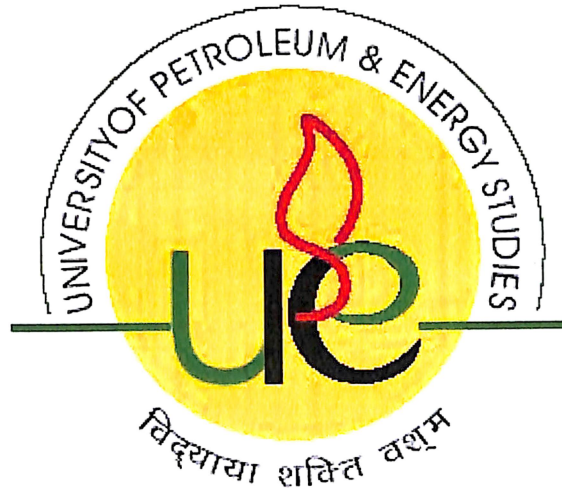


**A Dissertation Report  
On  
A Study on Vendor Evaluation Mechanism of  
Oil India Limited.**



**SUBMITTED TO:**

Dr. Sumeet Gupta  
Sr. Associate Professor

**SUBMITTED BY:**

Dilip Kumar Das  
Enrollment No.R020115009

**MBA (OIL & GAS Management) BATCH 2015-16**

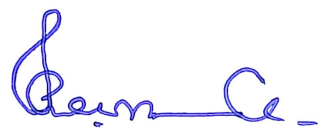
**A DISSERTATION REPORT SUBMITTED IN PARTIAL FULFILLMENT OF THE  
REQUIREMENTS FOR MBA (OIL & GAS MANAGEMENT)**

---

**COLLEGE OF MANAGEMENT & ECONOMICS STUDIES  
UNIVERSITY OF PETROLEUM & ENERGY**

## DECLARATION

I hereby declare that this project titled “ **A Study on Vendor Evaluation Mechanism of Oil India Limited**” submitted by me to the University of Petroleum & Energy Studies, Dehradun for partial fulfillment of pre-requisites for completion of final semester under MBA(Oil & Gas Management) is a bonafied work carried out by me under the guidance of Dr. Sumeet Gupta , Sr Associate professor and Head Centre for Infrastructure & Project Finance, University of Petroleum & Energy Studies, Deradun. It is based on the data and information collected by me. To the best of my knowledge and belief, the matter presented in this report has not been copied from any other source. Data and information collected from an Exploration and Production company are used here for academic objective only and no one should use the same for any other purpose.



**Dilip Kumar Das**

Enrollment No.**R020115009**

**ISPE, UPES**

## CERTIFICATE

This is to certify that, the dissertation report titled “**Study on Vendor Evaluation Mechanism of Oil India Limited**”, being submitted by **Mr. Dilip Kumar Das**, Enrollment No. **R020115009** for partial fulfillment of degree of “MBA (Oil & Gas Management)”, is a record of bonafide research work carried out by him. He has worked under my supervision and has fulfilled the requirements for submission of this report.

I wish him all the best for his future endeavors.



**(Dr. Sumeet Gupta)**

**Sr. Associate Professor**

Head Centre for Infrastructure & Project Finance

University of Petroleum & Energy Studies

Dehradun, Uttarakhand, India.

## ACKNOWLEDGEMENT

This Research is a result of efforts, time and skills contributed by a numbers of people. I would like to take this opportunity to thank all of those who have helped towards successful completion of this Research.

I thank *Dr. Sumeet Gupta*, for his valuable inputs and ideas supplied in the beginning. He took great pains to guide me in the right direction and suggested corrective actions from time to time. Periodic meetings with him during the last few months have been hugely beneficial for my development as a management student as well as a human being.

I also sincerely acknowledge the help provided by my institute - "University of Petroleum and Energy Studies".

Finally, I am grateful to our friends and my internal guide Sri PranjitDeka, GM(CSR) and Sri K Deka GM(ES) for their valuable suggestion and my fellow colleagues for facilitating the search for raw data for the purpose of research.



**(Dilip Kumar Das)**

Enrollment No.**R020115009**

## TABLE OF CONTENTS

DECLARATION.....	I
CERTIFICATION.....	II
ACKNOWLEDGEMENT .....	III
EXECUTIVE SUMMARY.....	IV

### **CHAPTER 1** **INTRODUCTION**

1.1	Background of the Oil India Limited (OIL).....	1
1.2	Background of the Study.....	1
1.3	Rationale of the study.....	2
1.4	Purpose of the study.....	2
1.5	General Vendor List in OIL.....	3
1.6	Selection of parties for inclusion of in vendor list.....	3
1.7	Vendor List for Specialized Items.....	4
1.8	Vendor List for Civil Construction Services.....	4
1.9	Vendor List for Various Services Contracts.....	4
1.10	Introduction to Vendor Evaluation Mechanism.....	4

### **CHAPTER 2** **LITERATURE REVIEW**

2.1	Vendor.....	6
2.2	Vendor selection.....	6
2.3	Literature survey.....	6
2.4	KPIs Factors identified for supplier performance evaluation.....	15

**CHAPTER 3**  
**RESEARCH METHODOLOGY**

3.1	Introducing Research .....	16
3.2	Research Methodology.....	16
3.3	Business problem.....	16
3.4	Research Problem.....	17
3.5	Research Question.....	17
3.6	Research Objective.....	17
3.7	Research Approach.....	17
3.8	Data collection.....	19
3.9	Data Analysis & Results.....	20
3.10	Vendor evaluation chanism.....	21
3.11	Performance Parameter Scaling.....	23
3.11.1	Performance marking chart against KPI.....	24
3.12	Performance Evaluation Rating Chart.....	25
3.13	Performance & Action Chart.....	26
3.14	Result & discussions.....	26
3.15	Vendor's Performance Rating Data Sheet.....	27

**CHAPTER 4**  
**CONCLUSION AND SUGGESTIONS**

4.1	Conclusions/ Recommendations& Future Research.....	29
	Annexure-I.....	30
	Annexure-II.....	32

**CHAPTER 5**  
**REFERENCES AND BIBLIOGRAPHY**

Reference.....	34
----------------	----

## **List of Tables**

- Table1 :Comparison of selection attributes between 1966-2001 and 2001-2010  
(Thir-uchelvam and Tooke 2011, 443)
- Table 2 :“Measurement Scales”. Source: Saaty(1980).
- Table 3: “Example for Pair-wise comparison Matrix.
- Table 4: “Normalised Matrix of Paired comparisons and calculation of priority Weights.
- Table 5:Chart of the priority position of key criteria.
- Table 6: Performance evaluation parameter.
- Table 7: Performance evaluation rating scale.
- Table 8: Performance evaluation action chart.

## **List of Figures**

- Fig 1: General Structure of Hierarchy (Saaty 2000)
- Fig 2: An Illustrative decision hierarchy for Supplier selection(Yousuf, PohYee, Hashmi 2001)
- Fig 3: Vendor performance evaluation model
- Fig 4: Vendor selection work flow chart of OIL.
- Fig-5: Work flow for vendor evaluation & rating.
- Fig 6: Population Size & respondent

## EXECUTIVE SUMMARY

The main objective of vendor selection process is to reduce purchase risk, project completion risk, maximize overall value ,obtain efficient services and develop closeness and long-term relationships between OIL and vendors considering the today's competitive industrial scenario for efficient execution of its various operational activities. The Vendor selection is a process by which an organization identifies, evaluate and contract with vendors, suppliers, serviceproviders. To get the quality material and services at a reasonable cost and at right time, proper vendor selection and their evaluation is must.

Through this study it is tried to establish a relation between vendor selection & performance evaluation and to create a tool for evaluation of vendors.

This paper takes a review of vendor evaluation system in place in OIL and also addresses the suitable method for OIL to address the performance evaluation of the vendor.



## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Background of the Oil India Limited (OIL)**

The history of Oil India Limited (OIL) is deeply rooted to the incredible story of oil exploration - dating back to the 19th century – in Indian shores amidst the steamy jungles of Upper Assam and goes back to the successful discovery of commercial hydrocarbon in the North East part of India at Digboi, Assam in the year 1889. It recounts the valiant efforts of individuals and organizations to find oil under conditions of extreme physical hardship. The Oil India Limited (OIL) begins its journey as a pioneer in development and growth of the exploration of hydrocarbon activities in India. It also symbolizes and traces the development and growth of India's petroleum industry. In 1953, the first oil discovery of independent India was made at Nahorkatiya near Digboi and then at Moran it was in 1956. To increase the pace of exploration in Northeast India, 'OIL INDIA PRIVATE LIMITED' was incorporated on February 18, 1959 as a result of a promoters agreement dated January 14, 1958, between the President of India, Burmah Oil Company Limited and Assam Oil Company Limited. It was registered as a Rupee Company with two-third shares owned by Assam Oil Company (AOC) / Burmah Oil Company (BOC) and one-third by the Government of India (GOI). In 1961, it became a joint venture company between the Indian Government and Burmah Oil Company Limited, UK holding a 50:50 interest in the Equity Share capital. On 14th, October' 1981, OIL became a wholly-owned Government of India enterprise Under the Ministry of Petroleum & Natural Gas by taking over BOC's 50% equity and the management of Digboi oilfields changed hands from the erstwhile AOC to OIL. It has now emerged as a profitable International company and present in Libya, Gabon, Nigeria, Sudan, Venezuela, Mozambique, Yemen, Iran, Bangladesh and USA.

#### **1.2 Background of the Study**

In Oil India Limited (OIL) for all its exploration and production activities, there are huge requirements of materials, equipment, and services. While the centralized Materials Department situated at Company's Field Headquarters in Duliajan caters for the requirements of Fields, the requirements of the Projects, Pipeline and other offices are met by the local Materials Department and Contracts Departments of the respective spheres. In field Headquarters, at Duliajan, these are being channelized through two departments Materials Departments & Contracts Departments. In OIL, all the activities relating to Material Requirement Planning, Indenting, Procuring from competent suppliers, Receipt and Accounting of materials, Warehousing, Issue of materials to the concerned departments and Inventory Management are the responsibility of Materials Department. The Contracts department has become the hub of all commercial activities of Oil India Limited. It has to meet the requirements of its internal customers by hiring a wide range of services and procurement of various materials, equipment from the various market which may be Local, Domestic or Global Market. In the process lots of Vendors from Local, Domestic as well as Global Market are to be handled for efficient

management, completion desired supply of materials, equipment and services. The system for evaluation of Vendors, Suppliers, Contractors, Consultants and their performance is key process and important to support an effective purchasing & contracting function of an organization.

### **1.3 Rationale of the study**

Globalization, increasing competition, volatility of crude Oil price and its downward trend has increased strain in the upstream OIL companies on its profitability and forced them to take various cost curtailment initiative. Further, it became necessary to manage the supply chain more efficiently to curtail cost and sustain in the competitive market environment. The procurement of product & service are to be more efficient in selecting the right vendor to deliver the right product & services efficiently in time. And vendor selection and evaluation is becoming more and more important to keep a competitive edge. With this, there has been a growing realization that avoiding the rigors of competition is not possible and developing strategies for enhancing sustainable development has emerged as a 'must do' exercise for all.

The fall in crude oil price and reduction in its production level and increase in cost of production Oil India Ltd has forced itself to look into possibility of improvement in functional and operational modal of its business. This effort is one of such nodes to maintain sustainability.

Achieving a good balance between costs and delivered quality is especially important for the public sector like OIL since it spends a great amount of money in purchasing and is accountable to their citizens. Hence, selecting the vendor with the best tender in terms of value for the money spent is important but also difficult. Furthermore, public procurement is widely regarded as a powerful tool to make governments more efficient

### **1.4 Purpose of the study**

In the Oil India Limited (OIL) for all its exploration and production activities, there are huge requirements of materials, equipment, and services and to meet these there is a huge vendor base. The effective vendor evaluation and management offers a holistic view of an organization's vendors, Suppliers, Contractors, Consultants allowing the organization to objectively evaluate, assess, and select new vendors and service providers. It brings about vendor performance and client expectations, recognizes and also help to manage vendor, Supplier, Contractor, Consultant and their risk to the organization.

The Contracts Departments and Materials Department of OIL have enlisted list of vendors, who are mainly entitle to participated Under the Limited Tendering system, tenders are issued to the parties enlisted in the vendors list maintained by the Department. In Contract Department itself there are more than 1146 listed vendors who are entitle for participation in limited tender of civil engineering related nature of jobs. And against these vendors there are same numbers of service contracts for miscellaneous

construction & maintenance jobs. And they are required to allot works on a regular interval based on the requirement of the company. But there is no effective mechanism to evaluate the performance of these vendors for allotment of work to an efficient vendor. In addition to these vendors there are other vendors who also participate in various supply and service contracts selection process based on the NIT norms.

An effective selection of vendor is very important for completion of order or completion of project in time and also to the success of any organization. It is therefore felt to have the study on the issue of vendor evaluation mechanism of OIL.

### **1.5 General Vendor List in OIL**

- i. For the benefit of the company's operational activities of OIL, vendors list are maintained by Contracts Departments and Materials Department to participate under the limited Tendering system. Under the Limited Tendering system, tenders are issued to the parties enlisted in the vendors list maintained by Contracts Departments and Materials Department. The civil engineering construction and maintenance works related vendor's list is maintained by Contracts Department and commodity-wise vendors list in maintained by Materials Department.
- ii. The commodity-wise vendors list has been prepared alphabetically and comprises of following categories:
- iii. (a) Items required for/used by a single department. (b) Item/group of items required for/used by two or more departments. (c) Proprietary items.

### **1.6 Selection of parties for inclusion of in vendor list**

The vendor list is prepared from the composite catalogue of oilfield equipment and services published by the World Oil, USA for each category and type of materials. The list also includes parties who have already successfully supplied same or similar item(s) to OIL in the past and have good track record. Information received from outside sources regarding any additional reputed parties and the parties who participate against Press Tenders from time to time are also considered while preparing/up-dating the vendors list. The list is reviewed and up-dated regularly by Materials Department in consultation with User Departments. Scanning of internet and the feedback coming to OIL's Web site are also looked into for updating the list of parties. For inclusion/deletion of any new party against any commodity code or for preparation of vendor list for a new item, approval is required.

## **1.7 Vendor List for Specialized Items**

There are some specialized oilfield items which are most regularly used by OIL for use in its fields. It has been experienced over the years that only a few parties have exhibited consistency in quality, delivery commitment etc. for such items. These items are included in a separate list called Specialized Items List. This list showing the parties having capability to meet the requirement of these items satisfactorily is prepared with approval. Tenders up to a value of Rs. 1.00 Crore(except for few items where limited tender is floated even if the value exceeds Rs. 1.00 Crore) are floated on a limited tender basis for these specialized items on the approved parties. Any deletion/ inclusion of items / parties in the Specialized list must be with prior approval.

## **1.8 Vendor List for Civil Construction Services**

There are 1146 listed vendors who are entitle for participation in limited tender of the services of civil engineering related nature of job. Through tendering process with same terms & condition they enter into a service contract with OIL to provide services on civil engineering related miscellaneous nature of jobs for a specific period (two years or more). They are entitled to receive orders of jobs from time to time based on the requirement of the job. Allotments of jobs are done on rotation basis. At present no further enlistment is done in this list.

## **1.9 Vendor List for Various Services Contracts**

OIL in its business of production exploration and transportation of hydrocarbon, its different department needs to enter into various service and consultancy contracts with the vendors. Against these service and consultancy contracts, on award of contract, vendor's name is entered into the vendor list.

## **1.10 Introduction to Vendor Evaluation Mechanism:**

Lysons (2012, 611) defines performance measurement as “quantification or the expression of a quality or attribute in numerical terms”, or in another definition of measurement: “The systematic assignment of numerical values (quantitative) or verbal descriptors (qualitative) to the characteristics of objects or individuals; designation of the status of such characteristics”. Evaluation also means to acquire information to form judgments for further decision making.

To assess vendor performance, more subjective and non-financial measures are considered, consisting of information sharing, responsive-ness in problem solving, collaboration level, vendor/supplier satisfaction, certified vendors and supply base

characteristics. These activities are also closely associated with developing vendor's performance and capabilities, like recognition and awarding, training and education, financial assistance and so on.

Gordon (2008, 5) states that quantitative metrics are not enough to provide managers the whole picture of supplier performance management, but also required qualitative methods. Qualitative metrics are usually intercompany communication including in-formation sharing, trust, and business relationship management (Lysons 2012, 376). These factors are comparatively more difficult to measure due to human factors of feelings, relationship, judgment impressions and bias tendency than normal quantitative metrics, like quality defects, on-time delivery, and cost and others. However, these qualitative metrics can have an impact on the value of a channel relationship.

