The Architecture and Evolution of World-Class Enterprises

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Research Question(s)

“Why do firms in the same industry vary systematically in performance over time?”

Evolutionary Economist, Richard Nelson
“Why do Firms Differ, and How Does It Matter?”
(Strategic Management Journal, 1991)

Organizational Ecologist, Glenn Carroll
“A Sociological View on Why Firms Differ.”
(Strategic Management Journal, 1993)

“How do firms that have a stakeholder approach differ in competitiveness from firms that maximize stockholder wealth?”

Evolutionary Economist, Edith Penrose
The Theory of the Growth of the Firm (1959)
Primary “Dependent” Variable: Long-Term Firm Performance

Manufacturing Example: Toyota Motors

Service Example: Southwest Airlines

What’s going on here?

Red’s main objective isn’t to maximize this...

Blue’s main objective is to maximize this...

Market Capitalization 1989-2009

American Delta All Others Southwest

Market Capitalization 1989-2009

Toyota Chrysler Ford GM

Example:

Toyota Motors

Example:

Southwest Airlines

Blue’s main objective is to maximize this...

Red’s main objective isn’t to maximize this...
“Independent Variable”:
Organizational Species
“A political perspective defines power as the ability to get things done when goals conflict.”
R. Dahl (1957)

“The business firm is a political coalition and the executive is a political broker.
The composition of the firm is not given; it is negotiated.
The goals of the firm are not given; they are bargained.

We assume that there is a set of potential participants in the firm such as investors, suppliers, customers and various types of employees.”
J. March (1962)
Primary “Independent” Variable

Architectural Modularity-Integrality

<table>
<thead>
<tr>
<th>Singular (Maximization of Shareholder Value)</th>
<th>Objective Function</th>
<th>Plural (Maximization of Stakeholder Surplus)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrow (narrow spatial, short temporal)</td>
<td>Boundaries (Spatio-Temporal)</td>
<td>Broad (broad spatial, long temporal)</td>
</tr>
<tr>
<td>Simple (High quantity of participants in a stakeholder class, Low quality of stakeholder relationships)</td>
<td>Interfaces</td>
<td>Complex (Low quantity of participants in a stakeholder class, High quality of stakeholder relationships)</td>
</tr>
</tbody>
</table>
Research

Design & Methods
**Theoretical Sample**
(small N, non-random sample for theory-building)

- **Modular** enterprise architecture
  - Firm
  - Product markets
  - Capital markets
  - Labor markets
  - Supplier markets

- **Integral** enterprise architecture
  - Firm
  - Product markets
  - Capital markets
  - Labor markets
  - Supplier markets

<table>
<thead>
<tr>
<th>Incumbent Species Representative</th>
<th>Industry (Sector)</th>
<th>Challenger Species Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boeing</strong> (US • 1916)</td>
<td>Commercial Airplanes</td>
<td><strong>Airbus</strong> (EU • 1970)</td>
</tr>
<tr>
<td><strong>General Motors</strong> (US • 1908)</td>
<td>Automobiles (Manufacturing)</td>
<td><strong>Toyota Motors</strong> (Japan • 1937)</td>
</tr>
<tr>
<td><strong>United Airlines</strong> (US • 1926)</td>
<td>US Airlines (Services)</td>
<td><strong>Southwest Airlines</strong> (US • 1970)</td>
</tr>
</tbody>
</table>
Research Design: Three Elements

1. 8 year, field-based comparative case study (of incumbent & challenger in primary sample)

2. Historical analysis using secondary data sources (on both primary & secondary samples)

3. Simulation model to extrapolate beyond the data (on both primary & secondary samples)
Mapping **Micro-Frames** (of key decision-makers) across the **Macro-Enterprise** (of key stakeholders)

**Internal Hierarchy of Stakeholder Firm**

**Enterprise Architecture**

*Micro-Frames of key Decision-Makers*

*Macro-Enterprise of key Stakeholders*

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Theoretical Framework
The Evolution of Business Ecosystems

**Market (Quantity) Loop**

**Enterprise Architectures**
- **Modular Enterprises**
  - Firm
  - Capital markets
  - Labor markets
  - Supplier markets
  - Maximization of Shareholder Value
- **Integral Enterprises**
  - Firm
  - Capital markets
  - Labor markets
  - Supplier markets
  - Product markets
  - Maximization of Stakeholder Surplus

