FACTOR AFFECTING OF SUPPLIER SELECTION IN CONSTRUCTION INDUSTRY

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Abstract - *Construction is largest industry. Any industry selling price is depend on their material cost. In construction industry material cost is more important for project cost. 10% to 12% cost is saved due to material management and purchase. Material purchase and supplier selection is difficult for all small company. There are many studies on selection of supplier in construction industry. Supplier selection specifically related to large construction projects. This paper studies which factor manly affecting for supplier selection in contractor companies. The investigation is based on a questionnaires survey conducted in some part like Cost, Quality, supplier Sustainability, etc. Arithmetic mean method using for selecting factor which are highly affecting for supplier selection. After this research some criteria is list down for selection of supplier for small construction company. This thesis is very helpful for-profit grain for small construction company.*

Key Words: **Construction Industry, Supplier selection Factor, Arithmetic Mean Method, Small contractor, Cost, Quality**

1. INTRODUCTION

In a world which is continuously shrinking thanks to global competing environment, the competition is on an increase and hence it's become considerably necessary for any company or a firm to reduce the costs, improve the quality and deliver the products on time to survive and thrive in the market and thereby gain competitive advantage over others. The key to success in the market is to meet the customer's demands in shortest time and least cost and therefore, emphasis is on the reduction of total costs and the delivery time. The benefits of the formal supplier analysis and rating system include the standardization of evaluation criteria, which should provide consistency and transparency. The significance of maintaining a strong relationship with suppliers to be competitive in today's construction environment. Quality and price of fabric procurement are two attributes that are directly suffering from the fabric supplier selection process. In order to take care of both of those attributes,

supplier selection should be defined. In the report to the Construction Industry on costs and benefits of material-management systems, it was indicated that "a basic materials-management system can be expected to produce a 4% improvement in labour productivity" and a more sophisticated computerized system could produce another 2-4% in savings.

1.1 OBJECTIVE

The aim of this study is to identify the highly affected factor for selection of supplier. This study also aims at successfully reducing the complexity of selecting of supplier for small construction company.

1.2 NEED FOR STUDY

Small construction Company are not having purchase department. This small company are handling by one person. this person responsibility purchase department, site engineer, supervisor, etc. so that person many times failed for selecting good supplier. For that reason, they face a many problem like Poor Quality, much cost, etc.

2. SCOPE OF WORK

The scope of work is to provide an integrated approach, particularly for organizations where the difficulty is high, as to how to prioritize and customize their efforts and resources towards attractive their customers and suppliers in the improvement of their products. Selection of supplier is too difficult for small organization. Small organization is grain profit through supplier selection.

1.4 RESEARCH METHODOLOGY

1.4.1 Literature Review

Literature review has been done from previously published research papers on this topic from various international journals as well as relevant books and

researched thesis to understand previous work done on this kind of project.

1.4.2 Data Collection

Data collection has been carried out by questionnaire survey from various executives who have worked in similar kind of projects and within similar region.

1.4.3 Data Analysis

Data analysis has been done from collected data by qualitative analysis and quantitative analysis as well as frequency analysis so that proper importance index to factor can be achieved

2. DATA COLLECTION

2.1 General

This chapter describes the background of the quantitative data collection exercise, and presents the main steps taken for the collection of data required for the study whereas the methodology chapter describes the steps taken in designing the questionnaire.

2.2 Questionnaire Design

The questionnaire is made by seeing the relative literatures in the area of Factor affecting of supplier selection in Construction industry. The questionnaire was validated with experts for clearness, comfort of use, and value of the data that could be collected.

2.3 Data Measurement

For measuring the process, Scale is used to rank each and every factors. This range from 1 to 5.

Table: 1 – Rating Scale

SCALE	SCALE DESCRIPTON
1	Very low
2	Low
3	Moderate
4	High
5	Very high

2.4 Sample Size

A total of 100 questionnaires, holding of 100 questionnaires in construction company, were sent out to owner of small construction companies. This is the sample size designated for the purchases department of all construction companies, specifically work in small company, specialist owner and site engineer and purchases department.

Table: 2 – Percentage of Valid Respondent

Number of distributed questionnaires	Number of respondents	Number of valid respondents	Response rate
100	48	48	48%

2.5 Criteria of Factor

Selection of suppliers is difficult process by the actual fact that many criteria must be measured within the supervisory process. Therefore, different criteria are usually careful through the supplier selection method.

Some important .data collected about supplier selection criteria.

2.5.1. Supplier characteristics:

A buyer group can have a record of suppliers said because the Supplier Profile list. It presentations basic supplier data like name, status, parental profile name, categories to which the supplier is connected to of all the suppliers at one look. Supplier advents has been restrained on the basis of the rank of the following administrative scopes: accomplishment of sales and promotion goals, financial presentation, success of current administrative goals and policy for technology age. Decent suppliers should have high administrative power and advanced organization skills.

