Step 5 – The Innovation Funnel – Commercially Vital but Absent From Economics

Ideas are the ultimate intangibles. They drive economic growth but not before they've passed through an entrepreneurial funnel to become innovations. Innovations have unique commercial elements. To acquire them, ideas have to pass in stages through a well-established Innovation Funnel described in detail by Stevens & Burley (1997)[29] (but tacitly known well before).

It is common to confuse ideas, inventions and innovations. Professional use is clear[30].

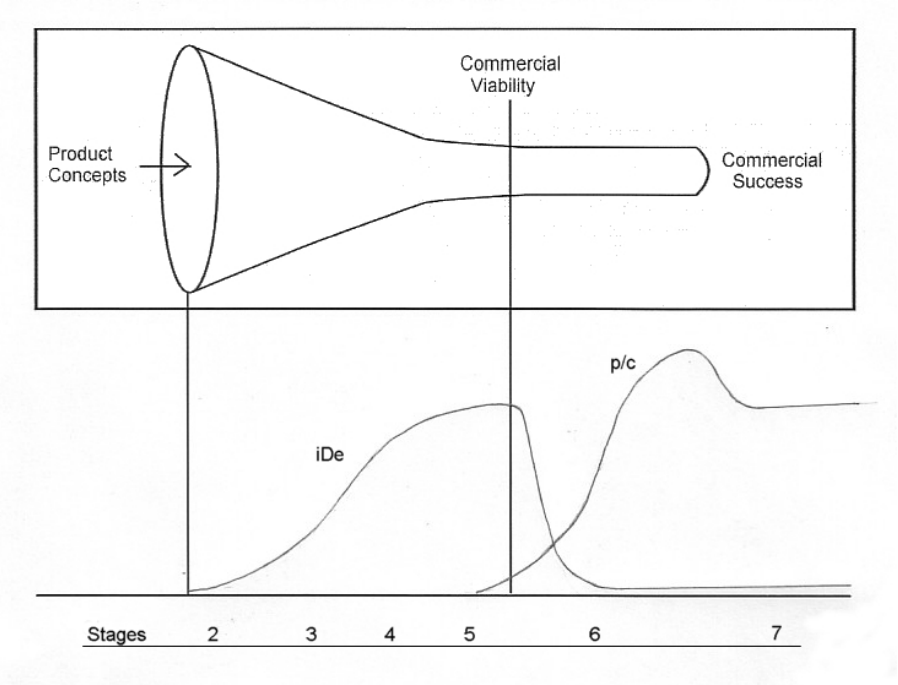

Figure 31 - The funnel admits ~300 'shaped ideas', or new product concepts, for every eventual commercial success. Substantial spending on iDe[31] drives Stages 2 to 6.

For commercial viability of the products of new technologies only two conditions are required. One is for price the other is for cost[32]. From these two an innovation metric (p/c) is derived, as follows,

(a) Price

The first condition can be determined from pPQ, which associates price with performance and competitive pressure.

[29] The stages are 1. Ideation 2. Explorations 3. Small Projects 4. Significant Project 5. Major Development 6. Commercial Launch 7. Commercial Success.
[30] Ideas are ideas. Inventions are ideas that are 'non-obvious to one of ordinary skill in the art' (in patent law parlance) and reduced to elemental practice; no commercial success is presumed. It is for innovations.
[31] 'Idea Development Expense' relates to conventional categories of R&D. It is the sum of company sourced Applied Research and Development (Appendix A).
[32] Neither condition requires a patent. Patent counting does not characterize innovation.

In a simple market, with two competing products,

For the first product,

$$p_1 = P_1(Q_1 + Q_2)$$

For the second product,

$$p_2 = P_2(Q_2 + Q_1)$$

Competitive pressure is the same, so,

$$p_1/P_1 = p_2/P_2$$

Making the essential point that, for market penetration, it's not necessary for performances or prices to be equal. It's the ratio that matters. Incumbents rarely appreciate this allows inferior products to succeed against them if their price is lower, or that consumers will even accept a necessary degree of aggravation for less outlay.

The price point is set by assessment in relation to competing entities and **not**, as commonly thought, by adding margin to cost. Opening price may need to be below cost.

(b) Cost

For the second condition the unit cost of delivered performance must be less than the achievable price point in the near future. This assures eventual and necessary profit.

Cost includes direct production labor and the materials and energy needed for manufacture plus the indirect labor of management and administration, of sales, marketing and R&D. In annual report parlance this is cost of sales COS (minus depreciation if included) plus Sales General and Administrative SG&A.

