

An exploratory study of why organizations do not adopt CMMI

**Mark Staples, Mahmood Niazi, Ross Jeffery,
Alan Abrahams, Paul Byatt, Russell Murphy**

Journal of Systems and Software (JSS), 2007

2007. 5. 16

Park, Seung-Hun

Contents

- Introduction
- Method
- Analysis and results
- Considerations
- Conclusion
- Discussion

Introduction (1/2)

- Process capability maturity model based SPI (CMMI, SPICE, etc)
 - Frameworks for defining and measuring process and practices
- Most of previous studies about adopting CMMI report
 - Post hoc experience of organizations that
 - Have already chosen, successfully implemented, and gained benefit from CMMI
 - Problems experienced by organizations implementing CMM
 - Sample population was familiar with CMM
- No prior published evidence about understanding why organizations do not adopt CMMI

Introduction (2/2)

- Empirical study environment of reasons why SW-developing organizations do not adopt CMMI
 - Data
 - Two months of sales data
 - Contact notes
 - Source
 - Company selling CMMI Level 2 Class B and C appraisal and improvement services in Australia
 - Analysis
 - Examine relationships between reasons, organizational size, and organizational type

Method (1/6)

- Research questions and hypotheses
 - Questions
 - Why do organizations decide not to adopt CMMI
 - How are the reasons related to the size of organizations
 - How are the reasons related to organizational type
 - Hypotheses
 - Cost, applicability, and time to benefit would be the most frequent reasons for such not adopting CMMI
 - Small and medium sized organizations would have a different pattern of response that large organizations
 - There would be a significant relationship between reasons and organizational type

Method (2/6)

- Steps of method



Method (3/6)

- Sales data
 - Duration
 - Two months by 3 salespeople
 - Source of the contacted organizations
 - Third-party company databases sourced from government
 - News articles
 - Sales-people's personal contacts
 - Contact information
 - Date, salesperson, organization contacted, individual contacted, current and next status of the sales opportunity, current and next status
 - Raw data
 - 429 contact events with 274 organizations

Method (4/6)

- Categorizing sales opportunities
Sales data and contact notes



Use Cohen's Kappa
(Kappa = 0.88)

- No Sale : 75
- In Progress : Most of others
- Sale : Several

Method (5/6)

- Classifying reasons

exclude

For 40 organizations

Group	Group frequency (of 73 orgs)	Reason	Reason frequency (of 73 orgs)
N/A	24	No software development	11
		Not in business	8
		Already using capability maturity model	3
		Want Class A rating	2
		Insubstantive	37
		May consider SPI later	17
Could not	33	Small organization	17
		Too costly	15
		No time	10
		Not applicable to our projects	2
		Should not	17
		No clear benefit	4
		Potential benefits not wanted	3
		Already know gaps	2
		No customer demands	2
		Risk of poor certification damaging business	1

Method (6/6)

- Determining size and type of organizations

- Size

# of employees	Size category	<i>N</i>	Minimum	Median	Mean	Maximum	Std Dev.
(0 ~ 19)	SMALL	15	1	5	7.8	18	6.53
(20 ~ 199)	MEDIUM	9	20	45	48.3	95	28.6
(200 ~ +)	LARGE	4	200	245	313	560	169
	UNKNOWN	12	?	?	?	?	?

- Type

Type	Definition	Number
Single unit	Single office location; No international offices	22
Head of national	Multiple office locations; Head office contacted; No international offices	6
Branch of national	Multiple office locations; Branch office contacted; No international offices	0
Head of multinational	Multiple office locations; Head office contacted; International offices	9
Branch of multinational	Multiple office locations; Branch office contacted; International offices	3

Analysis and results (1/6)

- Reason frequency

Frequency-ordered list of reasons

Reason	Frequency (of 40)	%
Small organization	17	43
Too costly	14	35
No time	10	25
Using other SPI	8	20
No clear benefit	4	10
Potential benefits not wanted	3	8
No customer demands	2	5
Not applicable to our projects	2	5
Already know gaps	2	5
Risk of poor certification damaging business	1	3

