Engineers perceptions of confidential information

Vinod Balasubramanian (University of Canterbury)
Dirk Pons (University of Canterbury)
Introduction

- Engineers work in a position of trust.
- They have duty of fidelity to their client.
- Some examples of how this is expressed are:

‘An engineer who obtains confidential information in connection with one purpose in the course of his or her engineering activities must not use that information for another purpose’ (IPENZ ethics New Zealand)
Problem

- The codes and the literature are silent on what exactly comprises confidential information.
- The code of ethics have certain exception, when it comes to the health and safety of the people.
- But the data/information falling under the exception category is not clear.
- There are a number of overlapping themes in the literature, which variously address: Trade secrets, Confidential information, Intellectual property, Expertise, Know-how Knowledge, Tacit and explicit Knowledge.
- Mechanisms: Patents, Plant Breeders Right, copyright, registered design, secrecy, NDAs, etc.
- This makes for a confusing picture.
Problem

- It is difficult to determine difference between confidential information vs. personal expertise
- This makes it difficult for the employers to protect the profit gaining information from the departing employees from the firm
- The unclear picture is, “How much personal expertise or what parameters of personal expertise can a departing employee use in his/her new firm.” Because this depends on the nature of the firm and the field of practice as well
- And more over the exactness of – which of these protection strategy is most appropriate is not clear
Need

There is a need to better understand what type of employer/client information is confidential in the engineering context.
Purpose

- Explore the perspectives of engineers regarding confidential information.
- The intent is to determine what types of information are important, and what importance engineers assign to this information.
  - Furthermore, it is expected that perceptions of engineers may change as their management responsibilities increase.
  - It may also vary depending on the nature of the firm, field of practice, cultural practices.
Approach

Understanding the need and the problem

Literature Study

Gaps in Literature

Prepare Questionnaire for the survey

Ethics approval

Loading the survey on to the website (Tiro)

Advertising the survey

Extraction of results

Analyzing the results

Arriving at conclusions
Literature

Explicit Intellectual Information

- Disclosed but protected intellectual property

Tacit Intellectual Information

- Commercial Secret

Confidential Information

Patents, Copyrights, Trademarks, Registered Design, Non Disclosure Agreements

**Issues**: Long time to file, Cost of filing, weak enforcements, Uncertain legal outcomes if contested, time terminated

**Gaps in the knowledge**: Critical evaluation of efficacy of NDA's. Consequently there is no way of knowing how effective the method is, or how often it is breached, or whether it even captures all necessary confidential information.

Information that impacts the firm's management, life, competitiveness, economic benefit, and possess high value that competitors would want to know

**Issues**: Misappropriation (Acquired through improper means “breach of confidence”) another problem is the issue with the term - common misappropriation of this term to refer to commercial confidential information irrespective of its degree of secrecy
Highly personal
Subjective
Informal
Inferred

Not found in
books/manuals/database

Most of the work-related
information that is slowly transformed into
tacit knowledge comes from personal contacts,
like friendly or informal conversations,
mentoring, internships and apprenticeships.

Tacit Intellectual Information

Protection Methods:
1. Creating awareness
2. Employee Trainings
3. NCA
4. Monitoring activities

Issues:
1. In the case of tacit knowledge, there are certain company confidential information that an employee infer through interacting with colleagues, seniors, subordinates, intuitions, observations etc. The organization find it extremely difficult to handle such cases.
2. Ambiguity with NCA
3. The engineering details that an employee can carry along with him/her while leaving the firm is not well defined.
4. From employer’s perspective, it has both positives and negatives. The issue is that, it might affect their firm but the advantage of this is that, they also get benefitted out of a new employee joining their firm and ready to share his/her knowledge gained from other firms.
Flow Diagram of an Employee Joining the firm, gaining the knowledge/experience/expertise and Departing from the Organization

1. Entry into organisation
2. Learning within the organisation
3a. Trade secrets exposed from the organisation
3b. Engineers departs with expertise
3c. Trivial information released

Knowledge gained from Induction process

Ability to function within the organisation

Pre-existing theoretical knowledge, process skills, contextual expertise

On-job learning, Training

Difficult to distinguish

Trivial information

Trade secret

Know-how, expertise learned in employment

Restraint of trade, Non-competition agreement

Might be difficult to enforce

Unethical Competitive advantage

Engineer applies expertise to next work situation

No loss or unfair gain by anyone

No loss or unfair gain by anyone

Difficult to distinguish
Questions that arise

1. To what extent can you clearly distinguish between a company trade secret, versus information that you are free to reuse and communicate to others outside the organization?

2. To what extent do you think the following are personal expertise that you could take and act on if you left the company?
   
   A. Marketing and sales strategy of the product/service
   B. Production layout, production control
   C. Manufacturing Processes
   D. Supplier of raw material
   E. Historical cost data such as budgets, capital costs, operating expenses etc.
   F. Aesthetic features of the product
   G. Operating processes for maintenance and repair
Questions that arise

H. Quality systems
I. Drawings and tolerances
J. Design and analysis methods
K. Problems in the product, customer needs
L. Employment conditions of other staff

3. To what extent do you consider tacit knowledge to be company confidential information?

4. What means does your employer take to prevent the disclosure of company confidential information?
Results - Trade Secret vs. Info free to Reuse

- The graph shows: The extent to which a large and very small organizations are able to distinguish between trade secret and information free to reuse.

