

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

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CIO Collaborative
Research on IS/IT
Organizational Design
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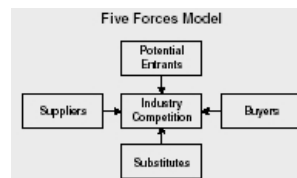


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What Explains Variation in Firm Performance?

- ❑ 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



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What Explains Variation in Firm Performance?

Empirical Studies Paint a Different Picture:



	Industry	Corporation	Business
Variation in Firm Performance	8%	1%	45%

(Rumelt 1991)

	Industry	Corporation	Business
Variation in Firm Performance	19%	4%	32%

(McGahan & Porter 1997)

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Alternative Explanation for Variance in Performance

- 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.



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Resource-Based View

RESOURCES

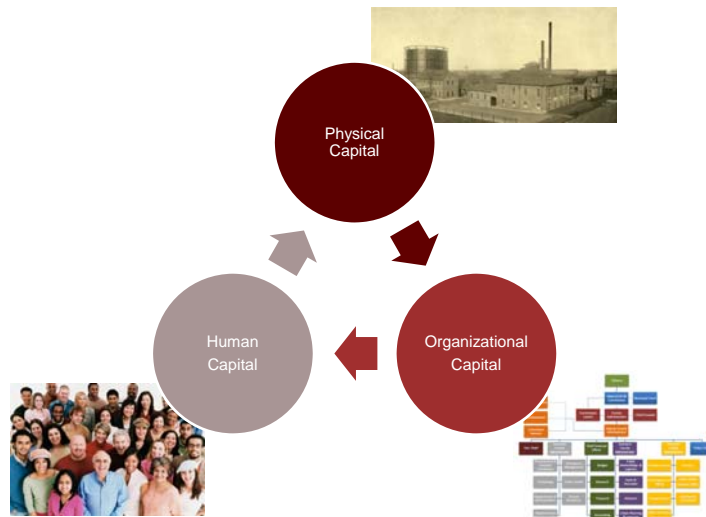


Sustained
Competitive
Advantage

- ❑ Penrose (1959) – Firm as a collection of productive resources.
- ❑ Barney (1991) – Firms have different collections of resources and these differences are persistent.

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A Framework for Firm Resources



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Resource Attributes

VALUE



RARITY



INIMITABILITY



- Conceive or implement strategies
- Exploit opportunities
- Neutralize threats
- Scarceness among competitors
- Uncommon
- No substitutes
- Path dependent
- Causally ambiguous
- Socially complex

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Empirical Studies on the Effect of Firm Resources

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)

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Empirical Studies on Resources and Process Performance

RESOURCES

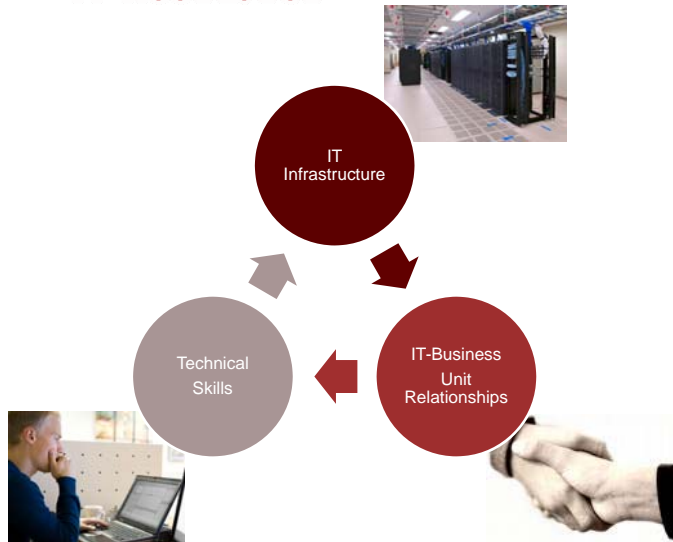


Process-
Level
Performance

- ❑ 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)

