

Outsourcing Innovation: A Guide for Start-ups

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This paper explores the beneficial impact of outsourcing on new venture innovation development efficiency and effectiveness. The relationship of outside firms on innovation commercialization is highlighted, with an additional focus on the enabling role service providers such as rapid prototype fabricators and quick-turn manufacturers perform. We synthesize our research into five distinct lessons, which form a guide for new ventures in selecting and implementing these external resources. The first lesson is optimizing your firm to allow easy integration of outside resources. In our study, the most successful firms leveraged a network of outside providers by keeping internal head-count low, and migrating to a software-like agile development processes. The second lesson is strategically selecting partners that provide more strategic long-term assistance as opposed to only discrete development resources. These firms help connect channel partners, customers, and new investors. The third lesson is managing the innovation process through agile milestones, not onerous procedures. Maintaining a balance between flexibility and discipline is a pathway to success for the new venture. Next, the ability of the firm to quickly and inexpensively source and have solutions fabricated for internal and external customer testing is essential to an efficient process. These fast solutions place concepts quickly in the hands of the development team and potential customers – speeding the process to market through rapid vetting of successive iterations. Finally, the use of quick-turn manufacturers and assemblers can also help the new firm gather important sales data without having to invest large amounts of capital on costly inventory – helping the new venture preserve precious financial capital while capturing data needed for full commercialization. These guiding lessons not only contribute to applied management knowledge, but outline phenomenon that require further detailed empirical investigation in the space of new venture innovation development.

1. Introduction

850,000 new businesses are started each year in the United States (Price, 2006). These firms are usually started by 1-3 founders and need to raise hundreds of thousands, if not millions of dollars to reach market (Zimmerer and Scarborough, 2008). As such, resources, both in human and financial capital, are scarce. The demands placed on these founders can be great – and it necessitates them to take on numerous responsibilities - from engineering to fundraising. Research shows us that that the path the entrepreneur takes during development of their product or service is all-important for the ultimate success of the product and business (Gartner et al. 1998). It has been shown that in new firms, the success of the first product is key to firm survival (Schnoonhoven, 2007). Given the fact that these firms have limited resources and need to successfully get to market – are there solutions or services where these start-ups might turn for help? One option is outsourcing important

components of innovation development and commercialization. Outsourcing options include innovation design, engineering, prototyping, manufacturing and sales functions. An example of outsourced design and engineering is the use of the industrial design firm. Industrial design firms – made famous by firms like IDEO and Continuum – are those firms that specialize in developing innovation in products, services, and business models. Marion and Meyer (in press) noted that the most successful new ventures turned to outside design firms for assistance. These firms formed teams that ‘plugged into’ the new firm, adding engineering, design, and marketing resources instantly to the start-up.

The ability of new ventures to easily and effectively bolster limited internal resources is a recent development. Over the last ten years, a ‘perfect storm’ has developed that enables new ventures to design, develop, prototype and test new concepts more efficiently and effectively than ever before. What has fostered this perfect storm is the combination of Web-based services, low-cost rapid

prototyping, and the freelance economy. Capabilities that were once only available to the largest of companies are now accessible to the garage inventor – seeding the ground for an explosion of innovative products and services in the coming years.

In this article, we explore how entrepreneurs and new ventures can best take advantage of outsourced innovation. We explore via exploratory empirical research and multiple case studies how these firms are finding resources, developing relationships, maximizing results and return for the entrepreneur, and developing long-term partnerships. We synthesize our finding in a guide that outlines five distinct lessons for effective outsourcing. These include shaping your new firm to leverage outsourced innovation, choosing strategic partners rather than discrete service providers, agile management of key milestones, using rapid prototyping to iterate concepts and gain market feedback, and lastly, implementing quick-turn manufacturing to validate market acceptance before costly full-production. We conclude the paper with comments contribution to literature, directions for further research, and limitations of the current study.

