

Product Development: From Concept to Market

Faryan Jalalabadi, MD, BBA¹ Aryan Sameri, MBA² Edward M. Reece, MD, MBA¹

¹ Division of Plastic Surgery, Michael E. DeBakey Department of Surgery, Baylor College of Medicine

² Consultant, McKinsey and Company

Address for correspondence Edward M. Reece, MD, MBA, Jamail Specialty Care Center, 1977 Butler Boulevard, Suite E6.100, Houston, TX 77030 (e-mail: edward.reece@bcm.edu).

Semin Plast Surg 2018;32:191–195.

Abstract

Plastic surgery has origins that date back to 3,000 BC and although some devices and techniques have withstood the test of time, the field has made much advancement through the use of modern day technology and innovation. The combination of the two has led to an array of advanced products we use in our offices and operating rooms on a daily basis. These products may be used by the surgeon or the patient, may be small scale, or sold en masse. The surgeon stands in a position of power, able to guide the progress of the field as a whole, through new product development. Ideas for advancement are just that—a thought—until put in the hands of an end user. This paper discusses the steps that may aid you in doing so: idea generation, design feasibility, testing and prototyping, pricing, distribution channels, marketing and sales, and seeking enablers.

Keywords

- ▶ product
- ▶ development
- ▶ design
- ▶ innovation
- ▶ marketing
- ▶ sales
- ▶ prototype

Plastic surgery takes its origins back to 3,000 B.C. in the form of nasal bone fracture repair, documented in the Egyptian manuscript titled, the “Edwin Smith Papyrus.” Greek surgeon Galen of Pergamon was noted for the use of silk and catgut to suture repair gladiators’ severed tendons, and while these materials were used well into the 20th century, innovation and design have provided an armamentarium of suture material to choose from, depending on the purpose of the stitch. It has also allowed us to progress from using raw meat as a hemostatic agent, as noted in the Papyrus.^{1,2} The plastic surgeon stands as the catalyst for innovation in the field, and this paper will discuss the steps required to transition from initial idea generation to market entry by considering the key steps for an effective product launch.

Idea Generation

As a plastic surgeon, the versatility of practice schemes provides an opportunity for personal business to thrive. This could stem from a single product to a product line, such as a single surgical instrument to an at-home skincare line, or services provided, like running a private practice. Ideas are cheap and a great deal of time and effort go into making them tangible for the public. Some ideas form in a light bulb moment; however, most result from conscious, purposeful inspection of innovation opportunity that helps

address the potential needs of an end user (e.g., being able to effectively, conveniently, or affordably fulfill a need). This may come from literature searches, systematic reviews, conferences, and discussions of current trends and issues.³

New ideas often stem from six key sources:³

1. *New knowledge*—This may come from outside sources and be adapted into new technology for our field.
2. *Critical follow-up*—Being hypercritical of our results can lead to future improvements (e.g., the donor site morbidity of a transverse rectus abdominis muscle flap led to adaptation of perforator dissection and the deep inferior epigastric artery flap).
3. *Unexpected occurrences*—Failure provides opportunity to recognize drawbacks and turn a setback into victory. Repetitive treatment of facial wrinkles with Botox was noted to give patients with refractory migraines temporary relief.
4. *Incongruities*—These inspire people to change their old practice. For example, chronic, nonhealing wounds led to the creation of the wound vacuum-assisted closure device. This known concept was then applied to the battlefield where traumatic wounds could be temporized during transfer.
5. *Process needs*—Innovation can exist if there is a more efficient way to meet needs. Demand for protocols has led to the application of surgical safety checklists to reduce complication rates.

Issue Theme Business and Technology;
Guest Editor: Edward M. Reece, MD, MBA

Copyright © 2018 by Thieme Medical Publishers, Inc., 333 Seventh Avenue, New York, NY 10001, USA.
Tel: +1(212) 584-4662.

DOI <https://doi.org/10.1055/s-0038-1673394>.
ISSN 1535-2188.

6. *Changes in perception*—How the consumer or producer perceive a subject directly affects the evolution of its demand. For example, the current desire for pouty lips has led to the novel development of various soft tissue filler designs.