- The graph shows that the large org understands the difference between trade secret and information free to reuse better than very small organizations.

- The reason may be that large organizations are more systematic, they conduct proper training, Induction programs to the employees.

ANOVA - P(0.00000)
Results- Trade Secret vs. Info free to Reuse

On analyzing graph further, it was found that there was no statistically significant difference between the large and small organizations in New Zealand, but in case of India we can see that small organizations feel that they can’t differentiate between trade secret and information that is free to reuse.

The reason for this maybe in India, in small organizations, the engineers don’t work in a specified role. There might be cases where a design engineer work with quality engineers or production engineer or vice versa.

ANOVA - P(0.00045)
Results - Trade Secret vs. Info Free to Reuse

- Analyzing the ability to distinguish between the trade secret and information free to reuse with the qualification
- We can see that, Master’s students feel that they find it difficult to distinguish between both.
- The reason for this is that, generally Master’s students are involved with complex work.

ANOVA - P(0.18716)
Results - Engineering knowledge

- Analyzing the engineering knowledge that an employee can carry and reuse and information that they can't reuse when they leave the firm.

- Employees feel that they can carry and reuse the details of Employment conditions of other staffs, Design and Analysis Methods and Aesthetic Features.

- They can't reuse - Production layout and production control, marketing and sales strategy.

- Details like - Problems in the product, Drawings and tolerances, Quality systems, Maintenance and repair, historical costs and data, Supplier of raw material, manufacturing processes comes in neutral category.
Result- Aesthetic features, Design methods, Employment Cond

Further analysis shows:

- We can see that both male and female think alike in terms of design and analysis methods.

- But when it comes to aesthetic feature of the product men value it a lot than women. Men feel that it can give a competitive advantage to the firm and hence it shouldn’t be reused.

- On the other hand when it comes to employment conditions, women value it more than men. A possible psychological explanation is that that women may be more sensitive to preserving privacy.

ANOVA - P(0.00074)
Results: Design and Aesthetics

- Analyzing the Aesthetic features and Design methods further between Indian engineers and New Zealand engineers.
- We can see that there is no big difference statistically in aesthetic feature between engineers in India and NZ.
- But Indian engineers value Design and analysis methods a lot. It is because of the fact that, Indian engineers were brought up saying that design and analysis fields has a great career option. And with rapid development of mechatronics/robotics, Indian engineering syllabus emphasizes a lot on this.
- Surprising that NZ engineers don’t value it so much. Or probably NZ engineers value it so much that they feel, by sharing this knowledge with the competitors, it can give them a better career with better pay and reputation in the new firm.

ANOVA - P(0.08953)
Result: Mech/Civil

- Analyzing the way mechanical and civil engineers think with respect to Design methods and Aesthetic features.

- Mechanical engineers and civil engineers both are on the same page when it comes to Aesthetic feature of the product. Both value the knowledge gained about aesthetic features of the product and they believe by sharing it, it could affect the profitability of the firm.

- But when it comes to Design and analysis methods, civil engineers value it more than mechanical engineers. This might be because civil engineers design major construction projects, such as roads, airports, tunnels, dams and bridges.

- And they believe their profession involves lot of cash/profit. And also believe, they need more critical knowledge is needed.

ANOVA - $P(0.00020)$
Result - Production control, Marketing Strategy

- Analyzing the engineering information that an employee fee that they can't reuse: i.e. Production layout and production control, marketing and sales strategy.

- We can see that an engineer who just started their career doesn't value the knowledge of production and marketing strategy compared to an experienced engineer.

- The possible reason for this might be the fact that, a fresher wouldn’t be in a position to realize the impact of these parameters in the firm’s economy.

ANOVA - P(0.13405)
Results - Production Control, Marketing Strategy

- Analyzing how Indian and NZ engineers feel about Production control and Marketing strategy.
- We can see that Indian engineers value it more than NZ engineers.
- The possible reason for this might be there is not much production happening in NZ compared to India.

ANOVA - P(0.16695)
Results - Quality Systems

- Some of the results of engineering information that employees responded neutrally
Result - Customer Needs
Result - Customer Needs
Conclusion

- Purpose - The intent is to determine *what types* of information are important, and what *importance* engineers assign to this information.

- ‘An engineer who obtains confidential information in connection with one purpose in the course of his or her engineering activities must not use that information for another purpose’ (IPENZ ethics New Zealand)

- After a detailed analysis, it is clear that the definition of confidential information in engineering perspective is not a simple definition, as defined above.

- It's much more complicated.

- It depends on various parameters like: the nature of the firm, field of practice, gender, Experience in the firm, role in the industry, Qualification etc.
Future Research Topics

- Study on how various type of engineers (Mech, civil, biotech, Computer, electrical, electronics etc.) think and feel about the confidential information.
- The study could be extended in terms of gender.
- Research could be carried on how engineers of various countries perceive about confidential information.