2. Industry Trends and Research in Outsourcing Technology and Innovation

At its basic level, innovation is “a process that begins with an idea, proceeds with the development of an invention, and results in the introduction of a new product, process or service to the marketplace” (Edwards and Gordon, 1984). For new ventures, innovation is a risky business. Half of all firms are out of business after several years (Headd, 2003), close to half of new products and services fail (Adams, 2004), and products have a very short window (less than 6 months) to prove themselves in the marketplace (Schneider, 2002). Because of the competitive pressures and risks associated with new product development (NPD), companies – particularly the vulnerable new venture - are looking to improve their product development process to minimize cost and development time while maximizing the success rate, return-on-investment, and proliferation of new offerings.

Since new firms are challenged for capital – both human and financial – new firms are at a disadvantage to arrange, manage, and commercialize their technology. Barring the rare exception of the well-funded new venture - these firms do not have marketing departments, tooling shops, pilot production plants, or expensive R&D facilities. These new firms have to maximize their internal resources by ‘wearing many hats’ and develop a network of partners to assist in innovation development and commercialization (Marion and Friar, in-press). These human capital variables are likely to influence the development of an idea and the organization of resources, which forms the environment surrounding the start-up. Van Gelderen, et al. (2006) noted the environment surrounding the start-up can include how it is funded, managed, and the network to which the firm belongs.

The network of external relationships is an important factor in the development and success of the new venture. In a study of 60 firms, Lechner, et al. (2006) showed that entrepreneurial networking is as much about adding new and different relationships as about transforming existing relationships. These relationships can include technology

development to free legal advice. In an in-depth study of 27 firms over a several year period, Gartner, et al. (1998) noted that entrepreneurs who devoted more effort to 1) working with established suppliers or subcontractors, 2) analyzing potential new entrants, and who devoted less effort to, 3) determining the identity of their business, were more likely to start a new venture that survived. For the new venture, the most readily available practice for increasing network relationships and associated team skill sets is through outsourcing.

Outsourcing, or the use of outside suppliers to provide services or products, frequently offers a cost competitive alternative to performing the required activities in-house (Rainey, 2005). According to Wu, et al. (Wu et al., 2005), outsourcing can be viewed as a strategically important activity that enables an enterprise to achieve both short- and long-term benefits. These strategic benefits include focusing on core company strengths such as innovation and design in order to maintain competitive advantages. Assigning tasks to an outside firm or to another group within the company may prove effective in accelerating the overall project (Ulrich and Eppinger, 2004). This allows companies like Apple to continue to focus on developing the next iPod while not being burdened with direct manufacturing management (Levy, 2006; Marion et al., 2007).

Over the last ten years, the ability to seek, develop, and enhance entrepreneurial networks via outsourcing has increased greatly. This change has been largely enabled by information technology, which includes Internet services, computer-aided-design (CAD), and global development sourcing. This ‘perfect storm’ of the integration of the Internet and e-collaboration, CAD, and a global network of suppliers and manufacturers allows companies to develop products at much faster rates using fewer resources and outsourced development teams (Marion et al. 2007). For the new venture – this flexibility of arranging development resources can be essential during initial phases.

Eppinger and Chitkara (2006) state “a new paradigm has emerged whereby companies are utilizing skilled engineering teams dispersed around the world to develop products in a collaborative manner. Best practices in NPD are now rapidly migrating from local cross-functional collaboration to a mode of global collaboration.” MacCormack (1998) notes that a flexible development process requires that as development proceeds, changes to the evolving design can be made quickly and at low cost. This global flexibility during development allows the start-up - working within their NPD network using e-collaboration and constantly *pulling-in* resources and information when needed - to quickly change the product design based on feedback from suppliers, potential customers, and the testing of rapid prototypes.

Our research validated these industry trends and highlighted ground-level execution of outsourced innovation. Our sample firms were gathered from the U.S. Small Business Development Centers¹ and *Inc.*

¹ The SBDC are state-funded organizations whose primary mission is to grow the U.S. economy by providing entrepreneurs with the education, information and tools necessary to build successful businesses.

