

Sub-contractor Selection for Maintenance Service of Paper Mills in Thailand

Nuttawut Rojniruttikul
Faculty of Administration and Management
King Mongkut's Institute of Technology Ladkrabang

— *Review of* —
**Integrative
Business &
Economics**
— *Research* —

ABSTRACT

The objectives of this research were 1) to study the importance of sub-contractor selection criteria for maintenance service of paper machine and 2) to compare the importance of sub-contractor selection criteria for maintenance of paper machine by organizational characteristics. The research instrument was questionnaires. Data were collected by simple random sampling method and analyzed by statistical programs. Statistics analyzed include percentages, arithmetic means, and standard deviations. t-tests and one-way ANOVA analyses were used to test the hypotheses. The research results are as follows: 1) Overall, the importance of sub-contractor selection criteria for maintenance service of paper machine was at high level. The most important sub-contractor selection criteria for maintenance service of paper machines was service quality, followed by service time and engineering capability, service price, management system, organization structure, and purchasing method, respectively. 2) Paper factories with different annual production volume indicated their difference in the importance of sub-contractor selection criteria for the maintenance service of paper machines at a statistically significant level of 0.01. In addition, paper factories with other different organizational characteristics had no difference in the importance of sub-contractor selection criteria for the maintenance service of paper machines.

Keywords: selection criteria, maintenance, paper, production volume

INTRODUCTION

The paper industry is one of the most important industries in Thailand, especially for economic development. The expansion rate of the paper industry sector can reflect the growth of social, education, and economic. Demand of paper products is continuously increasing in both household and industry sector, especially the kraft paper and hygiene paper. Kraft paper is used as the material for several packaging. These kinds of packaging is mostly used in many industries such as electronics industry, electrical industry, and food industry. For the writing paper, it is used as

material for printing industry that is necessary to support education, public and private organization. In this regard, the sub-contractor selection criteria plays a vital role to ensure smooth operation in the paper industry. This paper is structured in the following way: research framework, research methodology, research results, conclusion, recommendation, and future research.

RESEARCH FRAMEWORK

The two main objectives of this research are (1) to study the importance of sub-contractor selection criteria for maintenance service of paper machine and 2) to compare the importance of sub-contractor selection criteria for maintenance of paper machine by organizational characteristics. Independent variables in this research are annual production volume, certified quality management system status, type of paper products. Dependent variable is sub-contractor selection criteria for maintenance service.

Hypothesis: Paper factory with different organizational characteristics had different important level of sub-contractor selection criteria.

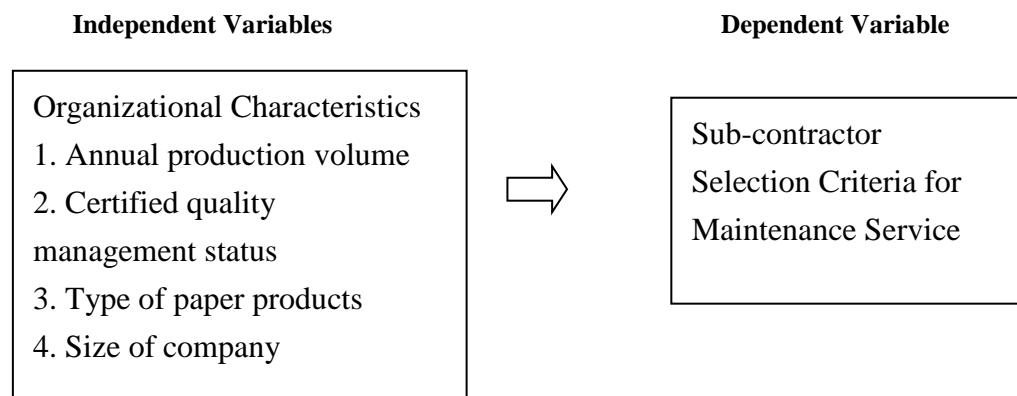


Fig.1. Research Model

RESEARCH METHODOLOGY

The paper analyses the results of a mail survey to 90 maintenance managers in paper factory in Thailand. The data for this study were drawn from a random sample of maintenance managers by using questionnaires as research instrument. The questionnaire asked the respondents to rate the importance of sub-contractor selection criteria of motorcycle parts using a five-point Likert scale. Sub-contractor selection criteria was operationalized as the extent to which company considered the importance of service quality, price, service time, engineering capability, management system, purchasing method, and organizational structure. The reliability of all

constructs have acceptable internal consistency reliability (Cronbach's alpha is 0.821 which is over 0.7 according to Nunnally [2]).