Changes in Technology, Customer's needs and likings, Innovations, Economic, Social and environmental Issues have forced organisations to re-orient/ re-organise themselves towards ever changing business scenario. Many organizations have achieved higher level of performance by adopting new ideas/, concepts in their business processes including specific strategy for selection of vendors. In the current international competitive environment vendor plays a key role in business development of an organization. Vendor selection & evaluation are processes by which firms identify, evaluate, and contract with vendors. The vendors selection process deploys a tremendous amount of a firm's financial resources. In return, firms expect significant benefits from contracting with vendors offering high value. The main objective of a vendor evaluation mechanism in an organization is to assess the performance of a vendor in comparison with other vendors with a view to draw comparative scale to make decisions. It can reduce supply chain costs and improve the quality and timeliness of the delivery of items to the organization. Absence of vendor evaluation mechanism may create many barriers to effective supplier development, such as, Poor communication and feedback, Complacency, Misguided improvement objectives, Credibility of customers, Misconception regarding purchasing power, Lack of clarity and commitment, Lack of a unified approach, Misaligned sourcing and performance metrics, Concealment problems, which may be detrimental for growth and development of an organization. A proper & effective Vendor evaluation mechanism can reduce supply chain costs and improve the quality and timeliness of the delivery of items to the organization.

In general, a well-balanced performance evaluation system can profit from various operational aspects. Those are organizational decision making, communication including internal and functional level, visibility of purchasing activities and departments, waste identified and limited, and motivation for recognized staff.

Each organization has its own strategy, policy and mechanism for evaluation of its vendors. In this research , the documentation designed to evaluate supplier performance will be studied principally in the aspect of quantitative measurement approach and a few qualitative metrics.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 VENDOR**

A **vendor**, or a supplier, is a supply chain management term that means anyone who provides goods or services to a company or individuals. A **vendor** often manufactures inventor able items, and sells those items to a customer(Wikipedia).

A **vendor**, also known as a supplier, is an individual or a company that sells goods or services to someone else in the economic production chain(WhatIs.com).

A supplier, a service provider, a contractor, a consultant who provides service, sell goods in general term is called a vendor. In this competitive business environment it plays key role in the business development. In OIL vendors mainly need to serve the following purposes:

- i. Vendors for Supply of Materials/Products/Equipment.
- ii. Vendors with supply of Product/Equipment with Services.
- iii. Vendors for providing Services.
- iv. Vendors for Supply of Materials on spot basis.
- v. Vendors for providing Services under Miscellaneous Maintenance Contracts.
- vi. Vendor for consultancy Services.

#### **2.2 Vendor selection**

The vendor selection is defined in as the ‘process of finding the Vendor being able to provide the buyer with the right quality products or services at the right price, at the right quantities and at the right time’. Vendor selection is a complex problem involving qualitative and quantitative multicriteria. A trade-off between these tangible and intangible factors is essential in selecting the best Vendor.

Performance analysis of vendor is of strategic importance for any organization. When making this analysis, it is important which criteria are to be selected in finding the performance of the vendor. Identification of decision criteria and methods for vendor evaluation are appearing to be the important research area.

#### **2.3 Literature survey**

The major aspect of the procurement function is vendor selection and evaluation. Different methods and approaches have been suggested by many researcher since mid-1960sthat are needed to evaluate the vendors. Different methods and approaches have been suggested by many researchers since mid-1960s that are needed to evaluate the vendors.

Dickson (1966) was the first researcher who performed an extensive study on criteria. His study was to determine, identify, and analyze what criteria were used in the selection of a

firm as a supplier. Dickson's study (1966) was based on a questionnaire, sent to 273 purchasing agents and managers selected from the membership list of the National Association of Purchasing Managers. The list included purchasing agents and managers from the United States and Canada, which was a total of 170 regarding the importance of 23 criteria for supplier selection. Dickson asked them to order the importance of each criterion on a five point scale: extreme, considerable, average, slight, and of no importance. He came up with "quality" is the most important criterion. The important criteria dependent on the study were "delivery" and "performance history" (Tahriri, Osman, Yusuff and Esfandiary, 2008).

Vendor/Supplier selection is a complex problem involving qualitative and quantitative multicriteria. A trade-off between these tangible and intangible factors is essential in selecting the best Vendor/Supplier. This problem initiated when there are limitations in the capacity in which the managers are compelled to decide about two issues: which Vendor/Supplier are the best and how much should be purchased from each selected supplier. Varieties of approaches have been applied, in the form of mixed integers, goal, and multi-objective programming to solve this problem. This approaches, being mathematical that have vital problems in considering qualitative factors. These study apply questionnaires to identify and adopt the important criteria for Vendor/Supplier selection based on related studies by Dickson (1966), Weber (1991) and Zhang's (2003).

Traditional business functions need to be coordinated to achieve customer satisfaction, value, profitability, and competitive advantage for individual companies and the entire supply chain. One of the functions that have been singled out as important in the coordination processes of the individual firms and supply chain is purchasing. Cheraghi et al (2002) presented the critical success factors (CSFs) for supplier selection reported in the literature emanating from the seminal work of Dickson (1966) and provide an update based on reviewing more than 110 research papers. The authors indicated significant change in the relative importance of various critical success factors in the research reported during 1966-1990 versus 1990-2001. Supplier selection and their performance evaluation is one of the important 68 Computer Science & Information Technology (CS & IT) drivers of supply chain performance. Uses of suitable criteria with appropriate methodologies are necessary for performance evaluation of a supplier. In the literature, it is observed that supplier selection and evaluation methods were based on quoted price, quality, business relations, lead time etc., constitute a multi-criteria or multi-objective decision making problem. The overall objective of the Vendor/Supplier selection process is to identify, evaluate, contract with the suppliers and optimum quota allocation to the Vendor/Supplier. Boeret al (2001) made a review on decision methods on supplier selection based on academic literature. Byun (2001) presented Analytical Hierarch Process (AHP) approach for vendor selection and identified supplier reliability, product quality and supplier experiences are the critical factors for effective supplier selection in Korean automobiles.

Muralidharan et al (2002) suggested guidelines for comparing supplier attributes using a five-point rating scale and developed aggregation technique for combining group member's preferences into one consensus for supplier rating. In the supplier selection process, organizations judge the supplier's ability to meet the requirements of the organization to survive in the intensely competitive global economy. Dulmin and

Mininno(2003) used multi-criteria decision analysis method in supplier selection problem using PROMETHEE and GAIA methodology. Rajkumar and Ray (2004) identified attributes and factors relevant for performance evaluation of suppliers through fuzzy inference system of the MATLAB fuzzy logic tool box. Venkatasubbaiah and NarayanaRao (2004) considered thirty three sub-criteria under six main criteria reported in the literature in four decision hierarchy levels for supplier selection using AHP.

Very often, experts opinion is the prominent characteristic of multi-criteria decision making problems and this impreciseness of human's judgments can be handled through the fuzzy sets theory developed by Zadeh (1965). Fuzzy set theory effectively incorporates imprecision and subjectivity into the model formulation and solution process. Chen et al (2006) adopted TOPSIS concept in fuzzy environment to incorporate imprecision and subjectivity into the model formulation and solution process to determine the ranking order of the suppliers. The author considered the factors such as quality, price, and flexibility and delivery performance. Lee et al (2007) adopted Fuzzy Analytic Hierarchy Process (FAHP) to analyze the importance of multiple factors by incorporating the experts' opinions to select Thin Film Transistor Liquid Crystal Display (TFT-LCD) suppliers. NarayanaRao et al (2007) illustrated fuzzy outranking technique for selection of supplier using minimum and gamma operators for aggregating the concordance and discordance indices of the alternative suppliers to arrive the ranking of suppliers with credibility values. Shouhua Yuan et al (2008) proposed DEA, AHP and fuzzy set theory to evaluate the overall performance of suppliers of a manufacturing company. Enyinda et al (2010) adopted analytic hierarchy process (AHP) model and implemented using Expert Choice Software for a supplier selection problem in a generic pharmaceutical organization. Elanchezhian et al (2010) adopted analytical network process (ANP) and TOPSIS method for select the best vendor. Jitendra Kumar and Nirjhar Roy (2010), adopted a hybrid model using analytic hierarchy process (AHP) and neural networks (NNs) theory to assess vendor performance. Yucel and Guneri (2011) assessed the supplier selection factors through fuzzy positive ideal rating and negative ideal rating to handle ambiguity and fuzziness in supplier selection problem and developed a new weighted additive fuzzy programming approach.