Grouping the reasons

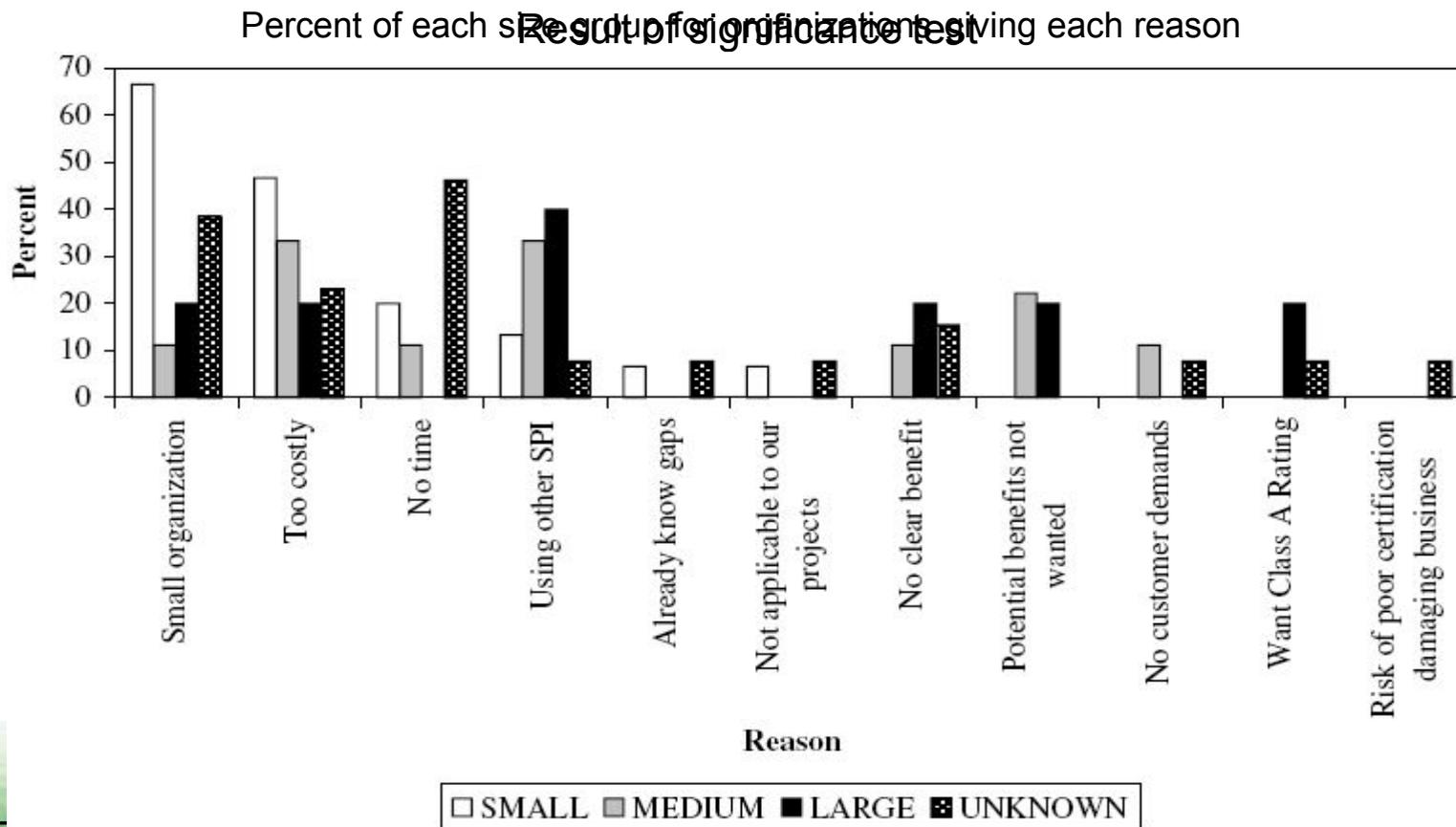
Reason group	Frequency (of 40)	%
Only “could not” reason(s)	23	58
Only “should not” reason(s)	8	20
Both “could not” and “should not” reasons	9	23

Analysis and results (2/6)

- Reason vs. size
 - Tested the significance of relationships using Fisher's exact test
 - Small organization, too costly, no time, using other SPI
 - Observation
 - Overall relationship between size categories and reasons
 - Source of any significance
 - Collapsed SMALL and MEDIUM categories
 - Collapsed MEDIUM and LARGE categories

Analysis and results (3/6)

