Marketing Science in Japan
How Marketing Science Orientation Affects NPD Process and Performance?

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Agenda

- Research Motivation and Purpose
- Theory
- Data
- Analysis
- Results
- Summary and Discussion
- Limitations and Future Research

Research Motivation and Purpose

- Research Motivation
  - Japan Institute of Marketing Science (JIMS), an equivalence of ISMS established in 1966, celebrated 100th conference last year.
  - At the memorial symposium, a question was raised "Have Marketing Science contributed to industry?"

- Research Purpose
  - To explore how Marketing Science affect firm's performance.
    - Develop Marketing Science Orientation (MSO) scale.
    - Develop theoretical framework and hypothesis how MSO affect NPD related variables.
    - Test proposed scale and hypothesis using longitude survey to Japanese manufactures.

Marketing Science Orientation

- What is "Marketing Science?"
  - No definition is found in English literatures.
    - "History of Marketing Science" project (MS, Volume 20, Issue 4, November 2001)
    - Winer and Neslin (2014), "The History of Marketing Science".
    - Homepage of MSI, informs, AMS
- In Japanese textbook Katahira(1983) "Marketing Science," dose not define MS. Instead, key words of "Marketing Science" are listed.
  - Data
  - Logic
  - Market
  - Managerial
  - "(MS is) a discipline that explore basic thinking and method that useful for decision makers. MS utilize data and logic"

- Definition of "Management science" (Cambridge dictionary)
  - "the use of scientific methods and ideas to understand business and management problems and decisions, or the formal study of management: Management science is concerned with designing and developing new and better models of organizational excellence.
    - http://dictionary.cambridge.org/dictionary/english/management-science

- Scientific process
  - "particular ways of observing, thinking, experimenting, and validating (AAAS 1989)"

Marketing Orientation and Marketing Science Orientation

- Two approaches of MO
  - Behavior based MO (Kohli & Jaworski 1993)
    - Market Intelligence generation
    - Market Intelligence dissemination
    - Responsiveness

  - Organizational culture based MO (Narver & Slater)
    - Customer orientation
    - Competitor orientation
    - Inter-functional coordination

  - MO focus into "observation" in scientific process, but neglects thinking, experimenting, and validating.

Definition of Marketing Science and Two levels of "Marketing Science Orientation"

- Definition
  - "the use of scientific methods and ideas to understand business and marketing problems and decisions, or the formal study of marketing: marketing science is concerned with designing and developing new and better models of organizational excellence.
  - Scientific methods and ideas is not limited to use of data and equations, it is way of thinking and behavior that involve hypothesis development, data generation, hypothesis testing, and update and accumulation of knowledge.

- Two levels of Marketing Science Orientation
  - Marketing Science at Behavior level
    - How data, model, and Logic are utilized?

  - Organizational process/Cultural level
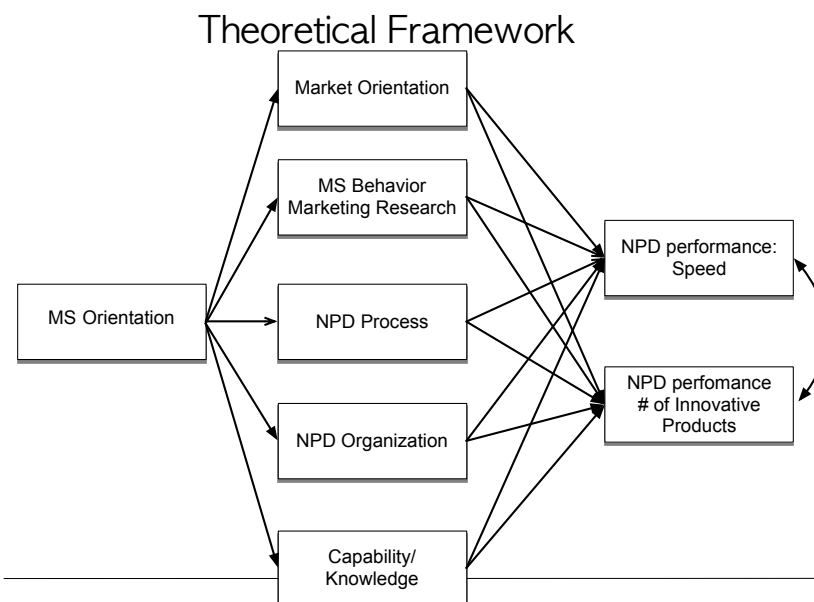   - How a firm employ scientific process?