**Competitive Dynamics**
- **Short-term Speed & Flexibility**
- **Long-term Speed & Stability**

**Firm Performance**
- **Modular 1**
- **Modular 2**
- **Modular 3**
- **Integral Enterprise**
  - Top-line Revenue focus
  - Bottom-line Cost focus

**Carrying Capacity** (e.g., Global GDP)

**Stable Markets** (Economies of Scope)

**Growing Markets** (Economies of Scale)

**Industry Output**

**1900 1925 1950 1975 2000**
The Evolution of Business Ecosystems

Technology (Quality) Loop

Enterprise Architectures

Firm Performance

Industrial Evolution

Maximization of Shareholder Value

Maximization of Stakeholder Surplus

Over-served markets

Under-served markets

Dominant Design

Carrying Capacity

(Technology Demanded)

Higher, Faster, Farther (Product Innovation)

Better, Faster, Cheaper (Process Innovation)

Cost Position

Product Differentiation

Top-line Revenue focus

Bottom-line Cost focus

Market Capitalization

Modular 3

Modular 2

Modular 1

Integral Enterprise

Modular 1

Modular 2

Modular 3

Integral Enterprise

1900 1925 1950 1975 2000

Technological Performance

Higher

Low

1900 1925 1950 1975 2000

Under-served markets

Over-served markets

(Technology Demanded)

Carrying Capacity

Dominant Design

Top-line Revenue focus

Bottom-line Cost focus

Market Capitalization

Modular 3

Modular 2

Modular 1

Integral Enterprise

1900 1925 1950 1975 2000

Technological Performance

Higher

Low

Enterprise Architectures

Firm Performance

Industrial Evolution

Maximization of Shareholder Value

Maximization of Stakeholder Surplus

Over-served markets

Under-served markets

Dominant Design

Carrying Capacity

(Technology Demanded)
The Evolution of Business Ecosystems

**Market (Quantity) & Technology (Quality)**

**Product innovation** drives the need for enterprise **integration**

During *high growth rate* phase, **integral** enterprise architecture “dis-integrates” towards a **modular** enterprise architecture

**Process innovation** drives the need for enterprise **integration**

**Firm α**
- Product markets
- Capital markets
- Labor markets
- Supplier markets

**Firm β**
- Product markets
- Capital markets
- Labor markets
- Supplier markets

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Evolution of the Commercial Airplane Industry

1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010

1916 Founding
1926-1929 Public flotation followed by M&A: forward and backward integration (United Aircraft & Transport Corp.)
1934-1935 anti-trust break-up Founder quits
1936 First union recognized
1970 Airbus Industrie founded as a "GIE" (groupe d'intérêt économique)
1980-2010 Japanese outsourcing grows from 15% to 35%
1987 Attempted hostile takeover
1990-2010 Multiple strikes, share buybacks
1997 McDonnell-Douglas merger
2010-2010 Market share losses

1916
1926-1929
1934-1935
1936
1970
1980
1990
2000
2010

Max. \frac{dq}{dt}
Max. \frac{dQ}{dt}

United Airlines
Boeing
I.A.M.
Pratt & Whitney, Hamilton and Vought

Technological Quality, \( q \)
Market Quantity, \( Q \)

EADS (Netherlands)
Airbus S.A.S.

BAE Sys. (UK)

Aérospatiale (France)
DASA (Germany)
CASA (Spain)

Careers: Capital markets, Labor markets, Supplier markets, Product markets

1997-2010 Market share losses
2000-2010 Multiple strikes, share buybacks
2010-2010 Market share losses

2005 Boeing Wichita sold (Spirit Aerosystems)
2006-2010 Diffusion of ownership
First labor "strikes"
Risk-sharing partnerships

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… at the *Ecosystem* level, the dominant Architecture appears to *oscillate*.

**Dominant Design**

(in Enterprise Architectures)

- **Firm & Industry Growth Rates**
  - (quantity & quality)

While Architectures appear to evolve *monotonically* at the *Enterprise* level...
Inter-species Competition

The Tortoise vs. The Hare

Modular Enterprise Architecture

Boeing

Integral Enterprise Architecture

Airbus
Inter-species Competition across Ecosystems

Automobile

Airplane

Airline

Steel (Mathur)

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Mathematical Models
(Numerical Simulation)
Inter-species Competition
Model Structure

The species is modeled on two dimensions:
1) Quantity (damped, K-based growth)
2) Quality (Cost niche)

