A process model of academic entrepreneurship

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Abstract Innovations stemming from research conducted on university campuses are a growing source for the ideas and core technologies that drive entrepreneurial endeavors. This trend has led to development of the term academic entrepreneurship, which refers to the efforts and activities that universities and their industry partners undertake in hopes of commercializing the outcomes of faculty research. Because it is a relatively new phenomenon, the process of academic entrepreneurship has not been as well articulated as one might hope. As such, the objective of this article is to draw on a range of academic entrepreneurship literature to develop a multi-stage process model of academic entrepreneurship. This model is intended to guide potential stakeholders through the application of academic entrepreneurship, with a focus on improving the odds of success. The advantage of this approach is identification of the activities, actors, and key success factors associated with each stage of the academic entrepreneurship process. We conclude our discussion by highlighting the benefits of engaging in academic entrepreneurship for a variety of potential stakeholders.

1. The evolution and domain of academic entrepreneurship

The concept of entrepreneurship centers on the creation of new businesses and the growth of existing ones. An increasing source of the ideas and core technologies that drive entrepreneurial endeavors is research conducted on university campuses. The idea that knowledge spawned via university research programs can be used for commercial applications and revenue generation led Etzkowitz (1998) to coin the term entrepreneurial university, describing the role that universities have come to play in modern economic development activities. Over time, the idea of entrepreneurial universities has become embodied in a more focused concept called 'academic entrepreneurship.' Academic entrepreneurship is an umbrella term which refers to the efforts and activities that universities and their industry partners undertake in hopes of commercializing the outcomes of faculty research (O’Shea, Allen, O’Gorman, & Roche, 2004). The basic premise behind academic entrepreneurship is that a wide range of scientific research takes place within universities, and some of the research results may have commercial applications capable of generating revenue for those universities. This trend toward universities acting as a catalyst for entrepreneurial activity, and also acting as revenue-generating
agents, is at the heart of the academic entrepreneurship phenomenon (Chrisman, Hynes, & Fraser, 1995; Etzkowitz, 1998; Shane, 2004).

To better understand what academic entrepreneurship looks like in practice, consider a company that was recently profiled in Entrepreneur Magazine. Ekips Technologies, Inc. was founded in 1997 by University of Oklahoma professor Patrick McCann. Professor McCann launched the company around laser technologies that he developed while researching at the university; the company now uses these laser technologies to develop instruments that help diagnose health problems, such as asthma. Ekips has emerged as one of the world’s leading producers of laser equipment for the healthcare industry (Sprinkle, 2006). Ekips is indicative of what the academic entrepreneurship model can achieve; thus, entrepreneurship researchers have sought to better understand, explain, and predict the issues associated with developing ventures like Ekips. As we dig into these issues, it is important to understand how universities came to be involved in entrepreneurial ventures to begin with.

In the United States, the growth of academic entrepreneurship can be traced back to the federal government’s passage of the Bayh-Dole Act in 1980. The Bayh-Dole Act provided a mechanism by which the intellectual property generated under federal research grants could become the property of the university, rather than the funding agency sponsoring the research. The core logic behind transferring these rights was that it would facilitate the dissemination of knowledge by allowing universities to quickly transfer intellectual property to the larger community (Carlsson & Fridh, 2002). More specifically, those in favor of the Act argued that by allowing universities to secure intellectual property protection (e.g., patents), outside partners would be enticed to pursue research outputs because their investments would be protected from imitation. While there were some universities engaged in commercialization activities before the Bayh-Dole Act, it is clear that the Act has been influential in enticing many universities to engage in technology transfer and commercialization activities (Markman, Phan, Balkin, & Gianiodis, 2005).

Today, nearly all publicly-funded universities are engaged in some form of technology transfer, and recent aggregate-level data shows a strong and steady increase in university technology transfer activities (AUTM, 2008). Given this continued growth and the importance of academic entrepreneurship, several entrepreneurship scholars—including Agrawal (2006), Shane (2004), and Wood (2009)—have recognized the need for developing success-driven models of university technology commercialization. Generally speaking, however, the literature on academic entrepreneurship is rather fragmented, and most research studies are designed around very specific parts of the commercialization process (e.g., Bercovitz & Feldman, 2008; Markman et al., 2005; Owen-Smith & Powell, 2001). As such, someone seeking a better understanding of the domain and operation of academic entrepreneurship would likely have a difficult time because there is not much literature that looks at academic entrepreneurship from a holistic perspective. Thus, the process of academic entrepreneurship remains rather opaque as key activities, potential stakeholders, and key success factors associated with the academic entrepreneurship process have not been as well articulated as one might hope.