## How MS Orientation affect NPD related Variables?

Theoretical Framework

Hypotheses

- Based on proposed theoretical framework, a set of hypotheses were proposed among the following constructs.
  - MSO→NPD Organization
    - (+)Heavy weight project leader (Clark and Fujimoto 1991)

  - MSO→NPD process
    - (+)Formalization of NPD process
    - (+)Front loading (Thomke and Fujimoto 2000)
  - MSO→Resource/ capability
    - (+)Technological knowledge/ capability (Song and Parry 1997)

  - MSO→MO and MS behavior
    - (+) Market intelligence generation and dissemination
    - (+) Marketing research

  - NPD outcome
    - Development speed
    - # of Innovative of new product

Hypotheses
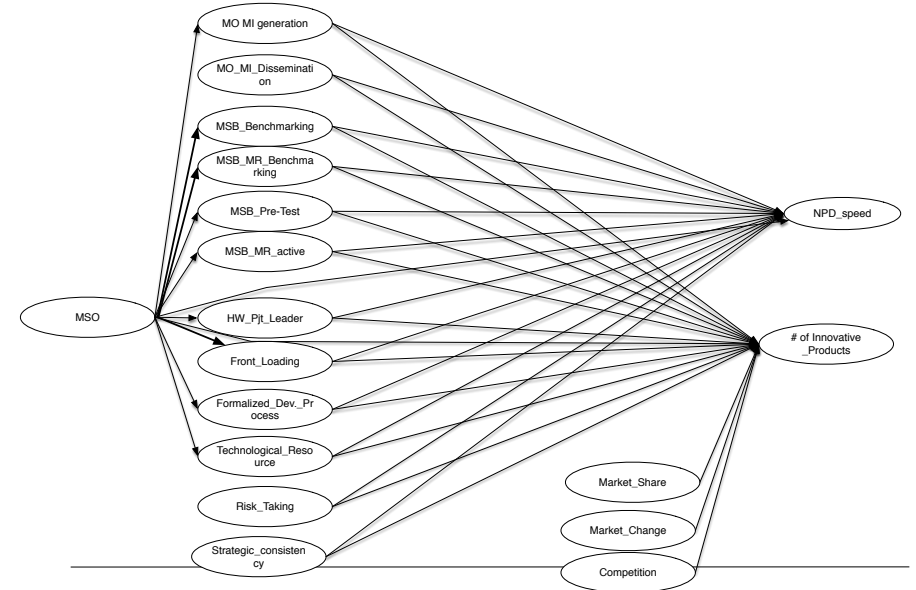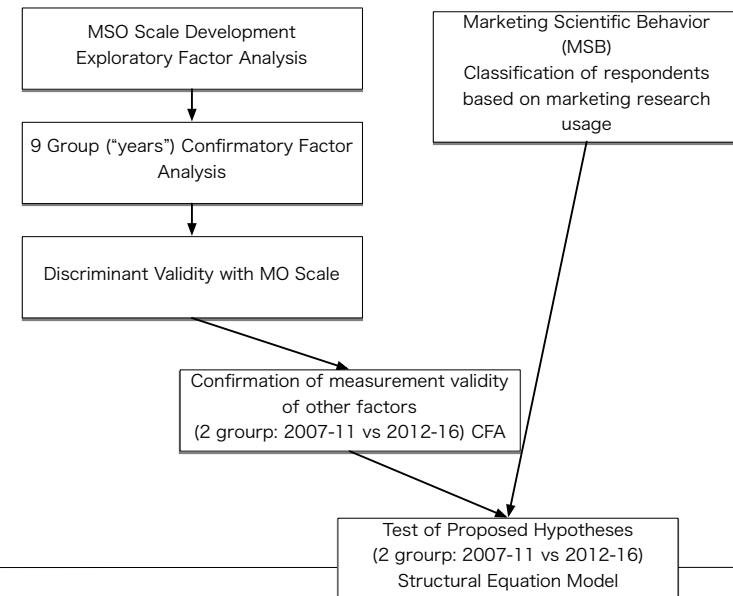
Data

- **Method**
  - Mail survey of Japanese manufacturers (2007-).
- **Sampling frame**
  - NPD managers of manufacturers listed in the Japanese stock exchange market.

- "No response bias" was not found
  - It was confirmed that there was no difference between the firms that responded and those that did not, in terms of sales and the distribution of industrial classification.