Yang and Jiang (2012) proposed AHM (Analytic Hierarchy Method) and M(1,2,3) methodology to evaluate the supply chains' overall performance. Durga Prasad et al (2012) proposed and illustrated the methodology for evaluating the efficiency and performance of the suppliers using Data Envelopment Analysis (DEA) technique. Amindoust (2012) proposed and illustrated ranking methodology in fuzzy environment with sustainable supplier selection criteria/sub-criteria. Abbasi et al (2013) proposed a framework and applied QFD/ANP to rank the relative importance of the key attributes in selection of suppliers. Galankashi et al (2013) presented supplier Selection for Electrical Manufacturing Companies Based on Different Supply Chain Strategies using AHP. Eshtehardian et al (2013), Computer Science & Information Technology (CS & IT) 69 presented a decision support system to the supplier selection in the construction and civil engineering companies using AHP and ANP simultaneously. Om pal et al (2013) presented review on supplier selection criteria and methods basing on research reported in the supply chain management area. Deshmukh and Vasudevan (2014) explored criteria that are important for green supplier selection, as evident in literature and gathered from discussions with experts. Ergün and Atalay (2014) proposed FAHP and FTOPSIS for evaluation of suppliers of an electronic company.



Thiruchelvam and Tooke (2011, 443), in the research of “Evolving trends of supplier selection and criteria and methods”, showed a table of comparison of selection attributes from 2 periods of time 1966 to 2001 verse 2001 to 2010. The table below demonstrates the top 5 factors. The figures clearly show that price, delivery and quality are among the top criteria relating to suppliers. Although the supplier’s production and technical capacity are rated far below the top three, they are still important metrics that belong to supplier’s continuous improvement and innovation efforts.

Table1 :Comparison of selection attributes between 1966-2001 and 2001-2010 (Thir-uchelvam and Tooke 2011, 443)

Criterion	Frequency 1966-2001	Frequency 2001- 2010	Overall
Quality	71	37	108
Delivery	75	36	111
Price	81	37	118
Production facilities and capacity	35	20	55
Technical capability	30	24	54

It is observed that in the research paper “Supplier Evaluation and Selection by Using The Analytic Hierarchy Process Approach-Yaser N. Alsuwehri” reviewed that in the developed AHP model, based on the identified criteria, sub-criteria and sub sub-criteria, contains five levels: the goal, the criteria, sub-criteria, sub-sub criteria, and alternatives.( Ref: Fig-1)

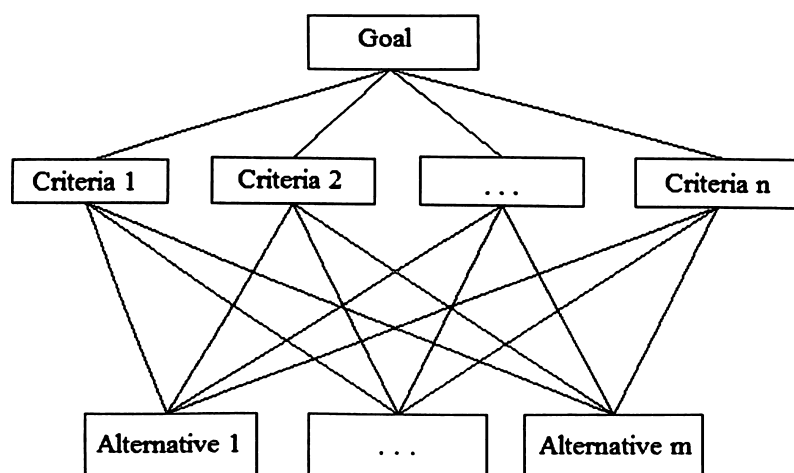


Figure 1: General structure of the hierarchy (Saaty, 2000)

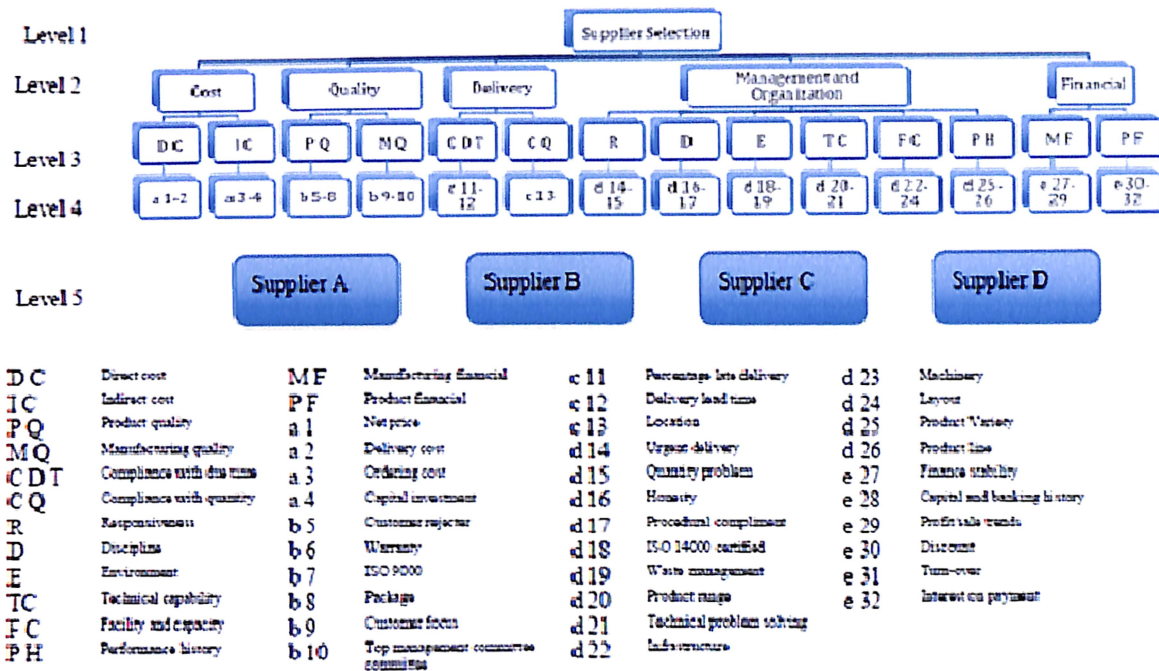


Figure 2: An illustrative decision hierarchy for supplier selection (Yusuff, PohYee & Hashmi, 2001).

Based on the consideration of literature, the priority weight of each criterion in each level was determined. The pair-wise comparison judgments were used to find the important criteria in level two. This approach is found to be very useful in collecting data. The function of the pair-wise comparisons is by finding the relative importance of the criteria and sub-criteria, which is rated by the nine-point scale proposed by Saaty (1980), as shown in Table 1, indicating the level of relative importance from equal, moderate, strong, very strong, to extreme level by 1, 3, 5, 7, and 9, respectively. The intermediate values between two adjacent arguments were represented by 2, 4, 6, and 8.

Verbal judgment or preference	Numerical rating
Extremely preferred	9
Strongly preferred	7
Moderately preferred	5
Equally preferred	3
Intermediate values between two adjacent judgments (when compromise is needed)	2,4,6 and 8

Table 2 "Measurement Scales". Source: Saaty(1980)

Criteria for Supplier selection	Cost	Quality	Delivery	Management and Organization	Financial
Cost	1	2	4	5	5
Quality	1/2	1	2	4	4
Delivery	1/4	1/2	1	2	2
Management and Organization	1/5	1/4	1/2	1	2
Financial	1/5	1/4	1/2	1/2	1

Table 3- "Example for Pair-wise comparison Matrix"

Criteria for supplier selection	Average	Row Total	Cost	Quality	Delivery	Management and Organization	Financial
Cost	0.444	2.222	0.465	0.5	0.5	0.4	0.357
Quality	0.268	1.339	0.233	0.25	0.25	0.32	0.286
Delivery	0.134	0.669	0.116	0.125	0.125	0.16	0.143
Management and Organization	0.088	0.44	0.93	0.62	0.62	0.08	0.143
Financial	0.066	0.328	0.93	0.62	0.62	0.04	0.071
Total	1		1	1	1	1	1

Table 4- "Normalised Matrix of Paired comparisons and calculation of priority weights"

From the above research literature data it can be concluded that cost with local weight of (0.444) had been prioritized as the first criteria followed by quality (0.268), delivery (0.134), Management and organization (0.088), and financial (0.066). In our research these data will be referred.