Because the successful application of academic entrepreneurship requires a holistic and integrative perspective, the objective of this article is to draw on a wide range of academic entrepreneurship literature to develop a framework that guides potential stakeholders through the application of the academic entrepreneurship model, with a focus on improving the odds of success. (Success in this context can mean many things; thus, we define success to be sustainable and ongoing revenue generation for both the university and its industry partners.) To that end, we seek to integrate what the literature suggests we know about this phenomenon by developing a process model of academic entrepreneurship. The advantage to this approach is that we are able to walk through the process of academic entrepreneurship and use existing research to outline the activities associated with each stage, to identify the key stakeholders involved, to develop success-focused practical recommendations for those stakeholders, and to discuss the benefits of engaging in academic entrepreneurship.

2. Academic entrepreneurship: A process perspective

Academic entrepreneurship is not a single event, but rather a continuous process comprised of a series of events (Friedman & Silberman, 2003). As such, we feel that a deeper understanding of academic entrepreneurship may be achieved through development of a multi-stage process model that identifies the key actors, activities, and success drivers associated with each stage of the innovation commercialization process. In developing this process model, we often use the terms ‘innovation’ or ‘university-held innovation.’ To be clear, we define innovation in this context as “any invention, new
technology, idea, product, or process that has been discovered through university research that has the potential to be put to commercial use” (Wood, 2009, p. 930). Based on this definition, the central idea is that university research leads to new innovations, and some of those innovations may have commercial applications that lead to entrepreneurial activity.

One of the difficulties of developing an integrative process model of academic entrepreneurship lies in the fact that lines between actor roles are not always clear. For example, it is not uncommon for a research faculty member to become the founding entrepreneur in the launch of a new venture formed to commercialize a research discovery (Chrisman et al., 1995). In that way, some of the stakeholder roles associated with various stages of the process could be occupied by the same person. One of our objectives is to identify the key stakeholder roles as we move through the academic entrepreneurship process, and while one individual could potentially take on more than one role, these roles remain conceptually distinct. In fact, some researchers have found that having one individual take on several roles decreases the odds of commercialization success. Franklin, Wright, and Lockett (2001), for example, found that a partnership between the research faculty and surrogate entrepreneurs was a better formula for success than having the researcher also take on the entrepreneurial role. As such, we emphasize that stakeholder roles should remain conceptually distinct as we begin our discussion of the first stage of the academic entrepreneurship process.

2.1. Innovation disclosure and intellectual property protection stage

Innovation commercialization efforts typically take place through the university’s Technology Transfer Office (TTO). The mission of the TTO is to ensure that the university’s innovations are disclosed, to ensure that proper intellectual property protection is secured, and to facilitate the transfer of the university’s intellectual property to outside partners (Carlsson & Fridh, 2002; Thursby & Thursby, 2007). As such, the TTO can be thought of as the coordinating hub of commercialization activities, and often plays one of the most central roles in the academic entrepreneurship process (Markman et al., 2005).

Given this centrality, much of the academic entrepreneurship literature (e.g., Bercovitz & Feldman, 2008) suggests that academic entrepreneurship begins with the activities of the TTO. However, tracing the process back to its true origins reveals that academic entrepreneurship actually begins well before the TTO becomes involved. In fact, one could argue that academic entrepreneurship starts in universities’ diverse array of laboratories and research centers. It is here that faculty members and their research teams engage in the wide range of basic physical and social science research that has become so critical to advancing our understanding of the world around us. The discoveries and innovations these researchers produce later become the technologies which TTOs seek to commercialize. Technology Transfer Offices become aware of new discoveries and innovations either because faculty are actively interested in commercialization, or because the aforementioned Bayh-Dole Act has resulted in university policies that often require research faculty to disclose newly-discovered innovations to the TTO. In some cases, research faculty are not particularly motivated to disclose their innovations, and if university policy does not require disclosure the technology is very likely to remain ‘on the shelf’ (Link, Siegel, Wright, & Ensley, 2006).

