

strategy&

***Holistic
value design***

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**A new strategy
for product
development**



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Executive summary



The design-to-value (DTV) model for product development has become popular in recent years, more for its promise than its results. DTV theoretically provides a framework for manufacturers to cut costs in certain procurement and design areas that least affect the value of the product while adding features that customers want. In reality, though, at most companies the structure of the organization — particularly its product development flow chart — and the corporate culture are not equipped to fully embrace the benefits that DTV potentially provides.

At most manufacturers, product development is in the hands of isolated silos, separate functions with disparate priorities that are unable to communicate well with each other. As a result, companies fail to realize the full potential of their products in terms of cost, features, life cycle, market share, profits, and customer loyalty — and they forfeit critical short- and long-term earnings in the process.

To avoid the shortcomings of design-to-value implementations, a different approach is needed — a method that Strategy& calls holistic value design. This framework for product development success emphasizes the management of product cost and value across the organization during the development process. Holistic value design is a multidimensional, multifunctional approach to product development that offers pivotal pathways for procurement, design, engineering, and manufacturing to collaborate in driving the most effective outcomes in product development activities.

To do this, holistic value design takes into account a product's performance, features, and recurring and nonrecurring costs as well as other essential attributes such as weight, life cycle, carbon footprint, and brand value, which helps organizations use product development tools and make product development decisions. The holistic value design framework typically leads to higher customer value for the same production costs or sales price, or lower costs and higher profitability for the same customer benefits.

Introducing holistic value design

The theoretical advantages of the design-to-value (DTV) model for product development are apparent to many manufacturers. Principally, the model provides a scaffold for manufacturers to cut costs in procurement and design areas that least affect the value of the product while continuing to add features that customers want.

In reality, though, at most companies, organizational structures and corporate cultures that inform product development processes are not equipped to fully embrace the benefits that DTV ostensibly offers. The primary problem is that, in many cases, product development is in the hands of isolated silos, separate functions with disparate priorities that are unable or unwilling to communicate well with each other.

It is crucial for companies to mitigate these obstacles and their significant impact on effective product design and development. Consequently, Strategy&, PwC's strategy consulting business, has created an alternative approach that optimizes product development and cost management in a cross-functional model encompassing the product's life span; we call this approach holistic value design. This tactical framework aims to change the culture of a company. Currently, the primary focus is on ad hoc cost reduction in various separate silos. This needs to be replaced by an emphasis on the management of product cost and value across the organization through the lens of various factors that can determine whether a product succeeds or fails.

Holistic value design is a multidimensional, multifunctional approach to product development that examines performance, features, and recurring and nonrecurring costs as well as other essential attributes such as weight, life cycle, carbon footprint, and brand value. And this framework provides a comprehensive set of tools to achieve holistic value design's goals.

Holistic value design tackles a number of critical elements of product development that can alter the trajectory of product introductions completely; simply put, it links DTV methods and tools into a product development process that is a core organizational function and a

collaborative effort. At the same time, it creates a governance structure for multidimensional product development optimization, ensuring that DTV succeeds more often. Holistic value design's pivotal functions include the following:

- Breaking down targets in design, procurement, and engineering for a project or product and continuously comparing the actual status against the target based on brand message and market positioning
- Reviewing customer requirements and technical solutions to find the right features for the right costs or to identify trade-offs between different aspects to achieve specific product characteristics
- Evaluating technical solutions to identify product optimization possibilities
- Creating cost and weight calculations at various levels of detail to validate supplier quotes or design solutions
- Analyzing make-or-buy or resourcing options for parts or assemblies
- Driving the identification, evaluation, and implementation of product value management (PVM) concepts across the organization

Taken as a whole, the holistic value design framework typically leads to higher customer value for the same costs or sales price, or lower costs and higher profitability for the same customer benefits and better products.

Shortcomings of classical product development

Because many companies are uncertain about why traditional product optimization implementations are disappointing, it is worth examining the organizational weaknesses that upend these activities. We can then demonstrate why holistic value design is a better solution.

Silos are the biggest obstacles to success. At most manufacturers, product development teams are separated from other departments in the product gestation cycle, and there may be several manifested silos even within the engineering department itself that isolate groups developing different segments of the final product. Because of this and despite the carefully cultivated analyses about how the marketplace is evolving and what the opportunities are for certain products — in other words, the vast empirical data pool in a DTV assessment — manufacturers are stymied by a lack of collaboration and fail to realize the full potential of their products in terms of cost, features, life cycle, market share, profits, and customer loyalty.

