

The Antecedents and Consequences of User Innovation

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User and Open Innovation Workshop
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Yutaka Hamaoka

Keio University
hamaoka@fbc.keio.ac.jp

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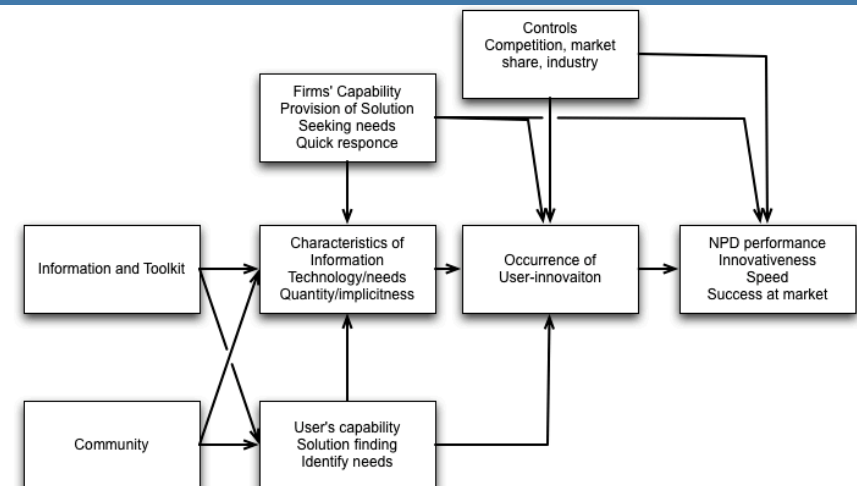
Agenda

- Related Works
- Theory
- Data
- Results
- Discussion
- Findings/Contribution
- Limitations and Future Research

Significance of the Present Study

- Theoretical
 - Extend the “Stickiness of Information” Theory (von Hippel, 1994).
 - Take into account the antecedents and consequences of user innovation.
- Empirical
 - Questionnaire surveys of Japanese manufacturers including B2B and B2C firms were conducted, and proposed model was tested using structural equation modeling.

Theory: Framework



Theory

Stickiness of Information (von Hippel, 1994)

- “The *stickiness of a given unit of information* in a given instance is the incremental expenditure required to transfer that unit of information to a specified locus in a form usable by a given information seeker. (von Hippel, 1994)”
- To achieve innovation, needs-related information and technology/solution-related information are necessary.
- “The player who has the stickiest innovation-related information is most likely to innovate.”

- Stickiness of information is affected by
 - Information itself: Explicitness and the amount of needs and technological information
 - Transaction cost theory (Coase 1937; Williamson 1975)
 - Attributes of information senders and seekers
 - Capability theory (Wernerfelt 1984; Langlois and Robertson 1995)

Hypotheses on Innovation-related Information and Capabilities

- Explicitness and amount of information
 - (+) Explicitness of technological information
 - (+) Implicitness of needs information
 - (–) The amount of technological information
 - (+) The amount of needs information
- Capability of Firms
 - (–) Technological/solution provision
 - (–) Needs identification
 - (–) Quick response to user needs
- Capability of Users
 - (+) Technological/Lead Usersness
 - (+) Needs identification

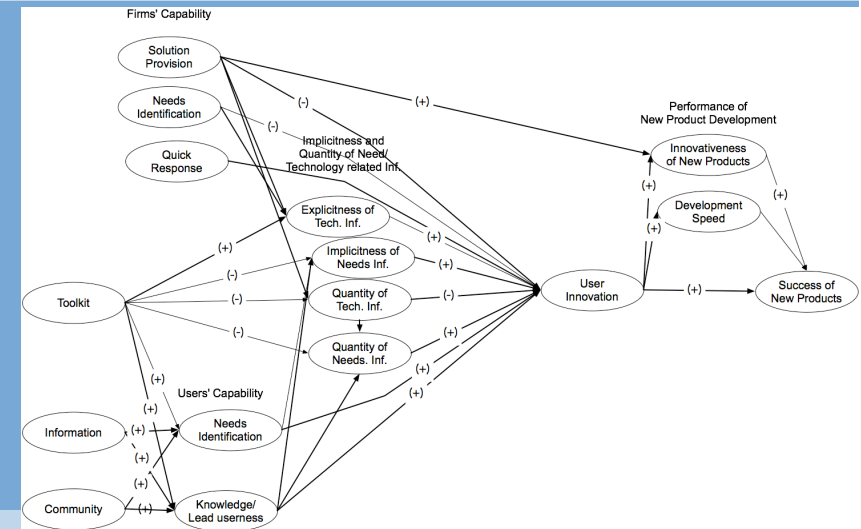
Determiners of Characteristics of Information and Users' Capability