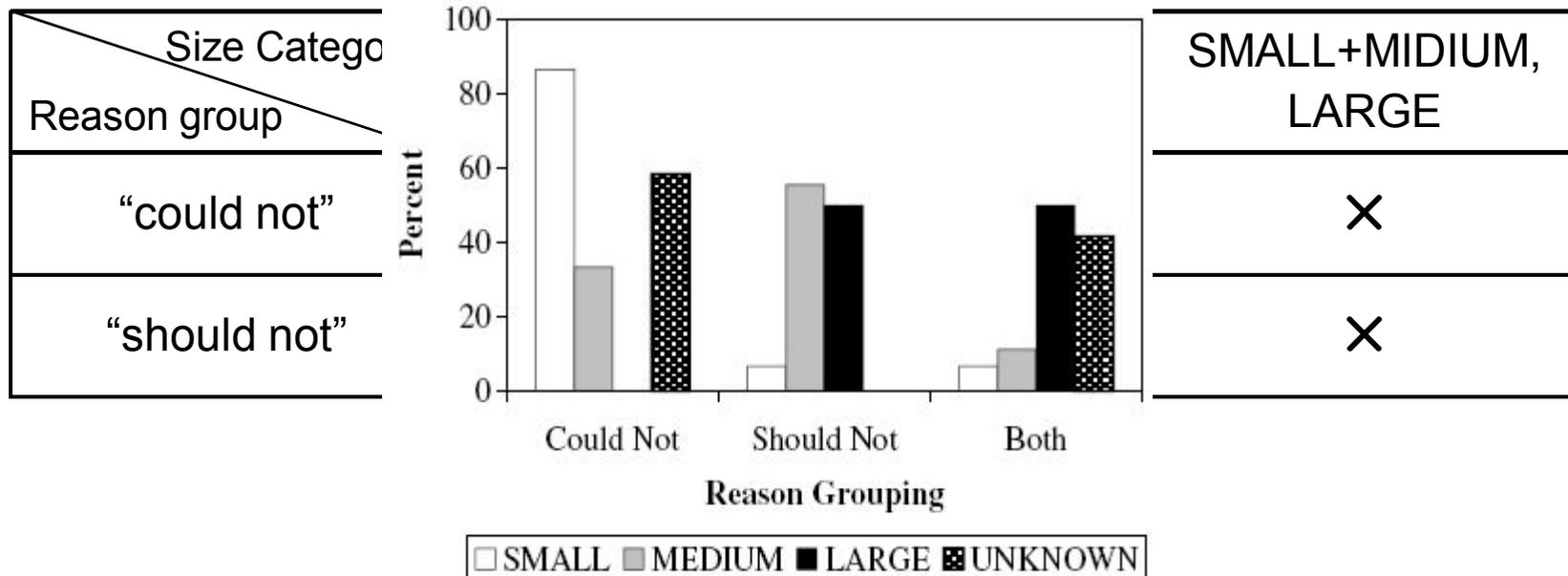
- Reason vs. size (cont'd)
 - Result 1 : each of reasons vs. size category



Analysis and results (4/6)

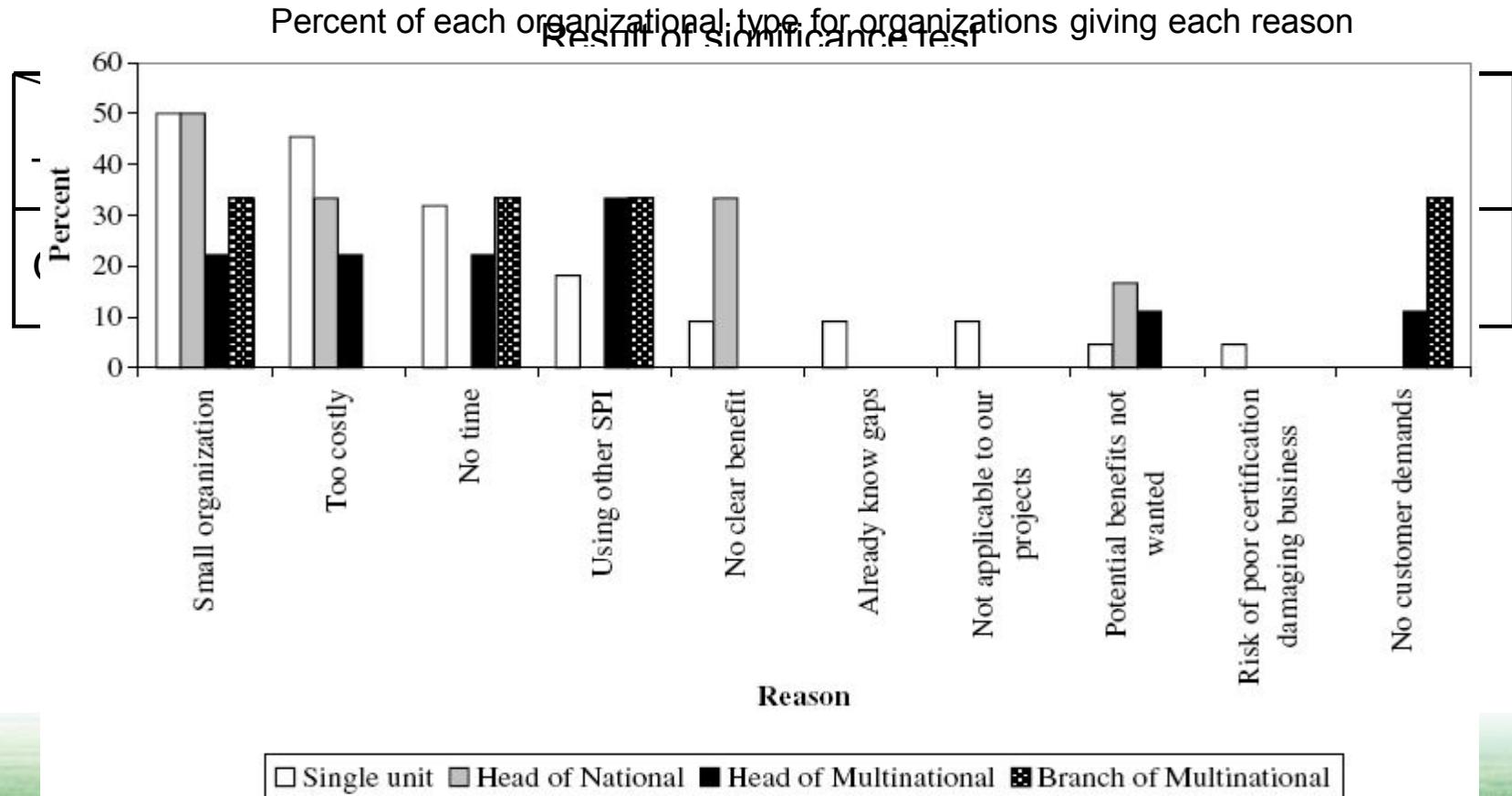
- Reason vs. size (cont'd)
 - Result 2 : reason group vs. size category

