

Marc A. Annacchino

THE PURSUIT OF
NEW PRODUCT
DEVELOPMENT

The Business Development Process



THE PURSUIT OF NEW PRODUCT DEVELOPMENT:

The Business Development Process

Marc A. Annacchino, P.E.



ELSEVIER

AMSTERDAM • BOSTON • HEIDELBERG • LONDON
NEW YORK • OXFORD • PARIS • SAN DIEGO
SAN FRANCISCO • SINGAPORE • SYDNEY • TOKYO

Butterworth-Heinemann is an imprint of Elsevier



Butterworth–Heinemann is an imprint of Elsevier
30 Corporate Drive, Suite 400, Burlington, MA 01803, USA
Linacre House, Jordan Hill, Oxford OX2 8DP, UK

Copyright © 2007, Elsevier Inc. All rights reserved.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the publisher.

Permissions may be sought directly from Elsevier's Science & Technology Rights Department in Oxford, UK: phone: (+44) 1865 843830, fax: (+44) 1865 853333, E-mail: permissions@elsevier.com. You may also complete your request on-line via the Elsevier homepage (<http://elsevier.com>), by selecting "Support & Contact" then "Copyright and Permission" and then "Obtaining Permissions."

- ∞ Recognizing the importance of preserving what has been written, Elsevier prints its books on acid-free paper whenever possible.

Library of Congress Cataloging-in-Publication Data

Application submitted

British Library Cataloguing-in-Publication Data

A catalogue record for this book is available from the British Library.

ISBN 13: 978-0-7506-7993-0

ISBN 10: 0-7506-7993-X

For information on all Butterworth–Heinemann publications
visit our Web site at www.books.elsevier.com

Printed in the United States of America

06 07 08 09 10 11 10 9 8 7 6 5 4 3 2 1

Working together to grow
libraries in developing countries

www.elsevier.com | www.bookaid.org | www.sabre.org

ELSEVIER

BOOK AID
International

Sabre Foundation

THE PURSUIT OF NEW PRODUCT DEVELOPMENT:

The Business
Development Process

*To Terrie, with whom I share the future,
To Angel Ashley and Alecia who are our future
To my Mother and Father who taught me how to embrace the future.*

And

*Also to the men, women, and families of the
United States Armed Forces
who work every day to
secure our future.*

PREFACE

WORLD COMPETITIVENESS AND LIFELONG LEARNING

The Objective of this Book

The objective of this book is to provide the reader with a thorough understanding of the business development process and how to execute a product development program to grow the business.

This book serves to outline the complexities in the planning, execution, timing, and problem solving skills required to manage a program. We are in a fast changing world where change brings adversity as well as opportunity. We all must practice continued learning to be world competitive, which allows us to participate in these new opportunities.

The Evolution of Employee

The learning process, as we all know, takes place every day during our life. More formalized learning occurring during school gives way to updates, seminars, and possibly more formal training. The first positions out of school allow us to gain experience. As we work longer we begin to amass more experience.

Initially, when we enter the workforce, we are on a quest for experience. This cements our learning. As we work longer, the many experiences both positive and negative shape our opinions and judgment. At some point in our career we reach a point where opinions are solidified.

There is a fine line between extensive experience and preconceived notions. If we are not careful, we cross the line into jaded thinking. A balance must be established.

The marketplace reestablishes the reference each day, forcing us to cope with the realities of energy level, absorption of information, and desire. Each day we can choose to reinforce and harden our own paradigms, or open our minds to new learning. The new learning allows us to remain on top of our game and be a formidable gladiator in the arena of business.

The Evolution of Firm, Corporation, Company, and Industry

The firm goes through a parallel process as it matures: Initially the young entrepreneurial organization meets the market head on with energy and intellect and drive. The corporation, as a unit, is intimate with the marketplace and is an active member of the business. Initial success allows the corporation to grow and expand.

