INNOVATION AND EMPLOYEE DIVERSITY

DOES DIVERSITY REALLY MATTER FOR INNOVATION?

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Motivation
Are we all different or the same?

- Our knowledge and actions are affected by our experiences
  - Categorization – related to instincts - we do not like differences and the unknown
  - Cognitive models - psychology: our knowledge, world-view and the way we react depends on our experience, education, social class, gender and age
  - Social identity – professional identity (education)
  - Culture (anthropology)- people watching
The role of employees

- Innovation as an interactive process that involves interaction and communication between various levels of the firm (Lundvall)
- Differences in the knowledge base in a firm creates opportunities for learning and new combinations
- Employee diversity might create a broader search space, make firms more open towards new ideas and be more creative
- Intuitive idea that employee diversity is good for innovation
Innovation expenditure in 2010. Per cent

- In-house R&D: 61.1%
- Acquisition of machinery, equipment and software: 10.8%
- External R&D: 17.6%
- Acquisition of external knowledge: 2.5%
- Other expenditure: 8.0%

Methods for stimulating new ideas or creativity among staff. 2008-2010

- Brainstorming sessions: Enterprises having employed a method
- Multidisciplinary or cross-functional work teams: Enterprises having successfully employed a method
- Job rotation of staff to different departments or other parts of the enterprise group: Enterprises having employed a method
- Financial incentives for employees to develop new ideas: Enterprises having employed a method
- Non-financial incentives for employees to develop new ideas: Enterprises having employed a method
- Training employees on how to develop new ideas or creativity: Enterprises having employed a method
Does employee diversity lead to innovation?
What is diversity and how should it be measured

- Employee diversity:
  - Everybody are unique, but also similar
  - Measure depends on which factors you look at and the purpose of the analysis

- Employees differ along a wide range of dimensions (demography, experiences, knowledge base, cognitive models, attitudes, values, norms) that are generated through complex processes

- We need measurable characteristics and the diversity measures need to be workable

- Visible or invisible differences
- Ascribed and achieved characteristics (Rueff et al)
  - Ascribed: demographic attributes such as gender, age, and ethnicity
  - Achieved characteristics: educational background, functional background, work experience
What is diversity and some problems in measuring diversity

- Diversity have three dimensions
  - Types (number of different types/groups)
  - Balance (shares of the different groups)
  - Disparity (the distance between the different groups)

- Different characteristics: Gender, age, education and ethnicity …

- But every employee fits into multiple categories

- We define employee diversity as the distribution of differences among the employees of the firm with respect to a common attribute

- Unit-level compositional construct (Harrison and Klein, 2007)

- Diversity should always been seen in context of the firm and the existing composition of the workforce and types of jobs
  - Diversity is not always good or bad
Diversity and performance

• There is a long tradition for studying diversity and performance
• “It is the heterogeneity of the productive services available or potentially available from its resources that gives each firm its unique character” Penrose 1959

• Innovation studies and evolutionary economics
  • Firms with diversity in knowledge, experience and skills among their employees benefits from complementarities that can foster development in other fields
  • … they have broader organisational routines (Nelson&Winter)
  • … they have a broader search for new solutions (Dosi)
  • … they are better to gain and exploit external knowledge (Cohen& Levinthal)
  • … they are better to exploit internal knowledge through interaction and learning (Lundvall)
  • Empirical studies show that technologically diverse firms survive longer and are more innovative
  • Diversity is positive for innovation, but most studies focus is on technology not human capital
Inside or outside the firm?

• Cohen and Levinthal (1990, 1994) and Joshi and Jackson (2003)….

• Two dimensions of effects of employee diversity

• 1) Within firm
  • Broad knowledge base
  • Cross fertilization and creation of new ideas

• 2) Outside links
  • Broad outside search and networks
  • Increased external sourcing
  • Absorptive capacity – use of external knowledge

• In this study we neglect outside links – focus on within firm effects
Diversity and performance: top management or entire firm?

• Upper echelon theories (Finkelstein and Hambrick)
  Education, experience and demographic characteristics affects the managements interpretation of problems and their strategy - has an effect on firm performance
  Diversity of a larger management proved to be a predictor for firm performance

• Top Management Team Literature and firm performance (Murray 1989, Bantel and Jackson 1989, Kilduff et al. 2000)

• Top management does not reflect composition of the entire firm

• Firms knowledge in the form of human capital is important in explaining performance (Laursen et al. 2005;2012)

• Diversity in the composition of employees contributes to diversity in the knowledge base (Woodman et al. 1993)
Diversity and performance: more critical theories

- Decision making (Priem et al, 1995):
  - To make good decisions when facing complex problems a degree of cognitive conflicts and different viewpoints are needed to avoid premature consensus
  - Too much diversity could create conflict
- Groupthink (Baron, 2005; Irving Janis)
  - Too much cohesion in groups hinders good evaluation of ideas.
- Social identity (Joshi and Jackson 2003):
  - Diversity in groups creates competition and conflict which reduce cooperation and internal communication
- Use of information (Dahlin et al, 2005):
  - Diversity increase the breath of information collection and use of information, but too much diversity hinders diffusion
- Communities of practice and learning (Wenger, 2000):
  - Interaction between different competencies and experiences creates learning if the disparity is not too large
Is diversity positive or negative?

