STRATEGIC MANAGEMENT OF INNOVATION
SESSION 2

Organizing Innovation I:
Internal Organization

Keld Laursen
Copenhagen Business School, INO
kl.ino@cbs.dk

September 2014


OUTLINE

• Intro
• The role of corporate structure
• The role of organizational practices
  – A small note on P-A theory
  – Complementary organizational practices’ effect on innovation.
  – Organizational practices and their effect on absorptive capacity.
  – Organizational practices and their effect on firms ability to absorb user/customer knowledge for innovation.
MAIN MESSAGE

• The way in which firms organize themselves affects:
  – The **direction** in which they do innovative search in terms of exploration and exploitation (Argyres/Silverman, 2004 SMJ; Jansen et al. 2006, AMJ).
  – The **level** of innovative activity within the firm and in conjunction with external parties such as customers (Laursen/Foss, 2003, CJE; Foss/Laursen/Pedersen, 2011, OrgSci)
The role of corporate structure
R&D, organizational structure and the effect on technological search

- Centralized R&D structure
  - Corporate HQ
    - Business Division 1
    - Business Division 2
    - Business Division 3
    - Business Division 4
    - Central R&D Laboratories

- Decentralized R&D structure
  - Corporate HQ
    - Business Division 1
      - R&D Organization
    - Business Division 2
      - R&D Organization
    - Business Division 3
      - R&D Organization
    - Business Division 4
      - R&D Organization

+ hybrid forms
The effect on technological search

• Research question: Does the type of organizational structure in terms of centralized or decentralized R&D lead to different innovations?
• Argyres and Silverman’s answer: Yes, it does!
The effect on technological search

• **Hypothesis:** The results of more centralized R&D activity will impact a larger number of subsequent innovations than will the results of more decentralized R&D activity.

• **Because:**
  – **Appropriability problems:** Divisions do not have the incentives to create *non-specific knowledge* that can benefit other divisions of the firm through spillovers — they are typically not rewarded for this (and it is hard to reward spillovers).
  – **Information processing:** regarding non-specific-knowledge, the advantage of having knowledge about individual product lines is lower in the case of centralized R&D as such R&D typically does beyond existing product offerings.
The effect on technological search

• **Hypothesis:** The results of more centralized R&D activity will have impact on a broader range of subsequent technological innovations than will the results of more decentralized R&D activity.

• Because:
  – Generic knowledge—opposed to specific knowledge—is likely to produce innovations that have relevance for technical applications in a broader range of technological areas.
The effect on technological search

• **Hypothesis:** More centralized research activity will encompass broader search efforts in organizational space—that is, will build to a greater extent on innovations developed outside the firm—than will more decentralized research activity.

• **Because:**
  – Divisional managers and engineers in multidivisional firms are close to the market, they are typically forced to adopt a customer-centric orientation, in which immediate customer needs are weighed heavily in R&D decisions (remember that argument?).
  – Researchers in centralized R&D labs are less deeply engaged in local (within division/firm) communication channels, they are less subject to the associated information filters, and are therefore more likely to appreciate and explore broader architectural innovations.
The effect on technological search

• Argyres and Silverman find empirical support for the above ideas using a survey of 71 firms combined with patent data.

• They also find that the coefficients for the hybrid forms were generally not significant, indicating that the hybrid organization forms did not consistently generate innovation that is different from that generated by decentralized organizations.
The effect on technological search

- **Central corporate funding** appears to affect the innovative impact of hybrid organizations differently from the way it does either fully centralized or fully decentralized firms.
- For the models pertaining to the level of innovative impact, increased centralization of R&D funding leads to increased innovative impact for all three hybrid forms (such funding may reduce ambiguities regarding control of activities).
- In contrast, changes in corporate funding have virtually no impact on fully centralized firms and lead to decreased impact for fully decentralized firms.
The effect on technological search

- Is centralized R&D then always to be preferred? Could there be downsides?
The role of organizational practices
Basic agency theory

• P-A theory typically assumes:
  – “Principals” and “Agents”
  – The agent performs a work task for the principal
  – Principals and agents produce a joint surplus
  – Principals are risk neutral and agents are risk adverse
  – Principals and agents have a conflict of interest
Basic agency theory