**Table : Literature Review**

Sl No.	Name of the Author/Journal	Inference	Variable & Methods	Research Gap
1	Vendor Evaluation and Rating Using Analytical Hierarchy Process : International Journal of Engineering Science and Innovative Technology (IJESIT) Volume 2, Issue 3, May 2013	In absence of a vendor evaluation and rating system in the organizations, evaluation criterions was developed using AHP technique.	The Analytic Hierarchy Process (AHP) is used to determine one that suits their needs and wants.	The study is limited to the evaluation of suppliers of valves.
2	Purchase_Manual of OIL	Detail of Purchase Procedures of OIL		Vendor evaluation performance evaluation strategy is absent
3	A CASE ON VENDOR SELECTION METHODOLOGY: AN INTEGRATED APPROACH, Senior Lecturer, Department of Business Administration East West University, Dhaka, Bangladesh	This paper addresses the issue of selecting the optimal vendor from the internal database of the company. Factor analysis, analytical hierarchy process and regression analysis is used in an integrated way to supplement the vendor selection process.	Analytical hierarchy process (AHP), Vendor Experience Index Vendor Satisfaction Index, Regression model	There is sufficient scope to identify sub-criteria of experience and satisfaction

4	<p>Supplier Selection Criteria and Methods in Supply Chains: A Review , by Om Pal, Amit Kumar Gupta, R. K. Garg ;World Academy of Science, Engineering and Technology International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering Vol:7, No:10, 2013</p>	<p>The main objective of supplier selection process is to reduce purchase risk, maximize overall value to the purchaser, and develop closeness and long-term relationships between buyers and suppliers in today's competitive industrial scenario. This paper throws light on supplier selection criteria and methods.</p>	<p>Various prequalification process of reducing the set of all suppliers to a smaller set of acceptable suppliers and various MULTI ATTRIBUTE DECISION MAKING (MADM) TECHNIQUES, ARTIFICIAL INTELLIGENCE METHODS are discussed.</p>	<p>The supplier selection issues need further attention in order to harmonize the combination of qualitative and quantitative criteria to develop the best criteria and methods for the selection of the best suppliers</p>
7	<p>AHP approach for supplier evaluation and selection in a steel manufacturing company: FarzadTahriri; M. Rasid Osman; Aidy Ali; RosnahMohdYusuff; AlirezaEsfandiary University Putra Malaysia</p>	<p>The model is formulated and then applied to a real case study for a steel manufacturing company in Malaysia. This model indicates that it can be applied to improve and assist decision making to resolve</p>	<p>an AHP-based supplier selection model</p>	<p>To comply with this method, questionnaires are prepared which have to be taught to the related and evolved members to enable them to fill them out</p>

		the supplier selection problem in choosing the optimal supplier combination. The work represents the systematic identification of the important criteria for supplier selection process.		correctly and accurately to get optimum advantages and results.
8	<p>Selection of Suppliers through Different Multi-Criteria Decision Making Techniques</p> <p>A.A. Khaled, Sanjoy Kumar Paul, Ripon Kumar Chakra borty , Md. SalahuddinAyuby , Global Journal of Managemant&amp; business Reseacher Volume 11 Issue 4 Version 1.0 March2011</p>	<p>The main objective of the paper is to provide different multi-criteria decision making approach and to clarify the similarities and dissimilarities, advantages and disadvantages of the method in order to select the better supplier selection approach.</p>	<p>Linear weighted point,Categoricalmethod ,Analytical Hierarchical Process (AHP),A Fuzzy Approach for Supplier, Evaluation &amp;Selection,Outranking methods,Multi-Attribute Utility Technique (MAUT),Judgmental modeling.</p>	<p>Only Comparison on methods of analysis discussed.</p>

## **2.4 KPIs Factors identified for supplier performance evaluation**

**Key performance indicators (KPIs)** are also called performance indicator or success indicators that measure various aspects of Vendors performance towards the strategic goals. The literature research we have done can be summarized with these those factors which the will be predominate in our further study and can be used for reference for our research in evaluation of the vendors. The KPIs predominantly having major weights are

- i. Cost
- ii. Quality
- iii. Delivery
- iv. Management and Organization
- v. Financial

## **CHAPTER 3.** **RESEARCH METHODOLOGY**

### **3.1 Introducing Research**

**Research** comprises "creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of humans, culture and society, and the use of this stock of knowledge to devise new applications." It is used to establish or confirm facts, reaffirm the results of previous work, solve new or existing problems, support theorems or develop new theories. A research project may also be an expansion on past work in the field. To test the validity of instruments, procedures, or experiments, research may replicate elements of prior projects, or the project as a whole (Wikipedia).

### **3.2 Research Methodology**

The system of collecting data for research projects is known as research methodology. The data may be collected for either theoretical or practical research for example management research may be strategically conceptualized along with operational planning methods and change management. A literature study was done to comprehend the context of multidisciplinary fields involved and to provide a clear theoretical framework as the basis of which the desired relationship between various factors can be established. Now let us look into the business problem of this case.

### **3.3 Business problem:**

The main objective of vendor selection and evaluation process is to reduce purchase risk, maximize overall value, obtain efficient services and develop closeness and long-term relationships between OIL and vendors considering the today's competitive industrial scenario for efficient execution and completion of its various operational activities. The relationship between the organization & vendors, if not smooth, business operational activity suffers, which on many occasion is for not selecting the right one. This is a great concern and business problem identified is

***“Non- availability of vendor evaluation system has hindered selection of right vendor which delayed project completion, resulted cost overrun and loss of revenue”.***



### **3.4 Research Problem:**

On study of vendor selection criteria in OIL, it is observed that vendors are initially evaluated based on Bid Evaluation Criteria (BEC) / Bid Rejection (BRC) criteria published in the NIT of the respective bids which mainly covers the Past Experience criteria, Financial criteria, Liquidity, Statutory compliance, there after amongst the eligible vendors the successful vendor is selected based on lowest quoted price. There after no systematic and scientific approach is made to evaluate the vendor i.e. their performance. Considering the above facts the research problem in this case is “Develop vendor evaluation mechanism of OIL.”

### **3.5 Research Question:**

In general, the performance evaluation system is to gain more added values for the organization from the aspects of finance, competitiveness, quality and customer relationship. The concern is how the system can be applied smoothly and what factors involved should be considered

What is the existing vendor selection process? What are the criteria for selecting vendors ?  
What is the evaluation system of performance of the vendor?

### **3.6 Research Objective:**

There are various aspects to measure and evaluate concerning the performance of vendor and supply chain in general, but the scope of the research aims to study the evaluation of vendor performance. This evaluation occurs after the business is delivered by the vendors, which is different from a more common topic of choosing the right vendor to start the business. But to understand the whole system holistically the objective of the this research is categorized in the following three broad perspective

- i. To analysis existing vendor selection system.
- ii. To develop the vendor evaluation mechanism .

### **3.7 RESEARCH APPROACH:**

To analysis the existing vendor selection system and to identify criteria for selection of vendors exploratory research will be done. To develop the vendor evaluation mechanism for selecting the right vendor exploratory research will be conducted. Exploratory Research and conclusive view of literature review will be taken into consideration in this research. In both process of designing the documentation and conducting the research to come up with the implementation plan, besides the secondary research literature review, the main information source is collected by

qualitative research. Sampling is will be done from focus groups and sample size will be as per the Yamane's formula

i.e.

$$n = \frac{N}{1 + N * (e)^2}$$

Where,

N= Population Size

n= Sample Size

e= error of 5 percentage point.

The focus group will be addressed through unstructured and structured interviews and group meetings. While identifying KPIs form the literature review, it is observed that cost, is first predominant criteria followed by quality, delivery i.e. completion time, Management and organization and financial. The cost & financial part has generally been addressed during the selection of bidder in the bidding process, further, new contract manual has been approved recently and vendor will be selected for award of supply & services as per the bidding process; therefore, in the performance evaluation **quality, delivery i.e. completion time, Management** will be considered as a key criteria for vendor performance evaluation. The basic vendor performance evaluation model will be based on these factors. A data will be collected targeting the focused group , thereafter data analysis will be done and a scale will be developed for measuring the performance of the vendor and a rating scale for final rating of the vendor. The performance evaluation model will be as represented below

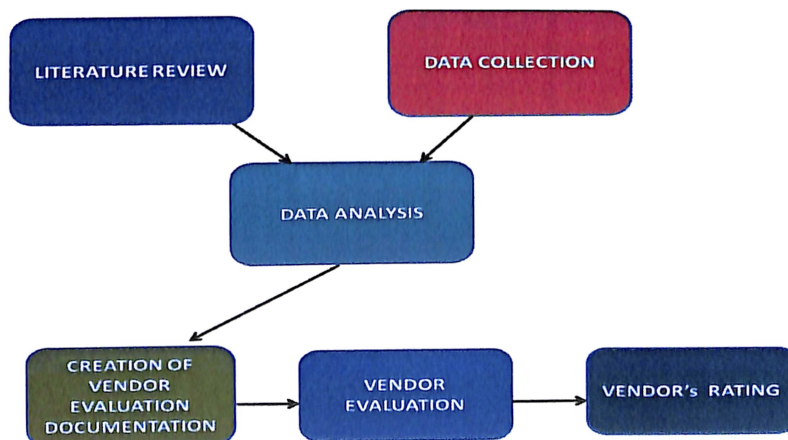


Fig 3: Vendor performance evaluation model

### 3.8 Data collection:

This research uses different kinds of data collection methods such as: extensive literature review, desk research, unstructured and structured interviews and group meetings. To review existing system of vendor selection 25 different contracts are reviewed to analysis the existing system.

