

How OEMs Can Enhance Market and Knowledge Leadership by Leveraging IDMs

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Highlights

- Determining the total cost in a make versus buy situation starts with the engineer having a full understanding of the real internal cost for manufacturing the product.
- While the fabless model provides many efficiencies, it also introduces a high degree of risk resulting from the dependence on third-party IP validation and verification.
- Companies that choose the SoC option can reduce costs compared to FPGAs, save validation headaches and potentially maintain healthier profit margins.

Description

Like the proverbial treadmill where a person runs ever faster just to stay in place, time-to-market pressures today force OEMs to introduce new products and upgrade existing ones ever faster in a race to protect continuously eroding profit margins. Designers increasingly utilize off-the-shelf components, such as FPGAs and connectivity glue logic to satisfy the time-to-market “dragon,” pushing off decisions about mass production to a later point. This approach often results in OEMs locked into a high-priced components strategy that over the long term harms profit margins. As a result of such short-term thinking, U.S. OEM market leadership has declined and Pacific Rim-based OEMs have emerged as a viable threat.

From the Engineer’s Viewpoint

One OEM strategy to “get off the treadmill” has included working closely with leading-edge Integrated Device Manufacturers (IDMs) that have a deep understanding of SoC design and IP. It is the business of IDMs to stay ahead of the curve on the latest SoC design methodologies and manufacturing processes to ensure both high-quality components and high-yield manufacturing operations. While the fabless model of component development provides many efficiencies, it also introduces a high degree of risk resulting from the dependence on third-

party IP validation and verification. This is typically the burden of the end user. High-end FPGAs are early adopters of advanced process technology and do introduce chip-level validated IP, but at the expense of astronomical chip costs, which can quickly sink OEM profit margins. Low-end FPGAs, such as the Xilinx CoolRunner™ and Spartan™ and the Altera Max® and Cyclone™, will continue to enjoy rapid yield improvement, with predicted price decreases by half over 18 months. High-end FPGAs will continue to enjoy rapid yield improvements with expected price decreases by as much as half over 18 months. At the same time, ASSP and FPGA companies are facing decline of their ASP and continuous pressure to maintain high gross margins.

The question then becomes: should companies reinvent common SoC functions? Or, should they depend on IDM experience? Companies that choose the SoC option can reduce costs, save validation headaches, sustain market share and earn potentially healthier profit margins.

Management’s Perspective

From the management perspective, the prospect of make vs. buy means identifying and evaluating tradeoffs. There are many considerations involved in arriving at the best decision for a company. For different companies and different components within a company, the “best” decision may mean different things. On the one hand, it is imperative for companies to maintain and increase retained learning. For managers to

decide that insourcing is the “best” solution, they must answer questions such as:

- Does internalizing the function make it more expensive?
- Does it help capture a larger portion of the end user market?
- Does it facilitate reaching market share goals?
- Does it risk designing a part that lacks differentiation?

Management’s “best” answers to these questions are often not the “best” answers for buyers. Conversely, IDMs generally have rationalized such tradeoffs long before OEMs since their internal ASSP cycles demand them to validate their return on invested capital (ROIC) tradeoffs.

The buyer is focused on what’s “best” for his company. Managers weigh opportunities and make commitments based on required business unit profit margins, ROIC and projected product demand. Of critical importance to all buyers is adequate lead times and attractive prices. Vendors must put themselves in the buyer’s shoes to remain viable and competitive.

Guiding the Decision Process

The Table below lists the key considerations in the make vs. buy decision process.

Cost/performance trade-offs	
Market Strategy	Leader or follower
Business Direction	Invest for long term or not
Intellectual Property	Differentiation based growth
Time to market	Building closer ties with supplier’s engineering strengths
Quality and customer satisfaction	

Cost

Determining the total cost in a make vs. buy situation starts with the engineer having a full understanding of the real internal cost for manufacturing the product compared with a clear knowledge of supplier strengths and areas of leverage. Internal costs should include material, labor, engineering and support costs, as well as overhead factors such as details of supplier strengths, including tools, methodologies, design center capabilities and onsite support flexibility.

Managers can determine the cost of buying a solution from an IDM by simply requesting a comparable price quotation for the function at the required performance level. Only with this knowledge should a customer then approach a vendor with a request for quote for the same function. Generally, IDMs have an advantage since they have deployed tools and flows, as well as introduced ASSPs based on these procedures. These tools and flows can lead to dramatic cost reduction in the ROIC analysis.

Managers can determine the cost of buying a solution from an IDM by simply requesting a comparable price quotation for the function at the required performance level. The vendor may offer a standard product, or, as needed, semi-custom—or even custom—products.

Vendors can offer several advantages, including the ability to obtain proprietary silicon solutions from product lines throughout the company at prices less than market cost, and access to inexpensive offshore manufacturing. This combination can result in lower costs for complex SoC functions. By tapping a vendor to complete the entire design and manufacturing, an OEM can save material, labor and other costs, while enabling the company’s talent to concentrate more on its strengths, such as system, software and package design.

Purchasing SoC solutions is a well-established, accepted industry practice with a significant history. It is used today by many OEMs for complex SoC design and manufacturing.