*Magazine*². This sample was used for both empirical and in-depth case research. In total, we made 62 observations on 6 firms, and conducted 23 interviews. Additionally, we empirically surveyed 45 firms in a confidential, Web-based study. The majority of our sample (81%) consisted of those firms that develop physical, assembled products for both industrial and consumer end users. Our sample also included several software firms. We found that the use of outside firms to foster innovation efficiency and effectiveness throughout the development process is pervasive. Firms used outside engineering and design resources extensively (56%), partnered with outside vendors and manufacturers, and used rapid prototyping in a flexible, agile process (96%). This led to strong outcomes – with a close correlation between use of outside design and engineering partners and increased development efficiency and effectiveness. For a complex multi-part product, the development duration from concept through production was found to be approximately 18 months at a cost of less than \$500,000 (development costs ranged from under \$50,000 to millions of dollars). For effectiveness, data were collected for project breakeven timing and product margins (after cost of goods sold for manufactured products). Project breakeven timing (initial investment payback) was approximately 36 months. Product margins on production was approximately 30% with full initial investment payback occurring in less than two years.

In the next section, we synthesize our research findings into a framework for new outsourcing innovation in new ventures.

3. A Framework for Outsourcing Innovation

Outsourced innovation design and engineering, expanded service provider networks, the Internet, CAD, and agile processes have allowed the new venture an ability to leverage the skills of the founding team (typically 1 to 3 individuals in a technology growth venture (Adams, et al. 2009)) to focus on the development of a strategic technology architecture for the firm. This technology architecture leads to scalable technology subsystems and platforms that ultimately result in cost effective variants. Shown in Figure 1 is a framework that illustrates this process.

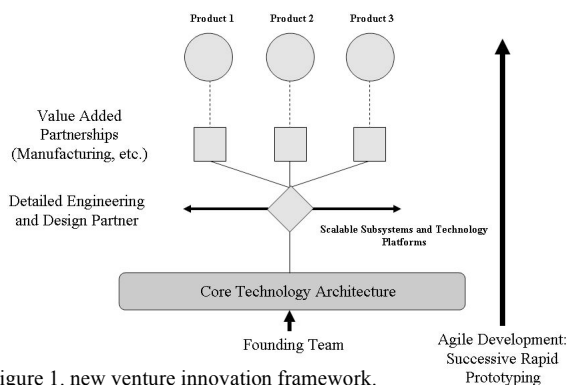


Figure 1. new venture innovation framework.

The framework is based on the work of Meyer (2007), which details the benefits of architecture and scalable subsystems in the development of point specific product lines. As illustrated in Figure 1, the founding team focuses on developing its core intellectual property – a robust architecture that can be used for a series of products. Outside firms (which may include aforementioned design firms such as IDEO and Continuum) can then assist the founding team realize by performing detailed design and engineering on the architecture, thus creating scalable subsystems and technology platforms. The technology architecture can then be developed into discrete product offerings. While new ventures will have a lead product based on its core technology architecture, it is vital that successive revenue producing variants be introduced overtime. This allows the firm to rapidly expand and maximize R&D efficiencies with each new product – realizing the true benefit of product platforms (Meyer and Lehnerd, 1997).

During development, additional outside partners such as quick-turn suppliers and sales support provide value-added services to the founding team. Throughout the path to commercialization, the entire development team is guided by an agile methodology - enabled by rapid prototyping that can quickly validate engineering and design. New ventures that follow this framework will see improved efficiency through value-added partners, and improved effectiveness through ongoing feedback on design iterations up to full product launch. In the next section we outline five important lessons for new ventures pursuing the advantages of outsourcing innovation.