- Toolkit (von Hippel and Katz, 2002)
 - unsticking
- Community (Franke and Shah, 2003; Hamaoka, 2002)
- Information provision to users
 - These variables affect users' capability and the characteristics of information.

Consequences of User Innovation

- UI could affect new product development and performance
 - Integrating users' ideas should accelerate development speed, innovativeness of new products, and success in the market.
 - Speed of NPD
 - Innovativeness of new product
 - Success in the market

Path Diagram for Proposed Hypotheses



Data

- Method
 - Mail surveys of Japanese manufacturers were conducted.
 - Questionnaire items to measure each construct were developed.
 - A Likert-type five-point scale was employed.

Examples of Questionnaire Item

- Users' technological capability: Lead Usersness
 - Our users are knowledgeable.
 - Our users are technologically advanced.
 - We have users whose needs are extremely advanced.
- User innovation
 - In your Industry, does the User often innovate?
 - How Often Do Your Customers Innovate?
- Toolkit
 - Tools and information to customize and develop our products are available.
 - Our products are easy customizable by users.
 - We provide toolkit to users.

- Sampling frame
 - Manufacturers listed on the Japanese stock market
 - Chief of the NPD department or a similar position
- Response
 - 2007: 151/612 (Response rate = 24.6%)
 - 2008: 124/646 (Response rate = 23.4%)
 - 2009: 103/631 (Response rate = 16.3%)
- Total samples: 378 (B2B: 153, B2C: 225)

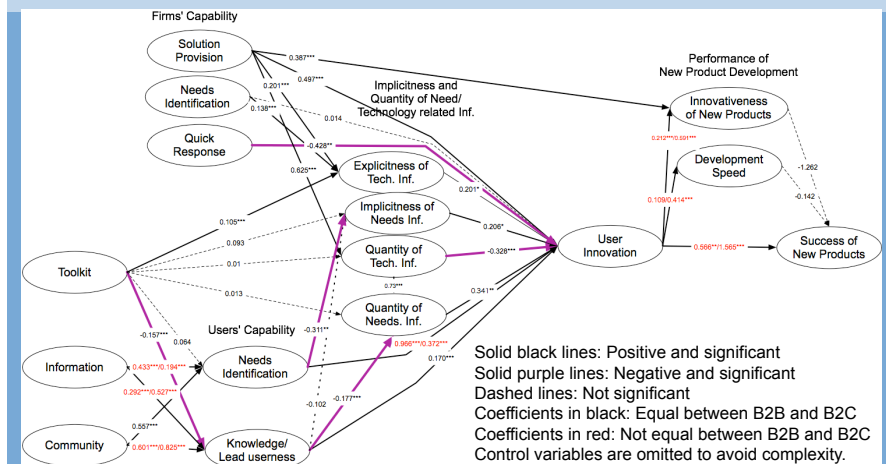
Analysis

- The structural equation model is employed because
 - This method can test the relationship between unobservable constructs.
 - Moreover, it can test the equality of parameters between B2B and B2C samples.
- Four models are estimated to examine the difference and similarity of the relationship among the constructs between B2B and B2C samples.