Once an innovation is disclosed, TTO staff members will engage in an extensive review process to determine whether the innovation is worth the time, effort, and expense required to secure intellectual property (IP) protection. The outcome of this review process is either rejection or the submission of a formal application for intellectual property protection (Carlsson & Fridh, 2002). A rejection by the TTO does not necessarily mean that the innovation will never be commercialized; rather, the IP typically reverts back to the researcher and it becomes his or her responsibility to individually pursue IP protection or engage in commercialization. Since they must individually bear the cost and risk of pursuing IP protection and commercialization activities at this juncture, however, faculty members are usually quite reluctant to do so on their own (O’Shea et al., 2004).

Should the TTO decide to pursue IP protection, it submits a formal application in the hope of obtaining a patent, copyright, or other similar form of legal protection (Carlsson & Fridh, 2002). While one could argue that neither the decision to seek IP protection nor the IP application process itself is interesting, both are extremely important. The total cost of securing a patent can easily run $20,000 or more and the process can take up to 2 years to complete (Barringer & Ireland, 2006). As such, errors in decision making or application processes can prove to be very costly: the TTO may choose not to protect valuable intellectual property or, more likely, choose to invest in protecting innovations that are unlikely to result in commercially viable products. However, the decision to pursue IP protection is
inherently difficult because most university-held innovations are in the early stages of development; normally, the TTO has nothing more than a proof-of-concept or a lab prototype as a basis for determining commercialization potential (Thursby & Thursby, 2007).

The difficulty of assessing potential value of embryonic innovations is captured in a case study by Colyvas et al. (2002), describing a proof-of-concept for light generation at a newly-discovered wavelength. This innovation was disclosed to the TTO of a major research university, which pursued a patent—subsequently received 3 years later—because it was determined that the technology had potential for application in the development of products for the semiconductor industry. While the research scientists did not have an initial interest in commercializing their innovation, the university persuaded them that it had commercial applications, and the TTO sought out potential partners to develop these. There was a negative response from potential industry partners, however, as several firms recognized the limited market potential of the technology. Thus, the university was never able to generate significant revenue from the innovation.

This example highlights the challenges TTOs face in evaluating the commercial potential of disclosed innovations: despite what appeared to be a promising discovery, the TTO staff did not fully understand the limited applications of the technology or the small market niche for the products that could be created. These types of commercialization challenges lead to a very simple and practical suggestion that would likely increase the odds of commercialization success for the research faculty, the TTO, and potential industry partners. That recommendation would be to further develop high-potential, university-held innovations before deciding on IP protection.

Implementing this rather simple recommendation is likely more difficult than it sounds, because at this stage, the principal stakeholders are the TTO and the research faculty (if engaged). These two stakeholders often have very different goals, motivations, and reward structures (Link et al., 2006). For instance, the TTO staff is concerned with potential economic outcomes, and thus is interested in having highly-developed innovations so that they can quickly and accurately evaluate commercialization potential. In contrast, research faculty members are embedded in a reward system that is based less on economics and more on reputational capital. Reputational capital is built by publishing a number of high-quality journal articles, and there is often little need to develop discoveries beyond what is necessary to publish the research findings. In other words, many researchers are not that interested in the commercial applications of their innovations; they prefer to return to their research, and work on the next discovery and its corresponding publication (Link et al., 2006).

The role and incentive conflicts that can exist between the TTO and research faculty mean that there is often little incentive to further develop and test the commercial viability of prior research projects (Laukkonen, 2003). This suggests that as the academic entrepreneurship model continues to evolve, there needs to be a greater focus on how researchers can be incentivized and rewarded for developing their innovations beyond what is needed for journal publications. At present, it appears that this reward structure has yet to be fully developed. Recent data shows that as much as 30% of the time, commercialization efforts do not include the principal researcher; of the other 70%, there is a high degree of variability in involvement (Agrawal, 2006). It is remarkable that this type of widespread behavior persists, given the solid body of evidence demonstrating that researcher engagement is critical to the ultimate success of university innovation commercialization (e.g., Nekar & Shane, 2003; Thursby & Thursby, 2004); moreover, that their role is even more critical when the innovation is not well developed (Jensen & Thursby, 2003) or when the innovation is a pioneering new technology (Shane, 2004; Wood, 2009).