RESEARCH RESULTS

Organizational Characteristics

Table 1: Organizational Characteristics

Organizational Characteristics	Frequency	Percentage
Annual production volume		
≤ 100,000 tons	21	23.3
> 100,000 – 200,000 tons	35	38.9
> 200,000 tons	34	37.8
Certified quality management system		
Yes	80	88.9
No	10	11.1
Type of paper products		
Kraft paperboard	47	52.2
Printing and writing paper	43	47.8

As indicated in **Table 1**, majority of maintenance managers work in paper factory with over 100,000 tons annual production volume and have certified quality management system. About 52 percent of the paper factory produced kraft paperboard, and the remaining factory produced printing and writing paper.

Table 2: Mean, Standard Deviation, and Importance Level of Sub-contractor Selection Criteria

Selection Criteria	Mean	S.D.	Level
Service Quality	4.311	0.759	High
Service Time	4.233	0.735	High
Engineering Capability	4.233	0.822	High
Price	4.222	0.818	High
Management System	4.211	0.828	High
Organization Structure	4.146	0.806	High
Purchasing Method	4.122	0.762	High
Overall	4.213	0.714	High

As indicated in **Table 2**, the level of all sub-contractor selection criteria were highly importance, especially the service quality has the highest rank, followed by service time and engineering capability, price, management system, organizational structure, and purchasing method, respectively.

Table 3: Comparison of Importance of Supplier Selection Criteria with Organizational Characteristics

Organizational Characteristics	Importance of Supplier Selection Criteria (Mean)	p-value
Annual production volume		
≤ 100,000 tons	3.844	0.005**
> 100,000 – 200,000 tons	4.216	
> 200,000 tons	4.437	
Certified quality management system		
Yes	4.254	0.100
No	3.886	
Type of paper products		
Kraft paperboard	4.307	0.161
Printing and writing paper	4.110	

** P < 0.01

As indicated in **Table 3**, paper factory with different annual production volume indicated the difference in the importance of sub-contractor selection criteria for paper machine at statistically significant level of 0.01. In addition, paper factory with different other organizational factors had no difference in the importance of sub-contractor selection criteria for maintenance service of paper machine.

CONCLUSIONS

This study has sought to provide answers to research question regarding how sub-contractor selection criteria differ among paper factory in Thailand. To answer this question, this research focused on two aspects: (1) to study the importance of sub-contractor selection criteria for paper machine and 2) to compare the importance of sub-contractor selection criteria for motorcycle parts manufacturer by

organizational characteristics by using quantitative analysis techniques (t-Test and One-way ANOVA).

Analysis of data from questionnaires strongly indicated that the important level of sub-contractor selection criteria for paper machine was considered as high level. Maintenance manager in the paper factory had the awareness on the importance of service quality. Sub-contractors who had excellent service quality provide the confidence to paper factory to continuously producing paper products to meet the customer demands. Regarding the engineering capability, maintenance manager expect the high level of engineering capability of sub-contractor in order to support new product developments.

RECOMMENDATION

Sub-contractor for maintenance service of paper machine should focus on the improvement of service quality to ensure the ability to perform the promised service accurately and promptly. In addition, the sub-contractor should develop the competency to increase engineering capability in order to support the new technology of their customers.

FUTURE RESEARCH

This study used the perceptions of respondents who work as maintenance managers in paper factory in Thailand as the data source. Therefore, the future research should involve production manager and operators who work closely with paper machine to reflect what their needs as the research sample. Finally, the combination of quantitative and qualitative approach is also recommended in order to provide in-depth understanding of the interaction among variables in the conceptual framework.

REFERENCES

- [1] Gavelin, G. (1999). *The Manufacture of Paper-a review*. Sweden
- [2] Heizer J. and Render, B. (2008) *Operations Management*, 9th ed, Pearson Education.
- [3] Kotler, P. (2003). *Marketing Management*. 11th ed. New Jersey : Prentice-Hall, Inc.
- [4] Morgan, G. A., Leech, N. L., Gloeckner, G. W., & Barrett, K. C. (2004). *SPSS for Introductory Statistics: Use and Interpretation*. 2nd ed.. Mahwah, NJ: Lawrence Erlbaum Associates.

- [5] Parasuraman, A, Valarie A. Zeithaml, and Leonard L Berry (1988) “SEVQUAL: A multiple item, scale for measuring consumer perception of service quality”, *Journal of Retailing*. 64 (Spring): 12-40.
- [6] William E. et al. (1994). *Properties of Paper: An Introduction*. Tappi Press.