It is observed from the review of contracts that for selection of vendors specific criteria, guide lines are documented on the contract manual for selection of vendor for the services or supply Materials/Products/Equipment, but once vendor is selected there is no vendor performance evaluation system. Basically evaluation occurs after the business is delivered by the vendors, which is different from a more common topic of choosing the right vendor to start the business.

To carry out our further research on vendor performance evaluation mechanism, we shall be taking the case of the 1146 listed vendors, against whom there are 1146 service contracts. These vendors execute the work under the Civil engineering Department. Their activities and works executions, performance are monitored 62 executive of Civil. Data sample will be collected from these executives.

The sample size will be as per the Yamane's formula

$$n = \frac{N}{1 + N * (e)^2}$$

Here, Population size ,N=62

Therefore, on the basis of Yamane's formula sample size= 53.

Form the literature review it is observed that cost, is first predominant criteria followed by quality, delivery i.e. completion time, Management and organization and financial. The **cost & financial** part has generally been addressed during the selection of bidder in the bidding process, further, new contract manual has been approved recently and vendor will be selected for award of supply & services as per the bidding process; therefore, these are considered as duly addressed by the existing vendor selection process of OIL, therefore, no analysis pertaining to these factors shall be considered further in our research. our system in the performance evaluation **quality, delivery i.e. completion time, Management** will be considered as a key criteria for vendor performance evaluation.

Here, Population size ,N=62

Therefore, on the basis of Yamane's formula sample size will be 53.

Questionnaires are set keeping these three criteria as key criteria and all the 62 executive who use to supervise and monitor the activities 1146 listed vendors, against their 1146 nos service contracts are requested to response. The respondent has made a request to incorporate one more criteria namely “Safety & Environmental compliance” as other criteria. Accordingly, key criteria on Questionnaires (Annexure-I) are reframed as noted below:

- i. **Delivery/ Completion Performance.**
- ii. **Quality Performance.**
- iii. **Management & Reliability Performance.**
- iv. **Safety & Environmental compliance Performance**

### **3.9 Data Analysis& Results:**

#### **Analysis of existing vendor selection system.**

For the benefit of the company’s operational activities of OIL vendors, list of which are maintained by Contracts and Materials Department, are categorized in following categories:

- i. Vendors for Supply of Materials/Products/Equipment.
- ii. Vendors with supply of Product/Equipment with Services.
- iii. Vendors for providing Services.
- iv. Vendors for Supply of Materials on spot basis.
- v. Vendors for providing Services under Miscellaneous Maintenance Contracts.
- vi. Vendor for consultancy Services.

There are numbers of supply and service contracts for which vendors are selected. In our research 25 different contracts are reviewed to analysis the existing system. The contract studied are service contract 17 Nos , Materials supply contracts 8nos .The workflow to award the contract or select a vendor for any supply and service contracts follow the following path

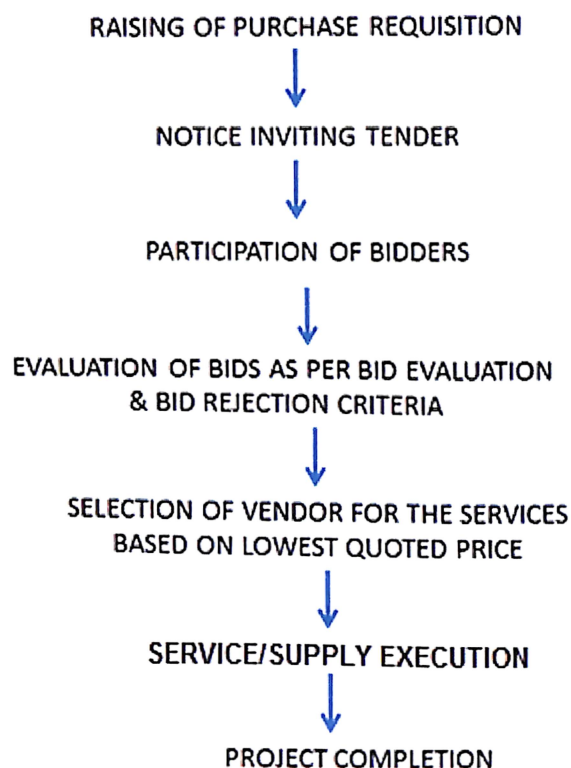
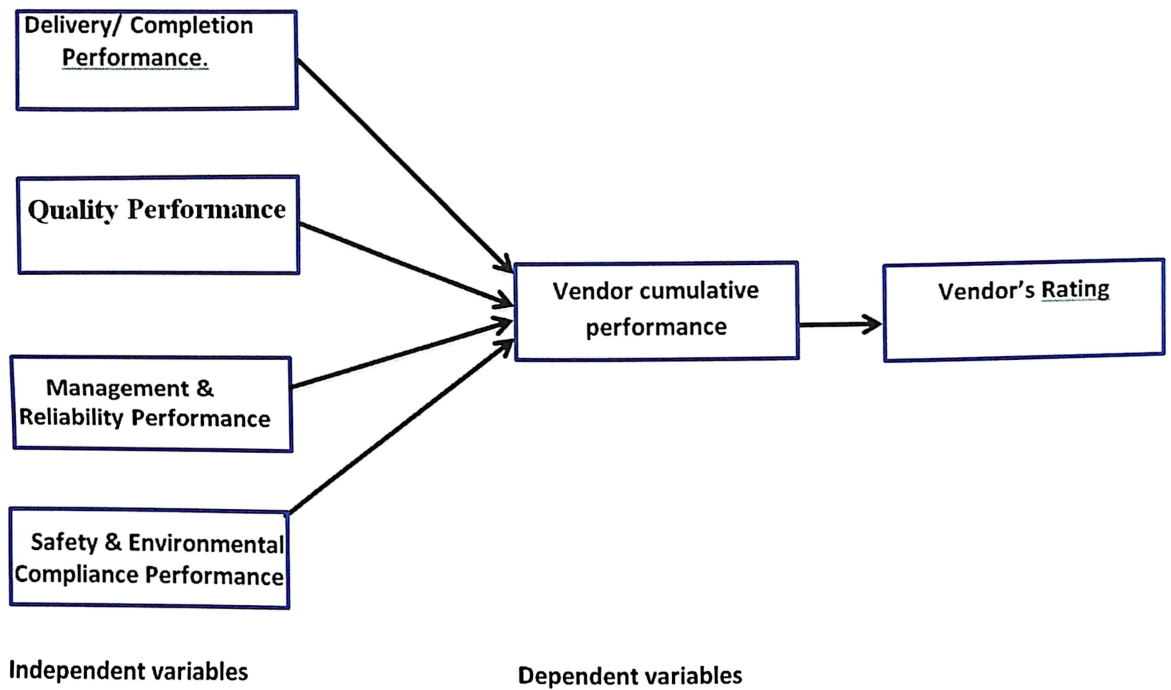


Fig 4: Vendor selection work flow chart of OIL

It is observed that the on becoming eligible vendor i.e. once he is selected the vendor needs to execute the service or complete the supply. We have checked these contracts in detail but have not observed any systematic vendor performance evaluation guide line or system to record the performance of the vendor. If he fails to execute the work or complete the supply order in time as per provision of the contract and vendor is penalized. The vendor's performance is not evaluated and documented in a systematic manner for future reference.