This suggests that at the disclosure and IP protection stage, the odds of success could be increased by achieving a greater synergy between principal research faculty and the TTO. Until more universities adjust their incentive structures and cultures in a way that makes this synergy possible, however, the academic entrepreneurship literature indicates that to increase the odds of a successful outcome, TTOs should determine the degree to which the innovation is developed and the degree to which the innovation reflects a pioneering technology. Based on these evaluations, continued researcher involvement would be recommended if the disclosed innovation is not well developed or is pioneering in nature. If the researcher cannot be engaged as a key stakeholder, the TTO would be urged to be very cautious in its decision to invest in intellectual property protection, even if the technology appears to have strong commercial applications.

2.2. Awareness and securing industry partnerships stage

Assuming a decision has been made to secure intellectual property protection, the second step in the
academic entrepreneurship process is for the TTO to begin seeking and securing industry partners that have the requisite skills and resources to develop the innovation into a commercially viable product or service. The first critical hurdle in this stage involves the TTO successfully attracting qualified industry partners. This has proven to be rather challenging, as entrepreneurs and business leaders have been slow to embrace academic entrepreneurship. While there are likely several reasons for this, one explanation may be that academic entrepreneurship suffers from an awareness problem (Kim, 2004). By this, we mean that many entrepreneurs and business leaders are simply not familiar with how academic entrepreneurship works or the types of innovations that might be available to them. Sprinkle (2006) points out that the Kauffman Foundation has tried to help TTOs solve the awareness problem by creating the iBridge Network, with the goal of increasing “transparency and access to university developed innovations that are available today, as well as to field experts, ideas, and information” (www.iBridgeNetwork.org). The aspiration of these broad-based initiatives is to widely alert industry partners regarding the potential of academic entrepreneurship, and thus provide TTOs with better access to qualified partners.

Once qualified partners have been attracted and become engaged in exploring a university-held innovation, a partnership must emerge. Generally speaking, forming and maintaining any type of business partnership can be difficult; but, the unique context of academic entrepreneurship often makes partnership formation especially challenging (Thursby & Thursby, 2004). For example, an important shift in the partnership formation stage is a move to an external focus. As the university seeks to develop industry partnerships, the TTO must broaden its focus from a rather singular university interest perspective to one of a multiple internal and external stakeholder perspective. This means that the TTO must now balance and align the internal interests of the university—including the researcher, if engaged—with the external interests of entrepreneurs and other business partners needed to commercialize the innovation. Academic entrepreneurship research suggests that this balancing and alignment process can be challenging, and many universities have unique cultures which make it difficult to successfully interact with external constituents (Benneworth, 2001; Schramm, 2006). As such, the literature indicates that the most successful universities have fostered a collaborative culture that has resulted in the development of an extensive network of key industry relationships (George, Zahra, & Wood, 2002). In that way, a critical success factor in the academic entrepreneurship process is the university’s ability to view industry partners as allies and to develop interest-aligning partnerships with those allies. University administration, TTO staff, and research faculty should realize that even the greatest innovations hold little value if they can’t be turned into viable products, services, or businesses. Entrepreneurs and business partners are the allies needed to make that happen.

Successful conclusion to the ‘awareness and attraction’ stage of academic entrepreneurship requires an agreement between the stakeholders to investigate commercialization feasibility at a deeper level. At this point in the process, the key stakeholders would be the university, represented by the TTO; the research faculty, if engaged; and the industry partners, in the form of single or multiple entrepreneurs or business leaders from existing firms. It is important to note that the TTO may engage multiple partners or enter into exclusive agreements when commercializing, and the research shows advantages to both approaches depending on the nature of the innovation (Colyvas et al., 2002). Whether there are multiple partners or an exclusive arrangement, the collective group of key stakeholders must now decide the best way to move forward. This leads us to the third stage in the academic entrepreneurship process: selection of the optimal commercialization mechanism.