4. Lessons for Outsourcing Innovation: A Guide for Start-ups

In our research, we found that the most successful firms proceeded in a similar fashion with arranging and managing development of their core technology architecture. First, these firms aligned their business to take full advantage of outsourced partners, rather than staffing internally. Secondly, these firms selected partners that complemented and enhanced their strategic mission. Thirdly, these firms adopted agile development processes, eschewing procedures for a more immediate impact on product performance. To support this fast and flexible methodology, these firms relied heavily on rapid prototyping solutions to iterate design. Lastly, these firms used low-volume quick-turn manufacturing partners to test market acceptance in a pragmatic manner, rather than pushing towards costly, and risky full commercialization.

4.1 Getting Your House in Order: Aligning Your Business For Outsourcing

Historically a new venture would raise funds and hire staff to complete technology development and ramp for commercialization. This can be expensive, time consuming and risky – especially for radical innovations whose market potential – and investment payback – are unknown. Since most firms have 1 to 3 founders, additional skill sets are needed. However, instead of hiring full-time staff, firms should look at selectively filling in gaps with talented part-time resources. This reduces monthly cash drain and allows the new venture to

² *Inc. Magazine* is a leading publication on business strategy for entrepreneurs and new ventures.

'test dive' potential full-time hires for a period of time. These freelance experts can be contacted and 'plugged into' a team when and where needed, without the burden of hiring a full-time employee. Need an industrial designer to design the exterior look and feel of your product? Go to Coroflot (www.coroflot.com). Need a temporary accountant to handle Quickbooks? Got to iFreelance (www.iFreelance.com). Do you need to find an engineer or designer to help realize your technological vision? Try Guru for any type of engineer, from software to mechanical engineering (www.GuRu.com). Eventually these functions can be staffed full-time as company growth permits – but for the start-up the freelance economy is a key enabler in limiting overhead expenses before breakeven.

In order to accomplish this plug-and-play arrangement of human capital, firms need to stay small, and take advantage of communication technology. In our study, many of the freelance personnel were not local to the firm. The companies in our study actively used the latest collaboration tools to foster the integration of high-potential part-time individuals into the team. These included project Wiki's and PC-based video conference tools such as Skype®. Keeping the firm small, adopting leading collaboration tools, and adding top-notch part-time freelance employees is a good first step in outsourcing innovation in the new venture.

4.2 Strategic Selection: Sourcing Partners That Are Much More Than Service Providers

Entrepreneurship literature notes the importance of networks in the success of the start-up. The firms in our study are no exception. In addition to adding quality part-time employees to fill important roles, these firms partnered with outsourced firms that provided key functionality to the new venture.

Pervasive was the use of outside industrial design firms to design and engineer the technology architecture into distinct products. However, these design firms went beyond pure physical design, but helped in validating business models, costing, and manufacturing. In many instances, these firms provided key networking contacts in sales, supply chain development, and production sourcing. Additionally, several of these firms directly invested in the projects, providing direct and indirect capital to the start-up. In selecting outsourced partners, new ventures need to internalize how these new partners might help with more than the discrete development – but provide complimentary skills, contacts, and resources that will accelerate growth.

4.3 Agile Innovation: Managing Milestones Rather Than Process

The new ventures in our study were pervasive adopters of an agile development process. Software developers first used the concept of agile development, but it is now more universally applied to products and services beyond software. Agile is a straightforward concept: quickly build, test, improve, and test again. User insights are translated into new design prototypes in a matter of days. Prototypes are constructed and reviewed by the development team (and potential customers) as quickly as possible. The firms in our study were all adopters of this

quick prototyping throughout the. Star-ups are well-served by adopting this quick design, validation, and test methodology.

In terms of the development process itself, these firms managed to milestones, not to a defined process. The most successful firms in our study had a clear focus of what was needed to get the project completed. Even if details on technological issues were fuzzy along the way, teams were not deterred. We found that these firms put less focus on managing the process and more emphasis on managing their goals. By removing bureaucratic layers and eliminating overarching procedures during development, firms quickened team reactions and reduced development cycles. To compete in an ever more difficult global environment, new ventures need to be quick, agile, and effective. Adopting fast design and prototyping methods along with a strong focus on milestones is a sure path to success.