External and internal cross-unit networks further enhance idea generation. These exist in small, coordinated teams working on the same problem. With the advent of an open-source community ideas can flow freely. The minds in the network mold and refine ideas. Their influences on the six sources result in innovation (→Fig. 1).⁴

Product Design

A rapid assessment of the *feasibility, timing, and specifications* of your product should preclude diving into the next steps. How accessible are the materials needed? How long do you estimate the development process take? Are there regulatory hurdles?

After a preliminary review of the above, product design should be focused around customer values—specifically focused on offering enhanced usability and user experience that exceeds the expectations of the end users. The “Elements of Value Pyramid” (→Fig. 2) breaks down the hierarchy of values. Similar to Maslow’s Hierarchy of Needs; however, the subject is applied to humans as “customers.” The essence of product design lies in functional and emotional points of differentiation provided to the customer. For example, value in “convenience,” is derived from a combination of the functional elements such as: *saving time, avoiding hassle, and reducing effort through simplification*.

Many combinations of elements exist in successful products and services today. Survey performed by the authors found that companies who provided multiple elements of value had more loyal customers, especially those with four or more. These companies also demonstrated greater growth

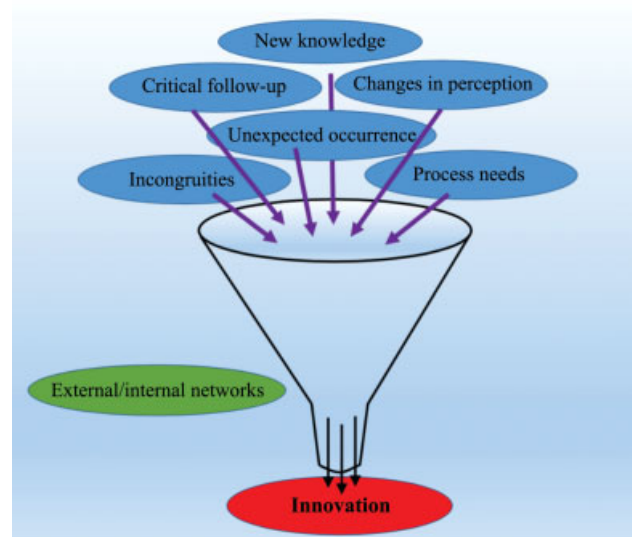


Fig. 1 Six key sources of innovation funneling through internal and external networks to produce innovation

revenue, four times that of those companies whose product only fulfilled one element. Plastic surgeons can use this pyramid to find out which new elements should be adapted to gain an edge on their competitors. The authors found that across all the industries, perceived *quality* affected customer advocacy more than any other element.⁵ The next element depends on who your product is targeting. It is important to determine the values of your specific customer whether it be other surgeons or patients.

Testing and Prototyping

It is in the designer’s best interest to assess his or her product objectively as early as possible. Initial testing could be conducted to seek feedback from your plastic surgery peers or even with small focus groups; however, it is important to note that these groups may not be representative of the overall market. For example, there may be variations in need by specialization (e.g., hand, pediatric, cosmetic, craniofacial, burn, microsurgery) and cost. Test its appeal online through survey. Launch a mock version. These are the best ways to assess the elements your market values most, before launching a product that is likely to fail after more time, expense and risk is taken on.⁶

David Kelley, founder and chairman of IDEO and the founder of the Hasso Plattner Institute of Design at Stanford, advocates early prototyping during the design phase. Not only do you benefit from repeated input from potential product users, but more value comes to the user/client. This process provides both forward-looking designers with guidance in creating new ideas and their clients with proof of concept.⁷

When testing your product, avoid premature termination of a product simply based on lack of evidence proving its success. This could be the result of failing to conduct the right experiment and not an intrinsic flaw of the product itself. On the contrary, beware of pro-bias when evaluating your product. Try to remain as objective as possible. Run the critical experiment despite fears that it may show your product will fail, and be sure to test early and often through iterative design tweaks, incorporating feedback from end users.⁸

Pricing

Though your product may call for complex pricing schemes before going to market, it is recommended to calculate “back of the envelope math” as early as possible. Estimations of costs and revenues can reveal whether this project will be worthwhile to you and your investors. To do this, competitive market prices should be assessed, though you should also evaluate what the value of the product could be to the consumers.

Once committed to production, a go-to-market pricing scheme should be considered. Below are various pricing strategies to keep in mind.

