

► Vertical Differentiation, A Lean Approach

By Steve Mowry

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In Asia the economic crisis is commonly referred to as the “Economic Tsunami.” Loudspeaker and driver manufacturing companies throughout Asia now face serious challenges to profitability and growth. Costs are increasing; the economic outlook in the US and Europe is recessionary, indicating a flattening or a reduction in worldwide demand; in China there was a surplus of manufacturing capacity even before the onset of the economic crisis, creating further downward pressure on margins; and affluent consumers are demanding higher quality and performance. It looks as though some level of industry restructuring is inevitable within the next two years.

Companies that fail to formulate effective strategies to make themselves competitive will be forced to close or operate at a loss. Any effective business plan must balance innovation, resource allocation, and cost containment. For those companies that plan to focus on cost containment alone, I see little or no hope of profitability and growth. Ultimately, cost containment will result in the loss of the most skilled people within the company, including, but not limited to, engineers, technicians, managers, and marketers. In the short run such staff losses may provide a way for the company to survive, but in the long run this indicates certain failure as capabilities are reduced.

In the following, I will formulate business models (**Fig. 1**) for audio transducer product development, manufacturing, and marketing that are based on the Ferrari/Maserati and Lexus models. New products alone may not be enough; a new high-end “European” company image and performance-based new product development along with streamlined manufacturing, marketing, and

distribution are the key elements of a plan for profitability and growth.

THE BUSINESS MODEL

The business model converts innovation into economic value for the company and spells out how a company makes money by specifying where it is positioned in the value chain. It does this by utilizing a company’s resources, capabilities, and innovation and then draws on an array of business subjects, including, but not limited to, entrepreneurship, management, strategy, economics, finance, operations, and marketing.

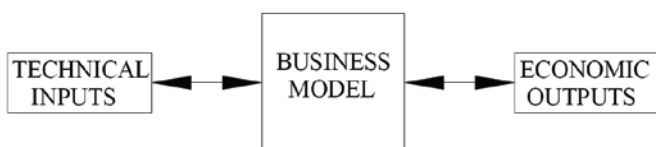
Simply put, a business model describes how a company positions itself within the value chain of its industry and how it intends to sustain itself by generating revenue. In the most basic sense, a business model is the method of doing business by which a company can generate revenue for a sustained period of time.

WARNINGS

Dr. Earl Geddes issued a warning in my interview with him published in the October 2008 issue of *Voice Coil* (www.audioXpress.com/magsdirx/voxceil/addenda/media/mowry1008.pdf, page 3), “You go to a factory and they have lots and lots of people, but very little technical expertise. . . The Chinese appear to be mostly interested in being the low-cost provider of commodity drivers and systems with very little value added content. . . I see the trend to migrate manufacturing into China as slowing down or perhaps turning around until such time that the Chinese seriously ramp up their technical capabilities.”

I will take this opportunity to also issue a warning. Unless audio transducer and/or loudspeaker manufacturers have the following resources and capabilities, they cannot innovate at the levels required to sustain profitability and competitiveness. LMS or CLIO with the world’s largest anechoic chamber is not enough. There is no value added by testing alone.

FIGURE 1: Simple illustration of a business model.



1. Nonlinear DC and AC Electromagnetic and Thermal FEA software and an experienced user who can simulate the motor assembly for large signals including $Bl(x,i)$, $Le(x,i)$, and temperature of the magnet(s).
2. Nonlinear Structural FEA software and an experienced user who can simulate the stiffness of the spider and the surround for large signals, $Kms(x)$ along with the buckling resistance of the surround.
3. A measurement system that can quantify the quantities simulated from 1 and 2 such as the KLIPPEL.
4. Natural Frequency FEA or BEM software and an experienced user who can simulate the natural frequency, bending modes, and buckling resistance of not just a single laminate material but also for sandwich composite materials and structures.
5. Software that can simulate a loudspeaker system, including transducers, enclosure, active and passive filters, with a large signal input along with an experienced user.

Unfortunately, for at least two of these resources, there is no canned software package available that facilitates the respective capability. General-purpose FEA software such as PAFEC, ABAQUS, or ANSYS requires the user to write input code that will solve the problem for the desired quantity. Typically this requires a senior transducer engineer. The problem is that this resource is on the endangered species list within Asia, and I know of only one company in Asia that has all five of the resources and capabilities.

What's the answer to this industry's skilled resource dilemma within Asia? Could it be a government bailout? On the contrary, there are indications that the Chinese government would be pleased to replace consumer electronics companies with companies from more sophisticated, higher technology industries with hopes of attracting more and more skilled Chinese people back from overseas, whether recent graduates or seasoned professionals and intellectuals. The transition of core industries from consumer electronics to industries such as semiconductors and/or pharmaceuticals and/or automotive was the history of industrial maturation in Singapore and Japan. I don't see government intervention into the consumer electronics industry as likely occurring.