2.3. Commercialization mechanism selection stage

A variety of formal and informal mechanisms can be used to transfer university-held innovations to industry partners. While distinct, these mechanisms are not necessarily mutually exclusive (Link et al., 2006). The two most commonly used formal mechanisms by which universities transfer intellectual property to outside parties is via use of technology licensing agreements or the launch of a completely new business, typically called a ‘spin-off.’ Use of these mechanisms is not exclusive to the academic environment, as many private and public companies use these mechanisms to transfer their IP beyond organizational boundaries (Yusof & Jain, 2010). However, the use of these mechanisms within the context of academic entrepreneurship raises specific issues; thus, each mechanism has proven to have its own unique strengths and weaknesses.

2.3.1. Technology licensing agreements

Technology licensing agreements have proven to be an effective mechanism for the commercialization of university-held innovations (Agrawal, 2006; Teece, 1986; Thursby & Thursby, 2007). Technology licensing agreements facilitate commercialization
of university innovations by transferring the innovation knowledge to an outside party in return for a fixed fee or continuing royalty payments. From the university perspective, technology licenses are often preferred because they increase speed to market, allow for optimization of multi-partner relationships, and minimize financial risk (Kim & Vonortas, 2006; Zhao, 2004). Some drawbacks to the licensing approach are that university innovations are often not well developed, licensing fees can be difficult to value a priori, and there is substantial variability in the degree to which research faculty are involved (Thursby & Thursby, 2007). Indeed, research indicates that only about half of university license agreements result in successful commercialization (Agrawal, 2006). This means that in 50% of the cases, the licensee probably got paid too much; in the other 50%, the university (licensor) likely got too little. Put simply, deciding on fair licensing fees, continuing royalty fees, and effective revenue sharing agreements is challenging because early-stage technologies are hard to value; further, transferring innovation knowledge is also difficult without significant faculty involvement (Jensen & Thursby, 2003).

2.3.2. Creating spin-off ventures
An alternative to licensing agreements is the launch of a spin-off firm. A spin-off is an entirely new business that is formed around the university’s innovation, and may be wholly owned by the university or created jointly with outside partners (Shane & Stuart, 2002). A unique feature of the spin-off is that the research faculty who discovered the innovation is usually heavily involved in the technological aspects of the spin-off (Feldman, Feller, & Bercovitz, 2002). This close collaboration provides a mechanism for the university to transfer tacit knowledge to those responsible for daily operations of the firm (Lahti & Beyerlein, 2002; Santoro & Bierly, 2006). Tacit knowledge transfer is important because research suggests that spin-offs are most successful when used for the commercialization of pioneering innovations, and these types of innovations require a great deal of face-to-face communication during the knowledge transfer process (DiGregorio & Shane, 2003; Shane, 2004; Thursby & Thursby, 2007). Despite this and other important advantages, there are substantial challenges to the spin-off approach. The creation of a spin-off venture often requires considerable financial and human capital, and it can be tough to keep research faculty motivated to participate in the venture (Nicolau & Birley, 2003). As such, spin-off ventures may entail a higher level of commitment than many universities are willing to bear.

2.3.3. Drivers of mechanism selection
Comparing and contrasting the use of licenses versus spin-offs, it becomes clear that these two commercialization mechanisms differ in their ability to facilitate the transfer of certain types of innovation knowledge (Wood, 2009). This differentiation has resulted in substantial ‘silo’ type research that independently focuses on the unique issues, problems, and advantages associated with commercializing university-held innovation using technology licensing agreements or the launch of spin-off firms (e.g., DiGregorio & Shane, 2003; Kim & Vonortas, 2006; Smilor, Gibson, & Dietrich, 1991; Thursby & Thursby, 2004). The major limitation of this approach is that it does not reflect the true nature of the process of academic entrepreneurship as experienced by actors in the field. In actuality, the stakeholders—faculty, TTO, industry partners—must decide whether a technology licensing agreement or a spin-off is the most appropriate avenue for commercialization, and this is not easy because the various stakeholders impose their view of ‘the right mechanism.’ In many cases, those views are driven by self-serving interests; thus, the views of the various stakeholders may begin to diverge and compete. For example, the university may want less involvement, but the business partner may want the university and the faculty researcher to have a vested interest in the commercialization outcome.