Value-Based Pricing

Value-based pricing focuses on setting a price based on the value it offers to the end users (e.g., equivalent savings through reduced patient time, ability to conduct surgery on more patients over the course of the day). When

The Elements of Value Pyramid

Products and services deliver fundamental elements of value that address four kinds of needs: functional, emotional, life changing, and social impact. In general, the more elements provided, the greater customers' loyalty and the higher the company's sustained revenue growth.

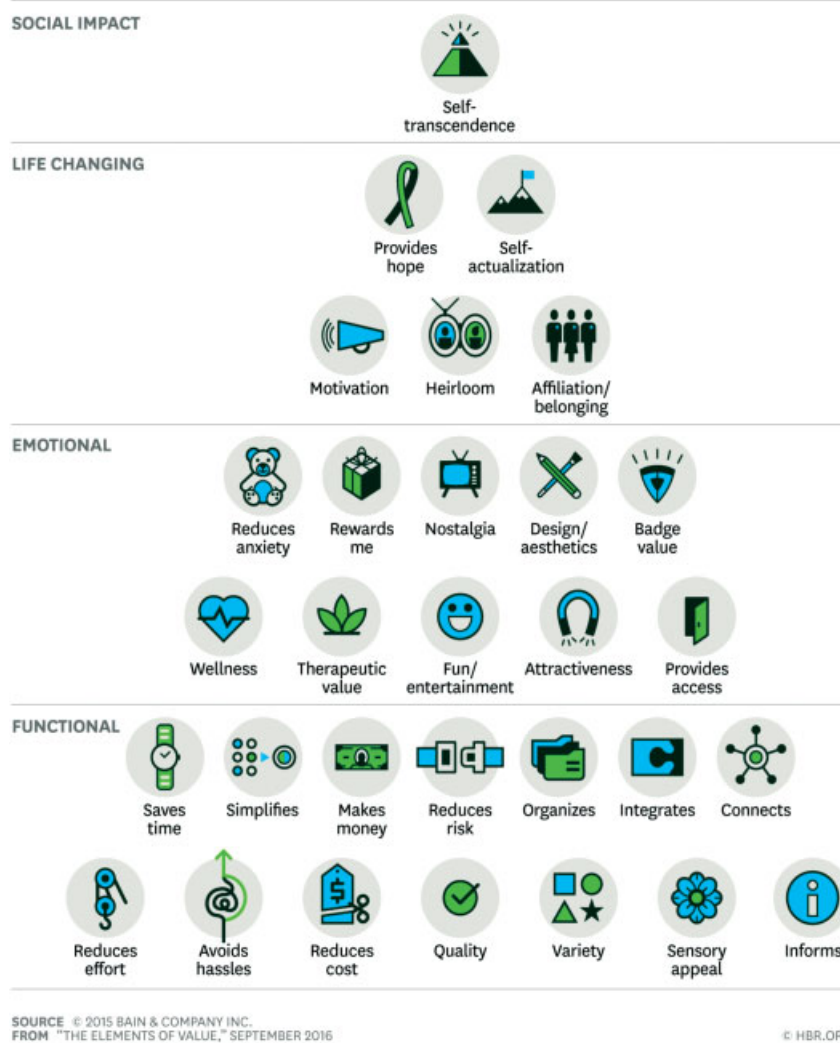


Fig. 2 The value pyramid grouping elements into functional, emotional, life-changing, and socially-impacting levels. Reproduced with permission of *Harvard Business Review*. "The Elements of Value." Almquist E, Senior J, Bloch N. September 2016. Copyright 2016 by Harvard Business Publishing; all rights reserved. Available from: <https://hbr.org/2016/09/the-elements-of-value>.

determining the pricing, initial focus should be on a single, targeted consumer segment (ideally with a large market size). To most effectively price the product via value-based pricing, innovators must understand the differentiated worth of their products. Note, however, when developing value-based pricing, it is important to compare the value of your product relative to competitor offerings (e.g., is it a premium, higher-quality product) to ensure that product is appropriately priced (e.g., not more expensive than a more premium offering). To help identify the price consumers would be willing to pay, research methods like conjoint analysis or qualitative customer interviewing could help.⁹

Cost Based Pricing

There are instances where groundbreaking novel products have no competitors or next-best-alternative to compare

with. In this circumstance, value-based pricing is not applicable. A different pricing scheme should be sought out. One example is cost-based pricing—an addition of the direct material costs, direct labor costs, and overhead costs plus a markup percentage to create a profit margin.

