

New Development Timing

By Steve Mowry

This article tackles the topic of cyclic phenomena, the Economic Business and the Product Technology Life cycles that vary with time, and how they can impact the effectiveness of new product development projects. When to “pull the development project trigger” is a question that implies that there is a target at which to aim. Well, there is. The timing of product development can be rationally based on economic theory by looking at the business cycle and the technology life cycle. Once you understand these cycles, the timing that minimizes risk and maximizes customer affordability—and thus maximizes sales and profit margins—is almost obvious, although perhaps counterintuitive at first glance.

THE BUSINESS/ECONOMIC CYCLE

The **Economic Business Cycle** refers to the fluctuations of economic activity about its long-term growth trend. Notice continued long-term economic growth is assumed. The cycle involves shifts over time between periods of relatively rapid growth of output (recovery and prosperity) and periods of relative stagnation or decline (contraction or recession). Although called cycles, these fluctuations in economic growth and decline do not follow a purely mechanical or predictable periodic pattern. The fluctuations are rather the results of changes in productivity, monetary supply, consumer confidence, government policies, costs, product supply and demand, sometimes referred to as economic “shocks.”

Another indication of the economic business cycle is the predictable long-term pattern changes in national income. Traditional business cycles undergo four stages: expansion, prosperity, contraction, and recession (**Fig. 1**). After a recessionary phase, the expansionary phase can start again. The phases of the business cycle are characterized by changing employment, industrial productivity, and interest

rates. Some economists believe that stock price trends precede business cycle stages.

EXPANSION

When the economy is growing and businesses in general are doing well, the period is known as expansion. There are several ways in which economic growth is measured. One way is gross domestic product (GDP), which is the total value of all goods and services that are produced in a country in a specific time period, such as a month, a quarter, or a year. If production is increasing, this is an indicator that the economy is growing.

Another measure of economic expansion is personal income. If workers have increasing income, the indications are that the economy is growing and workers can be paid more. Likewise, if unemployment rates are declining or remain low, this means that people who want to work are finding jobs and the economy is expanding. One fear is that the economy will expand too rapidly, leading to inflation.

CONTRACTION

The economy will reach a point at which expansion first slows and then stops. There might be a period of stagnation during which there is no growth or even a decline in economic activity. An economic decline, or contraction, typically follows this period. This is the result of business activity

slowing, less money being spent, unemployment rising, and wages and salaries declining or remaining stable.

STAGNATION

Stability in growth is a goal of the private-enterprise system. This means that there aren't any drastic changes in prices and the economy is moving forward at an acceptable rate. However, stability can lead to stagnation, a time when there is too much complacency, which in turn leads to a decline in new product development. If this occurs, consumers can become dissatisfied with what is available and spending slows down, followed by a decline in the economy.

For example, if consumers are spending at a steady rate and they are willing to pay reasonable prices for goods and services, manufacturers don't feel the need for innovation and growth in new areas. This causes stagnation, which leads to economic decline.

RECESSION

The National Bureau of Economic Research defines a recession as “a significant decline in economic activity spread across the economy, lasting more than a few months.” However, in macroeconomics, the definition of recession is a decline in any country's GDP, or negative real economic growth, for two or more successive quarters of a year.

THE PRODUCT/TECHNOLOGY LIFE CYCLE

Figure 2 shows the typical life-cycle of a new product or a manufacturing process or a production system from the stages of its initial conception to its culmination as either a technique or procedure of common practice. The y-axis (vertical) of the diagram shows the business gain to the proprietor of the technology while the x-axis (horizontal) traces its lifetime. The technology life cycle is concerned with the time and cost of developing new technology, the timeline of recover-

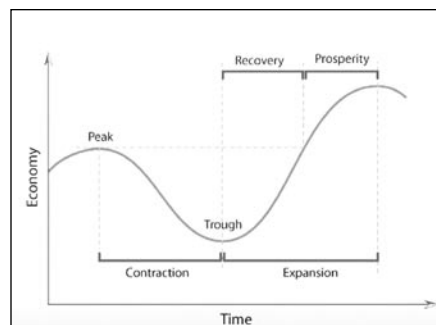


FIGURE 1: An abstract business cycle. (http://upload.wikimedia.org/wikipedia/en/b/bb/Business_cycle_01.png)

ing cost and modes of making the technology yield a profit proportionate to the costs and risks involved. The technology life cycle may further be protected during its cycle with patents and trademarks seeking to lengthen the cycle and to maximize the profit from it.

Referring to **Fig. 2**, you can see the Technology Life Cycle as composed of four phases.

1. The **Research and Development** (R&D) phase (sometimes called the “bleeding edge”) occurs when incomes from inputs are negative.
2. The **Ascent** phase happens when out-of-pocket costs have been recovered and the technology begins to gather strength by going beyond some point in the Technology Life Cycle curve (sometimes called the “leading edge”).
3. In the **Maturity** phase, gain is high and stable, and the region is going into market saturation (sometimes referred to as “state-of-the-art”).
4. The **Decline** (decay) phase is the time of reducing fortunes and utility of the technology (sometimes called the “falling edge”).

