Research Study On After Sales Services of Gas Turbines

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Certificate: This is to certify that the Project Report titled **'Research Study On After Sales Services Of Gas Turbines'** submitted by Ravi Raj, Reg. No **11mba1044** to VIT Business School, VIT University, Vellore in partial fulfillment of the requirements for the degree of Master of Business Administration is a bonafide record of work carried out by him / her under my supervision. The contents of this report, in full or in part have not been submitted in any form to any other institute or university for the award of any degree or diploma

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II.   Introduction to the Industry

The beginning: - Joint venture signed in November, 1997 between BHEL and GE of USA to form a JV company in India to provide After Sales Market support on exclusive basis for all heavy-duty GE design Gas Turbines in India and neighboring countries.

About BHEL: -

India's power major

14 manufacturing units

Manufactures GE tech. GT's

About GE:-

Most admired company

World's leading GT manufacturer

6 business

Background of BHEL :- (BHEL) (BSE: 500103 , NSE: BHEL) is one of the oldest and largest state-owned "engineering" and "manufacturing" enterprise in India in the energy related and infrastructure sectors which include Power, Railways, Transmission and Distribution, Oil and Gas sectors and many more. It is the 12th largest power equipment manufacturer in the world. BHEL is the only engineering company on the list, which contain online retail firm. The company has been earning profits continuously since 1971-72 and paying dividends since 1976-77. 74% of the total power generated in India is produced by equipment manufactured by BHEL.BHEL electronics division supplies gas turbine system for all ratings (frame sizes) of heavy duty gas turbines, which are manufactured/ supplied by BHEL, Hyderabad. BHEL is the first and the only licensee of GE, USA for manufacturing of Mark-IV control systems and the licensee for Mark-V and Mark-VI control system.

BHEL's gas turbine controls are supplied for mechanical drives, captive power plants (Simple cycle / combined cycle) and co-generation plants. BHEL is also providing technical services, supply of spares and up gradation of control system with the current technologies.

Background of GE: - Over the year there has been one organization that has dominated the global market. General Electrics leads all other firms in this market, consistently maintaining a market share of more than 40% for many consecutive years. . The main reasons for this have been its brand name and also the large portfolio of gas turbines that GE sells. It offers the widest range of heavy duty gas turbine in the market, ranging from 26 MW to 480 MW. It has a global installed fleet of more than 6,000 gas turbines: the largest installed base of any

gas turbine supplier worldwide. GE has a strong presence in countries such as Saudi Arabia, Nigeria, Spain, Germany, South Africa and Taiwan.

After the economic crisis, the global gas turbine market is currently in revival phase. Very few countries were able to insulate themselves from the liquidity crunch that followed it. This resulted into a considerable decrease in the global gas turbine orders in. The liquidity crunch that followed the subprime crisis resulted in absence of financing options for various projects. The lack of confidence of investors in projects resulted in the overall decline of the market. The global gas turbine market fell from $19,463.8m in 2007 to $10,727.4m in 2009. This slump clearly indicates the impact that the crisis had on the turbine market. How aver the future of this market looks bright, with many projects scheduled to go live in future and many contracts undertaken in the gas turbine market.

Objectives of joint venture: - Leveraging the best resources of two majors to offer after market services in India and neighbor regions.
BGGTS Experience and expertise:-
• Ranges from parts to services and repairs
• Leveraging on experience of 7000 GE gas turbines worldwide
• Offices located in each region for quick reach
• Total number of fleet in India region including (Northern region, western region, Eastern region and southern region) is 225.
• Regional offices are located in : Delhi, Kolkata, *Vadodara*, and Hyderabad

BGGTS Journey: - It started commercial operations in Q-1/1998. All the three important sectors namely parts, services and repairs were done under one roof. Repair facility accredited with ISO 9001, 14001 and OHSAS 18001 in April, 03. It executed several fuel conversion projects, turbine improvement and control retrofit projects. It introduced Mark VI to India in 2004. In present scenarios it is growing with customer's confidence.
BGGTS plant Life cycle includes:- [Value to customers]

✓ Customer information & training
✓ Plant improvement & Engg. advisory services
✓ Output planning & parts planning
✓ Supply of spare parts
✓ Repair & inspection services

Project experience of BGGTS:-
✓ 3 x Fr 5 Naphtha fuel conversion for MUL
✓ 2 x Fr 5 Naphtha fuel conversion for BPCL
✓ 1 x Fr 5 fuel gas conversion for IFFCO
✓ 2 x Fr 6 fuel gas conversion for NRL
✓ Engineering of mixed fuel firing for NTPC Kawas
✓ Engineering of gas fuel firing for IPCL Gandhar
✓ Fuel change studies for GIPCL,AECO,RIL
✓ Turbine upgrades for AECO, GIPCL, NFCL, L&T, IOC Mathura, Indogulf , AES Srilanka , IPGCL,PPCL Delhi
✓ Rehabilitation of gas turbines for IPGCL, TPAEC, BPCL, RPC, Ultratech , GSEC, BPDB

Outage services :- (Complete outage planning and execution on supervisory or turnkey), (Inspection services for gas turbines, generators, gear boxes, control systems and auxiliaries), (supply of parts), (repair services), (multiyear maintenance programs), (project management services), (Till implementation).

✓ Customer plant Mgr.
✓ Single source total solutions
✓ Parts
✓ Repairs
✓ Services
✓ Technical solutions
✓ Single point accountability

BGGTS advantages - resources: - <u>Better equipped to handle customer's emergency</u>
Table 1.3

GE's centralized support	BHEL's support	BGGTS's strength
24 x 7power answer center	complete info on plant design	Experienced TA's
GT centers of excellence	Info on aux equipments	Average exp- 12 yrs
Product service engineers/ Design engineers	Info on aux equipments	Proximity of its regional officers to customers
Parts center	In country repair facility	24 x 7 supports on phone

Introduction to the Study:-

Gas Turbine is an internal-combustion engine consisting essentially of an air compressor, combustion chamber, and turbine wheel that is turned by the expanding products of combustion.

This study is relevant for BGGTS to identify the factors that may effect after sales services, and factors that could be effective to make good relationship with the clients, and satisfy them further in the future. Though study is conducted in BGGTS, but the finest support is provided by IPGCL & PPCL, by responding to the questionnaire supplied to them. The key areas I tried to cover under this project are:-

✓ After sales services parameters that are critical for client's plant.
✓ Key drivers, for operation and maintenance (O&M), for clients plant.
✓ Operation & maintenance cost factors, in order of its importance to their plant.
✓ Services that need to be improve in the future.
✓ To identify the conversion/modification & upgrade services important for their plant.
✓ To identify Preferred decision making factors for clients.