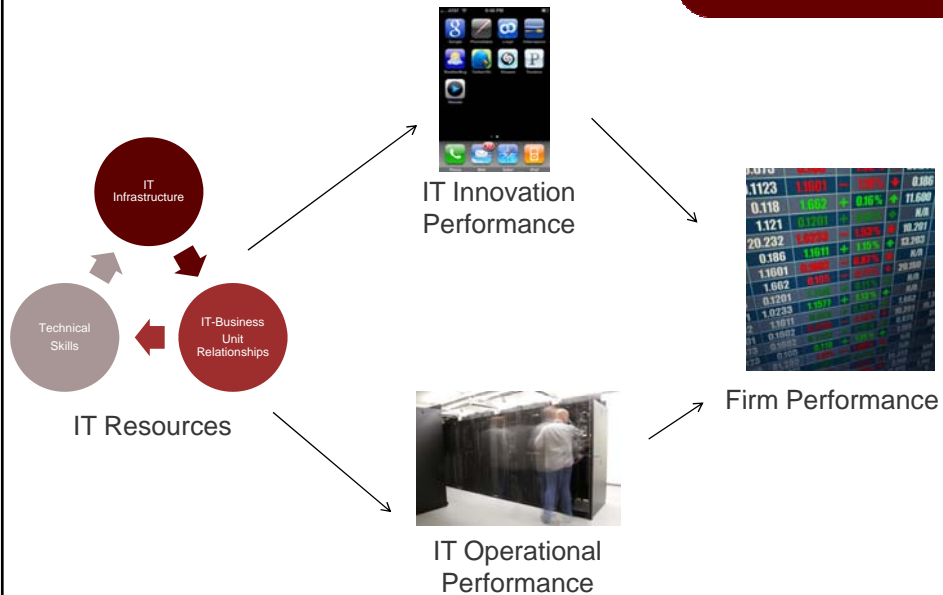
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A Framework for IT Resources



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Our Conceptual Model



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What Makes IT Resources Valuable?

VALUE

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.

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What Makes IT Resources Rare?

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.

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What Makes IT Resources Inimitable?

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).

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Key Findings

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.

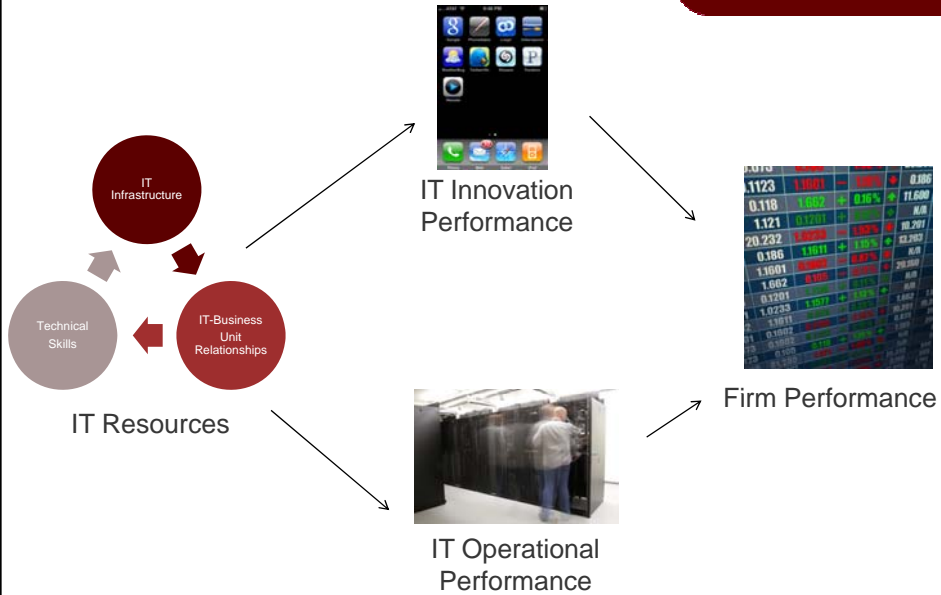
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Questions

- 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?

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Our Conceptual Model



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Sample

- ❑ 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)



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Measuring the Value of IT Resources

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.

	IT Infrastructure	IT Technical Skills	IT-Business Relationships
Mean	4.21	4.27	4.30
Std Deviation	0.60	0.59	0.53

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

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Measuring the Rarity of IT Resources

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.

	IT Infrastructure	IT Technical Skills	IT-Business Relationships
Mean	2.79	3.14	3.35
Std Deviation	0.77	0.67	0.64

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

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Measuring the Inimitability of IT Resources

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.

	IT Infrastructure	IT Technical Skills	IT-Business Relationships
Mean	2.62	2.96	3.09
Std Deviation	0.80	0.68	0.67

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

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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**.