• P-A theory typically assumes (con’t):
  – Principals can only imperfectly observe the effort of agents (information asymmetry)
    • Impossible to observe the input to the work task
    • and it is impossible to measure work output precisely
  – Agents can be compensated through an hourly wage or through pay-for-performance.
  – Pay-for-performance will be used when:
    • The agent is less risk-adverse.
    • It is easier to measure the activities of the agent
    • The effort of the agent has more impact on the level of output.
    • (The agent has more discretion regarding the choice of activities).
Beyond basic agency theory

• In reality, much knowledge about how to optimally carry out the task resides with the agent, and may be too costly to transfer to corporate headquarters (or other managerial layers), because of problems of eliciting the correct information or because the relevant knowledge is of a highly “impacted,” tacit or complex, kind (cf. von Hayek, 1947).

• In this situation, delegation co-locates decision rights with this knowledge.
Beyond basic agency theory

• Accordingly, the benefits from delegation are probably **underestimated** in the standard PA-model;

• and delegation generates incentive pay based on output.

• This is consistent with recent PA-model by Canice Prendergast 2002, JPE.

• In sum, modern organizational economics suggests that:
  
  – **Higher uncertainty/more complexity** in the task environment -> more **delegation** (choice of activity — for instance, the engineer chosen which solution to work on) -> **incentive pay** based on output.
  
  – In addition: **Knowledge sharing (KS)/**information exchange helps in coordinating activities and in bringing different knowledge components together, often resulting in innovation (KS likely to be strongly complementary with delegation).
New HRM Practices, complementarities, and the impact on innovation performance, CJE, 2003 (Laursen/Foss)
New HRM/Organizational practices

• “New HRM practices” is the overall label put on a host of contemporary changes in the organization of the employment relation, referring to team-based organization, continuous (often team-based) learning, decentralization of decision rights and incentives, emphasis on internal knowledge dissemination, etc.
• There may be strong financial performance effects, productivity effects and flexibility advantages of such new HRM practices — as documented by Huselid (1995), Ichniowski, Shaw, and Prennushi (1997) and Mendelsson and Pillai (1999), respectively.
Organizational Complementarities: Motivation

- Research in contract economics (and in management research) has focused the application of HRM (work) practices and on complementarities between them:
  - However the theoretical link between innovation performance and HRMP complementarities was not clearly identified.
  - The effect of HRMP complementarities on innovation performance was not empirically tested.
Complementarity

- Complementarities between activities obtain if “doing more of one thing increases the returns of doing (more of) the others” (Milgrom and Roberts, 1995: 181).
Measuring complementarities: Two methods

- Athey and Stern (NBER WP, 1998):
  - the “correlation approach”
  - the “production function approach”
Hypotheses (i)

- **H1**: The application of HRMP practices is conducive to innovation because:
  - The application of HRM practices may increase the level of decentralisation;
  - team practices, involving job-rotation are likely to provide coordination advantages in the sense that engineers (or “workers”) perform several tasks and therefore understand the technological problems of colleagues better;
  - teams often bring together knowledge and skills which — prior to then introduction of teams — existed separately, potentially resulting in incremental process and product improvements.
Hypotheses (ii)

• **H2:** However, the effect of such practices is stronger when the HRMPs are applied in ‘systems’, rather than alone.

• Indeed, practices should be expected to be complementary:
  – For example, to the extent that implementing new HRM practices is associated with extra effort or with disutility of changing to new routines, etc., employees will have to be somehow compensated.
  – Thus, we would expect many new HRM practices to work well (in terms of both profits and innovation performance) only if accompanied with new, typically more incentive-based, remuneration schemes.
The data

- Survey data from the DISKO project, 1996
- 684 manufacturing and 1,216 non-manufacturing firms (total of 1,900 firms)
- The dependent variable, innovation:
  - if non-innovator then inno = 0
  - if the firm introduced new product/service new to:
    • the firm, then inno = 1
    • the country, then inno = 2
    • the world, then inno = 3
The independent variables

