

Decision Making and the Fractal Funnel

Charles S. Brunner NPDP, Senior Consultant, Product Genesis, October, 2004

Decisions made throughout the new product development process (business strategy to product implementation and launch) determine the potential for success. In today's hyper-competitive environment, it is not enough for decisions to be made on an *ad hoc* or "it's always been done that way" basis. To achieve a high success rate for products brought to market, decision making at all levels of a company need to be based on proper evaluation of available information.

Decision-making methods/tools for use in the implementation phase of new product development are well documented and applied with a great deal of frequency. During the implementation phase of product development, a great deal of rigor is typically applied in selecting and verifying design decisions. It is misguided to believe that less rigor should be required when making decisions that affect corporate direction, market opportunity selection, technology and product portfolios, and product concept selection.

This report highlights the similarities present throughout the full spectrum of new product development activities with regard to converging to a single approach or decision from a range of options. Additionally it identifies ways in which strategic and business decisions may be improved, through the adaptation and adoption of proven decision-making methods to the "softer" data found in the fuzzy front end.

Introduction

Within product development, sales and marketing and many other disciplines, the action of narrowing down either from a number of concepts or from a number of prospective concepts is frequently depicted in the form of a funnel. From a product implementation standpoint the funnel represents a continuous convergence upon the best (most appropriate) design. If we expand our view to the entire new product development process, starting from the business strategy, down through the development of innovation charters, technology and product portfolios, market strategy, needs development, product implementation, product launch and beyond, one can envision that at each stage, a number of potential solutions must be narrowed down to a single decision or approach. In essence, although from a macro scale the path from initial business strategy to product launch can be viewed as one large funnel, the decision path is composed of a seemingly infinite number of funnels. Additionally, each funnel (narrowing of a group of possible solutions) is frequently interrelated. Each funnel represents the convergence from many options to a single approach. This would imply that tools used in the design implementation can be adapted to be used in business strategy on down through product launch as well as for business decisions required outside the product development process.

Challenges

Top-level management decisions affect an entire company. If the business decisions are not sound, no amount of hard work will produce stellar or even acceptable results. Establishing plans and or products around a technology or market that is not ready or worse, non-existent, can spell disaster. Based on time pressures in an ever increasingly competitive world market, gathering and analyzing information in a systematic manner may at first blush seem to tie up resources that could be applied to the current problem or opportunity. I would suggest however that a systematic approach will identify typically unforeseen interactions and drivers that will assure that resources are applied to the root problem or most likely opportunity.

A number of decisions that need to be made will greatly affect the success of the company.

- Innovation strategy
- Technologies to pursue
- Technology portfolio
- Market opportunities to pursue
- Market opportunity portfolio
- Technology timing
- Affect of technological, social, and economic trends on markets
- Product Portfolios
- Business expansion
- Acquisitions
- Licensing
- Organic technology growth

Making these decisions in an informed manner with the appropriate attribute weightings will improve the chances that successful products are developed and launched. Using a tool that can be quickly updated and can point to the appropriate alternative decisions provides a method of maintaining alignment with changing conditions and provides a means of adaptive decision management. Ideally this tool or tool set would be simple to use and provide a means of integrating “cross funnel” interactions.

Meeting the Challenge:

Various business disciplines have, over the years, developed tools to aid in making decisions that provide the greatest capacity for success. Taking a cross discipline (marketing, business development, engineering, manufacturing) view of available tools results in the realization that they are all very similar. The essence of all these tools is a method of assigning quantitative value and performing mathematical manipulations to provide insight into where the optimal path lies. Once the common theme among tools in each of the disciplines is realized one can begin to see how for example a marketing decision tool can be transformed into an engineering or manufacturing decision tool, or conversely how a product implementation decision tool can be used in the upfront product and technology approach decisions. Meeting the challenge of developing an interrelated meta toolset that can carry forward information and provide traceability in a simple usable format is difficult. Applying or adapting common or familiar decisions/evaluation techniques to areas where tools are not typically applied is much more straightforward.

A significant amount of literature exists that discusses how to transform what at first blush may appear to be a number of qualitative decisions into quantitative decisions. These tools range from relatively simple to rather complex and mathematically challenging. One example that most readers should be familiar with is a Pugh chart. This simple chart provides a means of capturing concepts and evaluating them against a baseline by listing the prospective solution concepts along one axis of the matrix and attributes across the other. Attributes in this case are items of concern that differentiate one concept or group of concepts from another. The Pugh chart is a simple tool that provides a range of benefits.