With continued growth comes organizations, structure and corporate momentum. Left unmanaged, bureaucracy begins to set in. Lack of customer intimacy may begin to affect orders and ability to secure orders. Not affected by any one item, the lack of progress on the following perspectives contributes to a loss in world competitiveness.

- The march along the pathway to intellectual competitiveness
- Absorption of external information
- Ability to synthesize solutions
- Ability to analyze situations objectively and form perspectives outside the organization
- New talent mentoring
- Arenas and industry segment activity
- Functional displacement of products and processes
- Leadership's role
- Diffusion index of new information
- Assimilation index

To prevent, or even reverse the natural evolutionary process, the corporation, by virtue of its employees, must take personal responsibility for remaining world competitive by life-long learning. This book's intent is to provide a basis for that learning.

Marc A. Annacchino

CONTENTS

Dedication, ix

Preface, xi

1 THE BUSINESS OBJECTIVE, 1

Background	1
Perspectives Internal to the Organization	15
Continuity	29
Leverage	30
Flow	33
Pursuit	33
Perspectives External to the Organization	34
Summary	45

2 THE MARKET OPPORTUNITY, 47

The Marketplace Within Our World	47
Marketplace Dynamics	51
Product Concept Synthesis	56
Product Integration into the Business	60
The Competitive Arena	72
The Pathways to the Product	76
Summary	98

3 THE BUSINESS CONCEPT TO THE NEW PRODUCT, 101

The Pathway to the Customer Needs	101
Engaging the Market and the Customer	110
Definition of the Product	116
Product Planning	120
Development Management	132
Interdisciplinary Considerations	136
Pathway Through the Organization	141
Product Definition Documentation	147
Summary	153

4 THE PRODUCT AND BUSINESS PLAN, 155

Business Plan—Blueprint to Success	155
Product–Plan Integration	161
Selling and Funding the Program	170
Corporate Operations Using the Plan	175
Dynamics of the Plan	178
Customer and Market Input to the Plan	183
Plan Corrective Action	185
Summary	189

5 JUSTIFYING A PROGRAM—THE ACCOUNTING VIEWPOINT, 191

Background	191
Development and Accounting: Two Different Disciplines	205
Financial and Business Modeling	207
Risk, Reward, Timing	210
Cash, Timing, Business Cycles	214
External Economic Forces	224
Program Continuity	226
Structure of Finances	229
Appropriation	230
Continuous Appropriations	231
Summary	231

6 STARTING OUT, 233

Logistics and Provisions	233
Organizational Dynamics	237
Project/Team Format	245
Management Reporting	250
Intellectual Property Protocol	263
Communications Protocol	266
Culture of the Group	268
Time Base	270
Corrective Improvement	272
Summary	273

7 EXECUTING THE PLAN, 275

Core Competencies	286
Core Technology Development	287
Outsourcing Development	287
Core Product Development	288
Critical Program Skills	306
Legal Issues	321
Summary	331

8 MANUFACTURING DEVELOPMENT, 333

Manufacturing Program Management	333
Design for Manufacturing	337
Process Competencies	350
Process Development	356
Outsourcing	357
Training of Manufacturing Personnel	358
Inventory Control	360
Manufacturing Records	361
Purchasing and Procurement	370
Manufacturing Throughput	383
Quality Management	391
Cost Containment	395
Summary	397

9 THE PRELAUNCH CHECKLIST, 399

Extensions to Engineering and Manufacturing	399
Product Certifications	402
Pilot Run Operations	403
Field Testing and Customer Acceptance	405
Product Information	409
Company Infrastructure	412
Channel Infrastructure	431
Assessment—Price Versus Value	432
Product Run Preparation	434
Feedback Systems	436
Summary	437

10 THE PRODUCT LAUNCH, 439

Product Promotion	442
Customer Visits	443
Initial Sales Evaluation	444
Production Volume Forecasting	450
Inventory Control	452
Sales Channel Initiatives	454
Summary	455