• The empirical model:

\[ A_i = \alpha \text{SIZE}_i + \chi \text{SECT}_i + \delta \text{LINK}_i + \phi \text{EXREL}_i + \]
\[ \varphi \text{SUBSID}_i + \eta_j \text{HRMP}_i^j + \ldots + \eta_n \text{HRMP}_i^n + \varepsilon_i, \]

• However, HRMPs should be looked at from a systemic point of view.
  Principal components analysis is one way of doing that.
## Factor loadings from PCA

<table>
<thead>
<tr>
<th>Variable</th>
<th>Factor 1</th>
<th>Factor 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRMP1: Interdisciplinary workgroups</td>
<td>0.71</td>
<td>0.14</td>
</tr>
<tr>
<td>HRMP2: Quality circles</td>
<td>0.66</td>
<td>0.15</td>
</tr>
<tr>
<td>HRMP3: Systems for collection of employee proposals</td>
<td>0.65</td>
<td>0.04</td>
</tr>
<tr>
<td>HRMP4: Planned job rotation</td>
<td>0.62</td>
<td>0.08</td>
</tr>
<tr>
<td>HRMP5: Delegation of responsibility</td>
<td>0.57</td>
<td>0.03</td>
</tr>
<tr>
<td>HRMP6: Integration of functions</td>
<td>0.65</td>
<td>-0.05</td>
</tr>
<tr>
<td>HRMP7: Performance related pay</td>
<td>0.55</td>
<td>0.05</td>
</tr>
<tr>
<td>HRMP8: Firm-internal training</td>
<td>0.14</td>
<td>0.90</td>
</tr>
<tr>
<td>HRMP9: Firm-external training</td>
<td>0.02</td>
<td>0.92</td>
</tr>
<tr>
<td><strong>Cumulative %</strong></td>
<td>0.33</td>
<td>0.50</td>
</tr>
</tbody>
</table>
Ordered probit regressions, explaining innovative performance across 1884 Danish firms

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model (i)</th>
<th>Model (ii)</th>
<th>Model (iii)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>p-value</td>
<td>Estimate</td>
</tr>
<tr>
<td><strong>Sector controls</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scale intensive</td>
<td>-0.242</td>
<td>0.061</td>
<td>-0.182</td>
</tr>
<tr>
<td>Supplier dominated</td>
<td>-0.275</td>
<td>0.037</td>
<td>-0.190</td>
</tr>
<tr>
<td>Science based</td>
<td>-0.143</td>
<td>0.418</td>
<td>-0.111</td>
</tr>
<tr>
<td>Specialised suppliers</td>
<td>0.082</td>
<td>0.567</td>
<td>0.181</td>
</tr>
<tr>
<td>Crafts</td>
<td>-0.948</td>
<td>0.000</td>
<td>-0.877</td>
</tr>
<tr>
<td>Wholesale trade</td>
<td>-0.203</td>
<td>0.098</td>
<td>-0.176</td>
</tr>
<tr>
<td>Specialised traditional services</td>
<td>-0.722</td>
<td>0.000</td>
<td>-0.654</td>
</tr>
<tr>
<td>Scale intensive services</td>
<td>-0.694</td>
<td>0.000</td>
<td>-0.631</td>
</tr>
<tr>
<td><strong>ICT intensive services</strong></td>
<td>Benchmark</td>
<td></td>
<td>Benchmark</td>
</tr>
<tr>
<td>SIZE</td>
<td>0.016</td>
<td>0.043</td>
<td>0.015</td>
</tr>
<tr>
<td>LINK</td>
<td>0.614</td>
<td>0.000</td>
<td>0.598</td>
</tr>
<tr>
<td>EXREL</td>
<td>0.267</td>
<td>0.000</td>
<td>0.247</td>
</tr>
<tr>
<td>SUBSID</td>
<td>0.127</td>
<td>0.042</td>
<td>0.098</td>
</tr>
<tr>
<td>Factor 1</td>
<td>0.192</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Factor 2</td>
<td>0.063</td>
<td>0.027</td>
<td></td>
</tr>
<tr>
<td>HRMP1</td>
<td></td>
<td></td>
<td>0.025</td>
</tr>
<tr>
<td>HRMP2</td>
<td></td>
<td></td>
<td>0.010</td>
</tr>
<tr>
<td>HRMP3</td>
<td></td>
<td></td>
<td>0.042</td>
</tr>
<tr>
<td>HRMP4</td>
<td></td>
<td></td>
<td>0.041</td>
</tr>
<tr>
<td>HRMP5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HRMP6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HRMP7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HRMP8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HRMP9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HRMPONE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HRMPTHREE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-1757.5</td>
<td></td>
<td>-1742.0</td>
</tr>
<tr>
<td>Log likelihood test</td>
<td>460.4</td>
<td></td>
<td>491.6</td>
</tr>
</tbody>
</table>