3.4 Rapid Solutions: Near Instant Feedback on Design and Functionality

In the 1980's, technology was developed that allowed virtual computer-aided-designs (CAD) of products to be built quickly using new technologies such as stereo lithography (SLA). These prototyping machines were expensive – and available only to the largest of firms such as automobile manufacturers. However, over the last ten years new technologies combined with refinements in existing machines have lowered the cost exponentially. There are now desktop machines that can create parts for several thousand dollars, approaching the point of being affordable for the average citizen. Additionally, these fast prototyping machines – combined with Web services such as Quickparts (www.quickparts) – can turn around look and feel prototypes in a matter of days, sometimes faster.

These parts, a cornerstone of agile development, can be used for rapid feedback on design efficacy and from target users - allowing firms to move quickly to market. Rapid prototyping has also entered other more complex spaces such as electronic circuit board turnaround, and production tooling (www.protomold.com). For new ventures, the ability to quickly design, prototype, and iterate has multiple ramifications – from pitching your technology to potential investors to beta testing production-like units without committing to costly production ramp-up.

4.5 Quick-Turn Production: Production-level Sourcing While Reducing Capital Needs

From your desktop, netbook, or smartphone is a collection of services that allow the new venture to design, source, manufacture, and test concepts. These services allow a limited number of founders to establish a network of providers that act as the purchasing department, manufacturing, and engineering – turning micro businesses into fact acting, and capable virtual corporations. These services are inexpensive and fast. They also help the new venture maintain low overhead – maximizing funds for technology development and commercialization. Do you need to find a microcontroller for your new device - tomorrow? Go to Digikey – a leading supplier of electronic components (www.digikey.com). Do you need to find a manufacturer

to build your product, and provide detailed quotes for cost engineering? Uploading product designs on MFG.com can net dozens of potential manufacturers in near real-time (www.mfg.com).

These services and potential manufacturing partners allow the new venture to pilot produce and commercialize their products without draining large amounts of capital during launch. The most successful firms in our study did not purchase hundreds of thousands of units for inventory – instead they found production partners and component vendors to produce production-ready goods in lower volume, allowing the new venture to test market and validate their products and services. This data can then be used to tweak the product, market positioning and full-launch plan. Many firms tested retail in a just few select stores, or in specific geographic areas. This data then helped the firm refine their business plan and ensure a smooth and less risky move to full-rate production and sales. By following this approach, new ventures can realize their potential without putting their entire business at risk of failure.

5. Conclusions and Future Research

New ventures are at the center of innovation in the economy. Unfortunately, most new firms fail. Failure modes include capital constraints, poor management decisions, and mis-steps during new product development and launch. The start-ups are resource constrained, both in human and financial capital. Through our research, we have found that a successful approach – fostered by changes in technology and globalization – is outsourcing key components of innovation. These include partnering with part-time individuals and firms to increase corporate skills sets. Using design and engineering firms to realize the potential of the firms' core technology architecture, and partner with key vendors to cost effectively execute product tests and full launch. Overlaying these key issues in outsourcing is the ability for the firm to rapidly design and test their technology through rapid prototyping. The final analysis of outsourcing innovation is the ability to greatly increase the network of the entrepreneur, provide world-class capability for low cost, and deliver results much faster than tradition methods. New ventures would be well-served to adopt the key points and lessons outlined in this article. However, this is just a first step in research the impact of outsourcing innovation in new firms. Additional studies are needed to further validate our findings. We hope future research will include non-U.S. firms and additional industries. What is clear from this initial research, however, is that the new venture is in a unique position to integrate services and solutions throughout the development process to increase innovation efficiency and effectiveness.