Then, rather than adopt a policy of gloom and despair, the contracting economic conditions can be viewed as an opportunity to start a new very high performance transducer and/or loudspeaker company by utilizing the surplus resources of part and component manufacturers (www.multimediamanufacturer.com/articles/mowry308.pdf).

VERTICAL INTEGRATION

I will begin by discussing the traditional vertically integrated company business model and then introducing a contrasting discussion about a simple but innovative approach, the vertically differentiated company

business model, sometimes referred to as dis-integration. Vertical Integration (VI) is defined as the process in which several steps in the production and/or distribution of a product or service are controlled by a single company in order to increase that company's power in the marketplace. For example, P.Audio is a leading manufacturer of professional transducers and systems in Asia. Steve Chen, the owner of P.Audio, with factories in Thailand and China (www.paudiothailand.com), also owns ATON Thailand and Malaysia (www.aton.co.th), a manufacturer of voice coils and diaphragm assemblies; U-sonics Power Cone Malaysia (www.u-sonics.com), a manufacturer of paper cones, surrounds and spiders; Sinohara, a steel part manufacturer; and First Sail (partnership) China, a manufacturer of voice coils. Rob Gault, the owner of Eminence (www.allenamcs.com/Eminence/TQRApr05.pdf), manufactures most of the transducers' component parts under one roof both in Kentucky and in China.

The larger China manufacturers such as GGEC tend to follow the under-one-roof business model of Vertical Integration. These are typically single factory complexes with 1,000 or more employees. Vertical Integration seems to work best when innovation slows down within a company, and in some cases these two characteristics are inversely related.

VERTICAL DIFFERENTIATION

Vertical Differentiation (VD), on the other hand, can be thought of as the reciprocal of VI, but with the focus shifted to creative cooperation with the supplier base. Where VI companies tend to be large and diverse, VD follows the lean company model by outsourcing manufacturing processes to suppliers that would otherwise be performed by a Vertically Integrated company factory.

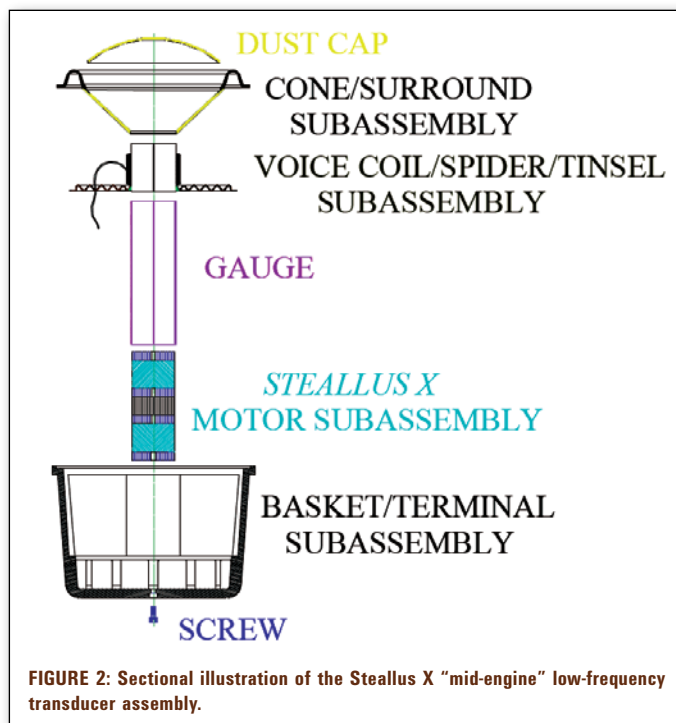
In the case of audio transducer manufacturing, the suppliers are required to perform assembly of key subassemblies, leaving final assembly of these subassemblies to the Vertically Differentiated company's factory. With regard to a low-frequency transducer, the motor assembly is manufactured by the magnet supplier and is magnetized prior to shipping, while the voice coil winding company attaches the spider to the voice coil bobbin. The surround (edge) manufacturing company attaches the surround to the cone.

Figure 2 contains a sectional illustration of the simplified *STEALLUS X* (www.audioxpress.com/magsdirx/voxcoil/addenda/media/mowry1107.pdf and www.audioxpress.com/magsdirx/voxcoil/addenda/media/mowry108.pdf) low-frequency transducer assembly that's an example of a vertically differentiated assembly processes. There are only six subassemblies and/or parts and a single shim gauge! Frankly it's just an application of the old cliché, "less is more."

VD allows a company to be run with a minimum number of employees who are essentially self-managed. This alone inherently reduces people problems within a company. It simplifies and reduces human resource

requirements. VD allows a company to focus on final assembly and to conveniently implement lean manufacturing. Lean is a term used to describe manufacturing processes that have no or very little waste.

Does Vertical Integration reduce cost and improve quality as several companies claim? My answer is no, but every case is different! Here are some of the features of vertically differentiated manufacturing. You decide for yourself.