Log likelihood test
Managing Potential and Realized Absorptive Capacity: How do Organizational Antecedents Matter
Potential and Realized Absorptive Capacity

Source: Zahra and George, AMR, 2002
Organizational Antecedents to Potential and Realized Absorptive Capacity

• The aim of Jansen et al. is to explain Potential and Realized Absorptive Capacity (Acquisition, Assimilation, Transformation & Exploitation) and to test the related theoretical arguments empirically.

• Use a survey sample of 462 organizational units of a Dutch bank with a total of 220 branches/769 organizational units (they had double respondents for some units).
Organizational Antecedents to Potential and Realized Absorptive Capacity

- The determinants are:
  - **Coordination capabilities** (cross-functional interfaces, participation, job-rotation).
  - **Systems capabilities** (formalization, routinization).
  - **Socialization capabilities** (connectedness, socialization tactics).
Organizational Antecedents to Potential and Realized Absorptive Capacity

- In general, the findings are:
  - Coordination capabilities matter more at the “potential AC end” than in the “realized AC end”.
  - Routinization affects “potential AC” negatively.
  - Socialization capabilities affects “realized AC” (but not “potential AC”—although “connectedness” is related to “assimilation”) positively.
Linking Customer Interaction and Innovation: The Mediating Role of New Organizational Practices
AIM AND MOTIVATION

• Examine how firms can design their organization to increase the probability of accessing user/customer knowledge and leverage it in the context of innovation.

• New work/organizational practices may contribute to this – in addition to improving productivity, the use of existing knowledge, recombination of knowledge, etc.

• Under-researched – but potentially important, given the increased prevalence of both user innovation and new organizational practices and indications that these may be related.
Positioning

• Positioned as mainly a contribution to the user-innovation literature.

• However, also implications for the absorptive capacity literature.
User/customer innovation

• Importance of interaction with users has been well recognized for more than four decades (Linder, 1961; Rosenberg, 1963; Freeman, 1968).

• **Strands** in the literature:
  • “User-innovation proper”: Users invent, develop, prototype etc. products (von Hippel, 1976, 2005).
  • “User-knowledge-as-a-basis-for-innovation-in-user-firms”: Firms get crucial technical cues, insights, etc. from users and customers (Urban and von Hippel, 1988).

• **General importance of this:**
  • Industry studies (e.g., scientific instruments).
  • Laursen & Salter (2006): 66% of UK manufacturing firms report that they use clients or customers as knowledge sources or information.
  • Part of a changing innovation model (Chesbrough, 2003)?
  • Motivates our first hypothesis:

H1. The more the focal firm engages in interaction with customers, the better its innovation performance.
Research gaps -- user innovation

• Work on the intra-organizational antecedents to innovation go back (at least) to Burns & Stalker (1961).

• Most of this work has explored organization as an antecedent to the use of knowledge that the firm already controls in-house.

• Little interest in exploring intra-organizational antecedents to the intake and use for innovation purposes of knowledge that is initially externally held (present paper may be the first to explicitly do this).