Outcome of this could be implemented effectively to retain and satisfy the loyal as well as prospective customers. To collect the information, questionnaire is being used; I personally made my presence to the respondents for explaining about their queries regarding questions being asked to them through questionnaire. SPSS software is used for interpreting and analyzing the data to come up for the statistical results.

III.   Objective of study:-

Post-warranty customer support for a products or services

In some of the cases after sales service can be almost as important as the initial purchase. The manufacturer, retailer, or service provider determine what should be included in any guarantee or warranty package. This generally includes the duration of the warrant, traditionally one year from the date of purchase but increasingly two or more years, maintenance or replacement policy, items included/excluded, labor costs, and speed of response. In the case of service provider, post sales service might include additional training or help desk availability.

Customer's perception of the degree of willingness with which, a supplier deal with a question or complaint, speed of response, and action taken is also equally important. This study is based on customer's feedback about the post sales services being offered by an organization that deals with "heavy-duty gas turbine" services. This indicates the factor, on which customer retention is based.

This study indicates that there are various factors on which customer's satisfaction is dependent and once an organization takes care of it; it becomes easy for them to retain already existing customers. From the competitors' point of view it becomes more important to take care of the needs of the customers. This study indicates that how a competitor could be aggressive once it gates the opportunity to serve the customer. BGGTS is the organization which takes care of all those activities that could keep competitors apart from its customer, to accomplish this objective BGGTS provides best services, repairing services, supplying parts& technical solutions to the customers. BGGTS follows a pattern for workflow of planning its services, & that includes

➢ A: - Turbine operators request for the services.
➢ B: - Operators information is forwarded to service marketing / sales, & there after service engineering is informed for operational experience and frame specific analysis.
➢ C: - Unit specific information (history of operations old/new) send to service marketing sales and this unit gives the operation information and unit specific information to service engineering team for unit specific service analysis.
➢ D: - Service recommendation is recommended by service engineering team and then after final bid is done followed by service agreement.

➤ **Inspirations of objective:-**

Interesting facts on customer retention: - It is claimed by Reichheld and Sasser (1990) that:-
✓ Acquiring new customers comprises of five times the cost of retaining existing customers.
✓ An average company loses 10% of its customers each year.
✓ Lessening the defection rate by as low as 5% can increase companies profit by 25% depending on industries standards.
✓ Customer profits keep on increasing over the life of the retained customer as cost in retaining the customer becomes lower and lower

However, Corrol & Reichheld (1992) dispute these calculations claiming that they result from faulty cross-sectional analysis.

Main objectives of study:-
a) The main objective of this study is to recognize the factors that could be helpful to retain the customers.
b) Sustain the customers for their life time value, through well defined services policies, and customer friendly environment.
c) Our objective is to determine the voice of customers, and implement it into the services being offered by BGGTS.
d) Determine the steps, BGGTS could implement to strengthen "relationship / partnership" through services, repair, and part supply of "gas turbines" to the existing customers.

Hypothesis:-

Table :-1.4

H1	There is no significant difference among the association in the age group, <30, 30-45 & >45, respondents in their choice of "Service" as the critical parameter for after sales service for their plant
H2	There is no significant difference among the association in the age group, <30, 30-45 & >45, respondents in their choice of "Maintenance" as the critical parameter for after sales service for their plant
H3	There is no significant difference among the association in the age group, <30, 30-45 & >45, respondents in their choice of "Online support" as the critical parameter for after sales service for their plant
H4	There is no significant difference among the association in the age group, <30, 30-45 &>45, respondents in their choice of "High combined cycle efficiency" as the key driver for O&M(Operation & maintenance) for their plant
H5	There is no significant difference among the association in the age group, <30, 30-45 &>45, respondents in their choice of "Low specific cost(per KW)" as the key driver for O&M(Operation & maintenance) for their plant
H6	There is no significant difference among the association in the age group, <30, 30-45 &>45, respondents in their choice of "High availability" as the key driver for O&M(Operation & maintenance) for their plant
H7	There is no significant difference among the association in the age group, <30, 30-45 &>45, respondents in their choice of "High simple cycle efficiency" as the key driver for O&M(Operation & maintenance) for their plant
H8	There is no significant difference among the association in the age group, <30, 30-45 &>45, respondents in their choice of "Pressure ratio" as the key driver for O&M(Operation & maintenance) for their plant

Organization of the Report:-
All the variables used in my research is defined in the variable view. Particulars such as name of variables, data entered should be in string or numeric, cell width for variable data, decimals, detailed label of the variable, value label of the variable, scale on which the variables is measured i.e. Nominal/Ordinal/Scale, these all are defined.

Review of literature:-
While early gas engine were reliable generator of electricity but because they were big, heavy, inefficient devices modern gas turbines was developed in the late 19th century to replace them. During 19950s and 1960s gas turbine continued to dominate an expending power generation market, as fossil fuel prices remained low & ever large steam turbines were brought on line. In 1986, General Electric's profit of introduced a new series of advance gas-fixed turbine that turned around its faltering power system segment. In 1994, operating profits of its power division business reached &1.2 billion to & 5.9 billion in sales. Just one year later profits had fallen about one-third, to $770 million, due to several factors in which Design flows, that could lead

to cracks, was the most predominant. GE had to make one of the biggest and most expensive recalls in the electric power business. In total 22 GE turbines in U.S & overseas had to be shutdown to be fixed an additional 28 being shipped or installed required retrofitting with new components. GE has also lost some orders to competitors in Asia, including a key contract in China. This made GE to think upon after sales services. And took several steps regarding service up gradations & because of this GE survived. During the early 20th century, turbine increasingly became international in scope. Major American and European manufacturers strengthen their presence in each other's market, leading to the deadly competitive environment, and hence scope for after sales services increased to satisfy the customers demand and also to retain customers for their life time value. This infect created the need to understand the customers behavior in different cultural and geographical contexts. The 1999 AMR research report from Gartner stated that business earn 45% of gross profits from the aftermarket, although it accounts for only 24% of the revenues. Cohen, Agrawal & Agrawal (2006) also thought that customers not only expect product to be perfect but they do expect manufacturers to fix things quickly, when they breakdown, especially in the industrial machinery industry, customers are more eager to get good performance on after sales-service.[Two chains compared(Cohen, Agrawal & Agrawal,2006)]

Table:- 1.5

Parameter	Manufacturing supply chain	After sales service supply chain
Nature of demand	Predictable, can be forecast	Always unpredictable sporadic
Required response	Standard, can be scheduled	ASAP (some day or next day)
Number of SKUs	Limited	15 to 20 times more
Product portfolio	Largely homogeneous	Always heterogeneous
Delivery network	Depends on nature of the products (multiple networks necessary)	Single network capability & capable of delivering different service product
Inventory management aim	Maximize velocity of resources	Pre position resources
Reverse logistics	Doesn't handle	Handles return, repair & disposal of failed components
Performance matrix	Fill rate	Product availability (Uptime)
Inventory turn (the more the batter)	6 to 50 a year	1 to 4 a years

Creating service products (Cohen, Agrawal & Agrawal, 2006):- The quickest way for companies to meet response targets is to replace the failed products with the whole end product unit that they have positioned on customers site. By contrast, the most economical way, to meet a service demand is to replace from the central facility with only the broken piece parts.

