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Winning the New Products Rat Race

Getting new designs on the market faster means a competitive advantage and higher profits, and it can be done with no loss of performance or quality.

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Many companies are finding it more and more difficult to develop successful new products—those that satisfy a market need, provide superior performance and, of course, that sell. A major part of the problem is the need for timeliness in today's market, where foreign competition is relentless, and small upstart firms nip at the heels of established companies.

The strongest competitors typically are most responsive and enter the market first. Slowly developed products are likely to be overpriced or obsolete by the time they reach the market, and straggling companies must play catchup and work harder to take market share from established leaders.

Thus, from a design perspective, speed contributes to a company's vitality. However, simply quickening the product development pace is no cure-all. Resorting to expediency can result in manufacturing problems and headaches in the field.

The choice, though, need not be between speed and resulting chaos on one hand, or elegant designs coupled with poor profits on the other. By streamlining the new product development process, companies can benefit from increased speed as well as improved quality.

Organizational goals

Countless impediments can slow the product development process. In fact, it is quite natural for the process to proceed slowly. Engi-

INVEST EARLY

One of the best ways to speed product development is making bigger investments—in both people and money—at the front end of a project. Expenses in the beginning are typically very low, so doubling them has a negligible effect on total costs. Benefits include better product definition, a concept better suited to market conditions and available manufacturing capability, fewer dead ends, and better contingency planning. Most importantly, top management should participate heavily in the early deliberations. They have a much greater opportunity to influence success at this point than by making big-dollar decisions farther downstream.

TRADE MONEY FOR TIME

Timeliness acquires significance when it is equated to monetary value. The value of development time depends on the type of product, the marketplace, and sales volume. To give some indication of the magnitudes involved, $100,000 per month in pretax profit is likely for a major product in a business with sales of $100 million per year. This means that if a product is one month late to market, $100,000 in profit is lost over its lifetime. Conversely, cutting one month from the development cycle increases profits by $100,000.

The value of time, once determined, has several applications. It sensitizes everyone in the organization to the effect that their actions have on profitability. The company suffers quantifiably when a requisition sits on an executive's desk or the model shop runs out of fasteners.

Because lost time cannot be recaptured, delay represents a permanently lost profit opportunity. For example, months of time can slip away in the front-end planning stage of a project, whereas time is carefully monitored during the final weeks before product introduction. The time-is-profit concept suggests that lost time is equally costly whenever it occurs, and this adds a sense of urgency to the planning stage.

Managers can use the time-is-profit concept quantitatively to make trade-off decisions. There are many opportunities to save time by spending money, such as using parallel development efforts, having extra laboratory equipment on hand, or ordering tooling before the design is firm. By knowing the value of time, these decisions are easier to make and justify. Consequently, the work and approval process accelerate. Similar financial analysis can compare development speed, product cost, product performance, and R&D expense to make a variety of trade-off decisions.

neers generally produce refined designs rather than quick ones. Marketing may want complete market data before making commitments. In addition, manufacturing startup is easier if all design documentation is available. And management prefers to avoid risk, which often translates into time-consuming meetings, paperwork, and signoffs.

It is possible to substantially shorten development cycles—in some cases by up to 50%. However, speeding it up requires changes in the way people think and act, and it requires persistent effort.

An organization's environment, goals, and resources must also be considered. For example, does the company want to make a fundamental, permanent change in the way it does business or simply improve short-term profitability? Is the goal to be an innovation leader, or is quick response to competitors' offerings more important? Each situation is different, so a solution should be tailored to fit the circumstances. However, some basics apply regardless of the overall goals.

Look beyond engineering

Because design engineering plays a central role in new product development, engineers are often singled out to speed up the development process. But delays in getting project approval or difficulties in turning engineering drawings into shippable product also hampers rapid product development.

In fact, engineering may only control a small part of the process. Marketing, manufacturing, and finance are also major players, and rapid development requires speed in all of these areas, as well as smooth interplay between the groups.

It is particularly difficult to give the front end of a project the emphasis it deserves because issues are so vague in the beginning. This is the stage that begins when a product need is first indicated and ends when the product definition is firm and actual design work begins. It is often called the "fuzzy front end" because the product concept is imprecise at this stage.

Much of the development time expended between appearance of product need and formation of a design team is often wasted, because the conceptualization process is itself not well defined. In fact, a large part of the development cycle—often approaching 50% is consumed before design work begins. This is overcome by adding structure to the process in the following ways:

- Developing tools or guidelines for assessing new product ideas.
- Writing a 60-day "war plan" for moving from a market need to a design team, and spell out the activities on each day.
- Finding ways to overcome the corporate annual planning cycle, which can add a year to project start-up.
- Starting conceptual design with limited market research on just the product characteristics. Other market information, such as expected sales volume, can be obtained as the design team works.

