Value, Rarity and Inimitability of IT Resources, and IT and Firm Performance: An Empirical Study of Medium Sized Enterprises

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Industry Structure – Firms participating in more attractive industries are more profitable (Porter 1985)

What is an Attractive Industry?
- Bargaining Power of Suppliers
- Bargaining Power of Customers
- Rivalry in Industry
- Threat from Substitutes
- Entry Barriers
Empirical Studies Paint a Different Picture:

<table>
<thead>
<tr>
<th></th>
<th>Industry</th>
<th>Corporation</th>
<th>Business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variation in Firm Performance</td>
<td>8%</td>
<td>1%</td>
<td>45%</td>
</tr>
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</table>

(Rumelt 1991)

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<tbody>
<tr>
<td>Variation in Firm Performance</td>
<td>19%</td>
<td>4%</td>
<td>32%</td>
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</table>

(McGahan & Porter 1997)
Firms within the same industry have different performance.

Firm attributes rather than industry structure has a more substantial affect on performance.

Alternative theory of firm performance is formalized in the Resource-Based View.
Penrose (1959) – Firm as a collection of productive resources.

Barney (1991) – Firms have different collections of resources and these differences are persistent.
A Framework for Firm Resources

Physical Capital

Human Capital

Organizational Capital
Resource Attributes

VALUE
- Conceive or implement strategies
- Exploit opportunities
- Neutralize threats

RARITY
- Scarceness among competitors
- Uncommon
- No substitutes

INIMITABILITY
- Path dependent
- Causally ambiguous
- Socially complex

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Empirical Studies on the Effect of Firm Resources

- Marketing Resources (Capron and Hulland, 1999; Markides and Williamson, 1994)
- Human Capital Resources (Farjoun 1998)
- IT Resources (Bharadwaj, 2000; Powell and Dent-Micallef, 1997; Tippins and Sohi 2003)
Operational Resources and Manufacturing Performance (Schroeder, Bates and Junttila, 2002)
R&D Resources and New Product Development (Henderson and Cockburn, 1994)
IT Resources and Customer Service (Ray, Barney and Muhanna, 2004)
A Framework for IT Resources

IT Infrastructure

Technical Skills

IT-Business Unit Relationships
Our Conceptual Model

IT Infrastructure

IT Innovation Performance

IT Resources

IT Business Unit Relationships

Technical Skills

IT Operational Performance

Firm Performance

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A resource is valuable when a firm is able to increase revenue and/or decrease costs compared to when the firm does not possess the resource.

- Useful in conceiving how IT can be used to solve business problems.
- When the resource can be used to develop and test applications that allow the execution of business activities.
- When the resource provides the technology platform to implement, operate, or maintain IT systems.
Rarity

Not common amongst a firm’s competitors and scarce in supply. Resource also should have no strategically equivalent substitutes.

- When conceptualizing innovative applications to support or shape business processes is very specific to an organization.

- When a deep understanding of the business processes and strategies of the firm are required.
INIMITABILITY

A resource is inimitable if firms that do not possess the resource cannot acquire it at comparable costs.

- When the firm accumulates customer data and uses that data to provide each customer with a personalized service (path dependence).

- A resource is used together with a set of other resources and the firm’s competitors are unsure about the presence and relationships among resources (casual ambiguity).

- When trust, interpersonal relationships, and a shared body of firm-specific knowledge between the IT personnel and business users at a level where they are able to effectively work together (social complexity).
The IT physical capital, human capital and organizational capital (IT Resources) are related to both innovation and operational IT performance.

Value, rarity and inimitability act in a complementary way to affect IT performance.

IT Innovation Performance is related to Firm Performance, while IT Operational Performance is not.
Which IT resources affect performance?

Which attributes among value, rarity, and inimitability affect IT performance?

Do the attributes of the resources act in a complementary way in affecting IT performance?