Table :- 1.6
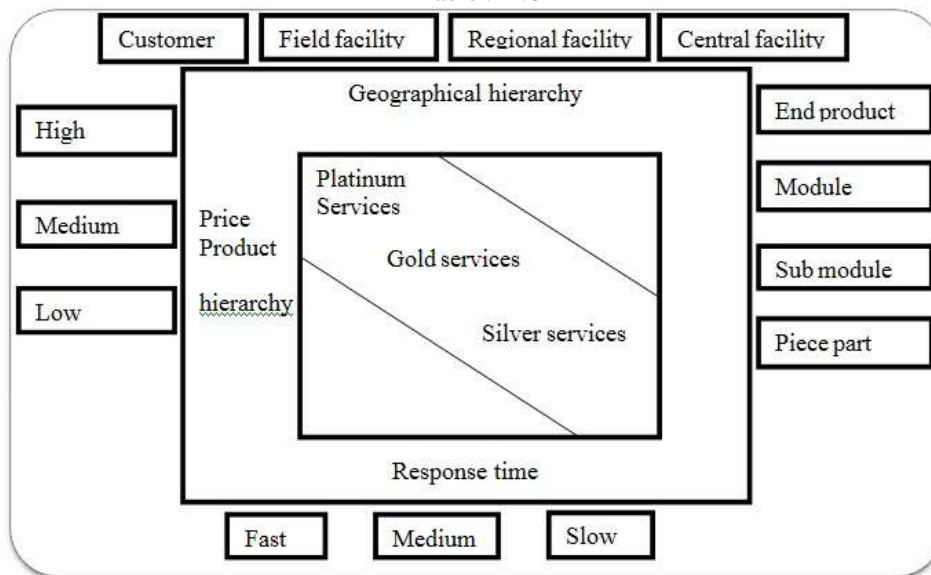
Creating service products (Cohen, Agrawal & Agrawal, 2006)

Two after sales service models: - "Who is responsible to take care of the after sales service? One is the manufacturer or its subordinate & other is dealer of the manufacturer who is responsible for the service work. Problem statement:-

Herbig &Palumbo (1993) found that most obvious problem is the spare parts problem, which includes:-
1. Maintaining the expensive spare parts.
2. Incurring shipping & importation delays in receiving the spare parts from some central storage.

If manufacturer let the dealers to take care of after sales service totally, there is the advantage that the storage way of spare parts might be more appropriate, because the dealers are more familiar with the conditions of the machines which they sold. They could have a good forecasting of spare parts inventory, moreover the dealers have more proximity to customers, and then their response for service might be quicker. However there is tradeoff between the service performance and service cost, and hence it should be well balanced.

Herbig & Palumbo (1993) researched the after sales market in Japan & in the United States and made two markets as the representation of Eastern & the Western market. They found that, Japanese customers expect prompt service & availability of the full line of parts for any major purchase. They expect after sales service is the part of purchase with longer warranty periods & that is why in Japanese market after sales service managed directly by the manufacturer itself.

Another research result made by Wilson, Bostrom & Lundin (1999), states that "East customers" want instant service & they want it for free & customers in "North America" are willing to pay in advance for the after sales service, in the form of service contract. Western customer seems to be more patient if they faced the problem such as machines failed as compared with the Eastern customers.

Wilson, Bostrom & Lundin (1999) defined the after-sales service performing in five activities when it is handled through a distribution network, and these are:-
  i. Installation
 ii. Training
iii. Routine maintenance
 iv. Emergency repair
  v. Parts supply
 vi. Software service

Wilson, Bostrom, & Lundin (1999) found the similar results that pointed out, the Far East market has more difficult areas to service, both with regard to expectation of customer and communication problems.

After sales service is the prompt delivery of the benefits to the customers. In the after sales service, there are work of knowledge transferring, cost effective maintenance, repair and replacement. Moreover the good after sales service is caused by the factors of location, manufacturer, and dealer supporting & service capacity.

IV. Research methodology:-

The research design methodology used here is "Descriptive Research" which is also known as "Statistical Research". The main goal of this type of research is to describe the data and characteristics about what is being studied. The idea behind this type of research is to study frequencies, average, and other statistical calculations. Descriptive research is the exploration of the existing certain phenomena. Descriptive research is mainly done when a researcher wants to gain better understanding of a topic, in this case the rationale behind how to retain the customer, determine the voice of customers to implement it into the services being offered by BGGTS, & steps BGGTS could take to further strengthen the relationship with their customers.

➢ **A)) Sampling techniques:-**
The sampling technique used is Non-probabilistic sampling method. Non-probabilistic sampling is a sampling technique where the sample selected for study does not involve random selection from the population. In our research since it was industry specific research, it was ideal to go for "Judgmental sampling" or "Purposive sampling" where the researcher chooses the sample based on who they think would be appropriate for the study. This is used primarily when there is limited number of people that have expertise in the area being researched. Only mechanical background employees who have expertise in "Gas Turbine" sectors were considered for study. Also the questionnaire was circulated to some BGGTS employees to check the consistency of the output across backgrounds characteristics.
Sample plan:-The sampling plan consists mainly of primary data collection. The following methods were used to gather information as part of primary data collection:-

➢ **B)) Focus group discussions:-**
BGGTS, IPGCL & PPCL employees has been identified as focus groups and there inputs on how the system can be modified are taken into consideration and the questionnaire is modified accordingly. The end result of focus group discussion is a clearly defined objective for the questionnaire. Based on the focus group discussions, the factors that can effect decision making where selected as the variables of the questionnaire. A Well designed questionnaire whose objective is to classify the respondents according to the age group characteristics, study the rationale under which they make a choice of BGGTS for the services, were circulated in power sector companies.

➢   **C)) Designing questionnaire:-**
    The necessary questions and the appropriate scaling is identified and the information's to be collected were classified into 4 parts.