Some advantages of this scheme are that it is simple and straightforward. Contractors are willing to accept this scheme for contractual agreements with customers since the markup factor assures covering costs and making a profit. If costs rise during production, a price increase to customers is justifiable as the supplier can demonstrate that increase in costs as its basis for increasing prices.

This scheme does not exist without its shortcomings. It ignores competition—if it exists, and if a company ignores the existing competitors' prices, and if markedly different, they may find that they either end up pricing too low and giving

away potential profits, or pricing too high, pushing consumers to competitor products.¹⁰

Consumer surveys and price testing should always be conducted (regardless of the pricing method) before launching a new product.

Pitfalls of Pricing

Pricing new products can be tricky; however, it is important to avoid several common pitfalls, including:

- *Pricing products without consumer input:* Before a wide-spread product launch, the potential price point for your product should be tested both through surveys and more effectively through sales at various price points, since this truly measures consumer behavior (vs. solely considering what the consumer says they might do).
- *Setting prices in stone over time:* Market dynamics change. New, innovative products may enter the market, or your own product may become a market leader. Your product prices could be dynamically changed as the market environment changes. However, before tweaking prices, it is important to measure what the potential impact of this price change could be (e.g., increase in volume sold but lower overall revenues by lowering price, decrease in volume sold but higher revenues by increasing price).
- *Pricing too low:* Many early-stage founders fall into this trap. While pricing low may be an effective market-entry tactic to drive awareness and product use, it is important not to undervalue your product as well. One way to enter markets at a low price point, while not devaluing your product over the long term is to offer initial price discounts for early adopters.¹¹

Distribution Channel

It is important to be aware who your end user may be, and based on that, you can choose a distribution channel that fits your goals. If your product is tailored to aesthetic surgeons, your channel may be private practice surgeons. If it is an at-home skin care line, you may turn to large cap distributors like Amazon. If your product is a highly complex and expensive operating microscope, you may turn to large

hospital institutions who can seek a return on investment from its use by multiple surgeons. Be aware of your target market and know the outlets to reach them.

Marketing and Sales

When going to market, one must decide whether its product would be better served by taking a marketing-driven approach or a sales-driven approach. Several factors come into play: price, market size, complexity, fit, customer, relationship, touch. Depending on how your product fits these factors, and how it lies on the spectrum, your go-to-market strategy can be tailored for optimal outcome (→ Fig. 3).

A high cost product may benefit from a sales intensive strategy, as it is important to clearly highlight the value (e.g., dollars and/or time saved) to the end user in a way that might not be as effectively communicated through display advertisements, e-mail campaigns, etc.

When assessing market size, a relatively small volume of potential customers negates the need for spending on targeting a large audience. Know your buyers and seek them out in a sales approach. Invest in going to industry shows.

A product that is simple in its construct, like toothpaste, which is less likely to require a personalized sales approach than say the complex configuration of a jet engine may require. A sales approach allows the buyer to ask questions about the construct.

High “fit and finish” means there is little for the user to do to operate. Most products should ideally be tailored to fit this picture to tap into the value of “convenience.” The lower the fit and finish, the more a sales approach is warranted to demonstrate operations.

A high “touch” product necessitates a complex, technical campaign for sales that will hopefully result in many sales over the years-long lifetime of a particular model and requires some relationship building between buyer and seller.

It is important to custom tailor your go-to-market strategy to fit that of the product you are rolling out. Assess where your product lies on the spectrum and adapt your sales and marketing approach accordingly.¹²

