How Engaging with Open Source Software Affects Business Growth in Japanese IT Companies

From the Questionnaire Survey of OSS Utilization and Contribution in Japanese IT Companies

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Professor of Economics
Problem Consciousness

- Reason of OSS Adoption $\Rightarrow$ Cost Reduction
- ....leads to Shrinking Market of IT Companies
- Necessity to cultivate New Markets
- Market Competition becomes Severe
- What is needed for Competitive Advantages?
  - Technical Capabilities, Development Capabilities
- From OSS Utilization to OSS Contribution
<table>
<thead>
<tr>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Benefit</td>
<td>Development Cost</td>
</tr>
<tr>
<td>Competitive Pressures</td>
<td>Cost Rise</td>
</tr>
<tr>
<td>Market Benefit</td>
<td>Development Cost</td>
</tr>
<tr>
<td>Market Benefit</td>
<td>Development Cost</td>
</tr>
</tbody>
</table>

Leverage Effect

Utilization

Contribution
Agenda

- Open Innovation and OSS Business Model
- Study Methodology
- Utilization and Contribution of OSS
- Effect on Business Growth of OSS
- Conclusion and Challenges for the Future
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From Closed Innovation to Open Innovation

Chesbrough (2003) describes traditional separate style business strategy as “Closed Innovation”

The superiority of “Closed Innovation” is being reduced because of the liquidity of labour, improvements in the knowledge power of employees, and the existence of venture capitals.

Chesbrough, H., Open Innovation (2003)
“Open Innovation” blurs boundaries between business enterprises, and by joining internal resources and external resources together.

This development style is essentially the same as the longer established OSS development style.
Matter of Free Ride and Need of Contribution

If every individual (or every business enterprise) behaves rationally, value provided by OSS will immediately drop, and quickly run dry.

Therefore, rational business enterprises that want to absorb the outcome of OSS must take part in the OSS development processes and contribute to the future of the platforms.
Three-step Business Model of OSS

Kunai (2010) categorizes the underlying OSS business model a “Three-step Model” regarding the engagement by business enterprises.

Kunai, T., Three-stage approach of Linux Development, Let’s go by Linux vol.2. (2010)
Three-step Business Model of OSS

- 1st stage; business enterprises use OSS as End Users
- 2nd stage; they use OSS in a more engaged manner, expanding functional features they need, constructing application software, serving support for their customers, and integrating systems.
- In this stage, the economic effect is comparatively higher than that of the 1st stage, though cost rises because of the demand of manpower and equipment to launch and sustain these derivative businesses.
Three-step Business Model of OSS

- 3rd stage; they participate in the “mainstream” development process of OSS, and bring forth the highest economic effect.
- They contribute to the “Community” by providing physical support and financial backing.
- The development style of this stage is different from stage two, primarily because they develop software in association with other companies, including their competitors. This is - as referenced before - enlightened self-interest.
Linux Kernel Development
How Fast it is Going, Who is Doing It, What They are Doing, and Who is Sponsoring It

<table>
<thead>
<tr>
<th>社名</th>
<th>変更の数</th>
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<td>4037</td>
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<tr>
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<tr>
<td>Renesas Technology</td>
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</tr>
<tr>
<td>Oracle</td>
<td>995</td>
<td>1.9%</td>
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<tr>
<td>Fujitsu</td>
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<tr>
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<td>Wolfson Microelectronics</td>
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<tr>
<td>Broadcom</td>
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<tr>
<td>NTT</td>
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<td>0.8%</td>
</tr>
</tbody>
</table>

The Linux Foundation "A White Paper By The Linux Foundation"
http://www.linuxfoundation.org
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Study Methodology

Investigate the effect on the business growth by OSS utilization and contribution in Japanese IT companies

“The more IT companies contribute to OSS communities, the more they are able to acquire economic effect”
OSS Utilization and Contribution Questionnaire Survey towards Japanese IT Companies

- From October to December, in 2012
- The survey slips were sent to 642 companies which accede to Information Industry Association in Japan, and 191 companies gave us replies (collection rate: 29.8%)
## OSS Utilization and Contribution Questionnaire Survey towards Japanese IT Companies

### Company profile:
- Q1. Home City
- Q2. Inauguration of Business
- Q3. Main Business Service
- Q4. Capital Stock
- Q5. Number of Employee
- Q6. Number of Developers (programmers, software engineers, etc.)
- Q7. Sales Amount
- Q8. Growth Rate of Sales (present period)
- Q9. Prospect of Sales Growth Rate (subsequent period)
- Q10. Growth of Employee Number (present period)
- Q11. Prospect of Employee Number’s Growth Rate (subsequent period)