1. <u>Background characteristics: -</u> Nominal scale has been identified to gather all data regarding background characteristics.
2. <u>Variable under study: -</u> The variables that have been identified & which could have an effect on the decision making in opting BGGTS for services to be delivered. Interval scale of 5 point scale (<u>Likert Scale</u>) has been identified to capture the output data regarding the variable under study.
3. <u>Test parameters: -</u> The various parameters that need to be tested on the Companies opting for BGGTS for the services being delivered. Interval scale or 5 point scale (Likert scale) has been identified to capture the output data regarding the parameters to be tested.
4. <u>Other factors: -</u> Factors that could affect the decision making on the basis of external factors such as competitive environment and technology enhancements has been identified & Interval or rating scale has been identified to capture the output data regarding the other factors.

➢   **D)) Questionnaires validity test:-**
    The questionnaires are subjected to content validity check using "<u>Lawshe formulae</u>" for content validity ratio (CVR).

It measures the essentiality of a question in a questionnaire.

Content validity ratio = $(2Ne/N)-1$

Where Ne = Number of panelists indicating that question is essential.

- N = Total number of panelists

The number of panelists was selected to be 5 & the questionnaires were circulated and the response for each item was noted. Items with CVR ratio < 0.5 were dropped. The final questionnaire was then formulated.

Reliability Test:-

Scale: ALL VARIABLES

Case Processing Summary			
		N	%
Cases	Valid	9	100.0
	Excluded[a]	0	.0
	Total	9	100.0
a. Listwise deletion based on all variables in the procedure.			

Table:- 1.7

Reliability Statistics	
Cronbach's Alpha	N of Items
.737	47

Inference:- Since the Cronbach's Alpha value is greater than .6 (.737 > .6), hence data are reliable.

Data Analysis & Interpretation: -

<u>Outcome of frequency test being supported by Pie chart (Case processing summary)</u>

Company name					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	IPGCL	3	33.3	33.3	33.3
	PPCL	6	66.7	66.7	100.0
	Total	9	100.0	100.0	

Inference:- Majority of employee are from PPCL, with 66.7% as compared by IPGCL which has 33.3% of employees.

Sex

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid male	9	100.0	100.0	100.0

Inference:- All the participants are male only.

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<30	4	44.4	44.4	44.4
	30-45	2	22.2	22.2	66.7
	>45	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

Inference:- Maximum number of participants are smaller than 30 years age group, with 44.4%, followed by greater than 45 years age group, with 33.3% and least number of participants are from 30-45 years age group, with 22.2% of the total employees.

service where 5>4>3>2>1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	2	22.2	22.2	22.2
	4	2	22.2	22.2	44.4
	5	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

Inference:- For service 5, which is the greatest possible rating has been rated by maximum employees, with 55.6%,followed by 2 & 3 which is rated by equal number of employees, with 22.2 % each of the total employees.

documentation where 5>4>3>2>1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4	5	55.6	55.6	55.6
	5	4	44.4	44.4	100.0
	Total	9	100.0	100.0	

Inference:- For documentation 4, which is the 2nd highest rating has been assigned by maximum number of employees, with 55.6 %, followed by 5, which is the highest rating by 44.4 % of the total employees.

maintenance where 5>4>3>2>1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4	3	33.3	33.3	33.3
	5	6	66.7	66.7	100.0
	Total	9	100.0	100.0	

Inference:- For maintenance 5,which is the highest rating has been assigned by maximum number of employees, with 66.7 %,followed by 4, which is the second highest rating by 33.3 % of total employee.

online support where 5>4>3>2>1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	2	22.2	22.2	22.2
	4	1	11.1	11.1	33.3
	5	6	66.7	66.7	100.0
	Total	9	100.0	100.0	

Inference:- For online support 5, which is the highest rating point has been assigned by 66.7 % , followed by 3, which is the third highest rating by 22.2 % ,and the second highest rating 4, has been assigned by least number of imployees with 11.1% of the total employees

parts supply where 5>4>3>2>1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4	4	44.4	44.4	44.4
	5	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

Inference:- For parts supply 5, which is the highest rating has been assigned by maximum number of employees 55.6 %, followed by 4, which is the second highest rating, by 44.4 % of employees.

upgrades where 5>4>3>2>1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	3	33.3	33.3	33.3
	4	3	33.3	33.3	66.7
	5	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

Infrence:- For upgrades 5 which is the highest,4 second highest &,3 third highest ratings has been assigned equally by 33.3 % of the total employees respectively.

high combined cycle efficiency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	4	44.4	44.4	44.4
	agree	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

For high combined cycle efficiency 5, which is the highest rating has been assigned by maximum number of employees, 55.6 %, followed by 4 which is the second highest rating by 44.4 % of the total employees.

Low NOx emission

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	3	33.3	33.3	33.3
	agree	6	66.7	66.7	100.0
	Total	9	100.0	100.0	

Inference:- For Low NOx emission maximum number of people are agree 66.7, followed by strongly agree, which is supported by 33.3

low specific cost (per KW)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	6	66.7	66.7	66.7
	Agree	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

Infrance:- For low specific cost maximum number of employees has prefered Strongly agree 66.7 %, followed by 33.3 % are agree.

High availability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	6	66.7	66.7	66.7
	Agree	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

Inference:- For high availability maximum number of employees referred Strongly agree 66.7 %, followed by 33.3 % for agree.

operating flexibility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	4	44.4	44.4	44.4
	Agree	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

Inference:- For operating flexibility maximum number of employees referred for Agree 55.6 %, followed by 44.4 % for strongly agree.

High reliability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	5	55.6	55.6	55.6
	Agree	4	44.4	44.4	100.0
	Total	9	100.0	100.0	

Inference:- For high reliability maximum number of people referred for Strongly agree 55.6 %, followed by 44.4 % for agree.

High simple cycle efficiency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	6	66.7	66.7	66.7
	Agree	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

Inference:- For High simple cycle efficiency maximum number of employees referred for strongly agree 66.7 %, followed by 33.3 % for agree

Cooling Technology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	4	44.4	44.4	44.4
	Agree	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

Inference:- For cooling technology maximum number of employees reffered for Agree 55.5 %, followed by 44.4 % for strongly agree

Firing temperature

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	4	44.4	44.4	44.4
	Agree	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

Inference:- For Firing temperature maximum number of employees referred for Agree 55.6 %, followed by 44.4 % for strongly agree.

Pressure ratio

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	6	66.7	66.7	66.7
	Agree	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

Inference:- For Pressure ratio maximum number of employees referred for strongly agree 66.7 %, followed by 33.3 % for agree.