6. References

- Adams, M. (2004): PDMA Foundation New Product Development Report of Initial Findings: Summary of Responses from 2004 CPAS. *Product Development and Management Association*.
- Adams, R., Almeida, H., Ferreira, D. (2009): Understanding the relationship between founders-CEOs and firm performance, *Journal of Empirical Finance*, vol. 16, pp. 136-150.
- Edwards, K.L. and Gordon, T.J. (1984): Characterization of Innovations Introduced on the U.S. Market in 1982, *U.S. Small Business Administration*, SB-6050-0A-82.
- Eppinger, S.D. and Chitkara, A.R. (2006): The New Practice of Global Product Development, *MIT Sloan Management Review*, vol. 47, no. 4, pp. 22-30.
- Gartner, W.B., Starr, J.A. and Bhat, S. (1998): Predicting New Venture Survival: An Analysis of 'Anatomy of a Start-up' Cases from Inc. Magazine. *Journal of Business Venturing* 14(2), pp. 215-232.
- Headd, B. (2003): Redefining Business Success: Distinguishing Between Closure and Failure. *Small Business Economics* 21(1), pp. 51-61.
- Lechner, C., Dowling, M. and Welpe, I. (2006): Firm Networks and Firm Development: The Role of the Relational Mix, *Journal of Business Venturing*, 21(4), pp. 514-540.
- Levy, S. (2006): The Perfect Thing, *Wired Magazine*, November, 2006, pp. 136.
- MacCormack, A. (1998): Managing Adaptation: An Empirical Study of Product Development in Rapidly Changing Environments, Unpublished doctoral dissertation, Harvard Business School, Harvard University, Boston, MA.
- Marion, T.J., Friar, J.H., and Simpson, T.W. (2010): New Product Development and Early-Stage Firms: Two In-Depth Case Studies, *Journal of Product Innovation Management*, in press.
- Marion, T.J. and Meyer, M.A. (2010): Applying Industrial Design and Cost Engineering to New Product Development in Early-Stage Firms, *Journal of Product Innovation Management*, forthcoming.
- Marion, T.J., Thevenot, H., Alizon, F., Simpson, T.W. (2007): The Effects of Globalization on Product Platforms and the New Product Development Process, 2007 ICED, *International Conference on Engineering Design*, Paris France, ID 246.
- Meyer, M.H., Lehnerd, A. P. (1997): *The Power of Product Platforms*, The Free Press, New York.
- Meyer, M.H. (2007): *The Fast Path to Corporate Growth: Leveraging Knowledge and Technologies to New Market Applications*. New York: Oxford University Press.
- Price, R.W. (2006): *Mastering Entrepreneurship*, Entrepreneurship, 5th ed. Dubuque, IQ: McGraw-Hil.
- Rainey, D. (2005): *Product Innovation*, New York: Cambridge University Press.
- Schneider, J. (2002): The Launch: Why New Products Blast Off or Fizzle, *PDMA Visions*.
- Schoonhoven, C.B., Eisenhardt, K.M., and Lyman, K. (1990): Speeding New Products to Market: Waiting Time to First Product Introduction in New Firms. *Administrative Science Quarterly* 35, pp. 177-207.
- Ulrich, K. T. and Eppinger, S. D. (2004): *Product Design and Development*, 3rd Edition, New York: Irwin McGraw-Hill.
- Van Gelderen, M., Thurik, R. and Bosma, N. (2006): Success and Risk Factors in the Pre-Start-up Phase, *Small Business Economics*, 26(4), pp. 319-335.
- Wu, F., Li, H. Z., Chu, L. K., and Sculli, D. (2005): An Outsourcing Decision Model for Sustaining Long-Term Performance, *International Journal of Production Research*, 43(12), pp. 2513-2535.
- Zimmerer, T.W. and Scarborough, N.M. (2008): *Essentials of Entrepreneurship and Small Business Management 5th ed.*, Upper Saddle River, NJ: Pearson Prentice Hall.