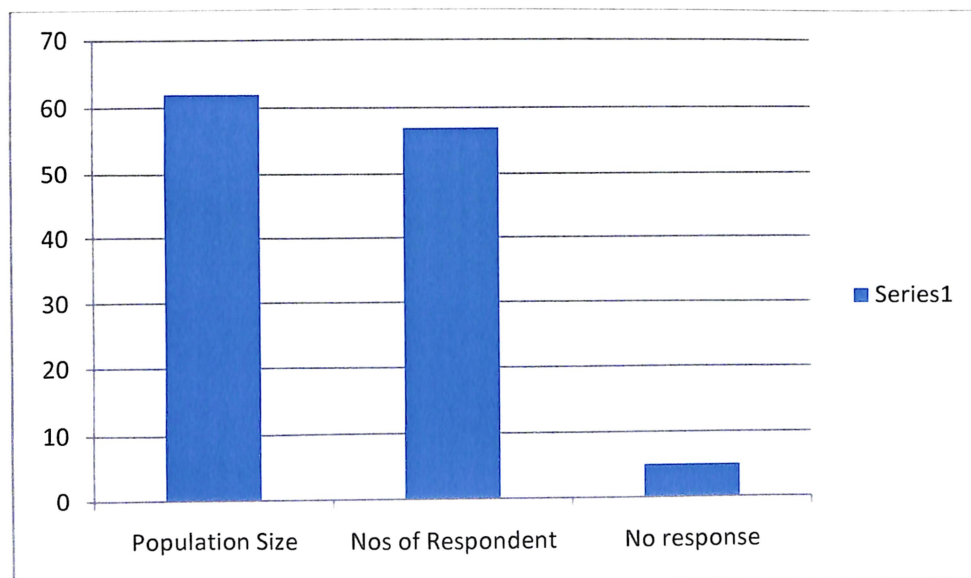
### 3.10 Vendor evaluation mechanism:

Questionnaires are set keeping key KPIs i.e. Delivery/ Completion Performance, Quality Performance, Management & Reliability Performance and Safety & Environmental compliance Performance of vendor performance. All the 62 executive who use to supervise and monitor the activities 1146 listed vendors, against their 1146 nos service contracts are requested to response.



**Fig-5: Work flow for vendor evaluation & rating**

Out of total population of 62, response received from 57 respondent's responded and 5 respondents not replied. Since respondent is 57 the Sample Yamane's formula is in order.



**Fig 6: Population Size & respondent**

Responses received on priority position of key criteria are tabulated below. Only 6(six) respondent Delivery/ Completion Performance as top most criteria.

SI No	Criteria	Position		Respondent
1	<b>Delivery/ Completion Performance.</b>	Top most criteria	6	57
		2nd position	51	
2	<b>Quality Performance.</b>	Top most criteria	51	57
		2nd position	6	
3	<b>Management &amp; Reliability Performance.</b>	3rd position	57	57
4	<b>Safety &amp; Environmental compliance Performance</b>	4th position	57	57

Table 5:Chart of the priority position of key criteria

Based on the above response and the finding of literature survey key criteria are priorities as below :

- i. Quality Performance.
- ii. Delivery/ Completion Performance.
- iii. Management & Reliability Performance.
- iv. Safety & Environmental compliance Performance.

### 3.11 Performance Parameter Scaling

Each of individual criteria will be scored from the total score of 100 based on its performance from the vendor. The evaluation basis is clearly indicated for different metric. A judgmental marking scale for this parameter is design as below for evaluation of performance based on response of respondent (Annexure-II)

Performance Parameter	Quality Performance	Delivery/ Completion Performance	Management & Reliability Performance	Safety & Environment Compliance performance	Total
<b>Maximum Marks against the criteria</b>	<b>40</b>	<b>35</b>	<b>15</b>	<b>10</b>	<b>100</b>

Table 6: Performance evaluation parameter

### 3.11.1 Performance marking chart against KPI

#### Quality Performance: 40 Marks

For Normal cases	No defects/No deviation/No failure	40 Marks
Quality failure	severe	0
Moderate nature but safe for operation	No defects on basic quality	20 Marks
Deviation /Defects	1 No	10 Marks
Deviation /Defects	2 No	5 Marks
Deviation /Defects	3 Nos & above	0

#### Delivery/ Completion Performance:35 marks

Completed within the time	35 Marks
Or % of value of work done within the actual completion time.	Equivalent % of marks

#### Management & Reliability Performance:15 marks (works & Service Contracts)

Submission of order acceptance, Submission of BG, signing of agreement/submission of Labour clearance/ work programme and other documents within time.	4 Marks
Mobilization of resources as per Contract and commencement of work in time	4 marks
Compliance to statutory norms,Requirements or Reliability of Estimates/Design/Drawing etc. in case of Consultancy jobs	4 marks
Deployment of sufficient Manpower, material, equipment's, Response to the instructions, sample testing. Overall be monitoring.	3 marks



**Management & Reliability Performance:15 marks  
(Supply orders)**

Submission of order acceptance, Submission of BG, signing of agreement/submission of Labour clearance/ work programme and other documents within time.	4 Marks
Attending complaints and requests for after sales service/ warranty repairs and/ or query/ advice .	4 Marks
Response to various correspondence and conformance to standards like ISO	3 Marks
Submission of all required documents including Test Certificates at the time of supply	4 Marks

**Safety & Environment Compliance performance:10**

<b>Compliance Safety &amp; Environment norms</b>	Total 10Marks
Short fall in compliance of safety norms during execution of the work.	5 Marks
Shortfall in compliance to environment norms	5 Marks

**3.12 Performance Evaluation Rating Chart**

The score of each criteria category is separately calculated and the final overall score is given, it will be classified to four groups:

Sl No.	Range(Marks)	Rating
1	60 & below	POOR
2	61-70	FAIR
3	71-80	GOOD
4	81& above	VERY GOOD

Table 7: Performance evaluation rating scale

### 3.13 Performance & Action Chart

Based on the above rating scale performance evaluation rating, action to be initiated as per the strategic policy of the company. Following action plan is devised for implementation of the performance evaluation mechanism of OIL.

SI No.	Rating	Action
1	POOR	Pursue explanation from vendor for Poor performance
2	FAIR	Pursue explanation from vendor for Fair performance
3	GOOD	Letter to the concerned vendor for improving performance in future
4	VERY GOOD	No further action

Table 8: Performance evaluation action chart.

### 3.14 Result & discussions

The system for evaluation of Vendors and their performance is a key process and important to support an effective purchasing & contracting function of an organization. Performance of all participating Vendors need to be closely monitored to ensure timely receipt of supplies from a Vendor, completion of an assignment by a Consultant or execution of order by a contractor within scheduled completion period. For timely execution of projects and meeting the operation & maintenance requirement of operating plants, it is necessary to monitor the execution of order or contracts right from the award stage to completion stage and take corrective measures in time. Payments of Vendors are to be made on regular interval as per the provision of the contract and **against each payment vendor evaluation may be carried out for monitoring the performance.** Measurement of Performance to be done based on the parameters defined in Data Sheet, Performance of concerned Vendor would be computed and graded accordingly. Data sheet designed is enclosed as Annexure-III. The measurement of the performance of the Party would be its ability to achieve the minimum scoring of 60% points in the given parameters. The vendor performance rating data sheet is tabulated in the next page.

### 3.15 VENDOR'S PERFORMANCE RATING DATA SHEET

- i. Brief description of Works:
- ii. Purchase Order/ Contract No. & date :
- iii. Purchase Order/Contract value (Rs.) :
- iv. Name of Vendor/Supplier/ Contractor/ Consultant:
- v. Vendor Code:
- vi. Contracted delivery/ Completion Schedule:
- vii. Actual delivery/ Completion date :
- viii. Vendor's Performance score

<b>Performance Parameter</b>	<b>Quality Performance</b>	<b>Delivery/ Completion Performance</b>	<b>Management &amp; Reliability Performance</b>	<b>Safety &amp; Environment Compliance performance</b>	<b>Total</b>
<b>Maximum Marks against the criteria</b>	<b>40</b>	<b>35</b>	<b>15</b>	<b>10</b>	<b>100</b>
<b>Vendor's Performance score</b>					

**Vendor's Performance rating, based on rating scale(below):  
VERY GOOD/GOOD/FAIR/POOR**

<b>Sl No.</b>	<b>Range(Marks)</b>	<b>Rating</b>
<b>1</b>	<b>60 &amp; below</b>	<b>POOR</b>
<b>2</b>	<b>61-70</b>	<b>FAIR</b>
<b>3</b>	<b>71-80</b>	<b>GOOD</b>
<b>4</b>	<b>81&amp; above</b>	<b>VERY GOOD</b>

Signature of Authorised Signatory:

Name:

Designation :

Date:

In case vendor rating is poor, vendor will be asked to explain the on his/her poor performance & his/her reply will be examined and if reply is not justifiable further action to be initiated as per the policy of the OIL mentioned in the purchase/contracts manual. In case of satisfactory reply, Performance Rating data Sheet to be closed with a letter to the concerned for improving performance in future. Similarly, based on the vendors performance scoring other actions shall be taken as per the Performance evaluation action chart.

The rating scale is devised based on the feedback received during the survey which may vary. Based on the principles and corporate strategy, OIL can flexibly update and adjustment to be made to the contribution of each metric or new ones can be added. This evaluation system can stimulate promoting characteristics that enhance competitive advantages to the company..

In order to utilize the ready-to-use documentation, company should pursue to integrate the same with the existing ERP system to store and track the evaluation results that are used to make decisions for ordering and prioritizing vendor relationship, which can promote the strategic integration. An immediate evaluation should be done after the order is made and delivered; otherwise, it may be very difficult to track back the number of defects or evaluation of communication during that business period, billing defect, or any improvements in products and process.