Mass flow

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	3	33.3	33.3	33.3
	agree	5	55.6	55.6	88.9
	neutral	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

Inference:- For Mass flow maximum number of employees referred for agree 55.6 %, followed by 33.3 % for Strongly agree where as 11.1 % employees reffered for neutral.

Planned outage frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	important	3	33.3	33.3	33.3
	Quite important	3	33.3	33.3	66.7
	Very important	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

Inference:- For Planned outage frequency all employees reffered equally for important, quite important, & very important 33.3 % respectively.

utage duration

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Quite important	3	33.3	33.3	33.3
	Very important	6	66.7	66.7	100.0
	Total	9	100.0	100.0	

Inference:-For outage duration maximum number of employees reffered Very important 66.7 %, followed by 33.3 % for Quite important.

Parts replacement frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Important	2	22.2	22.2	22.2
	Quite important	4	44.4	44.4	66.7
	Very important	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

Inference:- For parts replacement frequency maximum number of employees reffered for Quite important 44.4 %, followed by very important 33.33 %, and least number of employees reffered for important 22.2 %.

Parts replacement costs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Quite important	3	33.3	33.3	33.3
	Very important	6	66.7	66.7	100.0
	Total	9	100.0	100.0	

Inference:- For parts replacement costs maximum number of employees referred for very important 66.7%, followed by 33.3 % for quite important.

Uncertainty repair/maintenance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Quite important	2	22.2	22.2	22.2
	Very important	7	77.8	77.8	100.0
	Total	9	100.0	100.0	

Inference:- For parts Uncertainty repair/maintenance maximum number of employees referred for very important 77.8%, followed by 22.2 % for quite important.

daily operation costs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Important	2	22.2	22.2	22.2
	Quite important	1	11.1	11.1	33.3
	Very important	6	66.7	66.7	100.0

daily operation costs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Important	2	22.2	22.2	22.2
	Quite important	1	11.1	11.1	33.3
	Very important	6	66.7	66.7	100.0
	Total	9	100.0	100.0	

Inference:- For Daily operation costs maximum number of employees referred for very important 66.7%, followed by 22.2 % for important, and only 11.1 % reffered for quite important.

NOx abatement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	important	1	11.1	11.1	11.1
	quite important	4	44.4	44.4	55.6
	very important	4	44.4	44.4	100.0
	Total	9	100.0	100.0	

Inference:- For NOx abatement equal number of employees referred for quite important & very important 44.4 % respectively, followed by 11.1 % for important.

Long time surety of price

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	7	77.8	77.8	77.8
	Agree	1	11.1	11.1	88.9
	Neutral	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

Inference:- For Long time surety of price maximum number of employees referred for strongly agree 77.8%, followed by 11.1 % equally for both Agree and neutral respectively.

Provision of high quality outage services

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	7	77.8	77.8	77.8
	Agree	1	11.1	11.1	88.9
	Neutral	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

Inference:- For Provision of high quality outage services maximum number of employees referred for Strongly agree 77.8 %, followed equally by 11.1 % for both agree & neutral respectively.

Local project management & execution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	5	55.6	55.6	55.6
	Agree	4	44.4	44.4	100.0
	Total	9	100.0	100.0	

Inference:- For Local project management & execution maximum number of employees referred for strongly agree 55.6%, followed by 44.4 % for agree.

Rapid supply of key parts in case of emergency failures

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	9	100.0	100.0	100.0

Inference:- For rapid supply of key parts in case of emergency failures all employees opted only for strongly agree 100 %.

Remote expert monitoring of plant

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	11.1	11.1	11.1
	Agree	4	44.4	44.4	55.6
	Neutral	4	44.4	44.4	100.0
	Total	9	100.0	100.0	

Inference:- For Remote expert monitoring of plant maximum number of employees referred equallyfor agree & neutral 44.47% respectively, followed by 11.1 % for strongly agree.

An on site expert to provide immediate advice &coordinate activities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	3	33.3	33.3	33.3
	agree	5	55.6	55.6	88.9
	neutral	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

Inference:- For An on site expert to provide immediate advice & cooreinate activities maximum number of employees referred for agree 55.6%, followed by 33.3 % for strongly agree, and 11.1 % for neutral

Fuel system conversions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	5	55.6	55.6	55.6
	Agree	1	11.1	11.1	66.7
	Neutral	1	11.1	11.1	77.8
	Disagree	2	22.2	22.2	100.0
	Total	9	100.0	100.0	

Inference:- For Fuel system conversions maximum number of employees referred for strongly agree 55.6%, followed by 22.2 % for disagree, and followed by 11.1 % for both agree and neutral respectively.

Emission abatement systems

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	4	44.4	44.4	44.4
	Agree	2	22.2	22.2	66.7
	Neutral	2	22.2	22.2	88.9
	Disagree	1	11.1	11.1	100.0

Emission abatement systems

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	4	44.4	44.4	44.4
	Agree	2	22.2	22.2	66.7
	Neutral	2	22.2	22.2	88.9
	Disagree	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

Inference:- For Emission abatement systems maximum number of employees referred for strongly agree 44.4%, followed by 22.2 % for both agree and neutral respectively, and followed by 11.1 % for disagree and neutral respectively.

Auxiliary system modification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	4	44.4	44.4	44.4
	Agree	3	33.3	33.3	77.8
	Neutral	2	22.2	22.2	100.0
	Total	9	100.0	100.0	

Inference:- For Auxiliary system modification maximum number of employees referred for strongly agree 44.4%, followed by 23.3 % for agree, and followed by 2.2 % for neutral.

Instrumentation & control system modification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	5	55.6	55.6	55.6
	Agree	2	22.2	22.2	77.8
	Neutral	2	22.2	22.2	100.0
	Total	9	100.0	100.0	

Inference:- For Instrumentation & control system modification maximum number of employees referred for strongly agree 55.6%, followed by 22.2 % for both agree and neutral respectively.

Corrosion monitoring

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	6	66.7	66.7	66.7
	agree	2	22.2	22.2	88.9
	disagree	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

Inference:- For Corrosion monitoring maximum number of employees referred for strongly agree 66.7%, followed by 22.2 % for agree and 11.1 % for disagree.

Air sampling

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	4	44.4	44.4	44.4
	Agree	3	33.3	33.3	77.8
	Neutral	1	11.1	11.1	88.9
	Disagree	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

Inference:- For Air sampling maximum number of employees referred for strongly agree 44.4%, followed by 33.3 % for agree, and 11.1 % For both neutral and diagree respectively

Material testing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	5	55.6	55.6	55.6
	Agree	2	22.2	22.2	77.8
	Neutral	1	11.1	11.1	88.9
	Disagree	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

Inference:- For Material testing maximum number of employees referred for strongly agree 55.6%, followed by 22.2 % for agree and 11.1 % for both neutral and disagree respectively.