2.5.2 Cost:

The supplier continuously requires the lowest price of the produce to increase the profitability. The supplier consequently must find a low-cost supply base where it can lessen business cost related to the manufacture of the Product. Basically, price suppression leads to supplier pleasantly.

2.5.3 Quality

Quality valuation may be a important factor of suppliers by which they will improve and continue quality and delivery presentation. It is vibrant for the business and suppliers. Quality and convenience of product depends on this criterion.

2.5.4 Capacity

Suppliers' need capable ability to provide high quality product or facility, ensure future developments in presentation and promote successful growth efforts. Specifically, this is often vibrant when the company's strategy included growth of a standby product. These capacity measures insist firm to shift into the universal market place.

2.5.5 Services

The presentation of the supplier in providing service to the producer is that the prime criteria to make a decision its Appropriateness for a definite product. The good service given by the supplier may help in growth the customer base and thus, this standard is vital in global supplier selection

2.5.6 Finance

The financial status of the contractor can be analyzing by getting the data about the yearly turnover of the Supplier and their economic structure based on the past history. The financial status of the suppliers may affect local price controller. A good dealer should have a good financial base so that in case of delayed payments, supply is not delayed

2.5.7 Information technology and Communication

The Technology is use for payment structure and given information about supplier from any place. The ease of statement and negotiability with the dealers decide the long-term relation between the Supplier and producer

3. DATA ANALYSIS

3.1 General

This Analysis designates the detailed statistical numerical and ordinal analysis of the data collection for the study, which are the questionnaire survey. Data analysis may be a cautiously planned step within the research procedure that must to take into careful contemplation the aim of the analysis, which during this case is to supply data for descending at answers to the research questions underway in questionnaire.

After data is composed, the pre-analytical procedure is directed, where data is edited to see for intelligibility, constancy, and extensiveness of the collected data. Frequency counters allow the investigator to see that there are not any ideals that are outdoor the acceptable range, or within the case of doing a more extravagant analysis like cross-tabulations, to assess whether particular collections within the info set only have values that are effective for them. Some unusual responses discovered during the info cleaning process are then cross-checked with the questionnaire acknowledged, and modified by assigning the tolerable value within the case of data entry mistake, or missing value within the case of an inacceptable response.

Data will be converted speaking only after breakdown has provided a group of accounts, associations, and differences that are of use in speaking the investigation objectives. within the case of this investigation, the aim of knowledge analysis is both in discovery miracle which will describe or be related with a condition in how, like watching the possible relationship between Factor Affecting and Supplier selection in housing industry.

3.2 Analysis of factor

Table: 3 – calculation result

Factor	Mean	Percentage
Supplier Characteristics		
Relationship with owner	4.6	91.25
The Supplier reputation in market	4.4	87.92
Attitude of supplier	4.1	82.08

Ownership (private/partnership)	3.8	76.67
Timely response	4.3	85.83
Market experience	4.3	86.25
Advices of potential trouble	4.0	80.42
Answer promptly	3.8	75.83
Is he a chronic complainer	3.5	69.58
Help in emergencies	4.4	87.08
Reaction upon corrective action requests	4.2	83.75
Supplier dealership certificate	4.1	82.92
Technical data is necessary	4.4	88.75
Design Problem cooperates	4.1	82.92
Engineering representation	4.1	81.67
Keep promises	3.7	73.33
Development speed of supplier	4.3	85.00
Quantity adjustments	4.0	80.83
Management skill	4.6	92.50
Management information system	4.5	90.00
Innovation skill	4.3	86.25
Supplier commitment	4.2	83.33
Facility planning skill	4.4	87.08
Risk bearing	3.6	72.50
E-Transaction Facility	4.3	85.42
Long term relationship	4.5	90.83
Dispute in order	3.9	77.08
Cost		
Cost of Product	4.2	84.58
Ordering cost	4.1	81.25
Logistic cost	3.9	77.50
Quantitative discount	4.0	80.83
Payments facility	4.4	87.08
Indirect cost	3.7	74.58
Cost as per Quality	4.2	84.58
Cost variance in market	3.8	76.25
Credit Period	4.2	83.33

Quality		
Quality level	4.5	90.00
Investment in quality improvement	4.3	86.67
Quality Certification	4.4	88.75
Quality assurance	4.7	93.33
ISO 9001 Implementation	4.5	89.17
Responsibility for product quality	4.5	89.17
Responsiveness for product quality	4.2	84.58
Orders defect rate	2.9	57.50
Reliability of product	3.8	76.25
Durability of product	4.1	81.67
Capacity		
Manufacturing capability	4.3	85.83
Technological capability	4.4	88.33
Flexibility in production	4.0	79.17
Inventory turnover	4.1	81.25
Employee turnover	4.0	80.83
Capability enhancement	3.9	77.92
Employee availability	4.3	85.00
Time to Recovery (TTR)	4.4	87.92
Shortages of raw materials	2.6	51.25
Availability of Stocks	4.2	84.17

