# AN OPEN SYSTEM VIEW OF INNOVATION: A PULL-PUSH CONCEPTUAL FRAMEWORK

*Andrew J. Czuchry, East Tennessee State University, P.O. Box 70619, Johnson City, TN 37614, 423-439-7444, czuchry@etsu.edu*
*Mahmoud M. Yasin, East Tennessee State University, P.O. Box 70625, Johnson City, TN 37614, 423-439-5877, mmyasin@etsu.edu*
*Thomas Peisl, Munich University of Applied Sciences, Am Stadtpark 20, 81243 Munich, Germany, tpeisl@fhm.edu*

## ABSTRACT

The objective of this research is to shed some practical light on the role and process of traditional and strategic innovation. To achieve this goal, the authors draw on a series of conceptual frameworks and practical guidelines. These frameworks capitalize on the open system nature of today's dynamic organizations. Although the approach presented in this study applies to large businesses as well as small to medium-sized firms, it is especially helpful to small to medium-sized technology-based businesses as they attempt to manage the rapid growth in their demand through innovation and innovative strategies.

## BACKGROUND

The fundamental objective of this article is to suggest a framework for accelerating commercialization of technology through strengthening public-private sector partnerships and encouraging entrepreneurs to become the engine that drives the process. The goal is to implement a mutually beneficial roadmap to economic development that contributes to new technology-based products within existing businesses, spawns new technology-based ventures, contributes to work force development and creates attractive technology-based recruiting strategies. The advocated framework is derived from the experience cited above. Since 1996 when the Munich program was established, 327 new companies were started. Out of these companies, 284 still exist. Several of these companies have merged during the development phase or during their time in a business incubator or start-up facility. In total, 2791 Jobs were created, and 280 Million euros in private equity funding were invested in these start-ups. Benchmark efforts that reviewed programs at Georgia Tech, MIT, and the University of Delaware (http://www.gatech.edu/, http://web.mit.edu/index.html, http://www.udel.edu) helped substantiate the benefits of technology-based businesses to regional economies. The fundamental contribution of this applied research is to suggest an open system approach to innovation. Rather than protect an organization's intellectual capital by relying solely on its know-how, an open system view leverages this knowledge to clearly articulate the problem and then request the help of others to provide a better value proposition to the customer.

## PROPOSED FRAMEWORK

Based upon the first author's experience with a large electronics firm in the 1980's and early 1990's, most competitors deployed a closed system approach to Research and Development (R&D). This approach to innovation is depicted in Figure 1. Under such an approach, each competitor individually interfaced with customers and developed technology forecasts and roadmaps that gave guidepoints to internally funded R&D projects. Organizationally, internal technology centers were formed and charged

with maintaining a competitive advantage by staying on the cutting (and sometimes bleeding) edge of technology.

The closed system view of innovation shown in Figure 1 resulted in large organizations and/or prime contractors pushing the results of their internal R & D program to the customer. Although a marketing interface was established with the customer, often value-added strategies were of the forced nature. In cases where the innovations were truly revolutionary and new markets were in need of development, such as with the iPod, this strategy was still appropriate. See Backfriars' Marketing for example. http://www.blackfriarsinc.com/blog/2005/10/apples-video-ipod-marketing-coup.html. However, in many if not most cases, a strategy of relying only on internal R & D efforts caused intellectual capital to lie dormant throughout the supply–chain, while internal R & D costs escalated. With the Internet and web-based technologies the pace of change of technological innovations continues to accelerate, thus making it difficult for the technology-based organization to out pace potential competitors. In some cases, innovation may not be customized to customer needs, thus innovations may not become viable products or services