Site surveys

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	2	22.2	22.2	22.2
	agree	5	55.6	55.6	77.8
	neutral	1	11.1	11.1	88.9
	disagree	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

Inference:- For Site surveys maximum number of employees referred for agree 55.6%, followed by 22.2 % for strongly agree and 11.1 % both for neutral and disagree respectively.

Technical advisory services

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	5	55.6	55.6	55.6
	Agree	3	33.3	33.3	88.9
	Strongly disagree	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

Inference:- For Technical advisory services maximum number of employees referred for strongly agree 55.6%, followed by 33.3 % for agree and 11.1 % for strongly disagree.

services likes the most

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	OEM credentials	3	33.3	33.3	33.3
	design & looks	1	11.1	11.1	44.4
	quick service response time	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

Inference:- For Services likes the most maximum number of employees referred for Quick service response time 55.6%, followed by 33.3 % for OEM credentials and 11.1 % for design and looks.

Preferred decision making factors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Maintenance price	1	11.1	11.1	11.1
	Quick response	2	22.2	22.2	33.3
	Knowledgeable & polite sales staff	3	33.3	33.3	66.7
	Manner of the personal	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

Inference:- For Preferred decision making factors maximum number of employees referred for both knowledgeable and polite sales staff 33.3% respectively,followed by 22.2 % for quick responce and 11.1 % for maintenance price.

Your next order will be to BGGTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	3	33.3	33.3	33.3
	agree	3	33.3	33.3	66.7
	neutral	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

Inference:- For Your next order will be to BGGTS all employees referred equally for strongly agree, agree and neutral 33.3 % respectively.

Satisfied by services delivered

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	2	22.2	22.2	22.2
	Agree	5	55.6	55.6	77.8
	Neutral	2	22.2	22.2	100.0
	Total	9	100.0	100.0	

Inference:- For Satisfied by services delivered maximum number of employees referred for agree 55.6%, followed by 22.2 % for both strongly agree and neutral respectively.

Services worth money paid

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	6	66.7	66.7	66.7
	Agree	2	22.2	22.2	88.9
	Neutral	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

Inference:- For Services worth money paid maximum number of employees referred for strongly agree 66.7%, followed by 22.2 % for agree and 11.1 % neutral.

BGGTS response time is satisfactory

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	6	66.7	66.7	66.7
	Agree	2	22.2	22.2	88.9
	Disagree	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

Inference:- For BGGTS response time is satisfactory maximum number of employees referred for strongly agree 66.6%, followed by 22.2 % for agree and 11.1 % disagree.

Technical support is satisfactory

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	4	44.4	44.4	44.4
	Agree	1	11.1	11.1	55.6
	Neutral	4	44.4	44.4	100.0
	Total	9	100.0	100.0	

Inference:- For Technical support is satisfactory maximum number of employees referred equally bothfor strongly agree and neutral respectively, followed by 11.1 % for agree.

Test for correlation:-
Table :- 1.8
Correlations

		Age	service where 5>4>3>2>1
Age	Pearson Correlation	1	.830**
	Sig. (2-tailed)		.006
	N	9	9
service where 5>4>3>2>1	Pearson Correlation	.830**	1
	Sig. (2-tailed)	.006	
	N	9	9

**. Correlation is significant at the 0.01 level (2-tailed).

Conclusion:- There is Strong positive correlation between Age and Services where 5>4>3>2>1.
There is significant difference.
Table :- 1.9

ANOVA

Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.689	2	2.844	14.222	.005
Within Groups	1.200	6	.200		
Total	6.889	8			

Conclusion:- There is significant difference among the perception in the age group, <30, 30-45 & >45, respondents in their choice of "Service" as the critical parameter for after sales service for their plant

Correlations

		Age	documentation where 5>4>3>2>1
Age	Pearson Correlation	1	.625
	Sig. (2-tailed)		.072
	N	9	9
documentation where 5>4>3>2>1	Pearson Correlation	.625	1
	Sig. (2-tailed)	.072	
	N	9	9

Conclusion:- There is strong positive correlation between Age and Documentation where 5>4>3>2>1.There is no significant difference

Table:- 2
Correlations

		Age	maintenance where 5>4>3>2>1
Age	Pearson Correlation	1	.718*
	Sig. (2-tailed)		.029
	N	9	9
maintenance where 5>4>3>2>1	Pearson Correlation	.718*	1
	Sig. (2-tailed)	.029	
	N	9	9

*. Correlation is significant at the 0.05 level (2-tailed).

There is strong positive correlation between Age and Maintenance where 5>4>3>2>1
There is significant difference.
Table:- 2.1

ANOVA

Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.556	1	3.556	7.467	.029
Within Groups	3.333	7	.476		
Total	6.889	8			

Conclusion:- There is significant difference among the perception in the age group, <30, 30-45 & >45, respondents in their choice of "Maintenance" as the critical parameter for after sales service for their plant.
Table:- 2.2

Correlations

		Age	online support where 5>4>3>2>1
Age	Pearson Correlation	1	.679[*]
	Sig. (2-tailed)		.044
	N	9	9
online support where 5>4>3>2>1	Pearson Correlation	.679[*]	1
	Sig. (2-tailed)	.044	
	N	9	9

*. Correlation is significant at the 0.05 level (2-tailed).

There is strong positive correlation between Age and Online support where 5>4>3>2>1
There is significant difference.

Table :- 2.3
ANOVA

Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.556	2	1.778	3.200	.113
Within Groups	3.333	6	.556		
Total	6.889	8			

Conclusion:- There is no significant difference among the perception in the age group, <30, 30-45 & >45, respondents in their choice of "Online support" as the critical parameter for after sales service for their plant

Correlations

		Age	parts supply where 5>4>3>2>1
Age	Pearson Correlation	1	.653
	Sig. (2-tailed)		.056
	N	9	9
parts supply where 5>4>3>2>1	Pearson Correlation	.653	1
	Sig. (2-tailed)	.056	
	N	9	9

Conclusion:-There is strong positive correlation between Age and parts supply where 5>4>3>2>1.
There is no significant difference.

Correlations

		Age	upgrades where 5>4>3>2>1
Age	Pearson Correlation	1	.622
	Sig. (2-tailed)		.074
	N	9	9
upgrades where 5>4>3>2>1	Pearson Correlation	.622	1
	Sig. (2-tailed)	.074	

Correlations

		Age	upgrades where 5>4>3>2>1
Age	Pearson Correlation	1	.622
	Sig. (2-tailed)		.074
	N	9	9
upgrades where 5>4>3>2>1	Pearson Correlation	.622	1
	Sig. (2-tailed)	.074	
	N	9	9

There is strong correlation between Age and Upgrades where 5>4>3>2>1.
There is no significant difference.