1. Simplifies and streamlines incoming QC.
2. No magnetizing systems to purchase and maintain.
3. Shorter assembly lines with fewer stations and less floor space.
4. Simplified and streamlined purchasing and inventory control.
5. On-site employees and staffing levels are much less than for VI companies for the same manufacturing capacity.
6. Allows suppliers to function as specialists within their strongest capabilities and core competencies.
7. Free market competition among suppliers in Asia can be utilized to help control costs.
8. Greater flexibility with less sensitivity to changes in the market, in the product and/or in the economy, and/or the ability to grow or contract the VD company very quickly.
9. Small initial investment.
10. Less risk of developing firefighting as a problem-solving methodology (www.multimediamanufacturer.com/articles/mowry408.pdf).

The most effective way to realize Vertical Differentiation is by implementing the modular subassemblies starting

at the product development project's concept stage, very early on. This allows the concurrent development of the product and the manufacturing processes. The VD company may choose to retain a consultant to fill a key position. Consultants often have their own engineering tools along with varied experiences, thus adding capability and a flexibility of resource allocation to the company by outsourcing hard-to-find highly skilled people.

The end products will play a role in what management techniques will work most effectively. Low-cost commodity type transducers and loudspeakers need economies of scale (large quantities) to provide profitability, whereas high-end transducers and loudspeakers typically follow a model of low quantities and high margins (the Ferrari/Maserati business model analogy). Let's not forget that the demand for all these products at least in part is driven by innovation.

With regard to marketing within the vertically differentiated business model, direct sales is another lean characteristic that should be considered. Direct sales is selling products without the use of a retail outlet, distributor, broker, or wholesaler or other middle person. BOSE uses this method of marketing for their WAVE products. Perhaps the most famous company utilizing direct sales is DELL, with its computers and servers.

The low-quantity/high-margin products of the VD loudspeaker company are well suited to direct sales and marketing with a concentration on the Internet as the primary media. The consumer can conveniently pay with his/her credit card, facilitating shipping directly from the final assembly factory to the consumer. In this way the loudspeakers or transducers are paid for before they are actually manufactured.

The key is implementing a "Just In Time" methodology link between purchasing, manufacturing, and marketing. A reasonable alternative could be to maintain a small inventory at the final assembly factory.

The VD business model can also be applied to an existing loudspeaker or transducer manufacturer as a new subsidiary or an expansion to an existing product line. I refer to this approach as the LEXUS business model (www.s-m-audio.com/lexus.pdf). The high standards and innovation of the Lexus-like company division will inherently "trickle-down" improvements in quality, productivity, and efficiency to the mother company. The objective is to establish a new division of a company that will portray an image analogous to the world-class Lexus cars.

CONCLUSION

Without R&D driving innovation and new product development within a speaker company, the products become commodity-like. In a free market, the price of a commodity is set by supply and demand regardless of where it is manufactured or how it is sold, and the manufacturer has no control over pricing. Wine is a nice example with quality-driven pricing; however, as wine quality is reduced, the wine pricing behaves like

the commodities of rice, corn, or palm oil, and so on in the limit.

The most affluent consumers are not likely to change spending habits during a recession; however, average folks seem to be fighting just to survive. Companies that cannot add value to their products through innovation-based performance improvements will face the same battles to just survive, and some are destined to lose their battles. The capacity of companies to adapt to rapid and unexpected change is not well understood and poorly practiced. This can in most cases be traced to the companies' business models and capabilities.

Today, the three most critical market factors are accelerating change, increasing competition, and increasing complexity. While each of these forces presents its own particular problems, the impact of all three acting together significantly compounds the problem. The results are a reduced planning horizon for every company and the need for faster responses throughout the organization. The time to take corrective action is NOW!

While so many managers focus their attention on how businesses perform in today's markets, the key is how the forces of change will affect a company tomorrow and the day after. Unfortunately, the instinctive habit of management is to look backwards to the past or to look at what a competitor is doing to guide a course into the future. In an era characterized by rapid change this approach has little chance of success.

What is needed today is a lean company that can "turn on a dime" with products that contain such a level of perceived value as to be essentially recession proof, products such as the Ferrari and Maserati cars, for example. To accomplish this a company must have the resources and capabilities to add value. This does not require large numbers of low-wage unskilled employees; however, it does require a reasonable level of skilled resources and a carefully formulated business model.

What was once considered a fortress approach of a company's structure, Vertical Integration now seems to leave a company vulnerable to changes in market conditions and resistant to innovation. Just ask General Motors and their stockholders. Isn't it time to consider a vertically differentiated business model for that new startup or for that new high performance product division? **VC**

Steve Mowry is president of S. M. Audio Engineering. He has a BS degree in Business Administration from Bryant College and BS and MS degrees in Electrical Engineering with highest distinction from the University of Rhode Island. He has worked in loudspeaker R&D at BOSE Corp., TC Sounds Inc., EASTECH, and P.Audio. Steve is currently an independent researcher, lecturer, and consultant in transducer/loudspeaker system design and new product development along with being a frequent contributor to *Voice Coil* and *Multi Media Manufacturer* magazines.