In the automotive industry, for example, designers may sketch out a vehicle that meets certain visual or creative criteria without any real knowledge of the costs of their decisions — for instance, they may choose to include exaggeratedly curved headlights to give the car an aggressive and sporty look. Next, the marketing department offers input, saying that adaptive LED lighting has to be available as a headlight option, further increasing the potential cost. Now, it is engineering's turn to work on the vehicle. Engineers are given cost targets, but these often are not perceived as a priority. Instead, engineers almost always try to fulfill the needs of design and marketing while creating machines, equipment, and processes that are inventive, true to the brand's DNA, and better than those of competitors — and that will grab the attention of customers. Frequently this exercise increases production costs and leads to another round of analysis by design and marketing units and perhaps even a product value management team to figure out

which goals — cost, customer preferences, speed-to-market, and so on — must be met and which can be sacrificed.

The whole process is akin to putting out fires: dealing with unexpected issues, and being reactive instead of proactive. Meanwhile, the product isn't optimized — indeed, it may need to return to the drawing board again when flaws are found during the assembly process. As much as 80 percent of the cost for any new product is incurred during the up-front development efforts. Given that large expense, early-stage inefficiency and lack of coherence — endemic at many manufacturers — only rob the product of critical value. All of this adds up to a pattern of common barriers to product optimization.

The most obvious barrier is that product optimization is not integrated into core company processes and is not part of the organization's DNA. Many companies believe that they have methods and tools for product optimization in general and cost reduction in particular, but if they do, these devices are applied only occasionally and hardly ever in the critical initial product development phase. Few companies have adopted guidelines for using this early stage to identify optimum solutions sufficiently by challenging technology or design principles or by determining whether customers will be willing to pay for a new feature. Failure to integrate product optimization activities into the initial phases of development likely will reduce product profitability, sales volume, and competitiveness.

The second barrier is weak organizational governance structures to manage product optimization targets when they are established in, for instance, a design-to-value analysis. Most manufacturers lack strong leadership at the product development level to clearly define priorities within a series of goals. Which is more important: cost, new features, regulatory standards, breakthrough technology, or brand building? And who has responsibility for ensuring that the established priorities are addressed? Unless that is transparently communicated and overseen at the supervisory level, engineers, buyers, designers, and production higher-ups will lack a road map to navigate conflicting target dimensions. Numerous wasteful and expensive iteration loops and rework are the consequence.

Third, for many companies, product optimization is identical to product cost optimization. But in such a myopic view, many trade-offs in product development that should be considered are neglected, such as: weight, quality, performance, and maintenance costs. Many companies focus only on keeping cost down without mastering the impact on other crucial factors that have a big impact

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on customer perception. In other words, a misguided focus on costs becomes a vicious circle in which costs fluctuate while other critical dimensions of a product's potential for success — dimensions that could mitigate cost concerns — are ignored.

Three steps toward holistic value design

To adopt holistic value design — a product development program that overcomes traditional deficiencies — three steps are required: (1) create a road map; (2) implement a product optimization governance structure; and (3) realize product value.

- 1. Create a road map.** In this step, a holistic value design maturity assessment is conducted to determine the gap between the company's current product value management capabilities and those needed to create a viable product development program. The maturity assessment is a structured questionnaire focusing on strategy and objectives, methods and tools, processes, structure, and resources. From this analysis, clearly defined strengths and weaknesses of the organization will emerge, and an improvement road map can be created.

In our experience, the holistic value design maturity assessment is generally an intensive task conducted in a short time period. It includes a scoping session during which product design focus areas most relevant to the company are identified as best practices; a capability assessment, highlighted by a gap analysis that reveals differences between the current makeup of the company and the identified design-focused best practices; and the beginning of an initiative prioritization in which product design improvements are ranked by agreed-on criteria and according to their impact and ease of implementation.

- 2. Implement a product optimization governance structure.** Most product development programs fail because companies lack a management team to oversee the process and make sure that all stakeholders have equal access to critical information. Establishing the most effective management structure for holistic value design involves first determining who in the organization will be responsible for achieving product optimization targets. Other questions: Who will monitor costs? What are the guidelines for measuring and managing objectives? Who will ensure cross-functional collaboration to accomplish goals?

Ideally, these responsibilities are given to a dedicated product value management team that defines key performance indicators (KPIs) and provides reports about the status of the project. Beneath this group is a steering committee to monitor progress, authorize critical implementation steps, and supervise implemented cross-functional activities linked to the product development road map.

Establishing an organizational structure for product value management is a complex task. Typically, a balance needs to be struck between the requirement of having staffers focusing on product characteristics and costs on the one hand and, on the other, cross-functional engagement that gives diverse parts of the organization influence over these characteristics, costs, and shared product architecture and platforms. Whatever structure is chosen, strong oversight by a product value management team and the alignment of all stakeholders are a key success factor for holistic value design implementation.

Companies with robust product development organizations tend to have project management teams overseeing each essential product line in the firm. Companies with a more function-oriented structure generally set up a dedicated value management team across products and brands; it is this team's job to create firm-wide improvement ideas on features and costs, as well as to manage or support commercial and technical initiatives. But these value management teams usually are not sufficiently budgeted or lack the manpower to holistically manage large projects without strong project management teams at the top of the product development pyramid.