Because development time means development expense, design teams are usually not assigned to projects until there is a concrete product to develop. However, over the life of a product, development expense is often significantly less than lost profits that result from delays. Getting to market sooner

improves profitability, so it is usually worthwhile to assign engineers to a fuzzy concept and finish it sooner.

Manufacturing involvement

Manufacturing personnel often get involved in a development project late, causing several time-wasting problems. In the worst case, the design requires major revision be-cause it is discovered after the fact that the product is impossible to make.

More commonly, there are many small changes that manufacturing would prefer in a design. If these changes are made early in the design process, they are easy, informal, and fast. Changes made after the design is complete are far more cumbersome to implement.

Another engineering/manufacturing issue is planning for long lead-time parts. Without any planning, all parts for a product or subassembly are released at once, causing two problems. One is that the glut of paperwork overloads manufacturing engineering and slows processing. The other is that some parts take much longer to make than others, and they determine scheduling.

With astute planning, which can require compromises and risk-taking, long lead-time parts can be started early. This reduces the paperwork glut and cuts time requirements.

Streamlining

A number of other factors affect the timeliness of product introduction.

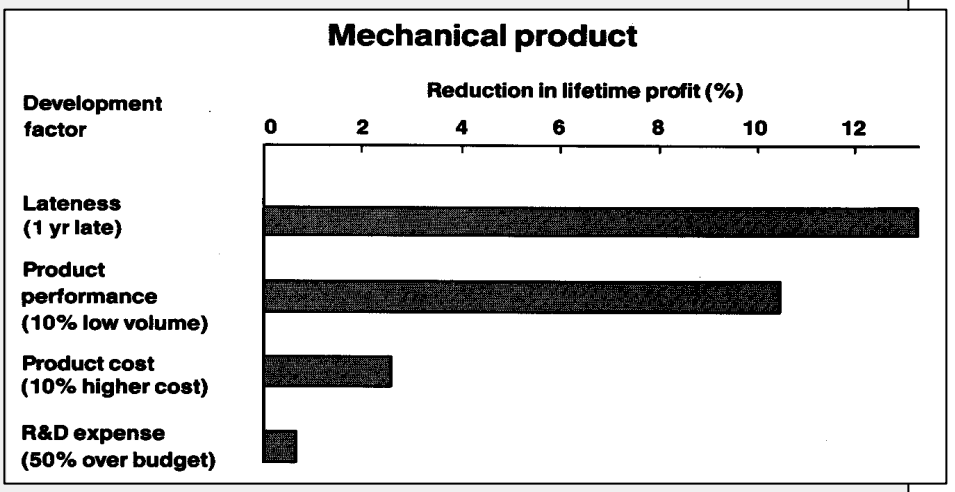
Fewer projects: There are often more good new-product ideas than resources to work on them, so it is quite easy to overload the development process. This often occurs in organizations where marketing dominates product planning and may order products much faster than the organization can produce them. As more new projects are initiated, efforts become more fragmented and development cycles stretch. Delays reduce future profits, and asking an overloaded group to take on one more project often affects other work sufficiently to reduce overall profitability. The solution is better dialogue and more

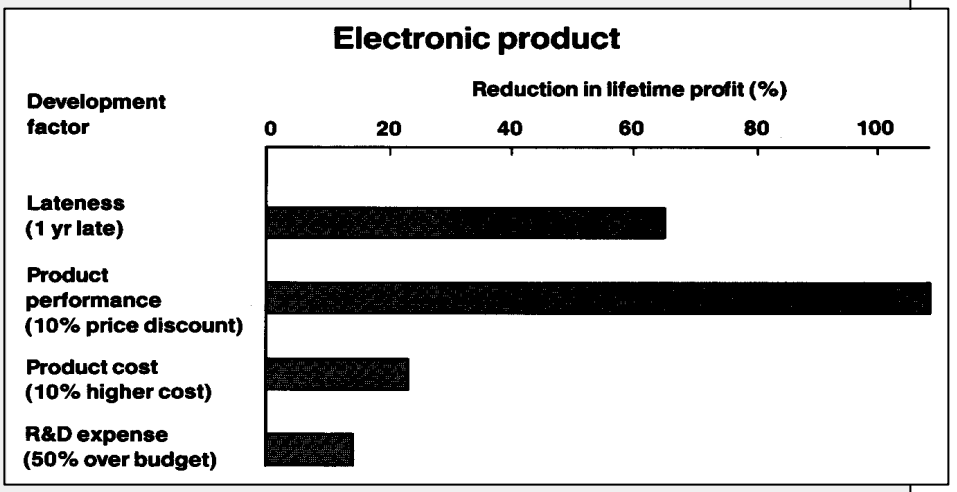
DEVELOPMENT PRIORITIES

Product design is a trade-off between product performance, product cost, development expense, and speed of development. Modeling cash flow for a product, including all of the expenses attributable to the product and all sales revenue it produces over its lifetime, establishes the factors that warrant the greatest emphasis. Modifying the basic cash-flow model simulates the effects of factors such as a change in product cost or late introduction.