### Utilization of OSS: (rate of utilization)
- Q12. Utilization of Linux
- Q13. Utilization of Apache HTTP Server
- Q14. Utilization of Database technologies (MySQL, PostgreSQL, etc.)
- Q15. Utilization of Programming Language Ruby
- Q16. Utilization of Other Programming Languages (Perl, Python, PHP, etc.)
- Q17. Utilization of Ruby on Rails

### Contribution to OSS Communities: (amount of direct investments and manpower costs of OSS engineers inside company)
- Q18. Contribution to Linux
- Q19. Contribution to Apache HTTP Server
- Q20. Contribution to Database technologies (MySQL, PostgreSQL, etc.)
- Q21. Contribution to Programming Language Ruby
- Q22. Contribution to Other Programming Languages (Perl, Python, PHP, etc.)
- Q23. Contribution to Ruby on Rails
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Utilization of OSS

- Linux
- Appache
- Databases
- Ruby
- Other Languages
- Ruby on Rails

Legend:
- 100%
- 75-99%
- 50-74%
- 25-49%
- 1-24%
- No Use
- Unaccounted
Contribution to OSS

- Linux
- Appache
- Databases
- Ruby
- Other Languages
- Ruby on Rails

- 1 million dollar <=
- 2 hundred thousand dollar <= < 1 million dollar
- 1 hundred thousand dollar <= < 2 hundred thousand dollar
- < 1 hundred thousand dollar
- No Contribution
- Unaccounted
Utilization and Contribution of OSS

- Linux, Apache, and Database technologies are well used
- Ruby, Rails are used particular business fields
- Contribute to OSS communities is relatively low in Japan

Japanese IT Companies are Free Riders?
Correlation between Utilization and Contribution of OSS

<table>
<thead>
<tr>
<th>contribution utilization</th>
<th>Linux</th>
<th>Apache</th>
<th>Databases</th>
<th>Ruby</th>
<th>O.L.</th>
<th>RoR</th>
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<tr>
<td>Databases</td>
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<td>.105</td>
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<td>Ruby</td>
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<td>-.013</td>
<td>.007</td>
<td>.324**</td>
<td>.114</td>
<td>.351**</td>
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<td>.189*</td>
<td>.099</td>
<td>.272**</td>
<td>.140</td>
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<tr>
<td>Ruby on Rails</td>
<td>.087</td>
<td>.086</td>
<td>.065</td>
<td>.331**</td>
<td>.159</td>
<td>.420**</td>
</tr>
</tbody>
</table>

Spearman's rank correlation coefficient
** 1% level of significance, * 5% level of significance
Correlation between Utilization and Contribution of OSS

• As a whole, correlations between utilization and contribution of companies in many OSS technology types are not significant.

• The exception was that the correlation between Ruby and Ruby on Rails in this context is significant.

• And those of Other Languages between Apache and Databases technologies are rather weak but significant.
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Effect on Business Growth by Utilization and Contribution of OSS

Correlations between business growth and utilization of OSS

<table>
<thead>
<tr>
<th></th>
<th>Growth Rate of Sales</th>
<th>Prospect of Sales</th>
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<tr>
<td></td>
<td>(present period)</td>
<td>Growth Rate</td>
<td>(present period)</td>
<td>(subsequent period)</td>
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<td>Apache</td>
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<td>.222**</td>
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<td>Ruby</td>
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<td>Other Languages</td>
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<tr>
<td>Ruby on Rails</td>
<td>.055</td>
<td>.178*</td>
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**Effect on Business Growth by Utilization and Contribution of OSS**

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Spearman's rank correlation coefficient

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Effect on Business Growth by Utilization and Contribution of OSS

- Utilization of OSS has an insignificant effect on the present sales growth
- but when they use OSS they tend to make allowance for the subsequent sales growth.
- However, the contribution to OSS communities has an insignificant effect both on the present sales growth and on the subsequent sales growth.
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Conclusion and Challenges for the Future

• Major OSS, like Linux, Apache, MySQL, and PostgreSQL, are still utilization objects for Japanese IT companies, or “Frontier” technologies.

• Ruby and Ruby on Rails are both utilization and contribution objects for Japanese IT companies. They have to contribute or participate in the development process of both technologies.
Conclusion and Challenges for the Future

• To survey the effect on business growth we take on growth rate of sales and growth of employee number as indicators of business growth.

• There are also other indicators to estimate business growth.
Challenges for the Future

• The survey included collected data from many types of supply side IT companies is lumping together.

• To analyze the effect on business growth, we have uncovered, will require more assorted statistical analyses.

• One proposed step for further research is to expand future survey criteria to the demand side of IT businesses.
References

Thank you for your attention.
&
I kindly ask for your cooperation.