Below is a brief discussion of several factors OEMs should consider when studying the make vs. buy decision.

Market Strategy

OEMs typically follow a performance-driven, leading-edge product strategy so that they can attach a premium price to their products. End customers have a different perspective: they seek risk mitigation and expect OEMs to develop products with slightly better performance margins. OEMs can accomplish this by leveraging IP maturity and quality to manufacturing margin. Leading through differentiation contributes to building the OEM’s core competency in the long run.

Business Direction

Upper management focuses on maximizing ROIC, while it is the role of middle managers to weigh the tradeoffs between make vs. buy to achieve that ROIC. In addition to the obvious analysis of costs, these managers must also study intangibles such as the IDM's ability to deliver robust IP and the quality of IDM design centers versus evaluating offshore SoC designs. They must also review the cost of lost opportunity by examining the pitfalls of offshoring.

Time to Market

Rapid time to market enables customers to gain market share and is therefore critically important. It is another area where purchasing a solution can offer significant benefits. SoC vendors are organized to provide rapid design turns. Buying SoC solutions can also give a company a competitive edge by simplifying the market introduction process. Often the desired result is a SoC product that is better or comparable to an off-the-shelf part.

Internal Resource Allocation

The profitable dedication of internal resources to the right tasks is a key challenge for any successful business. Prior to making the decision about developing SoC solutions internally or involving an IDM, managers should make a frank assessment of their company's strengths and weaknesses. Only after this analysis can management determine the long-term benefit of internal development vs. purchasing an SoC solution.

Intellectual Property & Valuation

Harnessing IP differentiation to build better products in a timely fashion can result in enhanced market share and margins. On the other hand, developing standard products and ASSPs can lead to a gradual decline of market valuation and limit the OEM's business options to low margin products.

Collaboration—Synergy in IDM-OEM Business Model

Toshiba realizes that having established an ongoing relationship between an OEM and a vendor can prove very beneficial. The relationship enables both parties

to leverage each other's strengths and build a competitive advantage in the marketplace. Of course, it is important to understand that competitors can pursue the same strategy.

Value Creation through Collaboration

Quality products in the Toshiba SoC product line have a proven record of offering cost-effective, high-performance SOCs with robust manufacturability, verified IP and the prospect of yet more user advantages going into the future. Many companies have realized benefits through developing a relationship with Toshiba. By buying products from Toshiba, they can obtain a significant competitive advantage.

Below is a brief example of the competitive advantages Toshiba provides:

BUY Solution

A recommended option is to design a standard off-the-shelf ASSP or FPGA. The table below outlines the consequences of this purchase:

Cost per unit (100Kpcs/yr)	\$400
Time to Volume	18 months
Internal Resource Allocations	Minimal, principally component verification
Intellectual Property	No differentiation from competitor
Market Strategy	Follower
Future Benefits	None; missed revenue due to incongruent pricing from suppliers

By purchasing the solution, the buyer will spend several million dollars annually in tooling and verification costs. The product is ready for prototyping in 18 months, with lead times (22 weeks) reducible to delivery from stock, if forecasting is provided. Notable risks include recall of the product due to verification and qualification failures.

MAKE Solution

The following analysis of the "real" cost to make this function includes an itemization of typical costs for the entire design process, in-house manufacturing, design verification, documentation, material costs, and agency

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approvals. There is synergy in working with suppliers and lowering the total cost as follows:

Most of the implementation tools are provided by the supplier along with onsite training to ensure smooth implementation during the netlist preparation and Place and Route. This cost is absorbed by the IDM because generally IDMs purchase multiple licenses used for ASSP product development and have broad agreements with tool vendors to expand the business.

The development schedule for this type of product is approximately 6 months. This assumes that every step in the development is well planned and the quality and stability of RTL. It also assumes schedules are well managed, "function creep" is avoided and a robust validation plan is in place.

The intelligent use of internal resources, combined with leveraging supplier resources creates an optimal approach for lowering opportunity cost. Managers improve efficiency by harnessing freed internal resources that were applied to system design to focus on downstream qualification and verification activity. Benefits include, for example, faster time to market for the end product.

In this scenario, the systems company has benefited by adding to its core

competency. However, it potentially lost the opportunity to benefit from the latest trends in system design that an IDM would have brought to the table.

Here is the bottom line of the "Make" solution results:

Cost per unit (100K pcs/yr)	\$30
Time to Market	20 weeks, on critical path
Internal Resource Allocations	Leverage IDM Design Centers in USA and IPs
Intellectual Property	Value created resulting in higher margins
Collaboration	Improved ROIC due to lowered tooling costs
Future Benefits	Retained learning and higher earning

Summary

The above example is a realistic assessment of a dilemma faced by OEMs. For each decision factor, "Make" appears to be the better choice. The lesson here is that the core competency of the OEM is to build smart and manufacturable products that are differentiated in the market place at a cost that is much lower resulting from collaboration with the IDM. The discipline of a bias towards "Make" for high-performance circuit solutions can be a catalyst for maximizing long-term profit margins.

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