	IT Operational Performance
Mean	3.53
Std Deviation	0.64

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

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Measuring IT Innovation Performance

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**.

	IT Innovation Performance
Mean	3.24
Std Deviation	0.79

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

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Measuring Firm Performance

In the last three years, your firm...

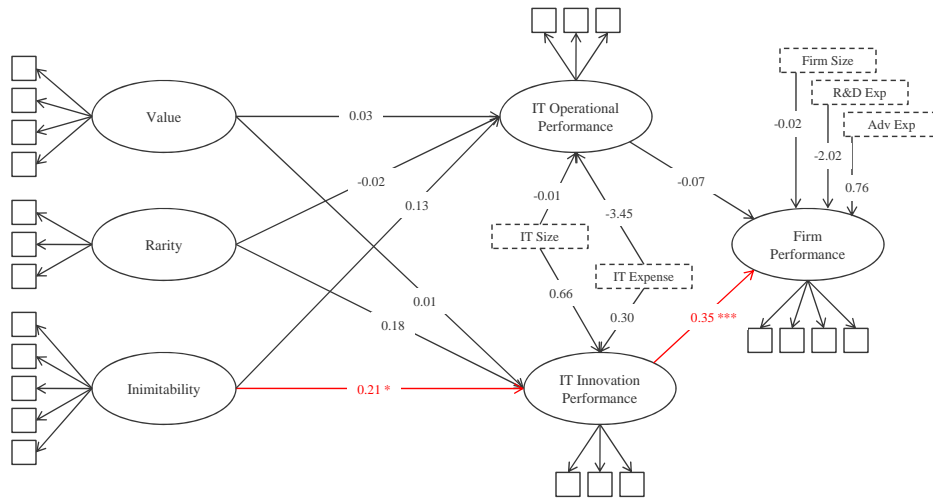
has consistently been **more profitable than its competitors**.
has successfully **defended its competitive advantages**.
return on assets (ROA) has been greater than that of competitors.
return on sales (ROS) has been greater than that of competitors.

	Firm Performance
Mean	3.45
Std Deviation	0.73

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

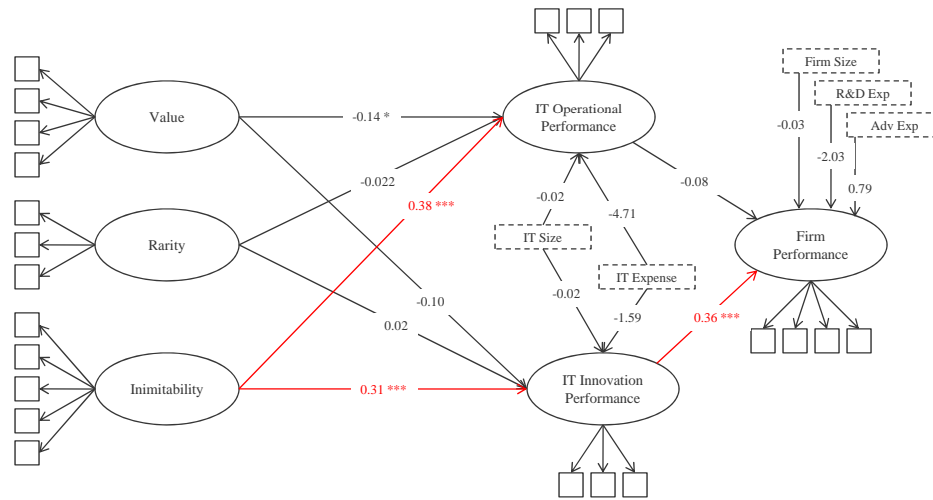
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Direct Effects IT Infrastructure