11 THE PURSUIT AND PRODUCT MANAGEMENT, 457

Product Portfolio	457
Growth Strategy	461
Product Maintenance	467
Quality Management (Production)	475
Product Recalls	479
Product Evolution	483
Product Life Cycle Management	486
Summary	491

12 BUSINESS DEVELOPMENT RECORDS FORMAT, 493

Organizational Format	493
Perspectives on Business Development	505

Index, 507

THE BUSINESS OBJECTIVE

BACKGROUND

1. New Product Development and the Economy

New product development is an integral part of a healthy, growing economy. This chapter will start out with a review of the various means for economic development, including manufacturing and how product development plays a role. The various types of product development and how they draw on and pay out to the economy are also included. In addition, we will look at our world and what it would be like without some famous new product developments. Finally, there is a review of what happens to a company without new product development, from a purely financial perspective.

A. Economic development

New product development contributes to the economy by generating revenue and profits to a corporation that otherwise would not have been generated. The revenue then is paid out to vendors (other manufacturers). The vendors themselves pay out to their sub-vendors and personnel, or retain the earnings. Salaries are paid to personnel and they, in turn, spend funds to purchase goods and services from other profit-making enterprises. The retained earnings fund the long-term growth of the enterprise and increase the value of the business. The profits are taxed and that goes into the pool of funds to govern the community and provide for the common good.

This is the role that private investment plays in the economic development arena. The public sector contributes to the economic development by providing incentives to encourage manufacturers to establish their businesses in their locale. They provide the means for funding business expansion and growth. A collateral activity is to network with other manufacturers on your behalf for future business. Figure 1-1 illustrates the typical funds flow in a manufacturing enterprise. As will be seen later, the service sector of the economy has a funds flow that is different from that in manufacturing.

Service businesses are not characterized by the leverage associated with manufacturers. Instead, they are characterized by a smaller investment in capital equipment, a smaller investment in each revenue cycle, and a generally faster revenue cycle; as such, they generate incremental profits from incremental investment with low fixed costs. This is shown in Figure 1-2.

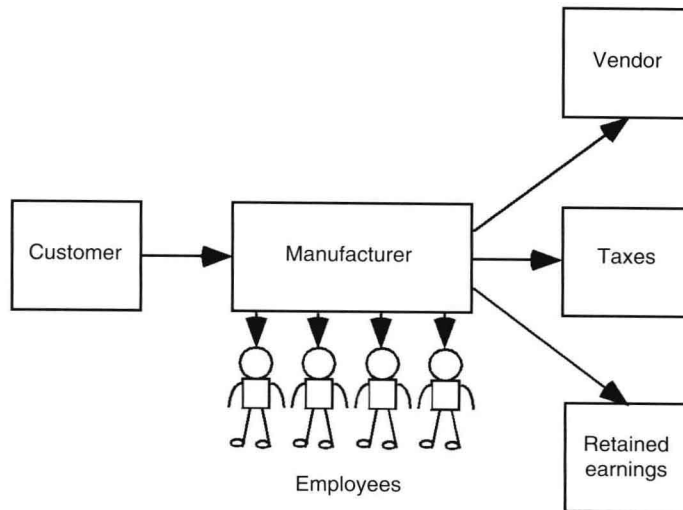


Figure 1-1. Manufacturer's funds flow model.

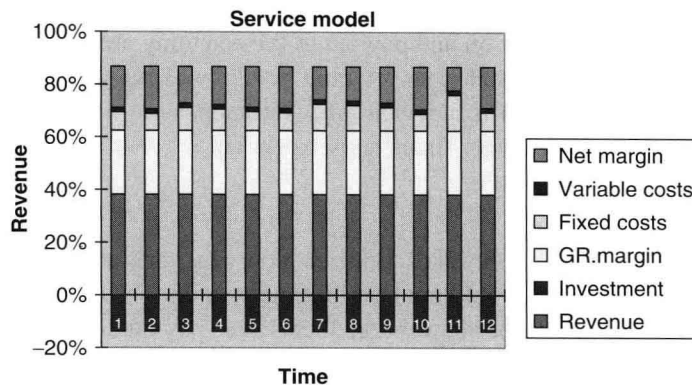


Figure 1-2. Service business funds flow model.