In general, the performance evaluation system is to gain more added values for enterprises from the aspects of finance, competitiveness, and quality and customer relationship. The concern is how the system can be applied smoothly and what factors involved should be considered. The company should encourage the philosophy of trust, win-win situation and objectiveness in evaluation. However, foremost, company must establish an applicable strategy, vision and mission, which ensure all the employees aligning the same goals to achieve.

## **CHAPTER 4**

### **CONCLUSION AND SUGGESTIONS**

#### **4.1 Conclusions/ Recommendations& Future Research**

Selecting a vendor is now as important of a process as developing new products. There is no one best way to evaluate and select vendors, there are variety of different approaches. The evaluation and selection of vendors are strategic decisions to be made by any the purchasing/contracts department and with changing environment the evaluation processes are to be updated to cover new scope and requirements. Performance Parameter Scaling , Performance Evaluation Rating Chart, Performance & Action Chart can be utilized for evaluation of performance of the vendor. This rating scale is judgmental will reflect overall performance of the vendor will be more useful for service contracts. In this research only a part of service sector of OIL is taken into account, a comprehensive research may be taken up in future for further improvement of vendor evaluation process covering all sectors.

Annexure-I  
Questionnaire for  
Evaluation of Vendor Parameter

1. How many vendors are in your section under Your section :

CLASS	NUMBER	TOTAL

2. Do you evaluate the performance of the vendor:

YES

NO

3. Do you like to evaluate the performance of the vendor based on  
**Delivery/ Completion Performance:**

YES

NO

4. Do you like to evaluate the performance of the vendor based on **Delivery/ Completion Performance:**

YES

NO

5. Do you like to evaluate the performance of the vendor based on its **Management & Reliability Performance :**

YES

NO

6. Do you like to evaluate the vendor based on **Safety & Environmental compliance Performance :**

YES

NO

7. Please arrange these parameters (**Delivery/ Completion Performance, Quality Performance, Management & Reliability Performance, Safety & Environmental compliance Performance**) of vendor priority wise to evaluate the vendor by numbering them from the most important to the least :

- i. ....
- ii. ....
- iii. ....
- iv. ....

8. Please mark these parameters (**Delivery/ Completion Performance, Quality Performance, Management & Reliability Performance, Safety & Environmental compliance Performance**) in a scale of 10 to 100 priority wise with a Maximum interval of 5 :

Quality Performance	Delivery/ Completion Performance	Management & Reliability Performance	Safety & Environment Compliance performance	Total (Maximum marks =100)
				<b>100</b>

9. Do you have any other criteria that You want to evaluate the vendors ?

10. Do you like to evaluate the performance of the vendor based on following scale:

**VERY GOOD  
(81-100)**

**GOOD  
(71-80)**

**FAIR  
(61-70)**

**POOR  
(60 & Below)**

**YES**

**NO**

**Respondent's Data Chart (Annexure-II)**

<b>Respondent</b>	<b>Delivery/ Completion Performance.</b>	<b>Quality Performance.</b>	<b>Management &amp; Reliability Performance.</b>	<b>Safety &amp; Environmental compliance Performance</b>	<b>Total Marks</b>
1	40	30	20	10	100
2	40	30	20	10	100
3	40	25	20	15	100
4	40	30	20	10	100
5	30	40	20	10	100
6	40	30	20	10	100
7	40	30	20	10	100
8	40	30	20	10	100
9	40	30	20	10	100
10	40	30	20	10	100
11	40	30	20	10	100
12	40	30	20	10	100
13	40	30	20	10	100
14	40	30	20	10	100
15	35	40	15	10	100
16	40	30	20	10	100
17	40	30	20	10	100
18	40	30	20	10	100
19	40	30	20	10	100
20	40	30	20	10	100
21	35	40	15	10	100
22	40	30	20	10	100
23	40	30	20	10	100
24	40	30	20	10	100
25	40	30	20	10	100
26	40	30	20	10	100
27	40	30	20	10	100
28	40	30	20	10	100
29	35	40	15	10	100
30	40	30	20	10	100
31	40	30	20	10	100
32	40	30	20	10	100
33	40	30	20	10	100
34	40	30	20	10	100
35	40	30	15	15	100
36	40	30	20	10	100



### Respondent's Data Chart (Annexure-II)

Respondent	Delivery/ Completion Performance.	Quality Performance.	Management & Reliability Performance.	Safety & Environmental compliance Performance	Total Marks
37	40	30	20	10	100
38	40	30	20	10	100
39	35	40	15	10	100
40	40	30	20	10	100
41	40	30	20	10	100
42	40	30	20	10	100
43	40	30	20	10	100
44	40	30	20	10	100
45	40	30	20	10	100
46	40	30	25	5	100
47	40	30	20	10	100
48	40	30	20	10	100
49	40	30	20	10	100
50	40	30	20	10	100
51	40	30	20	10	100
52	35	40	15	10	100
53	40	30	20	10	100
54	40	30	20	10	100
55	40	30	20	10	100
56	40	30	20	10	100
57	40	30	20	10	100
Total	2245	1765	1115	575	
<b>Mean</b>	<b>39.38</b>	<b>30.96</b>	<b>19.56</b>	<b>10.08</b>	
<b>Say</b>	<b>40</b>	<b>30</b>	<b>20</b>	<b>10</b>	

## CHAPTER 5 REFERENCES AND BIBLIOGRAPHY

### Reference

- C R Kothari, GauravGarg, “*Research Methodology Methods and Techniques*”New Age International Pvt Ltd.
- RanjitKumar(2014), “*Research Methodology*”, SAGE Publications India Pvt Ltd.
- John W. Creswel, “*Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*”
- Irene S. Rubin,,(2011), “*Qualitative Interviewing: The Art of Hearing Data*”
- FarzadTahriri; M. Rasid Osman; Aidy Ali; RosnahMohdYusuff; Alireza, ”*AHP approach for supplier evaluation and selection in a steel manufacturing company*”Esfandiary,(2008), Journal of Industrial Engineering.
- Kathy C. Charmaz, (2006)“*Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis*”.
- TaposhGhoshal Bill Taylor GautamSinha (2011), “*Research Methodology: A Guide For Researchers In Management And Social Sciences* “
- Aberdeen Group 2002. *The supplier performance measurement benchmarking report. Measuring supply chain success*. Isource. URL:  
[http://www.lyonsinfo.com/\\_resources/Aberdeen\\_SPMS\\_Report.pdf](http://www.lyonsinfo.com/_resources/Aberdeen_SPMS_Report.pdf).
- Beijer, T. A. 2012. Design of a supplier performance measurement & evaluation system for DSM’s Petrochemical & Energy Group. University of Twente, Industrial Engineer-ing and Management. URL:  
[http://essay.utwente.nl/61705/1/MSc\\_T\\_Beijer.pdf](http://essay.utwente.nl/61705/1/MSc_T_Beijer.pdf). Ac-cessed in 14.3.2013.
- Parmenter, D. 2010. “Key performance indicator: Developing, implementing, and using winning KPIs”. 2<sup>nd</sup> edition. John Wiley & Sons. New Jersey.

- Beijer, T. A. 2012. *Design of a supplier performance measurement & evaluation system for DSM's Petrochemical & Energy Group*. University of Twente, Industrial Engineering and Management. URL: [http://essay.utwente.nl/61705/1/MSc\\_T\\_Beijer.pdf](http://essay.utwente.nl/61705/1/MSc_T_Beijer.pdf).
- Bottani, E., Rizzi, A., (2005). A fuzzy multi-attribute framework for supplier selection in an e-procurement environment. *International Journal of Logistics Research and Applications*
- Chen-Tung Chena, Ching-TorngLinb and Sue-Fn Huang, (2006) “*Fuzzy approach for supplierevaluation and selection in supply chain management*”, International Journal of ProductionEconomics, Vol.102, No.2
- Tahriri, Farzad, Rasid Osman, Aidy Ali, RosnahYusuff, and AlirezaEsfandiary. "AHPapproach for supplier evaluation and selection in a steel manufacturing company."*Journal of Industrial Engineering and Management* 1, no.2 (2008)
- PURCHASE MANUAL , OIL INDIA LIMITED.
- Gailtenders.in
- .Kurian John, VinodYeldho Baby, GeorgekuttyS.Mangalathu  
*Vendor Evaluation and Rating Using Analytical Hierarchy Process*
- Thomas L. Saaty, Decision making with the analytic hierarchy process, *Int. J. Services Sciences, Vol. 1, No. 1, 2008*