The associated differential equation:
1) \( \frac{dY}{dt} = r_Y Y \left[ 1 - \frac{Y}{D+Y} - X \alpha_X / (D+Y) \right] \)
2) \( r_Y < r_X \) when \( X+Y < K/2 \)
   \( r_Y > r_X \) when \( X+Y > K/2 \)

The market is modeled on two dimensions:
1) Quantity (Diffusion)
2) Quality (Commoditization)

The associated differential equations:
1) \( \frac{dA}{dt} = r_d A (1-A/K) \)
2) \( \frac{dC}{dt} = r_c C (1-C/A) \)

The species is modeled on two dimensions:
1) Quantity (undamped, r-based growth)
2) Quality (Differentiation niche)

The associated differential equation:
1) \( \frac{dX}{dt} = r_X X \left[ 1 - \frac{X}{D+X} - Y \alpha_Y / (D+X) \right] \)
2) \( r_X > r_Y \) when \( X+Y < K/2 \)
   \( r_X < r_Y \) when \( X+Y > K/2 \)
Inter-species Competition
Model Structure & Behavior

K-strategist
(Equilibrium species)

Market Sector

r-strategist
( Opportunist species)
Duopoly Matrix
(Lambertini and Rossini, 1998)

Over-Invest

Invest at Market Interest Rates

Under-Invest

Profit-Maximizing Duopoly

Labor-Managed Duopoly

Mixed Duopoly

(Duopoly Matrix (Lambertini and Rossini, 1998))
Strategic Leadership

(Design Intelligence)
“Mr Okuda, chairman of Toyota Motor Corporation told the assembled money managers that it would be irresponsible to run Japanese companies primarily in the interests of the shareholders.”

“Under Japanese company law, shareholders are the owners of the corporation. But if corporations are run exclusively in the interests of shareholders, the business will be driven to pursue short-term profit at the expense of employment and spending on research & development.”

“To be sustainable, corporations must nurture relationships with stakeholders such as suppliers, employees and the local community. So whatever the legal position, the corporation does not belong to its owners.”

“‘In Japan’s case,’ said Mr. Okuda, ‘it is not enough to serve shareholders.’”
“We can’t let investors guide the company.”

Southwest CEO James Parker
*Business Week*, 8 October 2001

“We are willing to suffer some damage, even to our stock price, to protect the jobs of our people.”

Southwest CEO Herb Kelleher

“Manage in the good times, to prepare for the bad times.”

Southwest CEO Herb Kelleher

“We can’t let investors guide the company. That’s not to say that investors aren’t smart and don’t have good ideas, because they do. They just have different motives. We’ve got to stay true to who we are as a company and build for the long term.”

Southwest CEO Gary Kelly
*The Dallas Morning News (20 December 2007)*

“We can’t let investors guide the company.”

Stock Market Analysts

“Southwest is operating with a bloated balance sheet. It needs to get rid of its pile of cash.”

Stock Market Analysts

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“I am always a bit surprised by the speed with which Americans take decisions: that in three days (after the 9-11 attacks) they announce 25,000 lay-offs at Boeing seems to me totally stupefying,” Forgeard said. Forgeard said his company’s situation is different “because Airbus has a bigger order book than Boeing and growing market share.”

(Camus/Hertrich, AFX, 20 Sept. 2001)
“These days, you can’t swing a dead cat without hitting some corporate executive whining that Wall Street won’t let him run the company for long-term growth. But I say complaining is a waste of time. In the end, you have to choose your master – the investor or the speculator.” What’s the difference? 

**Time.** Speculators, of course, believe in the fast buck. They wave the capital in your face and expect you to abandon common sense. The amazing thing is, it works! Time and again, executives dance to their tune. We refuse to do it. I like to remind our managers: We are not dogs on a leash, doing tricks to manage the stock price or maximize dividends quarter-by-quarter. We’re eagles, we soar. If investors want to soar, too, they’ll invest in us. The speculators, we don’t need.”

*Nucor Steel Chairman, Ken Iverson*
“First and foremost, senior management needs to stabilize the organization.”

“Successful strategy implementation lies in adherence to long-term strategies, not short-term goals or revenue targets.”

“Achievement of short-term goals, often overrides the strategic direction established at top levels for the organization. There is less incentive for executive management to stick to the strategy, but rather more incentive to manage “by the numbers”. The result is that tactics become more important than strategy. The bottom line and profitability become more important than establishing market presence, etc.”

Carolyn Corvi, Boeing VP GM Airplane Programs