Table Model Fit

	Model 1	Model 2	Model 3	Model 4
Sample	Pooling all samples	Estimate B2B and B2C samples separately	Estimate B2B and B2C samples simultaneously	Estimate B2B and B2C samples simultaneously
Parameter constraints	---	None	All path coefficients of B2B and B2C samples are equal	Rejected constraints are released
Meaning of model	Parameters of B2B and B2C samples are the same	Parameters of B2B and B2C samples are completely different	Path coefficients of B2B and B2C samples are the same	Some of the path coefficients are different
AIC	63.7	-705.3	-772.3	-795.1
RMSEA	0.073	0.061/0.061	0.061	0.060

Results (Model 4)



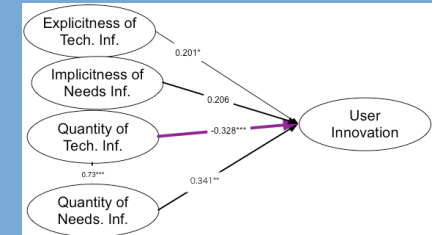
Differences between B2B and B2C

Table Coefficients where Equality Constraints were Rejected

	B2B	B2C
Information→Users' Capability: Needs Identification	0.433**	0.194***
Information→Users' Capability: Knowledge/Lead User	0.292***	0.527***
Community→Users' Capability: Knowledge/Lead User	0.601***	0.825***
Users' capability: Needs Identification→the amount of Needs Information	0.966***	0.372***
User Innovation→Innovativeness of New Products	0.212***	0.591***
User Innovation→Development Speed	0.109	0.414***
User Innovation→Success of New Product in the Market	0.566***	1.565***

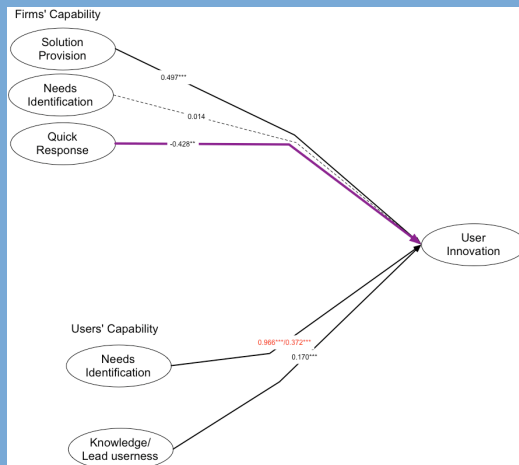
Determiners of UI—Innovation-related Information

- As expected, the four hypotheses are supported.
 - Explicitness of Tech Information and Implicitness and the amount of Needs Information have a positive impact on UI.
 - And the amount of technological information has a negative impact on UI.

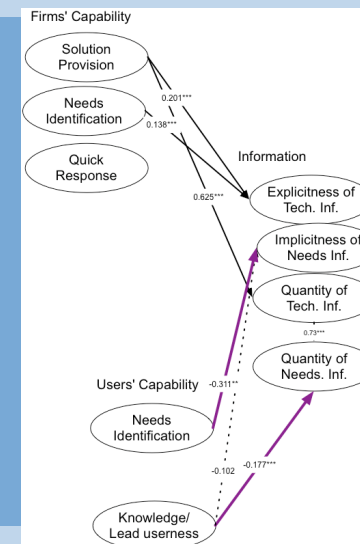


Determiners of UI—Capability

- Capability of Users
 - As we expected, the Needs Identification capability and Knowledge of users have a positive impact on UI.
- Capability of Firms
 - As we expected, Quick Response to user needs has a negative impact on UI.
 - Needs Identification capability of firms is insignificant.
 - Moreover, contrary to our expectations, the firms' Technological/Solution Provision capability has a positive and significant impact.