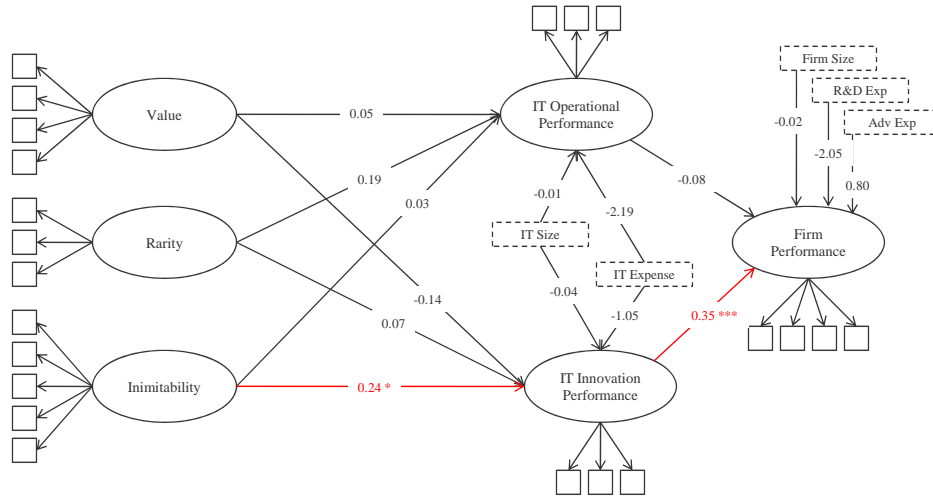
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Direct Effects IT Technical Skills



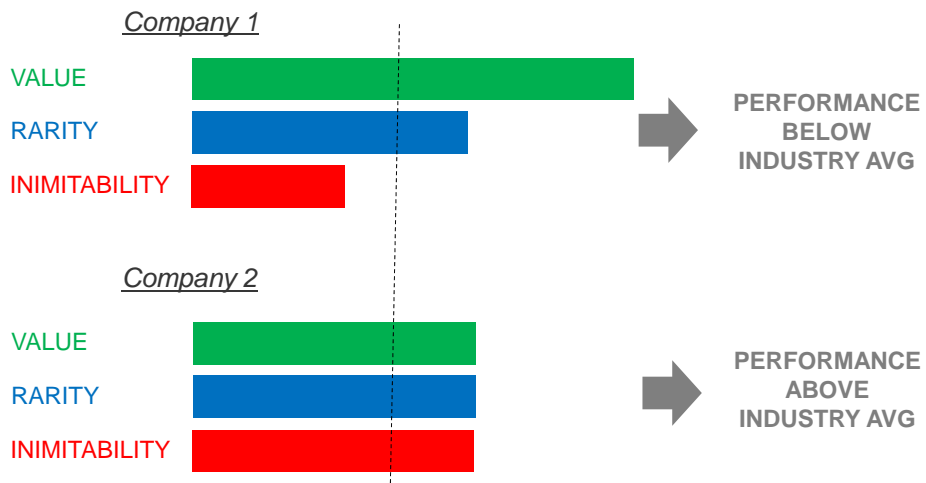
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Direct Effects IT-Business Relationships



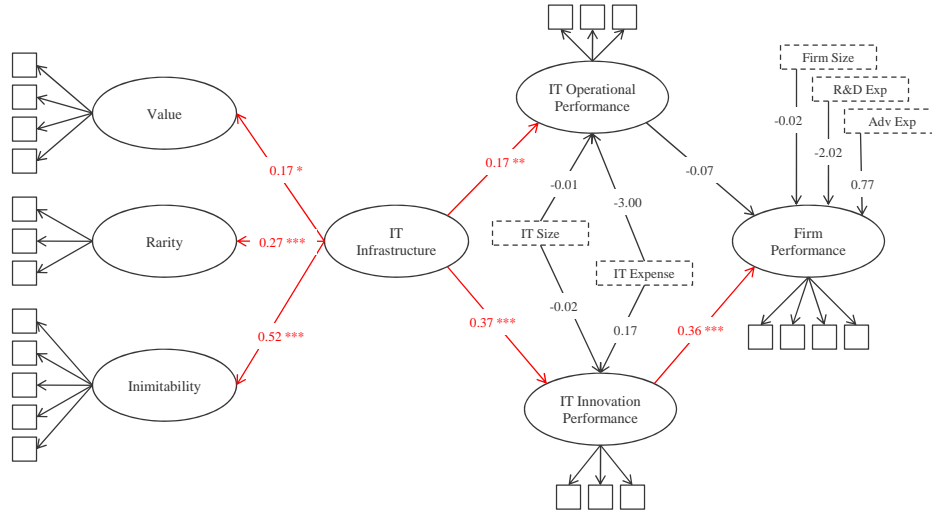
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Complementarity Among Value, Rarity & Inimitability