Percent of organizations of Results of significance tests in either or both group



Analysis and results (5/6)

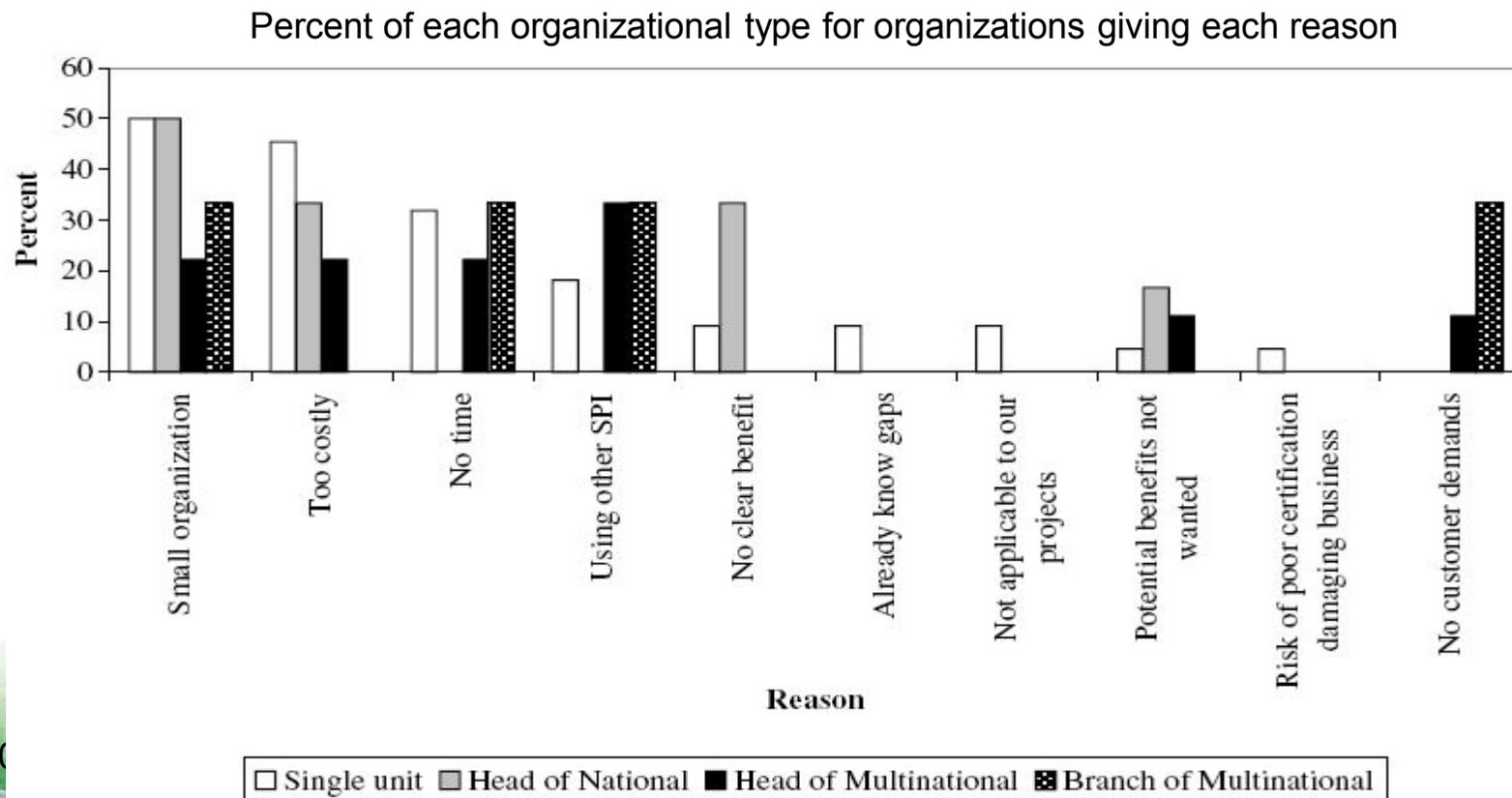
- Size vs. type



Analysis and results (6/6)

- Reason vs. type

- There is not a significant relationship between organizational type and the reasons



Considerations (1/5)

- Results of the tests for the hypotheses
 - Cost, applicability, and time to benefit would be the most frequent reasons for such not adopting CMMI
 - The most reasons from the sales data
 - Small organization, too costly, the lack of available time to adopt, competition from other forms of SPI already being used
 - Small and medium sized organizations would have a different pattern of response that large organizations
 - SMALL organizations have a different pattern of response
 - SMALL organizations tend to give “could not” reasons
 - MEDIUM and LARGE organizations tend to give “should not” reasons
 - Small organizations face other additional barriers than simply being unable to absorb additional cost overheads
 - “no time”, “not applicable to our projects”, “small organization”

Considerations (2/5)

- Results of the tests for the hypotheses (cont'd)
 - There would be a significant relationship between reasons and organizational type
 - Can not conclude that the relationship is significant
 - Relationships between organizational type and size, and between size and reason are not transitive
 - Factors influencing the relationships between size and reason may be different to those influencing the relationships between type and reason

Considerations (3/5)

- Improving SPI for small organizations
 - Issues
 - Negative perceptions of CMMI
 - Lack of widespread adoption of process capability maturity SPI among small organizations
 - Lack of studies of failed adoption of CMMI-based SPI
 - CMMI tailoring
 - Emphasizes the tailoring “down” rather than tailoring “up”
 - Requires additional burdens for tailoring CMMI to small organizations