Correlations

		Age	services likes the most
Age	Pearson Correlation	1	.524
	Sig. (2-tailed)		.148
	N	9	9
services likes the most	Pearson Correlation	.524	1
	Sig. (2-tailed)	.148	
	N	9	9

There is strong positive correlation between Age and Services likes the most.
There is no significant difference.

Correlations

		Age	Preferred decision making factors
Age	Pearson Correlation	1	.286
	Sig. (2-tailed)		.455
	N	9	9
Preferred decision making factors	Pearson Correlation	.286	1
	Sig. (2-tailed)	.455	
	N	9	9

Conclusion;- There is positive correlation between Age and preferred decision making factors.
There is no significant difference.

Table :- 2.4
Correlations

		Age	high combined cycle efficiency
Age	Pearson Correlation	1	.909[**]
	Sig. (2-tailed)		.001
	N	9	9

high combined cycle efficiency	Pearson Correlation	.909**	1
	Sig. (2-tailed)	.001	
	N	9	9

**. Correlation is significant at the 0.01 level (2-tailed).

There is strong positive correlation between Age and High combined cycle efficiency.
There is significant difference.

Table :- 2.5
ANOVA

Age					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.689	1	5.689	33.185	.001
Within Groups	1.200	7	.171		
Total	6.889	8			

Conclusion:- There is significant difference among the perception in the age group, <30, 30-45 &>45, respondents in their choice of "High combined cycle efficiency" as the key driver for O&M(Operation & maintenance) for their plant

Correlations

		Age	Low NOx emission
Age	Pearson Correlation	1	.180
	Sig. (2-tailed)		.644
	N	9	9
Low NOx emission	Pearson Correlation	.180	1
	Sig. (2-tailed)	.644	
	N	9	9

Conclusion:- There is positive correlation between Age and Low NOx emission.
There is no significant difference.

Table:- 2.6
Correlations

		Age	low specific cost (per KW)
Age	Pearson Correlation	1	.898**
	Sig. (2-tailed)		.001
	N	9	9
low specific cost (per KW)	Pearson Correlation	.898**	1
	Sig. (2-tailed)	.001	
	N	9	9

**. Correlation is significant at the 0.01 level (2-tailed).

Conclusion:- There is strong positive correlation between Age and
Low specific cost (per KW).
There is significant difference.

Table :- 2.7

ANOVA

Age					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.556	1	5.556	29.167	.001
Within Groups	1.333	7	.190		
Total	6.889	8			

Conclusion:- There is significant difference among the perception in the age group, <30, 30-45 &>45, respondents in their choice of "Low specific cost(per KW)" as the key driver for O&M(Operation & maintenance) for their plant

Table :- 2.8

Correlations

		Age	High availability
Age	Pearson Correlation	1	.898**
	Sig. (2-tailed)		.001
	N	9	9
High availability	Pearson Correlation	.898**	1
	Sig. (2-tailed)	.001	
	N	9	9

**. Correlation is significant at the 0.01 level (2-tailed).

Conclusion:- There is strong positive correlation between Age and high availability.
There is significant difference.

Table 2.9

ANOVA

Age					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.556	1	5.556	29.167	.001
Within Groups	1.333	7	.190		
Total	6.889	8			

Conclusion:- There is significant difference among the perception in the age group, <30, 30-45 &>45, respondents in their choice of "High availability" as the key driver for O&M(Operation & maintenance) for their plant

Correlations

		Age	operating flexibility
Age	Pearson Correlation	1	.653
	Sig. (2-tailed)		.056
	N	9	9
operating flexibility	Pearson Correlation	.653	1
	Sig. (2-tailed)	.056	
	N	9	9

Conclusion:- There is strong positive correlation between age and operating flexibility.
There is no significant difference.

Correlations

		Age	High reliability
Age	Pearson Correlation	1	.625
	Sig. (2-tailed)		.072
	N	9	9
High reliability	Pearson Correlation	.625	1
	Sig. (2-tailed)	.072	
	N	9	9

Conclusion:- there is strong positive correlation between Age and High reliability.
There is no significant difference.

Table :- 3

Correlations

		Age	High simple cycle efficiency
Age	Pearson Correlation	1	.898**
	Sig. (2-tailed)		.001
	N	9	9
High simple cycle efficiency	Pearson Correlation	.898**	1
	Sig. (2-tailed)	.001	
	N	9	9

**. Correlation is significant at the 0.01 level (2-tailed).

Conclusion:- There is strong positive correlation between Age and High simple cycle efficiency.
There is significant difference.

Table :- 3.1

ANOVA

Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.556	1	5.556	29.167	.001
Within Groups	1.333	7	.190		
Total	6.889	8			

Conclusion:- There is significant difference among the perception in the age group, <30, 30-45 &>45, respondents in their choice of "High simple cycle efficiency" as the key driver for O&M(Operation & maintenance) for their plant

Correlations

		Age	Cooling Technology
Age	Pearson Correlation	1	.653
	Sig. (2-tailed)		.056
	N	9	9
Cooling Technology	Pearson Correlation	.653	1
	Sig. (2-tailed)	.056	
	N	9	9

Conclusion:- There is strong positive correlation between Age and cooling technology.
There is no significant difference.

Correlations

		Age	Firing temperature
Age	Pearson Correlation	1	.653
	Sig. (2-tailed)		.056
	N	9	9
Firing temperature	Pearson Correlation	.653	1
	Sig. (2-tailed)	.056	
	N	9	9

Conclusion:- There is strong correlation between Age and Firing temperature.
There is no significant difference.

Table:- 3.2

Correlations

		Age	Pressure ratio
Age	Pearson Correlation	1	.898[**]
	Sig. (2-tailed)		.001
	N	9	9
Pressure ratio	Pearson Correlation	.898[**]	1
	Sig. (2-tailed)	.001	
	N	9	9

**. Correlation is significant at the 0.01 level (2-tailed).

There is strong positive correlation between Age and pressure ratio.
There is significant difference.

Table :- 3.3

ANOVA

Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.556	1	5.556	29.167	.001
Within Groups	1.333	7	.190		
Total	6.889	8			

Conclusion:- There is significant difference among the perception in the age group, <30, 30-45 &>45, respondents in their choice of "Pressure ratio" as the key driver for O&M(Operation & maintenance) for their plant

Correlations

		Age	Mass flow
Age	Pearson Correlation	1	.561
	Sig. (2-tailed)		.116
	N	9	9
Mass flow	Pearson Correlation	.561	1
	Sig. (2-tailed)	.116	
	N	9	9

Conclusion:- There is strong positive correlation between Age and Mass flow.
There is no significant difference.