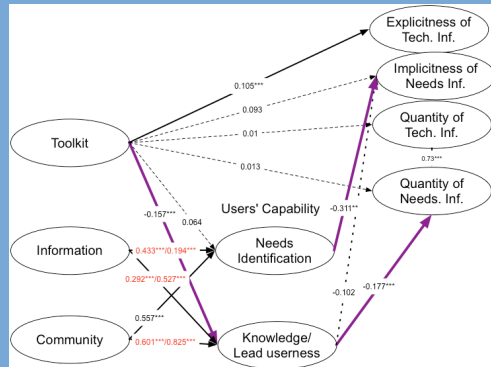
Relationship between Capability and Innovation-Related Information



- The relationship between capability and transaction cost has been less studied.
- We found that they are correlated. For example, users' capability reduces Implicitness and the amount of Needs Information.
- Firms' capability increases the Explicitness of Technological Information.

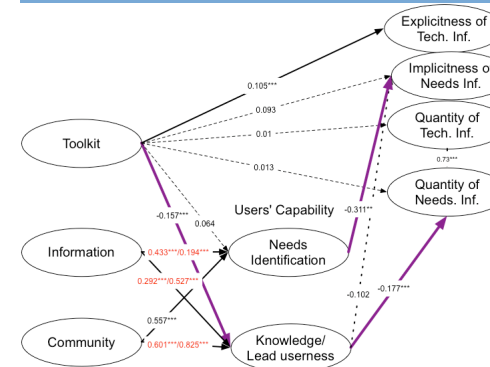
Determiners of Capability and Characteristics of Information: Information Provision to Users and the Community

- Information provision to users and the community has a positive impact on the *Technological and Needs Identification* capability of users.



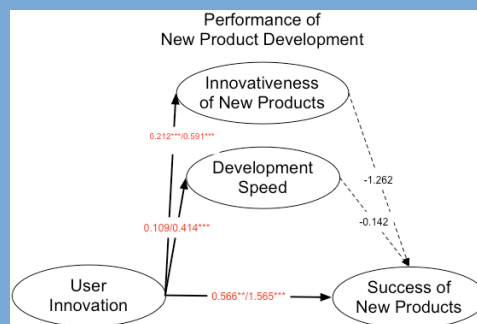
Determiners of Capability and Innovation-related Information: Toolkit

- The *Toolkit* has a positive impact on the *Explicitness of Technological Information*. However, it is insignificant to the other information characteristics.
 - What are the limitations of the available *Toolkit*?
- Moreover, we expected the *Toolkit* to promote learning among users. However, it has a negative impact on the *Knowledge of the users*.
 - Does the *Toolkit* deteriorate the knowledge of the users?



Consequences of User Innovation

- User Innovation* has a positive impact on the pace of product development, innovativeness of a new product, and performance of the new product in the market.
 - Integrating user innovation improves the overall performance of the new product.



Controls

- (+) Market share
- (-) Sales
- (+) Strength of distribution channel
- (-) Competition
- Industry dummy
 - (ns) Food, Machinery, Electronics, Automobile
 - (+) Chemicals
 - (-) Pharmatheauticals
- UI is frequent in smaller companies: those that maintain a strong market position.

Findings/Contributions

- The stickiness of information theory is extended and tested.
 - Determiners/Antecedents of UI
 - Hypotheses on Users' capability and innovation related information were supported. However, hypotheses on Firms' technological capability and needs identification capability were rejected.
 - Determiners of capability and innovation-related information
 - Providing information and harnessing the user community are more effective than using the toolkit.

– Consequences of UI

- UI has a positive impact on the speed of product development, innovativeness of new products, and performance of new products in the market.
- B2B and B2C samples are compared
 - We confirmed robustness of model.
 - 23 out of 30 coefficients are the same.
 - Provision of information and the community enhance the users' knowledge more effectively in a B2C sample.
 - Moreover, the linkage between UI and NPD performance are stronger for B2C samples.

Limitation and Future Research

- Some hypotheses were rejected.
 - Firms' capability → (-/+)User Innovation
 - More advanced firms provide more technological information to users?
 - Toolkit → (+/-) Knowledge /Lead Userness
 - Knowledge level and type of toolkit must be examined.
 - We need to conduct more research to clarify these relationships.
- We found UI has positive impacts on NPD performances.
 - We must investigate how firms integrate user innovation into NPD.

Thank you !

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