Architecture of Innovation

The Economics of Creative Organizations

by Joshua Lerner

Chapter 3

Architecture of Innovation: Chapter 3

Chapter 2:

Where R&D Came From

Chapter 4:

Getting Venturesome

What is R&D?

Research and experimental development comprise creative and systematic work undertaken to increase the stock of knowledge—including knowledge of humankind, culture, and society—and its use to devise new applications of available knowledge.

> **Basic research:** Experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view.
>
> **Applied research:** Original investigation undertaken in order to acquire new knowledge; directed primarily, however, toward a specific, practical aim or objective.
>
> **Experimental development:** Systematic work, drawing on knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing new products or processes or to improving existing products or processes (OECD 2015).

-NSF, National Science Board / Figures from NSF

Changing Face of Corporate R&D

“To be successful, innovation requires an intensive, hard-to-monitor effort from the participants, often working together.”

Changing Face of Corporate R&D

“How do incentives actually work in the real world?”

Changing Face of Corporate R&D

“Can creative exploration coexist with incentive compensation?”

Changing Face of Corporate R&D

- Netflix - movie recommendation algorithm
- Trends towards decentralized and incentive-based R&D
- Windows Mobile, Kodak, Bell Labs
- Favoring of divisional laboratories over central research facilities

The Rise of Open Source

- Software industry trend
- Market laggards have desire to open source
- Programming promise to share code with public
- Other trends: strategic alliances, competitions, and divisional labs
- Non-pecuniary benefits drive motivation (ego, satisfaction)

Taking Stock of Decentralization

- Stein Model (1997)
- Executives vs the technologist (information asymmetries)
- Internal capital markets - diversified firms find it difficult to redeploy capital into sectors with better investment opportunities
- Patent research on firm takeovers in unrelated industries (corellary with lower patent quality), Seru (2014)
- Core area research shows high levels of patent quality - the power of focus

Taking Stock of Decentralization

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Journal of Financial Economics

Volume 111, Issue 2, February 2014, Pages 381-405

Firm boundaries matter: Evidence from conglomerates and R&D activity ☆

Amit Seru

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https://doi.org/10.1016/j.jfineco.2013.11.001

Abstract

This paper examines the impact of the conglomerate form on the scale and novelty of corporate Research and Development (R&D) activity. I exploit a quasi-experiment involving failed mergers to generate exogenous variation in acquisition outcomes of target firms. A difference-in-differences estimation reveals that, relative to failed targets, firms acquired in diversifying mergers produce both a smaller number of innovations and also less-novel innovations, where innovations are measured using patent-based metrics. The treatment effect is amplified if the acquiring conglomerate operates a more active internal capital market and is largely driven by inventors becoming less productive after the merger rather than inventor exits. Concurrently, acquirers move R&D activity outside the boundary of the firm via the use of strategic alliances and joint ventures. There is complementary evidence that conglomerates with more novel R&D tend to operate with decentralized R&D budgets. These findings suggest that conglomerate organizational form affects the allocation and productivity of resources.

Appearance of Incentives

- Incentive model over last 20 years
- MLB and Schlumberger
- 1980s - rising tide against linking pay to performance (especially at larger firms)
- Other incentives include: stocks, other forms of equity, stipulated share of firm profits, promotions, future pay
- However, incentivized research still persists
- Research
  - IpPerformance Group (2011)
  - Neumeyer (1971)
  - Zenger and Lazzarini (2004)

Taking Stock of Increased Incentives

- Agency Theory and increased incentives (financial or non-pecuniary); Researchers are agents of corporate shareholders
- Expectancy models demonstrate relationships between incentives, effort, and performance
- Various studies done and many seem to replicate positive relationships (steel, glass, even golf)
- Motivation crowding-out is a concern with too high financial incentives
- Intrinsic Motivation Principle of Creativity by Teresa Amabile
- Manso (2011) argued for perfect combination of short-term protections and long-term rewards
- Research
    - Ichniowski et al. (1997)
    - Ehrenberg and Bognanno (1990)
    - Amabile (1982)
    - Manso (2011)

Taking Stock of Increased Incentives

The social psychology of creativity: A componential conceptualization.

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Amabile, Teresa M.

Abstract

Considers the definition and assessment of creativity and presents a componential framework for conceptualizing this faculty. Including domain-relevant skills, creativity-relevant skills, and task motivation as a set of necessary and sufficient components of creativity, the framework describes the way in which cognitive abilities, personality characteristics, and social factors might contribute to stages of the creative process. The discussion emphasizes the previously neglected social factors and highlights the contributions that a social psychology of creativity can make to a comprehensive view of creative performance. (99 ref) (PsycINFO Database Record (c) 2016 APA, all rights reserved)

Taking Stock of Increased Incentives

- Long-term incentives seem to have stronger outcomes
- Little association between short-term incentives for corporate R&D managers and innovation
- Research
  - Azoulay et al. (2009)
  - Wulf and Lerner (2006)