After the new organizational structure has been established, job descriptions need to be created outlining the tasks, required skill sets, and responsibilities of each role in the product value management team. For the specific project at hand, a set of KPIs for each target dimension should be defined, along with critical implementation steps, milestones, and time lines.

A company may decide that recurring costs and weight are the target dimensions to focus on for product optimization. In that case, the management team would also formulate the maximum cost increase that is acceptable to save one kilogram of weight and vice versa. This is an intriguing challenge, which requires coming up with a mathematically correct, yet pragmatic approach to balance the trade-offs among different target dimensions. These so-called hurdle rates need to be clearly communicated to the holistic value design development teams as guidelines.

Strong oversight by a product value management team and the alignment of all stakeholders are a key success factor for holistic value design implementation.

3. Realize product value. In the third step of adopting holistic value design, product value management systems are set up across the company. PVM tools and methods are available that cover all cost categories as well as other target dimensions such as weight, customer value, delivery time, and carbon footprint. Strategy& distinguishes among three PVM methods — transparency, technical, and commercial (*see Exhibit 1, next page*).

Each method has a different goal, application area, input/output parameters, and lead times. Further, each method requires a different set of capabilities and leads to different types of optimization ideas.

A company needs to have all three PVM methods in its toolbox and be prepared to select any of the appropriate tools to address specific problems. These tools must be linked to the company’s core processes in product development — including engineering, design, manufacturing, and purchasing — so that they are embedded in daily operations, are used continuously, and serve as a bulwark against a failed project necessitating a big recovery effort.

Transparency methods are focused on identifying and understanding true product costs. Included in this category are should-cost modeling, a detailed modeling of a product’s manufacturing process in which subject-matter experts calculate what each of the manufacturing and assembly steps “should” cost. Other methods include benchmarking, competitive impact mapping, and impact driver analysis (which includes considerations such as cost or weight).

Technical methods are linked to what can be done to product design to change the form, fit, or function of a part to increase product value or reduce product costs. Included in this category are specification optimization; value engineering; design-to-*x*, where *x* stands for cost, weight, and other requirements; and multidimensional and integrated planning.

Unlike technical methods, which involve changing the product to have a cost impact, commercial methods are employed to influence the cost of a product without altering the product itself. This can be done by renegotiating prices for procured services or goods or changing the source of the services or goods. Included in this category are supplier workshops and technology mapping.

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Exhibit 1
Methods to holistic value design

Transparency focus	Technical focus	Commercial focus
Should cost Benchmarking (internal/external) Brand-pillar based feature and performance allocation Big data, bill of materials analysis Cost-driver analysis Linear/nonlinear performance pricing	Value engineering Design-to-x Integrated product and cost planning Specification optimization Content management/social media analysis Cross-system optimization	Waste analysis Supplier workshops and development
		Workshop formats
		Collaborative cost camp Supplier-integrated innovation clinic

Source: Strategy& analysis

Workshop formats are bringing the methods together in ways that are effective, efficient, and sometimes even fun. This helps to motivate the team not only to participate but to come out of its comfort zone and deliver truly differentiating ideas for product optimization.

Due to the cross-functional and multidimensional character of the product value management approach, standard tools such as cost calculation software or ERP programs need to be adapted to fulfill PVM requirements. These tools must be able to provide, for example, breakdowns of relevant holistic value design parameters — recurring costs, nonrecurring costs, weight, carbon footprint, and other product improvement elements. And they must offer consistency in cost and weight estimates (using the same sets of master data and calculation schemes in all cases) and in the way the material is documented. In addition, all critical stakeholders must have ready access to this data.

Required culture shifts

Implementing holistic value design in an organization cannot be done without changing the culture of the company from executing cost reduction projects on an occasional basis to integrating multidimensional PVM activities into the core operations of the business. To be successful, the implementation team must overcome internal resistance to change. The level of resistance depends on parameters such as company size, industry, experience with changes, and financial performance.

An effective approach for modifying the culture for holistic value design involves these four stages:

1. Employees learn about the PVM road map and the associated changes through clear communication from management.
2. The project team overcomes employees' resistance by considering their objections and taking immediate action to manage the negative impact of the culture change.
3. Employees start to "feel the change" brought about by holistic value design when they see firsthand that goals such as producing a cost-competitive, yet technically advanced product are possible. At that point, they are more likely to accept the new PVM system and enthusiastically explore its methods and processes. Training, coaching, and supporting employees in applying the PVM tools helps at this stage, and initial success stories should be communicated across the organization.
4. As the organization becomes productive and efficient, the positive effects of holistic value design are apparent. This is the stage when management should celebrate the successful efforts and capture lessons for everyone's benefit.