Distribution of Response

Year	N	Return	Response Rate
2007	612	151	24.7%
2008	646	124	19.2%
2009	621	103	16.3%
2010	670	133	19.6%
2011	544	121	21.8%
2012	715	149	20.6%
2013	808	137	16.7%
2014	737	112	15.1%
2016	851	117	13.6%
Total	6204	1147	18.3%

Flow of Analysis

MSO Scale Development Exploratory Factor Analysis

↓

9 Group ("years") Confirmatory Factor Analysis

↓

Discriminant Validity with MO Scale

↓

Marketing Scientific Behavior (MSB) Classification of respondents based on marketing research usage

Confirmation of measurement validity of other factors (2 grourp: 2007-11 vs 2012-16) CFA

Test of Proposed Hypotheses (2 grourp: 2007-11 vs 2012-16) Structural Equation Model

Scale Development

- Marketing Science Orientation (MSO) (a =0.798)
  - We usually forecast sales and other metrics for new products.
  - We set subjective goal for new products development and sales.
  - We track sales and other metrics of new products after launch.
  - We track advertising effectiveness after launch.
  - We conduct development process review and reflect it future projects.
- Discriminant validity with Marketing Orientation Scale
  - Simplified MO scales
  - MI generation (a =0.889)
    - We explore implicit customer needs.
    - We seek potential customer needs.
  - MI disseminating (a =0.808)
    - Customer information is shared among SBUs and divisions.
    - Competitor information is shared among SBUs and divisions.

Analysis

- Data was collected at 9 data points (2007-14, 16).

- Multi-group confirmatory factor analysis (CFA)
  - Measurement invariance was examined for multi-group analysis ("year" as group)

Fit Index
(9 group confirmatory factor analysis: MSO+ 2 MO Factors)

	AIC	BIC	CFI	rmsea
configural	21281	22644	0.950	0.086
loadings	21264	22384	0.942	0.083
intercepts	21211	22089	0.943	0.076
residuals	21197	21712	0.929	0.076
means	21163	21557	0.931	0.073
pooled	21108	21214	0.959	0.076

Factor Correlation among MSO and MO Dimensions

	MO:MI generation	MO:MI dissemination
MSO	0.520	0.449
MO MI generation		0.476

- Discriminant validity was confirmed.

Marketing Science at Behavior Level (MSB)
Classification of firms based on usage of Marketing Research tools

	Inactive	Benchmarking	Customer visit	Test Mktg	Active
1.Information through sales representatives	94%	96%	98%	98%	93%
2.Information form customer support	27%	0%	73%	71%	96%
3.Ad hoc survey to users and consumers	6%	4%	7%	13%	75%
4.Regular survey to users and consumers	13%	11%	19%	32%	91%
5.POS&panel data	8%	8%	9%	13%	81%
6.Group and/or depth interview	5%	3%	10%	10%	90%
7.Bench marking	0%	100%	84%	77%	91%
8.Customer site visit/ observation	32%	0%	75%	75%	79%
9.Ad-test before product launch	0%	0%	0%	2%	18%
10.Ad-tracking	1%	1%	2%	4%	43%
11.Package and product name test	0%	1%	2%	3%	60%
12.Qualitative product test	21%	17%	18%	85%	80%
13. Conjoint measurement	6%	7%	6%	17%	66%
14. Pre-test marketing	11%	18%	8%	65%	38%
15. Test marketing	6%	5%	7%	18%	61%
16. Brand equity measurement	2%	0%	2%	3%	40%
17. Company image survey	6%	2%	10%	18%	74%
18.Marketing area analysis	4%	2%	5%	9%	22%
19.Media audience/ rating survey	2%	2%	4%	4%	40%
20.Distributor audit	2%	5%	2%	7%	36%
21.Price audit	14%	24%	21%	77%	74%
22.Monitoring on-line community	0%	1%	1%	3%	22%
23.None	0%	1%	0%	0%	1%
24.others	4%	7%	5%	2%	2%
N	248	133	396	244	129

Inactive
Benchmarking
Customer visit
Test Maketing
Active

Test of Hypotheses

- Comparison between 2007-11 vs 2012-16: two group analysis
  - Proposed model has more than 120 parameters, however, our sample size of each year was around 120. Thus, we limited samples that answered more than 2 times (N=293 firms) and compared the between the first (2007-11) and the latest period(2012-16).

  - (2 group) CFA
    - Additional constructs were also measured with subjective items.
    - Measurement invariance between 2 period was confirmed(loadings +intercept).