 - Small organizations are likely to have fewer resources available to do tailoring

Considerations (4/5)

- Improving SPI for small organizations (cont'd)
 - Issues
 - Needs of small organization
 - More interest in product quality than product quality assurance
 - Product quality : the product working well
 - Product quality assurance : evidence of the product working well
 - Extent and nature of variability in small organization
 - Not yet well understood
 - Suggestion
 - Agile methodologies
 - Target issues of greatest concern to small organization
 - Require low cost and time to trial and adopt
 - Recasting CMMI for the needs of small organizations

Considerations (5/5)

- Validity of method
 - Difference of concept between “buying” and “adopting”
 - Excludes organizations that gave the reason “already using CMM”
 - Inaccurate reasons that reflected better on them
 - Allows organizations to give the “Insubstantive” responses

Conclusion

- Summary

- Why organizations do not adopt CMMI
 - Small organization, too costly, no time, already using another form of SPI
- There is a significant relationship between size and the reason of being a “small organization”
- There is no significant relationship between an organization’s type and the reasons

- Future work

- Study the extent and nature of variation of business context, needs, and constraints of smaller organizations, and their differences to larger organizations

Discussion (1/2)

- How to deal with the survey data
 - Consider the validity issues in utilizing the data
 - Collected data can be biased to satisfy a specific purpose
 - Data are not collected using a survey instrument designed to support academic usage
 - Guideline is necessary to improve the validity

Discussion (2/2)

- Finding research issues that SPI for small organization
 - How to integrate agile methodologies into SPI
 - New capability model to support growing “up” tailoring
 - Ex) k-model