Companies need to define which PVM capabilities are of strategic relevance and therefore need to be developed internally, and which capabilities can be farmed out to third parties or acquired. In any case,

a training plan led by experienced PVM managers that teaches how to apply holistic value design methodologies is essential. In general, a holistic value design organization encompasses four roles, although a single employee may be responsible for more than one.

1. Product manager, who handles product characteristics and functions, approves product optimization ideas that influence different target dimensions, and escalates conflicts in the company's decision-making processes. Product managers typically specialize in cost reduction and customer value optimization methodologies and often have experience in working with interdisciplinary teams as well as in leading workshops.
2. Project manager, who executes cross-functional product optimization projects in all phases of the product life cycle.
3. Cross-functional experts, who create cost models, analyze the design or manufacturing process with respect to product optimization opportunities, and assess the required efforts and investments of technical changes. Technical experts are typically specialists in certain materials (e.g., aluminum), manufacturing processes (e.g., casting), or commodities (e.g., electronics).
4. Controller, who defines the targets and baselines for a particular product and monitors whether targets are being met over time.

Conclusion

For many companies, product development efforts have seemed too complex to fix — and as a result, they have settled for less than advantageous outcomes. In slow-moving markets, it may be possible to get away with one-dimensional, non-collaborative approaches to product production, hoping that customer loyalty will maintain sales and that competition will not impact results. In virtually every industry today — as digitalization, more rapid innovation, and a greater number of consumer channels are taking hold — this relative passivity toward product design is not workable. Profits and market share depend on a more holistic, cross-functional, and even aggressive embrace of tools and frameworks to manage costs, materials, designs, assembly, and brand augmentation for products throughout their life span. Anything less cedes market position to rivals.

Holistic value design case study: An auto supplier takes a U-turn toward profitability

To understand the holistic value design process, consider the case of a Tier One automotive supplier. Although this company is a technology leader in its market, its product line was of limited complexity, which meant that price, rather than features, was uppermost in customer purchasing decisions. That was bad news for the supplier, whose operations were not cost competitive. As a result, revenue and profit margins were on a downward trajectory.

Hoping to mitigate this problem and primarily improve its cost position, the supplier began with a maturity assessment to see where its product value management capabilities were lagging. The company found that its organization lacked key components of the design-to-value framework. Among the missing elements were should-cost modeling processes and competitor benchmarking.

Next, the supplier developed a realistic product design strategy that would eliminate the organization's shortcomings. Among the activities in this phase, the company established a cost estimation team, which was staffed with technical experts who developed tools for assessing data on material prices, labor costs, and machine and overhead rates. This team would provide a high level of cost transparency and a set of should-cost models for analyzing and forecasting costs, which in turn would provide cost estimates for product features and parts that would be compared against supplier quotations. The primary goal of this should-cost modeling effort was to support procurement in supplier negotiations and ensure that costs were equal to value.

After that, the automotive supplier integrated weight management into

the product development process. Under this methodology, the engineers were given weight targets for specific parts based on the impact of weight on product development costs. In this cross-functional value-engineering environment, design and engineering teams determined how they could use cost and weight calculations to further optimize their products; they then continuously assessed whether weight targets were met and should-cost models were complied with.

Integrating benchmarking into the product value management toolbox followed. Some competitor benchmarking had been conducted in the past, but only in an unstructured way to arrive at a predictable outcome: namely, that the supplier's products were superior to rival products. Turning this conclusion on its head by generating true insight that could help developers understand how competitors' products were superior (seen through the lens of investment, development, production, and customer value) involved significant changes in management oversight and benchmarking implementation. An in-house benchmark database was built that showed best-in-class solutions (internal or external) for common product features.

Finally, the supplier implemented its holistic value design framework across the company to ensure that open collaboration and communication existed among the teams working on procurement, design, engineering, and manufacturing. PVM tools and methods were established to monitor target achievements, create transparency on all product dimensions — in this case, customer value, delivery time, and carbon footprint, in addition to cost and weight — and drive product

optimization activities across functions. To support engineers in achieving targets, training sessions were held on design-to-cost and design-to-weight practices as well as on value-engineering concepts.

After going through this holistic value design exercise, the supplier could rightfully claim to have a best-in-class product value management framework. The center of PVM activities in the company is located in the supplier's finance department, which acts as a neutral arbiter among engineering,

design, procurement, and sales units. And this approach has already lived up to expectations. By implementing holistic value design, the supplier has been able to lower its cost of operations substantially, resulting in average cost reduction of 5 to 7 percent for existing products. This has given the supplier more leverage to avoid heavy discounting in negotiations with OEMs, and the supplier has won a series of new orders due to its optimized product cost structure. Perhaps most important, more aggressive pricing has improved profitability.

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