Shown are two product models, one in a fast-moving electronics market and the other a more traditional mechanical device. (Scales differ due to different modeling assumptions for the two products and their basic profit levels.) For both products, the most important development factors are timeliness in getting to market and product performance. Product cost is less crucial, and R&D expenses, even at a 50% overrun level, is least significant. This suggests that priority should be placed on timeliness and product performance, even to the detriment of the other factors.

Due to differences in these two products, performance affects profit in different ways. For the electronic product, performance is related to price; for the mechanical device, it is related to versatility, which is reflected in sales volume. These results illustrate the behavior of certain products only, and do not apply generally. For example, product cost is more important in high-volume products than for those shown here. The technique, however, is broadly applicable to such variations.





restraint in proposing projects. Place bigger bets on fewer projects, get them completed quickly, and then start a few more.

Established priorities: Friction occurs when people have differing views on project priorities. While all projects cannot have top priority, it is equally true that no project will have top priority unless that fact is established. Management should set priorities and communicate them throughout the company. This very process helps an organization meet its goals.

Realistic specifications: Specifications define the expected product, and poor product definition can cause a long development cycle. If specifications are overly ambitious—trying to make advances in too many areas at once—the schedule stretches considerably. Poor dialogue between marketing and engineering leads to changing specifications, causing lost time and squandered design resources.

Strive for short specifications, but marketing and engineering should negotiate until they hammer out a working consensus. All too often, marketing drafts the specification, engineering laughs at it, and the resulting product fails to meet sales expectations.

Limited innovation: Innovation is highly regarded and encouraged, but it carries a high price, takes time, and adds risk. Plan carefully where innovation is needed, and use it only where it adds value that the customer will perceive.

Reduced team size: Use the smallest development team that can do the job. Strive for full-time members who can devote undivided attention to the project. A small, coherent work group encourages commitment, speeds decision making, and facilitates communication.

Condensed communication links: Fast product development, on a day-to-day basis, depends on rapid, close, and informal communication among marketing, engineering, and manufacturing participants. Find ways to make this happen. Some firms use project management or matrix organization to tie activities together.

For the most urgent projects, consider forming small, multifunctional teams and relocating them in a team compound. The objective is to include all essential players while minimizing the number of communication links and keeping the links short.

Development speed is interrelated with other development goals, such as product quality and product performance. If an organization is having difficulty developing products with performance advantages, then this issue takes precedence over speed. It does little good to rush an unsaleable product to market.

On the other hand, it pays to upgrade both capabilities at the same time because they have many issues in common, such as good product specifications and close communication. Speed and quality can be increased simultaneously when fundamental improvements are made in the development process. ■

TIMESAVING OPPORTUNITIES

Product timelines, which reveal valuable information on project time requirements, are typically defined by four events.

- The need for the product is indicated publicly. For example, a competitor introduces a product; changing social customs indicate a need; or government regulations, such as the Clean Air Act, create a need. The organization may not act on the need at this time, but evidence of it is available.
- A fully staffed engineering design team starts on the project.
- The last engineering drawings are released to manufacturing.
- Full-scale production is under way and products are shipped to customers.

The proportions on the timeline shown are typical, yet surprising: About half of the total development cycle is consumed before the design team begins work. This period presents ample opportunity for saving time, but it is difficult to exploit this opportunity. At this juncture, product needs seem uncertain and there are other projects, more concrete and closer to fruition, that have priority.

The interval from engineering release to production start-up is also a relatively long one, but can be shortened by releasing long lead-time parts early. It also helps to involve manufacturing personnel early in the design phase, so they become familiar with the design and make appropriate arrangements, such as with vendors, before they receive formal prints.

The timeline also offers insight into the value of modern engineering tools, such as computer-aided design, analysis, and testing. Because the design interval can be relatively short, reducing it has a limited impact on the complete development cycle. The timesaving potential of these aids is greatest if they smooth transition from design to manufacturing.