Some of the more recent academic entrepreneurship research speaks to these issues and states there are critical innovation- and situation-based criteria that should drive mechanism selection. The logic here contends that using these criteria is more likely to result in a successful outcome than simply relying on the potentially biased views of a diverse group of stakeholders. Wood (2009), for example, argues that selecting between the use of licensing agreements or spin-offs should be contingent upon the attributes of the innovation being commercialized. This approach relies on the innovation literature and the idea that innovations have different attributes, whose cumulative effects represent an innovation that is incrementally improved over existing technologies or a radical and pioneering new technology (Zander & Kogut, 1995). The recommendation that follows is this: when a university-held innovation is an incremental improvement over existing technologies and practices, a technology license is likely to be the best mechanism. Conversely, when the innovation is of a more radical and pioneering nature, creation of a spin-off venture is the favored mechanism (Wood, 2009). This selection guidance is thought to be applicable across the range of potential stakeholders and suggests that by aligning the attributes of the innovation with the proper mechanism, the odds
of success may be increased; this assumes that all of the stakeholders are aligned by a common understanding that revenue generation is a successful outcome for everyone involved.

In addition to attributes of the innovation, access to venture capital (Florida & Kenney, 1988), physical proximity to the university (Shane & Stuart, 2002), and condition of the regional knowledge structure (Saxenian, 1994) have all been shown to be related to the likelihood of spin-off creation. While these research streams do not explicitly speak to mechanism selection, they have implicit implications for the mechanism selection decision because they suggest that if the environmental conditions are unfavorable for spin-off creation, the university and its industry partners may be forced into using a license agreement for commercialization. As such, universities and potential industry partners may be well served by efforts that (1) help ensure the availability of start-up capital, (2) reduce the need to be physically close to the university, and (3) increase the likelihood that the knowledge structure needed to develop seed technologies is available. Engaging in these efforts helps ensure that the university and its industry partners will truly have a choice between using a technology licensing agreement or the creation of a spin-off venture.

The final issue to consider regarding mechanism selection involves evidence that there are a number of informal mechanisms that can be used to facilitate commercialization. More specifically, consulting arrangements, joint publications with industry scientists, and collaborative relationships between university researchers and industry researchers have all been shown to help facilitate the formation of formal innovation transfer agreements (Link et al., 2006). The general logic is that ongoing, informal, collaborative-type relationships often lead to commercialization ideas that later take the form of formal license agreements or spin-off ventures, and those entrepreneurial endeavors are less likely to develop without informal collaboration (Colyvas et al., 2002). As such, research faculty, TTOs, and potential industry partners need to heed the benefits of developing collaborative relationships that—over time—are likely to lead to formal agreements and, eventually, successful academic entrepreneurship.

2.4. Commercialization stage

The final phase of the academic entrepreneurship process is what we term the commercialization stage. By this juncture, the university, its research faculty (if engaged), and its industry partners have decided to attempt commercialization of the innovation via license agreement or creation of a spin-off. There will be many ongoing activities in this stage, including: securing of key resources, such as capital; research and development; market research and marketing activities; and developing key networks and distribution channels. The focus here has shifted to the industry partners, and most activity is happening within the organization that purchased the licensing rights or within the new venture created to commercialize the innovation. As these actions take place, the number of stakeholders begins to increase at an exponential rate. Bankers, investors, suppliers, employees, customers, and the broader local community all begin to hold vested interests in the success of the commercialization effort. We would argue that because so many stakeholders become directly or indirectly involved in the commercialization stage, the activities and decisions that are made in the early stages of the academic entrepreneurship process are absolutely crucial, as they provide a foundation that can greatly influence the odds of commercialization success.