Commercial Viability

Using this cost+ definition[33], the commercial viability of a firm's new product can be expressed by the ratio $\left(p/c+\right)$ where $c+$ must be less than P[34], or $c+ < P$ so that,

$$\left(p/c+\right) > \left(p/P\right)$$

[33] c^+ is the unit cost a firm's price must exceed. It is greater than the underlying commodity cost. Commodity cost c excludes overheads. It is composed of materials, energy and direct production labor.
[34] Projected for full-scale production, at Stage 5 for realization at Stage 7.

but from pPQ,

$$\left(p/P\right)=\sum Q$$

so that,

$$\left(p/c+\right)>\sum Q$$

for each commodity provided by a firm to a market. By this inequality competitive pressure $\sum Q$ takes on another meaning. It constitutes an innovation boundary IB that can be expressed graphically as shown in figure 32.

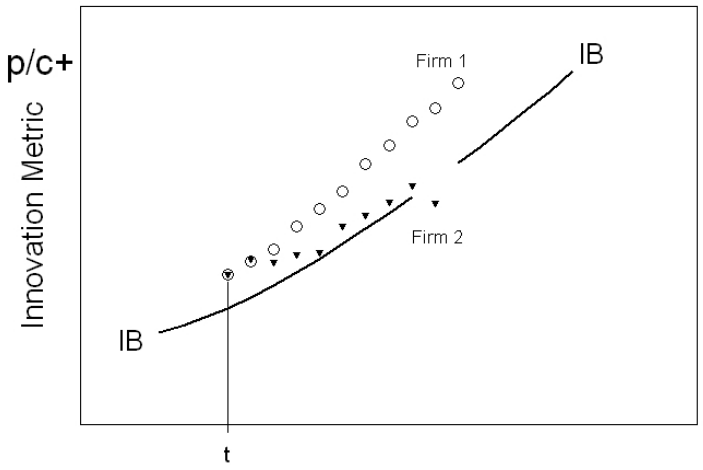

Figure 32 – Firm 1 innovates successfully above the boundary, Firm 2 does not [35,36]

where the trajectory of $\left(p/c+\right)$ for two commodities each introduced by a different firm in year t is shown. The first remains above IB while the second veers into it when c=P. This vital transition marks the onset of creative destruction, Schumpeter (1942), which is the fundamental mechanism of economic growth in an economy. And where $\left(p/c+\right)$ is the metric that controls it. Therefore

Innovation is

The prospering of new technology in a market,

enumerated by the commercial metric $\left(p/c+\right)$.

[35] With t =1963, Firm 1 is Anheuser-Busch, Firm 2 was the Falstaff Brewing Company, Farrell (2007).

[36] Noting that survival is systemically easier for products than firms. This arises because a firm's cost is always greater than a commodity's, c+>c. As often happens a commodity survives by being transferred into stewardship of a firm with a lower cost structure and eventually, perhaps, to a smaller firm serving a niche market that tolerates a higher price. As a corollary, products tend to have longer survival times than firms.

Interpreting Innovation Funnel Schema

The graphic below the funnel in figure 31 imagines how iDE spending effects the innovation metric (p/c) during development.

The earliest stage is inexpensive There is nothing but ideas, (p/c) = 0. The explorations phase will require mock-ups crafted from existing parts. They will possess some kind of functional representation, so p is larger, but will be very expensive to create. As development proceeds functionality will increase and unit cost will decrease across planned milestones and putative (p/c) will rise. The most expensive stages are ahead. These usually involve unforeseen and unique issues seen in the context of multiple designs coming together. They often relate to interactions between particular machine and material characteristics. Sometimes these are unprecedented and require original applied science to resolve. At the very least, flaws have to be removed or ameliorated without increasing cost.

The interdisciplinary requirements, invariably unavailable from open literature, and the urgency for resolution, make this world of the innovation professional one of the most fascinatingly rich and challenging technical spheres imaginable. It is also one of the least known about.

Products of the developing technology may enter test markets or niches where high unit costs can be tolerated, at least for a while. (p/c) may peak for early adopters (the wow factor described at **Step 2**, p23-24). Once fully commercial (p/c) will increase slowly as improvements, especially those lowering cost or renewing attributes, are implemented.

The development knowledge acquired by iDE spending stays with the firm and becomes part of its core competency.

Note on Definition

For some it may be worth recalling the working definition of innovation adopted by the 'Measuring Innovation in the 21st Century Economy' committee, Commerce (2008) and page 95, but which remained unrefined throughout viz.

Innovation is,

'*The design, invention, development and/or implementation of new or altered products, services, process systems, organizational structures, or business models for the purpose of creating new value for customers and financial returns for the firm*'.

By convolving this to '**The prospering of new technology in a market**' the single metric the committee chairman opined – no doubt based on its awkward definition - would likely never exist, and anyway be transient and error prone, is comprehensively proven otherwise within this book.