As shown, the service model has relatively constant net profit. This is because there is no major initial investment to absorb and there is a small incremental investment with each order. The other costs are somewhat variable and track with the incoming order rate. Incremental profits can track with incremental revenues. Service businesses generally have a lower barrier to entry than do their manufacturing counterparts.

Manufacturing businesses differ markedly from service businesses in that leverage can occur. This leverage is characterized by larger returns for their investment. A larger investment is required at the outset, but revenue is generated through a stream of returns from year to year through the products' life cycles. This assumes there is sufficient volume to offset the fixed expenses and the absorption of the initial investment. There is significant investment in capital equipment and processes, along with significant payoff if you have hit on the right opportunity with the right product.

The manufacturing financial model (Figure 1-3) shows that net margin increases at a disproportionate rate as revenue increases. This is because the fixed costs are already absorbed

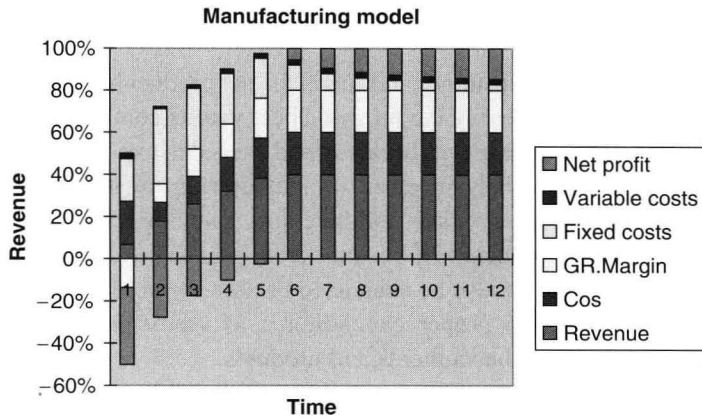


Figure 1-3. Manufacturing financial model.

by some base level of business and the incremental revenue does not require incremental investment with each order. Fixed costs decrease as a percent with increasing revenue.

However, there is a large initial investment to design the product, which can run the length of the diagram in time. Figure 1-4 illustrates how a manufacturing enterprise's funds flow as a result of new product development.

An idea is conceived and qualified in terms of opportunity and overall business sense. There are costs associated with these activities, such as market planning costs, surveys, customer visits, and demographics data analysis. There are also costs in taking the opportunity and the market data fed back and coalescing them into a product opportunity. The scope of the target market is accounted for in this stage, and the product platform must be laid out to reach the market at a cost-effective price. These costs are generally low compared to the other costs in the product development arena.

The next phase is the investment and development phase of the program. This phase takes the product concept and creates the intellectual property required to take a concept and reduce it to bills of material, manufacturing processes, and define a manufacturable product that the market will purchase. There are technical, labor, development, tooling, and other capital equipment costs in this phase.

The next phase in the model assumes that all the development is complete and manufacturing takes place. Here, there are set-up costs, material, labor, and overhead costs required to produce the units. The product moves out of manufacturing and into the sales channel for