- William & O’Reilly (1998) 40 years of studies of demography and diversity in organisations:
  - Both direct and indirect effects on processes and group performance
  - But also negative and positive effects
  - Many studies finds no effect
  - More recent studies find similar results
  - Double edged sword of diversity

- Positive effects: openness, creativity, learning, flexibility, broader search space, better problem solving, increased absorptive capacity and new combinations of knowledge
- Negative effects: distrust, conflict, dissatisfaction and increased transaction costs (interaction and communication between two different knowledge bases and groups might be difficult)
- Group membership, social interactions, power relations, organisational framework
The relation between employee diversity and innovation

- Performance measures:
  - Productivity
  - Turnover or profits
  - Patents
  - Innovation

- Innovation is different (human capital is more important)
  - Only a few studies of innovation and they focus on TMT or a single firm and use innovation proxies, but generally finds some positive effects

- An invention and creativity phase
- An implementation phase

- Selection effects
- Hiring policies
- Self selection
- Organisational structure
• Hypothesis 1.

• There is a positive relation between employee diversity and the likelihood that firms innovate.

• Hypothesis 2.

• The likelihood that firms innovate decreases for high levels of employee diversity.
• Hypothesis 1a. There is a positive relation between gender diversity and the likelihood that firms innovate.

• Hypothesis 1b. There is a negative or neutral relation between age diversity and the likelihood that firms innovate.

• Hypothesis 1c. There is a positive relation between diversity in ethnicity and the likelihood that firms innovate.

• Hypothesis 1d. There is a positive relation between educational diversity and the likelihood that firms innovate.
Data

- Disko4 innovation questionnaire survey on organisations, employees and research and development strategies in Danish firms

- Innovation activity in the period 2003-2005
  - sent to stratified sample of 4136 companies,
  - 1775 answers
  - response rate of 42.9 per cent
  - we use 1648 observations

- Integrated Database for Labour Market Research (IDA)
  - register data (2002)
  - detailed information on all Danish firms and all individuals on the labour market from 1980
  - information on the characteristics of individuals, e.g. age, gender, level of education, work experience and nationality.
The integrated database for labour market research
How to measure diversity?

- Shannon–Weaver entropy index used for categorical variables

\[ \sum_{i=1}^{n} p_i \left( \ln \frac{1}{p_i} \right) = \left( p_1 \left( \ln \frac{1}{p_1} \right) + p_2 \left( \ln \frac{1}{p_2} \right) + \cdots + p_n \left( \ln \frac{1}{p_n} \right) \right) \]

- Diversity dimensions: types, balance and disparity

- For age diversity we use the standard error
  - coefficient of variation create a bias towards high average age

- Control for average age in firm (AgeMean)
Diversity measures

- Gender diversity
  - Entropy
  - Gender groups (1–5) based on the share of the most represented gender: Group 1: 90–100% of the same gender, Group 2: 80–90% of the same gender, Group 3: 70–80% of the same gender, Group 4: 60–70% of the same gender and Group 5: 50–60% of the same gender
- Ethnicity (EthnDiv) we use the individual’s country of origin.
  - Divided into six different groups: Danish, Nordic, EU15 and Swiss, other Europeans, other western countries, and the rest of the world
- Education
  - 16 different higher education categories making a distinction between Bachelor’s, Master’s and Ph.D. degrees
  - Social sciences, humanities, food and health science, engineering, and natural sciences, high-school teachers and officers in the army, navy, and air force
  - Dummy variable on the presence of at least one highly educated employee (HighEducDummy)
  - Share of share of highly educated employees in the firm (HighEducShare).
Dependent variable and controls

• Dependent Variable (Innovation)
  Innovation is defined as whether the firm has introduced a new product or service during the period 2003-2005, excluding minor improvements on already existing products and services.

• Control Variables

  • Industry: Two digit NACE industries (35 industries – manufacturing and service)
  • Size: 51 size groups
  • Firm age (ln)
  • Organisational change (OrgChange)
  • Diversity policy (DivPolicy)
  • Dummy variables for high intensity collaboration along the value chain (ValueChainColl) and knowledge institutes (KnowColl).
  • Tenure (length of service), experience and positions
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** Significant at the 5% level.
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* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.
Results

• Hypothesis 1. There is a positive relation between employee diversity and the likelihood that firms innovate.
  • It is supported

• Hypothesis 2. The likelihood that firms innovate decreases for high levels of employee diversity.
  • Not supported

• Self selection, HRM policies, generally no extreme diversity
Hypothesis 1a. There is a positive relation between gender diversity and the likelihood that firms innovate.
• Positive effect
• Generally overlooked in the innovation literature

Hypothesis 1b. There is a negative or neutral relation between age diversity and the likelihood that firms innovate.
• Negative relation

Hypothesis 1c. There is a positive relation between diversity in ethnicity and the likelihood that firms innovate.
• No significant relation
• Labour market dominated by Danes
• Routine work

Hypothesis 1d. There is a positive relation between educational diversity and the likelihood that firms innovate.
• Positive relation
• Most important diversity dimension
• Human capital
• Professional identity
Future research

• Consider other factors that make the human capital composition of a firm to a success - not only at the demographic composition
• Diversity management and management culture

• Better measure of teams involved in innovation

• Persistent innovators and diversity
  • Causality for the link between diversity and innovation

• Types of work organisation, innovation modes (DUI/STI) and strategies

• Types of jobs and mobility

• External links and diversity

• The role of geography
Firm diversity vs. regional diversity

Diagram showing the relationship between firm diversity and regional diversity.
Conclusion

• This study of 1648 Danish firms shows that employee based on the characteristics of all employees have an effect on their likelihood to innovate

• Employee diversity matters for firms’ innovative performance

• Employee diversity in terms of gender, age, education has an effect on the likelihood that firms innovate with controls for other factors
  • Strongest effect of education
  • Followed by gender
  • Negative effect for diverse age distribution
  • No effect on ethnicity
  • No indication for curvilinear effects