  - (2 group) Structural equation model
    - Based on proposed hypotheses, paths were introduced. Fit of model that assumes measurement invariance with different regression coefficient was the best.
      - CFI=0.70, RMSEA=0.090

17

Results (Standardized Coefficients)

Explanatory Variable	Dependent Variable	2007-11		20012-16	
MSO	Heavy weight pjt leader	0.99	***	0.46	***
MSO	Formalized process	0.98	***	0.61	***
MSO	Front loading	0.99	***	0.54	***
MSO	MSB Benchmarking	0.10	***	0.06	***
MSO	MSB Customer visit	0.33	***	0.06	***
MSO	MSB Pre-Test	0.25	***	0.04	***
MSO	MSB MR active	0.13	***	0.02	***
MSO	MO_MI Dissemination	0.99	***	0.63	***
MSO	MO_MI generation	0.99	***	0.63	***
MSO	Technological Capability	0.99	***	0.51	***
MO_Dissemination	NPD_speed	0.12		-0.04	
MO_MI generation	NPD_speed	-0.01		0.11	
Heavy weight pjt leader	NPD_speed	-0.19		0.01	
Formalized process	NPD_speed	-0.14	**	0.15	**
Front loading	NPD_speed	0.25		-0.03	
Risk Taking	NPD_speed	0.27	***	0.29	***
Strategic consistency	NPD_speed	-0.04		-0.04	
Technological Capability	NPD_speed	0.38	***	0.23	***
MSB Benchmarking	NPD_speed	-0.07	*	-0.14	
MSB Customer visit	NPD_speed	-0.03		-0.22	**
MSB Pre-Test	NPD_speed	-0.04		-0.23	*
MSB MR active	NPD_speed	-0.03		-0.23	
Competition	NPD_speed	-0.07		-0.08	
Market demand change	NPD_speed	0.13	***	0.01	
Market share	NPD_speed	0.33	***	0.24	**
MO_Dissemination	Innovative Product	0.28		-0.08	
MO_MI generation	Innovative Product	-0.21		0.00	
Heavy weight pjt leader	Innovative Product	0.13		0.02	
Formalized process	Innovative Product	0.26		-0.01	
Front loading	Innovative Product	0.44		-0.01	
Risk Taking	Innovative Product	0.57		0.03	
Strategic consistency	Innovative Product	-1.14	*	0.05	
Technological Capability	Innovative Product	-0.02		0.04	
MSB Benchmarking	Innovative Product	0.28	**	-0.19	*
MSB Customer visit	Innovative Product	0.13		0.06	
MSB Pre-Test	Innovative Product	0.22	**	0.12	
MSB MR active	Innovative Product	0.31	**	0.42	
Competition	Innovative Product	-0.29		-0.05	
Market demand change	Innovative Product	0.35		0.11	**
Market share	Innovative Product	0.17		0.03	

Significance level ***: 1% **: 5% *: 10%

18

Summary and Discussion

- Marketing Science Orientation scale was developed based on scientific process: hypothesis exploration, testing, followup, and review.
  - We confirmed the MSO scale is distinct from Market Orientation Scale.
  - We also confirmed the MSO scale and MO scale is stable for 10 years for Japanese manufactures.

- Marketing scientific behavior (MSB)
  - Based on usage of marketing research tools, manufactures were classified into 5 types. (1) Inactive, (2) Benchmarking, (3) Customer visit, (4) Test-marketing, (5) Active in MR. Among 1150 respondents, only 129 were classified as "Active"

- Effect of MSO and MSB on NPD related variables
  - Theoretical framework and hypotheses that relate MSO and MSB with NPD related variables: organization, process, and performance was developed.
  - Through analysis of Japanese manufacture data, the following were confirmed.
    - MSO promotes MSB and NPD related variables: formalization of development process, project leader who has both technological and marketing knowledge, and so on.
    - MSO also promote accumulation of technological knowledge that leads to speedy NPD.
    - MSB has negative impact on NPD speed , on the contrary, it has positive impact on innovative product.
    - Comparison between 2007-11 and 2012-2016 revealed that Japanese firms adapted new NPD process.

19

Limitations and Future Research

- Analysis
  - Some puzzling results are obtained, for example reversed sign between two periods (path form "MSB Benchmarking" to "# of innovative products" was positive for 2007-11. On the contrary, it was negative for 2012-16). Further examination is necessary.

  - Model fit was not satisfactory. Model improvement is necessary to add path based on modification index and/or additional hypothesis.

- Theory
  - We assumed two periods are independent. Appropriate modeling and theory on dynamic process among constructs is necessary.

20

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Than you!

Marketing Science in Japan: Findings from 10 Years Longitude Survey
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2017/6/10
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