KNOWLEDGE FOR INNOVATION

DYNAMIC CAPABILITY:
THE CONCEPT AND HOW IT HELPS US UNDERSTAND ECONOMIC CHANGE

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Objectives and themes

- **Illuminate some aspects of the business side of innovation – deriving from the fact that the business actors are out to make money, and they both adapt to change and cause it.**

- **Explore the meaning of "change" and its contrast with "continuity" – and the implications for innovation, profitability and development.**

- **Highlight the main issues in recent discussions of "dynamic capability."**

DYNAMIC CAPABILITY AND CHANGE: AN INSTRUCTIVE EXAMPLE

A

Perceptions of change

- "You could not step twice into the same river; for other waters are ever flowing on to you." -- Heraclitus (attrib.)

- "What has been is what will be, and what has been done is what will be done, and there is nothing new under the sun." -- Ecclesiastes 1:9 (English Standard Version)

- "Plus ça change, plus c'est la même chose." -- J-B A Karr (1849)

Dynamic capability in brief

"Innovation in semiconductors? I'm not sure there *is* innovation in semiconductors. They just keep doing the same thing, over and over."

-- Dr. Ralph Gomory

(circa 1983, when he was VP for R&D at IBM. Quoted with permission.)

??? “Over and over” ???

- The thing “they” (particularly Intel) were doing over and over was stepping along the miniaturization trajectory of semiconductor technology.
- That is, enacting “Moore’s Law” – squeezing more transistors onto a chip.
- Gomory certainly was not denying that progress was being made in semiconductors, but somehow he didn’t find it very exciting – because the *process* was in many ways repetitive.

Moore's Law … per Intel today (www.intel.com)

"Intel co-founder Gordon Moore is a visionary.

His bold prediction, popularly known as Moore's Law, states that the number of transistors on a chip will double approximately every two years.

Intel, which has maintained this pace for decades, uses this golden rule as both a guiding principle and a springboard for technological advancement, driving the expansion of functions on a chip at a lower cost per function and lower power per transistor, by shrinking feature sizes while introducing new materials and transistor structures."

Counterpoints to the semiconductor (Intel) story

- **The charming stories of many iPhone apps, individual entries in a vast domain of creativity and "entrepreneurship."**
- **The sad story of Smith Corona, later SCM, a typewriter company that struggled to transition to the electronic age, and succeeded to a point – but wound up in Chapter 11 bankruptcy, failed again after it emerged, and was liquidated in 2001.**

Danneels on the Smith Corona case.

"The above history shows that Smith Corona was successful in transitioning within its product category, going from mechanical to electric to electronic typewriters to personal word processors. However, it was not able to transition into other categories. The company never achieved more than 11.8 percent (in 1995) of sales from products outside of typewriters and their accessories and supplies (see Table 1)."

-- Erwin Danneels, "Trying to Become a Different Kind of Company: Dynamic Capability at Smith Corona," SMJ 2011

DYNAMIC CAPABILITY: CONCEPTS AND CONTROVERSY

Background: Knowledge and production

- The ability to achieve a certain productive result is often considered to derive from having "the ingredients" and "the recipe" – the latter being some symbolically rendered account of how to achieve the result. Call this the "recipe theory."

- In our alternative view, the ingredients are needed and, the recipe may be helpful, but what is also needed is the ability to implement – to actually perform the specific actions that achieve the result. Call this the "capability theory."

The sources of capability

- At the individual level, we refer to capability as "skill". As is well known, the acquisition of skill involves an element of practice, and acquiring high skill demands *a lot* of practice.

- In organizations, organizational routines serve as the "nervous system" that supports effective action. Like skills, effective routines are developed through practice.

- "An organizational capability is a high-level routine (or collection of routines) that, together with its implementing input flows, confers upon an organization's management a set of decision options for producing significant outputs of a particular type."

Distinguishing capabilities

- Every viable business has capabilities of some sort that permit it to transform inputs into outputs, sell the output, buy more inputs and keep going. These we call "ordinary" or "operational" capabilities. They enable the firm to " make a living now."

- Some businesses have "dynamic capabilities," systematic activities that permit them to modify ordinary capabilities so as to continue to make a living, or make an even better living, in the future. (The concept embraces much, but not all, of what is usually called innovative activity.)

“Capabilities” vs. “Problem-solving”

- **The idea of dynamic capability, like that of ordinary capability, centrally involves an affirmation of the crucial role played by learning and practice. DC is “learned competence” for dealing with change.**

- **There are other ways to change, ways in which practice plays a lesser role relative to creative insight, systematic thought, or dogged pursuit of goals.**

- **Part of the interest in the subject arises from the challenge of parsing the relative roles of dynamic capability and these alternatives. (See Gomory quote again).**

Technological paradigms

The semiconductor case illustrates most vividly the point that dynamic capabilities are often centered on the routinized pursuit of a "technological paradigm", tracing out over time a "technological trajectory".

(See the June 2008 special issue of *Industrial and Corporate Change*, commemorating Giovanni Dosi's *Research Policy* paper of 1982, "Technological Paradigms and Technological Trajectories.")

Where “dynamic capability” came from: Teece, Pisano and Shuen, Strategic Mgmt J. 1997

“The global competitive battles in high-technology industries such as semiconductors, information services, and software have demonstrated the need for an expanded paradigm to understand how competitive advantage is achieved.