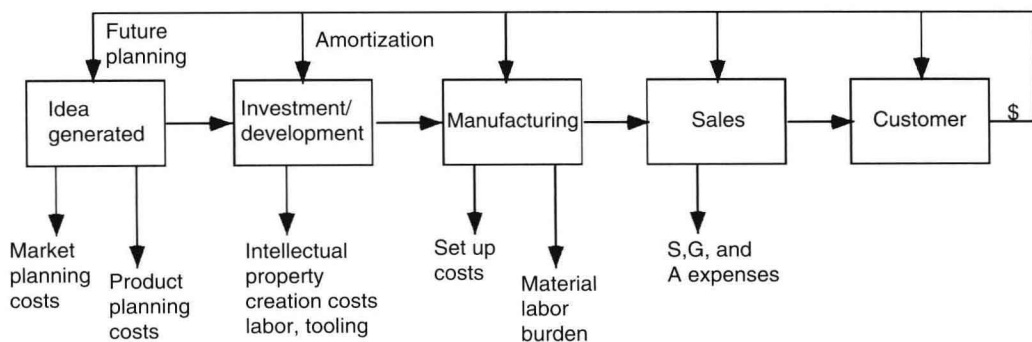


Figure 1-4. Manufacturing funds flow as a result of new product development.

placement at the customer. In this stage there are a host of sales, general, and administrative (SG&A) costs incurred.

Finally, the product is at the customer and funds for the product have changed hands. The manufacturer now can begin to enjoy the profits. These profits come after the funds are distributed appropriately. Dollars must go back to fund the sales expenses, general expenses, and any other expenses previously incurred. Manufacturing must be reimbursed for the materials labor, manufacturing expenses, and inventory carrying costs.

The development of the product must be amortized so as to be able to fund future developments. In addition, funds must also be channeled back to the product planning and market planning function to allow the proper expenditures to verify product viability, market program viability, and future enhancements and products.

B. Types of new product development and their contribution

There is a variety of different types of new product developments in existence today. Each is used for a different reason, and each has its own objectives and dynamics for execution. The following is a common list of the different types and their attributes and contributions.

1. "New to the world" products

These are somewhat revolutionary in the marketplace in that the marketplace never had exposure to the product directly—perhaps only as a concept or prediction from a futurist. They generally create entire new markets that never before existed. An example would be the cellular telephone. Predicted only vaguely by the Dick Tracy cartoon strip and personified as a "communicator" in *Star Trek*, the cellular telephone has revolutionized person-to-person communications in modern-day society. One such product looming on the 10-year horizon today is mass-market fuel cells.

These product development programs generate entire new markets that were not previously there. They enable true growth in the economy by generating revenue to the enterprise. They also have a multiplication effect in the economy by generating requirements for parts and subassemblies that need to be developed and supplied by the vendors. In many cases, they generate new channels of sales and new routes to market.

2. New product lines

These new categories of products allow entry into newer markets not previously participated in by the manufacturer. By adding the categories, manufacturers must be careful to protect the positioning of their existing products, which generate the existing business. Failure to do so will place them in danger of converting loyal customers away from one already successful product to a new one, with no net gain in market share. Perhaps a good example of this type of product would be the Hyundai Azera, a higher-end automobile offering from Hyundai. Here a large manufacturer with many product lines generated an entire new category of car to serve a more discerning customer base. Careful not to jeopardize their existing base, this new car company initially launched its product in the same value-focused dealerships selling the existing products. This is different from the Acura offering distancing itself from Honda.

The new product lines generate incremental revenue to the manufacturer by leveraging the market's familiarity with the manufacturer into new categories of products. In many

cases, the market's familiarity with the manufacturer paves the way for new categories of products. Sometimes these products go into new markets, but can also be an alternative to existing ones.

3. Additions to existing product lines

These efforts support existing product lines by creating line completers to extend the influence of the original products' brand to larger audiences or extending range, power, and scope. All are done in the attempt to secure more of a market. An example of this type of product would be the M&M Candy Company extending their product line to M&M peanut and M&M almond and seasonal M&Ms for Christmas and Easter. Another example would be tomato sauce versions—hearty, traditional, roasted garlic, Alfredo, and vodka tomato. By taking the basic product and modifying it, a wider market share is realized.

The addition to existing lines has a similar effect on the company's revenue as the new product lines. They generate incremental revenue by leveraging the existing product familiarity rather than the company familiarity. These programs generate incremental improvement in the economy, but generally fall short of the contribution made by the totally new products.

