WHITE PAPER

# Competitive Advantage

**June 2005**

## *The Physics of Business*

Before there were digital computers, engineers used to simulate designs using analog computers. In the case of a mechanical simulation, they would use electrical equivalents to study the design's behaviour. They would use an electric circuit as a model of a mechanical structure. As a simple example, a mechanical equation like F = ma (force = mass times acceleration) could be simulated as V = IR where voltage would be analogous to force, resistance to mass and current to acceleration. These simulations worked well as mechanical behaviour could be accurately predicted.

In business, is there an analogy or set of equations that can predict competitive advantage the way electrical equations can predict mechanical behaviour?

Successful organizations have momentum and exist in an environment of change. In physics, momentum is mass times velocity. One could argue that an organization's size is equivalent to mass and, since velocity is directed speed or distance over time, its analogy would be the progress over time or the rate of directed change. Business momentum then would be organizational size ($M_{org}$) multiplied by the rate of progress (P/t where t is time).

Now change is not constant, the rate of change has been accelerating for at least the past 100 years. Inventions from a century ago like the telephone, airplanes and electricity took over 50 years to become commonplace. Things from the mid-twentieth century like VCRs, microwaves and televisions took about 30 years. Today, we think of cell phones and PCs as fast-paced products but they were invented in the 1970s and 80s and took about 15 years to be ubiquitous. The World Wide Web, introduced in the mid 90s, took only two years. Every morning when I log on to my computer my security software checks for new program updates and downloads a change almost every day. Time to market is getting faster and product lifecycles shorter. The rate of change is accelerating. Why is this?

One reason is that there are more and more people working on change. According to the US Bureau of Statistics, the number of people graduating from post-secondary institutions in the United States is doubling every 15 years. Why does anyone hire a university graduate? One hires them to make a difference, to improve on what was before and to create; all of which is making change. However, if you want things to stay the same, as in a factory process, you hire a worker and reward them for consistency. With more people working on change, it is no wonder its rate is accelerating. This acceleration in available change agents is not restricted to the USA. It is occurring all over the world.

Let's get back to our equations. If momentum is an organization's size multiplied by progress/time, what would be analogous to force in business? I believe force in business is competitive advantage. Can competitive advantage be simulated by the force equation F = ma?

Acceleration is velocity/time or distance/time$^2$ so force is mass multiplied by velocity/time which is equivalent to momentum/time. (F = ma = mv/t = momentum/time). In our business context, acceleration is an increase in the rate of directed change or progress/time$^2$. So our equation F = ma has equivalence in the form of the size of an organization multiplied by the increase in the rate of change that is occurring or $F = M_{org}P/t^2$. So we have an equation, but is competitive advantage really modeled by $M_{org}P/t^2$?

Enough of classical physics! Let's move from Newton to Einstein.

Gravity (g) has the same units as acceleration (a) and they are equivalent. Newton saw gravity as a force pulling on a mass whereas Einstein explained gravity as a distortion in space-time caused by a mass. Mass warps space-time.

Business people like talking of a level playing field, but is its existence possible in the presence of organizational mass ($M_{org}$) and accelerating change? Can we warp the level playing field to our advantage, or worse, can your competitors distort it to theirs?

Maybe I have taken the idea of analog computing too far and ideas like warped playing fields are too abstract. However, can this mental exercise tell us anything? I think so.

Here are some of my conclusions:

- The idea of a level playing field is flawed as someone will always have a competitive advantage, so make sure it's you.
- Competitive advantage comes from warping the playing field. Being nimble and having adequate organizational mass are important warping parameters.
- See progress as directed change. Act quickly to drive change in your business in the direction you need to go.

Live long and prosper!

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*If you have any comments on this paper, please email to ken_bradley@lytica.com*