One of the unique characteristics of the commercialization stage is that, if successful—and in a few cases, even if unsuccessful—commercialization efforts will continue indefinitely. In that sense, there is not necessarily a clearly identifiable end to the process of academic entrepreneurship. Thus, we consider the commercialization stage to be a transition point where many of the issues central to success or failure become the issues that all entrepreneurial ventures face. The broader entrepreneurship literature provides insightful guidance regarding challenges that emerging ventures and businesses developing new technologies must overcome. As such, we conclude our discussion of the process of academic entrepreneurship and turn our attention to highlighting the benefits of engaging in the process for a variety of potential stakeholders.

3. The benefits of academic entrepreneurship

A process model of academic entrepreneurship is useful because it clarifies the activities, potential stakeholder roles, and key success factors associated with each stage. As the process model is applied, it surfaces a number of opportunities for universities, research faculty, entrepreneurs, and business leaders. For the university, successfully engaging in academic entrepreneurship is likely to lead to a host of financial, reputational, and societal benefits. Universities have a long history of providing innovations that have helped society deal with some of
its most challenging problems (Colyvas et al., 2002). However, public funding for university research has diminished over time and academic entrepreneurship provides a method of generating the revenue that is required to fund major research initiatives. As such, universities that successfully embrace entrepreneurship have the opportunity to generate much-needed revenue, to help spur economic development and job creation, and to produce solutions for some of our most pressing problems. All of these outcomes are likely to be very beneficial to society and are consistent with the mission of major research universities.

Research faculty also stand to benefit from engaging in academic entrepreneurship. One of the most obvious benefits is potential for personal financial gain. There are numerous examples of situations in which research scientists have received significant personal financial gains from licensing royalties or by launching successful spin-off ventures. In addition to personal considerations, commercialization efforts have also led to increases in research funding. In an environment where lead scientists are often responsible for securing research funding, academic entrepreneurship should be considered as an option and may act as a supplement to, or replacement for, grant-type funding. A final benefit for research faculty is that academic entrepreneurship promotes close collaboration with industry scientists and product development teams. Studies have shown that these collaborative relationships can benefit faculty by providing them with new ideas for future research projects (Colyvas et al., 2002). Thus, it appears that by helping to commercialize their innovations, research faculty may be inspired to take their research programs in directions that were not previously considered. In some cases, these new directions may lead to discoveries that are tremendously beneficial to society.

Entrepreneurs and business leaders represent another group that may experience benefits from embracing academic entrepreneurship. We suggest that entrepreneurs and business leaders can think of the TTO as a catalog of early-stage innovations that are awaiting entrepreneurial vision. Thus, the early-stage technologies available through TTOs are likely an excellent source of entrepreneurial inspiration and entrepreneurial ideas (Wood & McKinley, 2010). One advantage to working with a TTO is that entrepreneurs can apply their unique skills, abilities, and visions to early-stage innovations, which can become the core technology of a new business or new product. Natural science and social science researchers frequently seek novelty in their research; consequently, much of the intellectual property available through the TTO is unique in some way.

Strategic management scholars have long argued that economic rents, or profits, are a function of the firm’s ability to differentiate itself from competitors (Penrose, 1959). As such, developing businesses and products based on the university’s IP means that the core technology is prone to be relatively idiosyncratic, path-dependent, and difficult to imitate (Barney, 1991). Research has shown that businesses which demonstrate these qualities generate the highest economic returns (McEvily & Chakravarthy, 2002). Thus, entrepreneurs and business leaders should recognize that embracing academic entrepreneurship is likely to lead to unique opportunities for new business creation (Shane, 2004) and strategic entrepreneurship (Ireland & Webb, 2009), with the potential for substantial economic returns.

In conclusion, we feel that there is a strong case to be made for the benefits of academic entrepreneurship, for a variety of potential stakeholders. As discussed, a number of benefits are available to those who choose to be directly involved in the process. Moreover, there are likely untold benefits to the communities, regions, and nations in which these entrepreneurial endeavors take place. Challenges exist, however, and the process of academic entrepreneurship is not as efficient or as effective as it could be. It is hoped that this article provides a better understanding of the academic entrepreneurship process, its difficulties, recommendations for overcoming these, and the potential benefits that may be gained as academics and practitioners strive to develop improved models of academic entrepreneurship.

References