Service		
Reliability of delivery service	4.2	83.75
Deliver as per schedule without follow up	4.0	79.58
Delivery quickly	4.3	85.42
Deliver as per consignee instruction	4.4	87.92
Field technical Services	4.1	81.67
Replace rejection promptly	3.7	74.17
After sales services	4.0	80.83
Good packaging	4.2	84.17

Sharing of information	3.9	78.75
Speed and timeliness of communication	4.3	85.00
Accuracy of product and quantity delivered	4.3	85.00
Warranty	3.6	72.92
Returns	3.5	70.42
Time adjustment	4.2	83.75
Technological Response	4.0	79.58
Finance		
Fixed Assets	3.9	78.33
Comparative balance sheet	4.5	89.17
Debt or credit rating	3.8	75.83
Financial capability	3.7	73.33
Financial stability	4.1	82.08
Information and Communication		
Payment System	4.3	86.67
Purchase order system	4.4	87.50
Production and scheduling system	4.5	90.42
Inventory management system	4.3	85.42
Barcode and RFID system	3.9	78.33
Enterprise Resource Planning (ERP)	4.0	79.58
Sustainability		
Work safety and labour health	3.8	75.42
Employment practices	4.2	84.17
Product design for environment (Eco-design)	4.6	92.08
Environmental management system	3.9	78.75
Investment in Research and Development (R&D)	4.1	82.50
ISO 14001 implementation	4.1	81.67
Contractual stakeholders influence	4.1	81.25
Collaboration certificate	4.1	82.50
Insurance of product	3.9	77.08
Insurance of firm	4.1	82.92

From the calculation, the percentage of the factor is higher than 85% is highly affected for selection of supplier in construction industry. It is marked with red line.

So, by doing the analysis by Arithmetic mean method, we found out that 30 factors from a total of 92 factors have top most effect on the supplier selection process on construction industry. Those factors (constraints) are shown below.

Supplier Characteristic
   ❖ Relationship with owner
   ❖   The Supplier reputation in market
   ❖   Timely response
   ❖   Market experience
   ❖   Help in emergencies
   ❖   Technical data is necessary
   ❖   Management skill
   ❖   Management information system
   ❖   Innovation skill
   ❖   Facility planning skill
   ❖   Long term relationship
   ❖   Dispute in order
Cost
   ❖   Cost of Product
 Quality
   ❖   Quality level
   ❖   Investment in quality improvement
   ❖   Quality Certification
   ❖   Quality assurance
   ❖   ISO 9001 Implementation
   ❖   Responsibility for product quality
Capacity
   ❖   Manufacturing capability
   ❖   Technological capability
   ❖   Time to Recovery (TTR)
Service
   ❖   Delivery quickly
   ❖   Deliver as per consignee instruction
   ❖   Technological Response
Finance
   ❖   Financial capability
   ❖   Financial stability
Information & Technology
   ❖   Payment System
   ❖   Purchase order system
Sustainability
   ❖   Work safety and labour health

4. CONCLUSIONS

This research work helped us to supplier selection process for material procurement and vendor development practices adopted by the contractors engaged in road and highway projects, Building and Infrastructure Project. It completely depends upon the quantity of material to be procured, different levels of supplier firms, availability of suppliers and supplier capabilities.

In this research, find some factor by using arithmetic mean method. This factor is use for finding best supplier in construction industry. In this research data collect from small construction company so this factor is affected for small company. By using this factor small construction company are definitely find good supplier for that company.

REFERENCES

[1] Awino Z. B. (2002) "Purchasing and Supply Chain Strategy: Benefits, Barriers and Bridges" An Independent Conceptual Study Paper in Strategic Management, School of Business, University of Nairobi September. [1]

[2] KamleshNanaji (2015), "Supplier Selection Process in the construction material purchasing system", International Journal of Engineering Science and Research Technology,Vol.4, pp.670 - 680. [2]

[3] Mani V. (2014), Rajat Agarwal, Vinay Sharma, "Supplier Selection using Social sustainability: AHP based approach in India", International Strategic Management, Vol.2, pp.98-112. [3]

[4] Manoj Sharma (2013), "Multi attribute decision making techniques", International Journal of Research in Management, Science and Technology, Vol.1, pp.49 – 51, [4]

[5] Madhav B. Kumthekar (2016), "Supplier Evaluation and selection methods in construction industry", International Research Journal of Engineering and Technology (IRJET), Volume: 03 Issue: 06. [5]