4. Improvements and revisions of existing products

As time marches on, customers have higher expectations of your product and the competition adds features to their offering. It becomes necessary to improve your company's offering to increase market share or to retain it. By redesigning the product or repackaging it, your company can offer a greater value or satisfaction to the customer. It is possible to temporarily affect this by enhancing perceived value; however, an ever-more-informed customer base will respond to actual value increased in the long run. An example of this type of product development is the automotive companies adding features to their base models each year as standard.

Generally, the improvements to existing products do not generate additional revenue to speak of. They are simply a means to retain the market share or to slightly improve it. They are defensive in nature and in many cases are stopgap measures until a new product program can be introduced. These programs do little to generate a vitalized economy in the long run, but can provide time and revenue to pursue the development of a replacement.

5. Repositioning

Another means of increasing or maintaining market share is through repositioning. A repositioning is an exercise in changing the perception in the mind of the consumer. It generally can happen with products that are lower in value (dollar amount), or the consumer spends little time evaluating the actual data. For high-dollar decisions, the consumer will generally take the time to evaluate the facts and make his or her own decision. Repositioning is truly a marketing activity rather than a development activity. An example of this is a change of advertising by focusing the audience on a possible linkage drawn between certain brands of cereal and a high-fiber, lower-cancer-risk diet.

Repositioning is another stopgap measure for generating revenue from an existing product. It does not generate overall growth in the economy per se; rather, it is similar to an improvement or a revision except that it doesn't even necessarily require a product change. It simply repositions the product in the mind of the consumer.

6. Cost reductions

These programs are strictly a means for reducing the cost of products to offer similar value. They generally are the result of a competitive initiative, either generated internally or from external forces. In many cases, it is simply a means to generate more volume, which will generate less incremental profit (but perhaps more overall profit). Whatever the motive, a cost reduction is generally meant to increase unit volume through the channel. This becomes easier with capital equipment costs and development costs absorbed, and the manufacturer wants to capitalize on the sales channel.

Cost reductions are helpful to the organization by generating additional margin from the existing product. This margin can absorb development costs and manufacturing set-up costs. In many cases, they enable a period of time to continue with the product, generate the revenue, and allow the organization to position itself with a new product. They do not, however, generate any real growth in the economy.

Figure 1-5 summarizes the different types of product developments in terms of (a) time required to develop (b) the revenue to the economy; (c) the revenue to the company; (d) the company's positioning; and (d) the margin impact.

C. Narrative and financial review of a nondeveloper contribution

Figure 1-6 illustrates the dynamics of the income statement of a company that has little new product development. As shown in the financial analysis, a company can grind to a slow halt by not participating in the dynamics of the ever-changing marketplace.

Along the top are the years under study. Along the left side are the income statement categories. The following summary discusses the perspectives and how they affect the overall operation.

1. Cost of sales

The cost of sales has a natural tendency to increase over time. This is a result of the increases in direct labor costs in manufacturing the unit as well as the effect of vendor increases in pricing. For most manufacturers, the product maintenance function of development has to initiate cost reduction wherever possible, just to stay even. Therefore, to progress down the learning curve, significant initiatives must be made to effect cost reductions because these changes must offset the increases already built-in.

Type of development	Time to introduce	Potential revenue contribution to economy	Revenue contribution to company	Company positioning strategy	Potential margin impact
New to the world	Longest	Highest potential	Highest potential	Market development	Highest
New product lines	Long	High potential	High potential	Market development	High
Add to existing	Medium	Medium potential	Medium potential	Line complete	Medium
Improve or revise	Short	Little potential	Medium potential	Market share	Medium
Repositioning	Shortest	Little potential	Medium potential	Market share	Medium
Cost reductions	Shorter	Little potential	Medium potential	Raise margin	Medium

Figure 1-5. Types of product development programs.