, 2016) and the *Journal of Small Business Management* (Schoonmaker et al. 2016, Brunswicker and Vanhaverbeke, 2015; Campbell et al., 2015; Dennis, 2011; Lasagni, 2012; Madrid-Guijarro et al., 2013; Parida et al., 2012; Tambunan, 2005; Verbano et al., 2015) in the past. These complimentary guest issues contribute further to this subject.

Hong et al. (in this issue) consider the impact of government grants on technology-intensive firms in China. Their findings indicate that while innovation efficiency of high-tech industries rapidly improved in the past decade, government grants exert a negative influence on innovation efficiency of firms. However, the impact of private R&D funding on efficiency is significant and positive. By grouping the firms into five industry categories, it was found that government grants clearly had different effects on innovation in each category. Consequently, a one-size-fits-all policy

is inadvisable for technology-intensive industry. Tailoring of policy is required as contextual variables that are still undefined play an important role.

Having considered funding, Maresch et al. (in this issue) consider the impact of a different form of government intervention – regulation of property rights through patent protection. This is an important area of study as earlier research has offered contradictory results on the benefits/drawback that patent protection offers inventors and firms. Through a consideration of 975 cases they find that patent protection offers the greatest value in instances of strong competition and fast time to market. The takeaway from this paper is that patents are clearly helpful if in place for products that are brought to the market quickly in emerging markets. As this is a study of firms that have been employing patents, the paper does not address the impact of patent trolls that have no intent in producing and/or selling goods and services.

Ho et al. (in this issue) considers an approach to use personnel from public research institutes to assist in upgrading the technical capabilities of Small-and-Medium-sized Enterprises (SMEs) – The Growing Enterprises through Technology Upgrading (GET-Up) initiative. It is proposed that such an approach to technology transfer enhances and improves the industrial impact of public sector research. Results from surveys in 2005 and 2012 indicate that secondment has a positive impact on SMEs in regards to: technological capabilities, innovation performance and growth of participating companies. Case studies indicate this approach has the flexibility to address a wide range of challenges and to cater to specific needs and requirements. This approach suggests tremendous opportunity for government laboratories and institutes in other regions and countries.

Aspanovich et al. (in this issue) contrast Science and Technology-based Innovation (STI) with Doing Using and Interacting-based innovation (DUI). While contrasting these two modes of innovation is widely relevant, Aspanovich et al. (in this issue) find that in the case of post-Soviet innovation environments, the DUI form has greater relevance. There is need to consider these two different forms in traditional market and developing economies and to consider the implications to policymaking. It can be argued that the finding of Aspanovich (in this issue) et al. have been implemented in the program considered by Ho et al. (in this issue). This raises the question of how and where best to identify programs and policies for obtaining further benefits – e.g. interaction between small firms and universities or government/small firm interaction as part of the public procurement process.

There is much room for further work in this area in terms of better understanding the underlying phenomena to better prepare small business management for the recurring changes that accompany the downside and upside risk provided by technology. Policy makers also need to better understand the recurring process to better create helpful policy and regulation and avoid accidentally hampering the creation of economic and social value. Such assistance has implications to a variety of topics, such as: barriers to entry (e.g. approval processes), development of infrastructure (e.g. networks for communications, energy, and skills), and access to needed funding (e.g. for untimely expansion that opportunity creates). As much of the economic and social benefits that are based on technology and innovation arise from firms that are either small or that were small prior to the growth caused by the expansion, this is an area of concern for the economic well being of regions, countries and the global economy. It is also critical for addressing the grand challenges that we all face together (NAE (National Academy of Engineering), 2008; UN (United Nations), 2015).

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We look forward to your comments and suggestions on our attempt to lend a fresh and unique perspective to the multi-dimensional problems facing today's organizations both big and small. We hope other editors will consider this integrative approach to looking at the world.

"You never change things by fighting the existing reality.

To change something, build a new model that makes the existing model obsolete."

R. Buckminster Fuller

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