• “Organizational variables are a black hole to me.”
Research gaps -- absorptive capacity

- The “ability to identify, assimilate, and exploit knowledge from the environment” (Cohen and Levinthal, 1990).
- They are explicit that organizational phenomena such as departmentalization, etc. matter – i.e., other organizational antecedents than prior related knowledge.
- However, the dominant antecedent to firm-level AC is firm-level prior related knowledge (R&D investments, "capabilities," "routines," etc.).
- Organizational design variables neglected in the context of understanding:
  1. The antecedents of AC (cf. bibliometric analysis in Volberda, Foss & Lyles, 2009).
  2. The mechanisms through which absorptive capacity influences performance seem black-boxed.
    - Problem is relevant to the user-innovation literature.
Organization in the user-innovation lit.

How can a firm be designed to increase the probability that
1. Knowledge is brought into the firm.
2. Is transferred to the right persons?
3. Is leveraged into innovation?

Arguably downplayed in the user-innovation literature because the unit of analysis is the relation between a focal firm and users.
What kind of “organization” is relevant?

- **Any** kind of organization may be “relevant” to the relation between user-interaction and innovation.
  - Antecedent, moderator or mediator.
  - E.g., departmentalization and specialization may matter to intra-firm knowledge transfer.

- However, we focus (solely) on “new organizational practices” – specifically, a **high degree of delegation** of decision rights; extensive lateral and vertical **communication**; and **incentives** that are tied to knowledge sharing.

- Many observations re changing organization in the new organizational practices literature can be **related** to these (Colombo & Delmastro, 2002; Ichniowski et al., 1999; Mendelson & Pillai, 1999; Zenger & Hesterly, 1997).

- **Causal relation** between the increased prevalence of user innovation and NOPs?
Linking AC and new org practices

- Cohen & Levinthal (1990) distinguish between:
  - “Outward-looking” AC
    - Relates to the firm’s points of contacts with external sources.
  - “Inward-looking” AC
    - Relates to the efficiency of internal communication.
  - These are likely complementary.

- We argue that there are organizational dimensions to these notions of AC
  - Delegation of responsibility is an organizational dimension of outward-looking AC.
  - Intensive internal communication and incentivizing knowledge sharing are organizational dimension of inward-looking AC.
New organizational practices

• Delegation of responsibility
  • In information rich environments where there is a need for speedy decision-making, it makes sense to delegate decision rights with respect to the direction of innovation projects to gatekeepers and other employees working with customers.
  • Empowers employees to make active efforts to identify and assimilate external knowledge.
  • Motivational effect.
    • H2. The more the focal firm interacts with its customers, the more it will delegate responsibility.

• Intensive internal communication and incentives for knowledge sharing facilitate the internal transfer and transformation of knowledge that is already brought inside the firm.
  • H3. The more the focal firm delegates responsibility, the more it will link salaries to knowledge sharing behavior.
  • H4. The more the focal firm delegates responsibility, the more communication will take place inside it.
Innovation and new org. practices

- Schumpeterian argument that innovations are caused by the firm’s “combinative capabilities” (Kogut & Zander, 1992) -- that are mediated by shared knowledge (idem.; Dougherthy, 1992).

- Recent network/social capital arguments that the link between knowledge and innovation is mediated by intra-organizational communication and knowledge sharing (Hansen, 1999; Tsai, 2001).
  - H5. The more the focal firm engages in internal communication, the higher its innovation performance.

- Still, agents may need to be incentivized to pass on information and knowledge that can be leveraged in the context of innovation.
  - Network H6. The more the focal firm links salaries to knowledge sharing, the higher its innovation performance.
H1. The more the focal firm engages in interaction with customers, the better its innovation performance.

H2. The more the focal firm interacts with its customers, the more it will delegate responsibility.

H3. The more the focal firm delegates responsibility, the more it will link salaries to knowledge sharing behavior.

H4. The more the focal firm delegates responsibility, the more communication will take place inside it.

H5. The more the focal firm engages in internal communication, the higher its innovation performance.