An open system or Connect and Develop (C&D) strategy is advocated in Figure 2. Organizations that embrace this strategy are willing to partner today and compete tomorrow. Rather than outsourcing their R&D, they leverage it by involving customers, suppliers, national laboratories, institutions of higher learning, and even potential competitors in the process. Up front marketing effort is focused a clear definition of current and future customer needs and expectations. Internal innovation efforts are compared and strengths and improvement opportunities are identified. Next the problem is clearly defined and a request for innovation (RFI) is broadcast throughout the network. Benchmarking with the Munich Network and early results of the Northeast Tennessee Technology Council (NETTC) efforts suggest that an outside facilitator or enabler may accelerate the process. The anticipated benefit is that the number of innovations will be increased and financial returns will be improved. Such an approach is particularly attractive to small to medium-sized technology-based organizations. However, larger organizations and government laboratories also appear to benefit as well. Based upon this experience, a framework for implementation was developed by the NETTC. The focus is on pulling innovation through the supply-chain. However, it is recognized that matching the need with existing intellectual property accomplishes the same objective as in the more traditional push approach.

## INNOVATION PULL PROCESS

The NETTC is currently working with one of their client companies, Saratoga Technologies, Incorporated, to implement a pilot project to validate the framework presented here. The fundamental process is comprised of three phases as shown in Figures 3, 4 and 5. The process better enables small to medium-sized businesses to utilize the resources of academic institutions and national laboratories.

The purpose of this section is to draw upon the results of the Munich Network experience in conducting a business plan competition to gain confidence that similar benefits will accrue when the framework and associated roadmap is applied in the United States. Strategically, the overarching concept is to transition from a more traditional closed system view of innovation that pushes innovation to the customer (Figure 1) to an open system view that engages the customer to both pull and push innovation through the supply chain (Figure 2). Figures 3, 4, and 5 provide the roadmap for implementing this new orientation. In the process, it capitalizes on the experience and lessons learned from the Munich Germany benchmark.

The Munich Business Plan Competition – Munich Network was established in 1996. Since inception 327 Companies were started as a result of the competition using an open system approach to innovation as described in Figure 2. Of the 327 original companies formed, 284 Companies still exist. Encouraged by the open system approach to innovation, several of the original companies have merged during the development phase or during the time at the incubator. The resulting success rate is impressive when compared with the eighty percent failure rate of technology-based companies that do not have a similar support network. Based on the Munich experience, 2791 Jobs were created, and € 280 Million in private equity funding were invested in these start-ups. Over the years, the number of projects has expanded considerably and currently number approximately 70 business plans that are transitioning into the final stage. Based upon these encouraging results, the NETTC has elected to implement a pilot project following the roadmap outlined in Figures 3, 4, and 5.

## CONCLUDING REMARKS

The traditional closed system view of innovation (Figure 1) may have been economically viable in the latter part of the last century when larger firms possessed R&D budgets that allowed them to successfully leverage their innovative technology in the marketplace. Even then, potential supplier innovation leading to improved performance, quality enhancements, and reduced cost often lay dormant because of the protective nature of a closed system orientation throughout the supply-chain.

Pressured by the need to achieve growth targets and confronted with increasing R&D costs, business and industry leaders are seeking new strategies. Based on one such strategy, the open system view of innovation is suggested in Figure 2. This approach is consistent with the Connect and Develop (C&D) strategy employed by Proctor & Gamble (P&G) in their request for increased innovation (Huston and Sakkab, 2006). Outsourcing innovation and the partnership approach suggested in Figure 2 are markedly different. Under an open system orientation, the organization seeks to synergistically leverage its R&D with the intellectual capital of the community to respond to an identified need. This differs dramatically from outsourcing the innovation function.

The Munich Network experience suggests that the open system view has a significant economic development impact. To capitalize on this potential the framework used by the Munich Network is expanded in this article to include a strong customer role to provide an identified demand for innovative solutions that potential entrepreneurs can respond to with a systematic approach. This enlarges the concept of competition for the best innovative solution from student and faculty interpretation of what the market might demand, to a clear understanding of what the market does demand thereby channelling and focusing the innovation process towards a more immediately marketable product. One of the significant lessons learned from the Munich experience is that ideas and inventions often lie dormant, and a RFI from the company holding the intellectual property can be the trigger for an entrepreneurial team to begin commercializing this intellectual property.

References and figures available upon request.