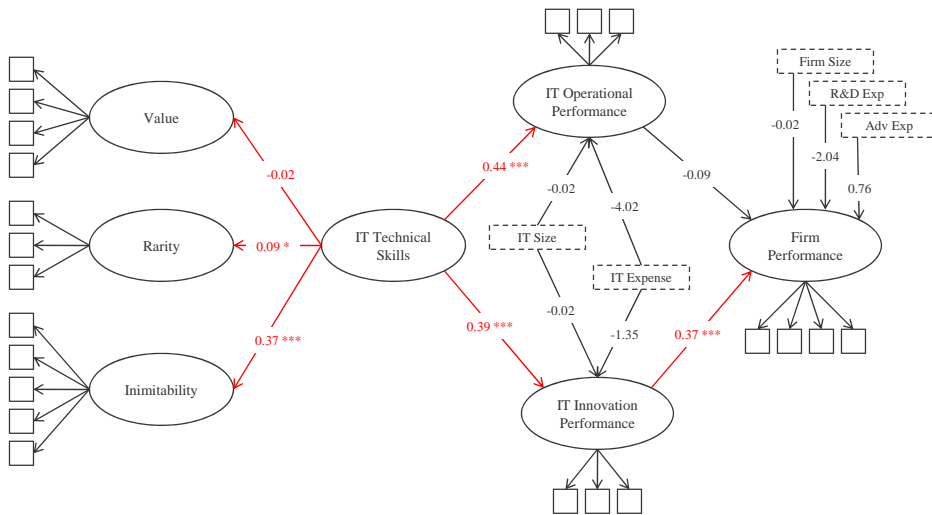
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Complementary Effects IT Infrastructure



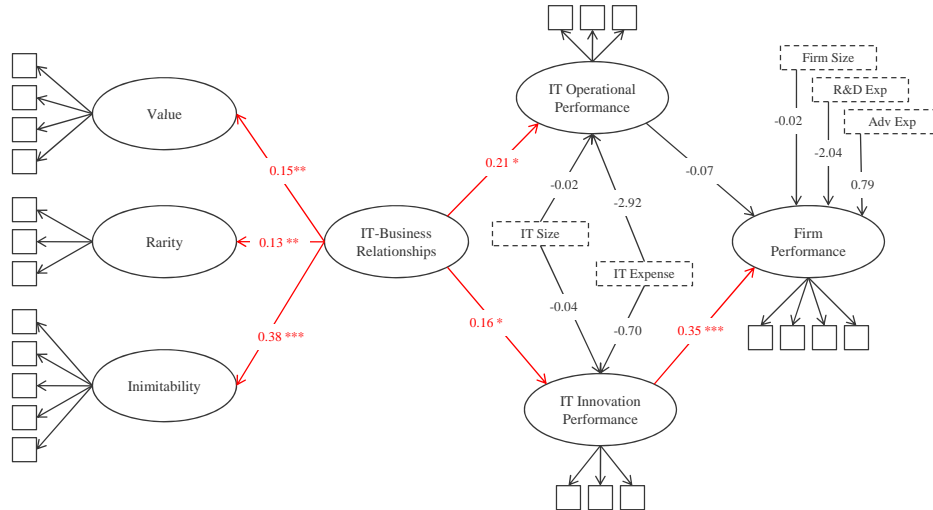
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Complementary Effects IT Technical Skills



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Complementary Effects IT-Business Relationships



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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.

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So... We Have Discussed

- ❑ 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

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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.



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The Devil Is in the Details

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

VALUE

When Is a Resource Rare?

- not readily available in the market
- more would be utilized if available

RARITY

When Is a Resource Inimitable?

- "difficult" to obtain (make or buy)
- has no ready substitutes

INIMITABILITY

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Instantiation in IT - Value

Value

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

Speed

- Lineman
- Offensive Backfield
- Defensive Backfield

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Instantiation in IT - Rarity

Rarity

- IT Infrastructure (commodity/proprietary)
- IT Technical Skills (insourced, specialized, leading)
- IT-Business Relationships (shared mental models)

Strength

- Lineman
- Offensive Backfield
- Defensive Backfield

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Instantiation in IT - Inimitability

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

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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)

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Implications for IT Strategy

- Select or Develop
 - Resources
 - Resource Capabilities
- Configuration with Competitive Capabilities
- Level of Flexibility/Adaptability



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Questions and Comments?

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Thank you!



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