H6. The more the focal firm links salaries to knowledge sharing, the higher its innovation performance.
Data

- 2001 survey in which 1,000 largest Danish firms received a questionnaire.
- About $\frac{1}{2}$ of questions based on existing scales (mainly Lawler, Mohrman and Ledford, 1998).
- Only 169 responses were usable for statistical analysis.
- Respondent: CEO (in some cases the HRM-manager or other managers have responded).
- Test for non-response bias: Chi$^2$ test (of sample and population industries) and t-tests (sales, year of founding) indicate no non-response bias.
### Constructs and Items

<table>
<thead>
<tr>
<th>Constructs and items</th>
<th>Factor loading**</th>
<th>t-value</th>
<th>R²-value</th>
<th>Construct Reliability</th>
<th>Variance extracted by constructs</th>
<th>Variance shared between constructs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interaction with customers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customers involved in close collaboration</td>
<td>0.71</td>
<td>6.75</td>
<td>0.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intense communication with customers</td>
<td>0.84</td>
<td>9.31</td>
<td>0.71</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategy of close collaboration with customers</td>
<td>0.60</td>
<td>5.64</td>
<td>0.36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.71</td>
<td>0.55</td>
<td>0.34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Delegation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employees have influence on their own job</td>
<td>0.77</td>
<td>8.16</td>
<td>0.59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employees engaged in teams with high degree of autonomy</td>
<td>0.71</td>
<td>5.26</td>
<td>0.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.76</td>
<td>0.61</td>
<td>0.28</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Salaries linked to knowledge sharing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salary associated with the ability and willingness to share knowledge</td>
<td>0.81</td>
<td>10.37</td>
<td>0.66</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salary determined by the willingness to improve skills and upgrade knowledge</td>
<td>0.75</td>
<td>9.76</td>
<td>0.57</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.70</td>
<td>0.54</td>
<td>0.28</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Internal communication</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exchange of information between employees across departments</td>
<td>0.69</td>
<td>5.53</td>
<td>0.48</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication among employees and management</td>
<td>0.78</td>
<td>7.33</td>
<td>0.61</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.72</td>
<td>0.56</td>
<td>0.14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Innovation performance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovation capacity of focal firm compared to competitors</td>
<td>0.79</td>
<td>4.74</td>
<td>0.62</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profitability of focal firm compared to competitors</td>
<td>0.71</td>
<td>4.86</td>
<td>0.50</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Structural equation model

GFI = .96
Common method bias

• Placed dependent variables independent variables in the questionnaire (Salancik & Pfeffer, 1977).

• Conducted test for CMB:
  • Using confirmatory factor analysis, we examined the fit of a single factor model (all items load on one factor) (Podsakoff et al. 2003).
  • Single factor model is insignificant.
  • More complex models become significant and fit better.
**Alternative specifications**

- **Direct links model**: interaction with customers, delegation of responsibility, salaries linked to knowledge sharing and internal communication all individually lead to innovation performance.
  - GFI: 0.82

- **Partial mediation model**: interaction with customers lead to delegation of responsibility; delegation of responsibility lead to salaries linked to knowledge sharing and internal communication + direct links model
  - GFI: 0.96

- **Full mediation (i.e. current) model**: interaction with customers lead to delegation of responsibility; delegation of responsibility lead to salaries linked to knowledge sharing and internal communication; salaries linked to knowledge sharing and internal communication lead to innovation performance.
  - GFI: 0.96 (but other fit indices improve).
Conclusions

• (Intra-)organizational design variables seldom or never enter the user innovation literature (or the AC literature).

• A priori reasoning (and anecdotal knowledge) suggests that organizational practices do influence the link from user/customer knowledge to firm innovative performance.

• In fact, the link between customer interaction and innovation performance is fully mediated by organizational design variables – i.e., no direct impact from users/customers to innovation.

• In particular, new organizational practices, such as delegation, high-powered incentives and communication, are important.
Future research (aka limitations)

• Improve data quality in general (more objective data, better items (e.g., for innovation), etc.).
• Examine what are the appropriate organizational responses to a wider range of external knowledge inputs (e.g., do our findings also hold for interactions with suppliers and universities?).
• Treat individuals more explicitly; requires multi-level methods.
Keld Laursen
Department of Innovation and Organizational Economics, Copenhagen Business School
http://www.druid.dk/laursen/
E-mail: kl.ino@cbs.dk