“The term 'dynamic' refers to the capacity to renew competences so as to achieve congruence with the changing business environment;

Update : Teece in SMJ 2007, "Explicating Dynamic Capabilities

… in today's fast-moving business environments open to global competition, and characterized by dispersion in the geographical and organizational sources of innovation and manufacturing, *sustainable* advantage requires more than the ownership of difficult-to-replicate (knowledge) assets. It also requires unique and difficult-to-replicate dynamic capabilities. These capabilities can be harnessed to continuously create, extend, upgrade, protect, and keep relevant the enterprise's unique asset base.

David Teece (2007: 1319)

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Sustainable competitive advantage?

- **This emphasis on congruence with a changing competitive environment marks the dynamic capabilities approach as different from prior approaches in the strategic management literature, which generally associated sustainable advantage with a static position that was immunized against challenge for some reason.**

- **Depending on circumstances, DCs may operate primarily *reactively*, to adapt to identified change, or *proactively*, to innovate.**

- **The line between these can blur, however.**

The basic economics of dynamic capability

- **In the adaptive application, a firm might hedge its commitments to its ordinary capabilities by investing in preparedness for various environmental contingencies, so as to smoothly negotiate a possible future change.**

- **But there are many possible contingencies and preparedness *per se* generates no revenue in the short term; it is an overhead cost burden.**

- **Because of its overhead costs, the use of dynamic capability as a simple hedge against change is necessarily limited, and a realistic option only for larger firms.**

Implications of scale

- A common scenario is that a startup firm is born with an initial product idea is hand, or almost in hand. This idea may be the product of random inspiration, or more likely, it is the result of exposure to some knowledge source.

- While this idea may yield success in the short term, few such ideas have durable success without follow-on improvements

- Because of the cost burden, a small startup is likely to have difficulty in transcending its initial success and producing a continuing flow of improvements.

Conceptual controversy

- The original characterization of dynamic capabilities provoked skepticism on the ground that the concept is tautological, a phenomenon recognizable only by its desirable effects and successful instances.

- The emphasis here on is learned competence, acquired at a cost, and with no guarantees as to the duration of benefits. It is not tautological and not a "rule for riches."

What are we talking about here?

- Is dynamic capability best thought of as an organizational attribute, or as a skill of the top management team … perhaps just the CEO?

- Should primary emphasis should be given to the activities of R&D scientists and engineers, or to managerial cognition and tasks?

- Is dynamic capability built primarily through learning from experience, or are human resources policies a fundamental factor?

- Can we say "all of the above"?

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Schumpeterian antecedents

I. *The Theory of Economic Development*, 1911 [1934]
II. *Capitalism, Socialism and Democracy*, 3rd ed, 1950

"…mere growth of the economy, as shown by the growth of population and wealth," is not "development." (TED: 63)

In TED, development is the result of innovations by entrepreneurs, disrupting the equilibrium "circular flow."

In CSD, Schumpeter speaks of the "routinization of innovation", and ascribes a central role to corporate R&D.

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Routinization of *innovation*?

"… it is much easier now than it has been in the past to do things that lie outside familiar routine – innovation itself is being reduced to routine. Technological progress is increasingly becoming the business of teams of trained specialists who turn out what is required and make it work in predictable ways…." CSD: 132.

- **This sounds like routinization of product development, i.e., "invention," which is not innovation in Schumpeter's sense.**
- **Dynamic capability is a kindred idea to the routinization of Schumpeter II, but it is a broader idea than Schumpeter's.**

MORE EXAMPLES, IMPLICATIONS

Expanding the examples

- There are many other companies that, like Intel, have maintained market success over many decades on the basis of extending a central technological competence

- The struggles of the pharma companies to negotiate changing drug discovery regimes are broadly analogous to those of Intel with miniaturization.

- A quite different class of examples is provided by the large replicator organizations in fast food, mass retailing, hotels, furniture, banking.

Replication in economic evolution

- A central problem for any evolutionary theory is how a “type” becomes extended in space and time.
- In standard economics, there has been a tendency to trivialize this process, but it is both interesting and important to development.
- The dynamic capabilities of replicator organizations reside in the central structures that guide the geographic extension of the network and support it.

Replication studies: the questions

- Origins and growth.
- Learning – about the product, the system, and the replication process.
- Replication methods – how much flexibility?
- Site heterogeneity – picking sites, coping with idiosyncrasy
- Organization forms – franchises vs. company-owned, control, incentives.
- Public policy aspects – regulatory, trade, acceptance.

Generalizations about dynamic capability

1. Dynamic capability is a pervasive phenomenon in the global economy and a major source of economic change in many sectors.

2. It is most characteristically illustrated in large organizations that have had success in doing "the same thing" over periods of many decades.

3. Success requires repeatedly overcoming novel, multi-dimensional challenges – not just technical challenges.

Much of the resulting change is to be celebrated, but the total amount of social change being produced is enormous whether it is desirable or not. In one area after another, significant concerns arise *precisely because* of the sustained innovative prowess of large organizations.

Uncertainty? Who suffers the uncertainty? Sustainable advantage? How about sustainable development?

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