The value of the technology depends on the stage of its development—early, mature, or declining phases. Some of the major factors that dramatically impact price of technology products include competition, inventory levels, changes in technology, and manufacturing processes. A relationship may also exist between where a product is on its technology life cycle curve and its price. It is not uncommon for a supplier to reduce the price of a

mature product in order to drop component part inventories prior to discontinuing the manufacturing of the product.

TIMING

From the perspective of the finance department, the tendency is to fund R&D when economic conditions have reached prosperity. However, this is the timing that indicates the most risk of bringing a new product to market when the economic conditions are contracting. This will minimize sales and margins. Starting and funding new product development projects based on company cash flow alone is just too simple and potentially costly and ineffective.

Manufacturing may not have the capacity for prototype runs during periods of prosperity. New manufacturing processes, which need to be developed concurrently with the new product, are more conveniently developed during economic contraction, assuming sales (demand) are increased by prosperity and decreased by contraction. On the other hand, the marketing department will be most effective during economic expansion. Consumers have been delaying purchases and confidence increase during expansion.

The human resource department will find it easier to locate those special development human resources during times of economic contraction, whether those resources are newly recruited, from within company staff, or from independent consultants. Furthermore, the critical technical and/or R&D resources that are required for new product development will be available at the lowest cost at the economic trough (local minimum on the business cycle curve).

Now having looked at the development timing from the standpoints of finance, manufacturing, marketing, human resources, and engineering/R&D, take a close look at **Figs. 1** and **2**. Actually, the curves are similar in shape but they represent two very different quantities. It should be clear now that a bad time to start a new product development project is at peak economic prosperity, a lo-

cal maximum on the business cycle curve. There is then a reasonable chance that the product technology’s vital life will coincide with economic contraction (trough) or even a recession in worst case.

The economic downturns since World War II have ranged between 6 and 18 months, with an average of 11. It is a reasonable task to estimate the length of time to complete the development stage of a project and reach start of production—typically it’s one-year and the “vital life” of a product’s technology is typically no less than five and no more than 10 years. It may take some time to actually realize that the economic contraction has begun and the planning of a new product development project will also take some time. Thus a bit of guesstimation and/or some Internet searches on the topic of economic downturn may be helpful in dialing in the best date to begin. However, the point here is that that date is selected to be during an economic contraction or even a recession, but not during economic expansion or prosperity phases.

Then ideally and with respect to **Figs. 1** and **2**, the local minimum on the business cycle curve (trough) should coincide with the local minimum on the technology life cycle curve (R&D phase). Thus the local maximum on the business cycle curve (prosperity) will coincide with the local maximum (product maturity) on the technology life cycle curve. This assumes a business cycle with an economic downtime of approximately one year followed by economic recovery with a period of approximately five years; however, the business cycle can now be considered a variable (driver) in the length of time and for what price the product is sold in the marketplace. These quantities are reasonable assumptions. Is the most effective timing for a new product development project obvious now?

With regard to the present-day economic conditions, by the time you read this, it will most likely be a good time to start that new product development project. Why wait until the economy begins to recover? Recovery

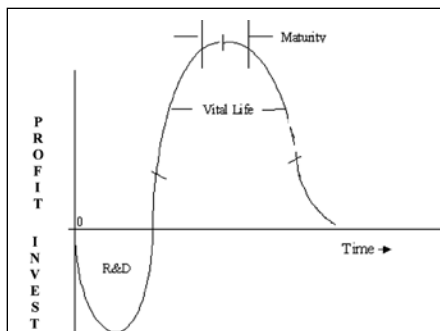



FIGURE 2: An abstract technology life cycle. (http://upload.wikimedia.org/wikipedia/en/d/db/Tecnology_Life_Cycle.png)

is the time to introduce the product to the market and subsequently saturate the market with respect to sales during economic prosperity. With its increased stimulus to demand, consumers have money to spend. The company that has invested in new product development in a timely manner will have little competition regarding the new technology product. With supply based on the developer's production capacity of the new technology product and demand stimulated by economic prosperity, sales and margins will be maximized and business will be "good."

On a supply-related topic, during significant economic contraction or recession, inefficient and ineffectively managed and/or funded companies may be forced out of business. This purging of weak manufacturers and suppliers during economic downturns is an inherent characteristic of the free market (capitalist) economic system. Well-managed and reasonably funded companies are best equipped to take advantage of this development model. Develop low and sell high. 

Steve Mowry, president of S. M. Audio Engineering (www.s-m-audio.com), has a BS, Business Administration, from Bryant College, and a BS and MS, Electrical Engineering, from URI with highest distinction. Steve has worked in R&D at BOSE, TC Sounds, EASTECH, and P.Audio. Steve is currently an independent consultant/lecturer in project management/transducer and system design.