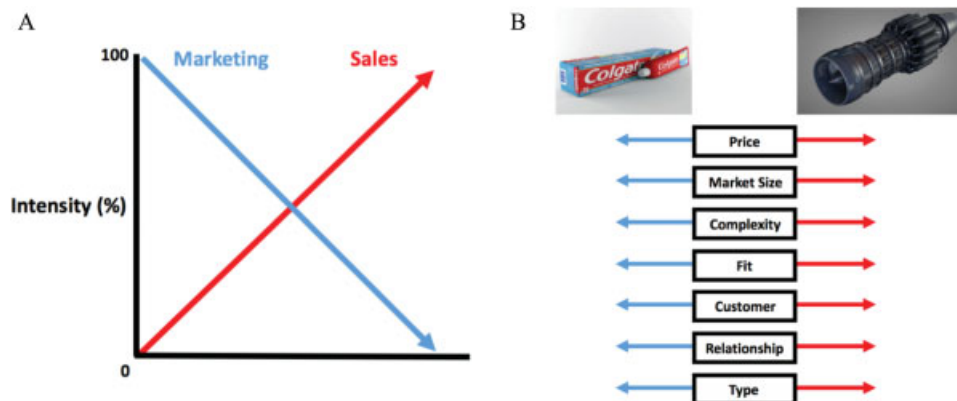


Fig. 3 Marketing versus sales graph factors in several key factors, creating a custom approach in go-to-market strategies (Photos adapted with permission from turbosquid.com).

Enablers

As a physician, it is important to take advantage of the foundations of a medical atmosphere in supporting your ideas through to completion. In an academic institute, bioengineering and technical departments may be easy outlets to consult—they may be aware of similar products in testing phases and can help link up startup ideas/companies. Medical schools and hospitals affiliated to you can potentially be sources to help finance early-stage prototype models. They may even serve as the source of your innovation—an open network to run ideas through. Your pool of scrub technicians can provide feedback for new operative equipment/instrumentation. Keep an open eye and open mind. Identify truth-seeking personalities in the early stages to call your product out on its flaws and shortcomings.⁸

Conclusion

The evolving future of plastic surgery lies in the hand and innovative minds of the surgeons. The advent of new devices for other surgeons and patients brings with it the potential for greater convenience in the operating room, shorter operating times, increased surgical volume, improved patient care possibilities, safer conditions, and countless other benefits. Familiarity of the design process and ability to anticipate the hurdles in each of the steps involved will increase the chances of unrolling a successful product. By following the pearls presented in our approach to product design, we hope to see a growing market of successful devices and product lines for our field.

References

- 1 Shiffman MA, Giuseppe AD. *Cosmetic Surgery: Art and Techniques*. 1st ed. Berlin/Heidelberg, Germany: Springer-Verlag; 2013
- 2 Levine H. Stitch in time: 18 fascinating facts about the history of sutures. October 5 2016. Available from <https://www.jnj.com/our-heritage/history-of-sutures-ethicon>. Accessed July 7, 2018
- 3 Wang Y, Kotsis SV, Chung KC. Applying the concepts of innovation strategies to plastic surgery. *Plast Reconstr Surg* 2013;132(02): 483–490
- 4 Johnson S. *Where Good Ideas Come from: The Natural History of Innovation*. New York, NY: Penguin Group; 2010
- 5 Almquist E, Senior J, Bloch N. The elements of value. *Harvard Business Review* 2016;46–53 available from: <https://hbr.org/2016/09/the-elements-of-value>
- 6 Hulme T. Launch your next idea before it's ready. *Harvard Business Review Video* 2012; available from: <https://hbr.org/video/2226821024001/launch-your-next-idea-before-its-ready>
- 7 Martin RL. The unexpected benefits of rapid prototyping. *Harvard Business Review* 2014; available from: <https://hbr.org/2014/02/intervention-design-building-the-business-partners-confidence>
- 8 Bonabeau E, Bodick N, Armstrong RW. A more rational approach to new-product development. *Harv Bus Rev* 2008;86(03):96–102, 134
- 9 Dholakia UM. A quick guide to value based practicing. *Harvard Business Review* 2016; available from: <https://hbr.org/2016/08/a-quick-guide-to-value-based-pricing>
- 10 Accounting Tools, Accounting CPE courses and books. July 24 2017. Retrieved July 7 2018; available from: <https://www.accountingtools.com/>
- 11 Gaffney T. Pricing lessons from working with 30+ seed and series AB2B startups. *First Round Review*, May 05 2018; available from: <https://ift.tt/2rearEB>
- 12 Leslie M. Leslie's compass: a framework for go-to-market strategy. *First Round Review*, January 25 2017; available from: <http://firstround.com/review/leslies-compass-a-framework-for-go-to-market-strategy/>