- By putting concepts/options to paper other options/solutions and combinations of options/solutions present themselves. In many cases the new options/solutions that surface from this effort are better than those initially developed.
- In defining attributes, the decision maker is forced to consider what is important and what differentiates one option from another.
- In applying rankings the decision maker is forced to consider why a given option is better or worse and if the information is available to assign a ranking.
- Results of rankings frequently do not match “gut feel”, prompting the decision maker to reevaluate attributes, rankings, available information, assumptions, or realign the “gut feel”.

Another tool that is commonly used to make decisions on a product/market basis is QFD (quality functional deployment) and HoQ (House of Quality). These tools translate voice of the customer information into a need and finally into product requirements. The parallel between a customer need and a decision need should be readily obvious. What customer problem or need is this product going to address aligns well with what problem will this decision address. Note that as an example of the fractal funnel, the HoQ has multiple levels each of which works down to the next level of detail; needs drive product requirements, product requirements drive system requirements, system requirements drive subsystem requirements, subsystem requirements drive component requirements, etc. Also of note is that the HoQ used for product definition can be used earlier in the development process as part of the technology development tool set. Once again with this tool, as discussed in the Pugh chart, some of the major benefits are derived by quantifying choices, requiring that attributes be considered and weighed, and the required reevaluation of results to either reset “gut feel” or evaluation criteria.

Incorporating “cross funnel” relationships into a simple Pugh chart can be difficult. However, attaining the proper level of interaction between decisions as well as the relative importance/impact of various attributes upon a decision can be critical to achieving the best solution. Finding the right balance for the tools will depend on the corporate needs, the sophistication of the users, tool adoption rate, etc. It should be noted though that even the simple Pugh chart approach will provide significant benefit.

Applications

Product Genesis has integrated proven engineering and marketing decision-making tools into a hybrid toolset that addresses the front end product development activities. These activities include:

- White space innovation
 - Impact of emerging or disruptive technologies on existing markets
 - Determination of technology readiness for existing markets
 - Expanded market opportunities for existing technologies
- Portfolio management
 - Evaluation of technologies to pursue/divest
 - Evaluation of products to pursue/divest
- User needs
- Product requirements
- Enhanced implementation (DFSS modeling of critical parameters, requirements allocation).

Of note in the above listing of activities is the ever-increasing “firmness” of the information that is available for evaluation as the innovation process moves through the “fractal funnel. The term “the fuzzy front end” is frequently used when referring to activities such as white space innovation. Those who have worked in this area can attest to the accuracy of this description. Activities here are sometimes also referred to as “cloud wrestling”. Although it is tempting, due to the lack of solid factual information, to dismiss the potential of structured tools, the value provided by these tools, as described in the prior sections, should not be discounted.

The systematic approach taken by Product Genesis and supported by toolset has helped clients identify technology approaches that meet near and long term market needs while positioning the company to take advantage of emerging technologies when they are ready for commercialization. By applying rigor to the process of reviewing markets, new market segmentations have been developed and previously unmet user needs, and therefore new market opportunities, have been identified.

(Continued)

Conclusion

The product development process from identification of business strategy to engineering implementation and market launch is a continuous narrowing of options to a selected approach. Each narrowing process can be visualized as a funnel and as each funnel is looked at under greater magnification the underlying decision (funnels) can be seen. As with any part of business the proper tool must be applied at the appropriate time, place, and with an appropriate level of detail. The complexity of the tool must also be appropriate, not only to the problem at hand, but with the skill of the user. With this being said, even the adaptation of a simple Pugh chart to a business or market challenge can lead to new insight. By applying rigor and tools throughout the process each of the decision funnels can be traversed in a manner that identifies the drivers and interactions and provides a level of decision tracability that can be revisited as market, technical, or other applicable forces change. By applying the same requirements for detailed criteria based selection and verification of product implementation decisions to the front end of the product development process, a solid foundation for successful innovation is established.

References

1. Otto K. and Wood K., *Product Design Techniques in Reverse Engineering and New Product Development*, Prentice Hall, 2001.
2. Creveling, C.M., Slutsky J.L. and Antis D., *Design for Six Sigma in Technology and Product Development*, Prentice Hall PTR, 2003.
3. Crawford, M.C. and DiBenedetto, A., *New Products Management*, Irwin/McGraw-Hill, 2003
4. Personal Communications with Victor Tang, Ph.D. candidate, Massachusetts Institute of Technology.