What is the impact of IT operational and IT innovation performance on firm performance?
Our Conceptual Model

IT Infrastructure

Technical Skills

IT-Business Unit Relationships

IT Innovation Performance

IT Resources

IT Operational Performance

Firm Performance

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- Firms with US$250 million - $1 billion annual revenue
- All public firms in the five state region
- 490 firms surveyed
- 120 valid responses
- Original and two follow-up mailings
- Respondent of interest is Chief Information Officer (or top IT executive)
Your firm’s IT Resources are…

important in conceiving new IT applications.
important in developing and testing new IT applications.
important in implementing new IT applications.
important in the day-to-day operation of IT applications.

<table>
<thead>
<tr>
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<th>IT Infrastructure</th>
<th>IT Technical Skills</th>
<th>IT-Business Relationships</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.21</td>
<td>4.27</td>
<td>4.30</td>
</tr>
<tr>
<td>Std Deviation</td>
<td>0.60</td>
<td>0.59</td>
<td>0.53</td>
</tr>
</tbody>
</table>

Strongly Disagree=1; Disagree=2; Neither Agree nor Disagree=3; Agree=4; Strongly Agree=5

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Your firm’s IT Resources are…

**common** amongst your competitors (in terms of quality and quantity). **easily replaced** with available substitutes (e.g., outsourced alternatives). **replaceable** with **equally valuable** substitutes.

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<th>IT Technical Skills</th>
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</thead>
<tbody>
<tr>
<td>Mean</td>
<td>2.79</td>
<td>3.14</td>
</tr>
<tr>
<td>Std Deviation</td>
<td>0.77</td>
<td>0.67</td>
</tr>
</tbody>
</table>

*Strongly Disagree=5; Disagree=4; Neither Agree nor Disagree=3; Agree=2; Strongly Agree=1*
Your firm’s IT Resources are…

a unique resource that is very specific to your firm.
difficult to describe in terms of how you create, deploy, and renew them.
difficult for your competitors to observe in terms of how you create, deploy, and renew them.
difficult for your competitors to imitate given the history of decisions and investments you have made to develop them.
difficult for your competitors to imitate given the unique social characteristics of your firm.

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<tr>
<td>Mean</td>
<td>2.62</td>
<td>2.96</td>
<td>3.09</td>
</tr>
<tr>
<td>Std Deviation</td>
<td>0.80</td>
<td>0.68</td>
<td>0.67</td>
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Strongly Disagree=1; Disagree=2; Neither Agree nor Disagree=3; Agree=4; Strongly Agree=5
Measuring IT Operational Performance

Your firm is above the industry average...

in delivering IS/IT applications/solutions on budget.
in delivering IS/IT applications/solutions on time.
in operating IS/IT applications/systems with low downtime.

<table>
<thead>
<tr>
<th></th>
<th>IT Operational Performance</th>
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<tbody>
<tr>
<td>Mean</td>
<td>3.53</td>
</tr>
<tr>
<td>Std Deviation</td>
<td>0.64</td>
</tr>
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</table>

Strongly Disagree=1; Disagree=2; Neither Agree nor Disagree=3; Agree=4; Strongly Agree=5

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Your firm is above the industry average.

in its ability to align IS/IT strategy/plans with business strategy/plans.
in evaluating emerging technologies to solve business problems.
in innovating with information technologies to deliver business solutions.

<table>
<thead>
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<th>IT Innovation Performance</th>
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<tr>
<td>Mean</td>
<td>3.24</td>
</tr>
<tr>
<td>Std Deviation</td>
<td>0.79</td>
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Strongly Disagree=1; Disagree=2; Neither Agree nor Disagree=3; Agree=4; Strongly Agree=5

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In the last three years, your firm…

has consistently been more profitable than its competitors.
has successfully defended its competitive advantages.
return on assets (ROA) has been greater than that of competitors.
return on sales (ROS) has been greater than that of competitors.

<table>
<thead>
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<th>Firm Performance</th>
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<tbody>
<tr>
<td>Mean</td>
<td>3.45</td>
</tr>
<tr>
<td>Std Deviation</td>
<td>0.73</td>
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</table>

Strongly Disagree=1; Disagree=2; Neither Agree nor Disagree=3; Agree=4; Strongly Agree=5

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Direct Effects
IT Infrastructure

Value
-0.02
0.03
Rarity
Inimitability
-0.02
-0.07
-2.02
0.76
0.13
0.66
0.30
0.35 ***
-3.45
IT Size
IT Expense
IT Operational Performance
Firm Size
R&D Exp
Adv Exp
Firm Performance
IT Innovation Performance
0.21 *
Complementarity Among Value, Rarity & Inimitability

**Company 1**

- **VALUE**
- **RARIETY**
- **INIMITABILITY**

**Company 2**

- **VALUE**
- **RARIETY**
- **INIMITABILITY**

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Complementary Effects
IT-Business Relationships

Value

Rarity

Inimitability

IT-Operational Performance

IT Size

IT Expense

Firm Size

R&D Exp

Adv Exp

IT Innovation Performance

Firm Performance

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Questions & Answers

Which IT resources affect performance?
Physical (IT Infrastructure), human (IT Technical Skills) and organizational capital (IT-Business Relationships) affect performance.

Which attributes among value, rarity, and inimitability affect IT performance?
Inimitability is the key attribute.

Do the attributes of the resources act individually or in a complementary way in affecting IT performance?
The combination of resource attributes affects IT performance.

What is the impact of IT operational and IT innovation performance on firm performance?
IT Innovation Performance is associated with firm performance.
- 3 Types of IT Resources (Technical skills, Infrastructure, IT-Business Relationships)
- 3 Resource Attributes (Value, Rarity, Inimitability)
- 2 Types of IT Process Performance (Operational, Innovative)
- 1 Firm Performance (Profitability)
- Complementarity Among Attributes
A Concrete Example - Football

- 3 Types of Resources (Lineman, Offensive Backfield, Defensive Backfield)

- 3 Resource Attributes (Strength, Speed, Knowledge of the Game)

- 2 Types of Process Performance (Defensive, Offensive)

- 1 Team Performance (Wins/Losses; Championships)

- Complementarity – Knowledge of the game makes speed and/or strength more productive.
When Is a Resource Valuable?
- aids in the performance of the process (internal)
- can be sold in the marketplace (external)
- provides more economic value than what we could get for the resource in the marketplace

When Is a Resource Rare?
- not readily available in the market
- more would be utilized if available

When Is a Resource Inimitable?
- “difficult” to obtain (make or buy)
- has no ready substitutes

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Value
- IT Infrastructure (aligned, robust, reliable)
- IT Technical Skills (aligned, current, adaptable)
- IT-Business Relationships (trusting, goal compatible)

Speed
- Lineman
- Offensive Backfield
- Defensive Backfield
Rarity
- IT Infrastructure (commodity/proprietary)
- IT Technical Skills (insourced, specialized, leading)
- IT-Business Relationships (shared mental models)

Strength
- Lineman
- Offensive Backfield
- Defensive Backfield
Inimitability
- IT Infrastructure (unique, path dependent, causally ambiguous)
- IT Technical Skills (customized, path dependent, causally ambiguous)
- IT-Business Relationships (institutionalized, path dependent, causally ambiguous)

Knowledge of the Game
- Lineman
- Offensive Backfield
- Defensive Backfield
Complementarity of Resource Attributes

IT (Value, Rarity, Inimitability)
- IT Infrastructure (General Mills/ 3M)
- IT Technical Skills (Delta Airlines/ SuperValu)
- IT-Business Relationships (UnitedHealth/ Cargill)

Football (Speed, Strength, Knowledge)
- Offensive Line (Matt Birk/ Bryant McKinney)
- Defensive Backfield (Mike Singletary/ Cedric Griffin)
- Offensive Backfield (Tavaris Jackson/ Brett Favre)
Implications for IT Strategy

- Select or Develop
  - Resources
  - Resource Capabilities

- Configuration with Competitive Capabilities

- Level of Flexibility/Adaptability
Questions and Comments?
Thank you!