Correlations

		Age	Planned outage frequency
Age	Pearson Correlation	1	.311
	Sig. (2-tailed)		.415
	N	9	9
Planned outage frequency	Pearson Correlation	.311	1
	Sig. (2-tailed)	.415	
	N	9	9

Conclusion:- there is positive correlation between Age and planned outage frequency. There is no significant difference.

Correlations

		Age	Outage duration
Age	Pearson Correlation	1	.180
	Sig. (2-tailed)		.644
	N	9	9
Outage duration	Pearson Correlation	.180	1
	Sig. (2-tailed)	.644	
	N	9	9

There is positive correlation between Age and outage duration.
There is no significant difference.

Correlations

		Age	Parts replacement frequency
Age	Pearson Correlation	1	-.498
	Sig. (2-tailed)		.173
	N	9	9
Parts replacement frequency	Pearson Correlation	-.498	1
	Sig. (2-tailed)	.173	
	N	9	9

Conclusion:- There is negative correlation between age and Parts replacement frequency.
There is no significant difference.

Correlations

		Age	Parts replacement costs
Age	Pearson Correlation	1	.449
	Sig. (2-tailed)		.225
	N	9	9
Parts replacement costs	Pearson Correlation	.449	1
	Sig. (2-tailed)	.225	
	N	9	9

Conclusion:- There is positive correlation between age and parts replacement costs.
There is no significant difference.

Correlations

		Age	Uncertainty repair/maintenance
Age	Pearson Correlation	1	.238
	Sig. (2-tailed)		.538
	N	9	9
Uncertainty repair/maintenance	Pearson Correlation	.238	1
	Sig. (2-tailed)	.538	
	N	9	9

Conclusion:- There is positive correlation between age and uncertainty repair/maintenance. There is no significant difference.

Correlations

		Age	daily operation costs
Age	Pearson Correlation	1	.373
	Sig. (2-tailed)		.322
	N	9	9
daily operation costs	Pearson Correlation	.373	1
	Sig. (2-tailed)	.322	
	N	9	9

Conclusion:- there is positive correlation between age and daily operation cost.
There is no significant difference.

Correlations

		Age	NOx abatement
Age	Pearson Correlation	1	.445
	Sig. (2-tailed)		.231
	N	9	9
NOx abatement	Pearson Correlation	.445	1
	Sig. (2-tailed)	.231	
	N	9	9

Conclusion:- There is positive correlation between Age and NOx abatement.
There is no significant difference.

Correlations

		Age	Long time surety of price
Age	Pearson Correlation	1	-.508
	Sig. (2-tailed)		.163
	N	9	9
Long time surety of price	Pearson Correlation	-.508	1
	Sig. (2-tailed)	.163	

Correlations

		Age	Long time surety of price
Age	Pearson Correlation	1	-.508
	Sig. (2-tailed)		.163
	N	9	9
Long time surety of price	Pearson Correlation	-.508	1
	Sig. (2-tailed)	.163	
	N	9	9

Conclusion:- There is negative correlation between age and long time surety of price. There is no significant difference.

Correlations

		Age	Provision of high quality outage services
Age	Pearson Correlation	1	-.318
	Sig. (2-tailed)		.405
	N	9	9
Provision of high quality outage services	Pearson Correlation	-.318	1
	Sig. (2-tailed)	.405	
	N	9	9

Conclusion :- There is negative correlation between age and provision of high quality outage services. There is no significant difference.

Correlations

		Age	Local project management & execution
Age	Pearson Correlation	1	-.653
	Sig. (2-tailed)		.056
	N	9	9
Local project management & execution	Pearson Correlation	-.653	1
	Sig. (2-tailed)	.056	
	N	9	9

Conclusion:- There is negative correlation between age and local project management & execution. There is no significant difference.

Correlations

		Age	Rapid supply of key parts in case of emergency failures
Age	Pearson Correlation	1	.[a]
	Sig. (2-tailed)		.
	N	9	9

Rapid supply of key parts in case of emergency failures	Pearson Correlation	.a	.a
	Sig. (2-tailed)	.	
	N	9	9

a. Cannot be computed because at least one of the variables is constant.

Correlations

		Age	Remote expert monitoring of plant
Age	Pearson Correlation	1	-.127
	Sig. (2-tailed)		.745
	N	9	9
Remote expert monitoring of plant	Pearson Correlation	-.127	1
	Sig. (2-tailed)	.745	
	N	9	9

Conclusion:- there is negative correlation between age and remote expert monitoring of plant.
There is no significant difference.

Correlations

		Age	An on site expert to provide immediate advice &coordinate activities
Age	Pearson Correlation	1	-.045
	Sig. (2-tailed)		.909
	N	9	9
An on site expert to provide immediate advice &coordinate activities	Pearson Correlation	-.045	1
	Sig. (2-tailed)	.909	
	N	9	9

Conclusion:- There is negative correlation between age and An on site expert to provide immediate advice and coordinate activities.
There is no significant difference.

Correlations

		Age	Fuel system conversions
Age	Pearson Correlation	1	-.509
	Sig. (2-tailed)		.162
	N	9	9
Fuel system conversions	Pearson Correlation	-.509	1
	Sig. (2-tailed)	.162	
	N	9	9

Conclusion:-There is negative correlation between age and Fuel system conversions.
There is no significant difference.

Correlations

		Age	Emission abatement systems
Age	Pearson Correlation	1	-.602
	Sig. (2-tailed)		.086
	N	9	9
Emission abatement systems	Pearson Correlation	-.602	1
	Sig. (2-tailed)	.086	
	N	9	9

Conclusion :- There is negative correlation between age and emission abatement systems. There is no significant difference

Correlations

		Age	Auxiliary system modification
Age	Pearson Correlation	1	-.521
	Sig. (2-tailed)		.150
	N	9	9
Auxiliary system modification	Pearson Correlation	-.521	1
	Sig. (2-tailed)	.150	
	N	9	9

Conclusion :- There is negative correlation between age and Auxiliary system modification.
There is no significant difference.

Correlations

		Age	Instrumentation & control system modification
Age	Pearson Correlation	1	-.518
	Sig. (2-tailed)		.153
	N	9	9
Instrumentation & control system modification	Pearson Correlation	-.518	1
	Sig. (2-tailed)	.153	
	N	9	9

Conclusion:- There is negative correlation between age and Instrumentation and control system modification.
There is no significant difference.

Correlations

		Age	Corrosion monitoring
Age	Pearson Correlation	1	.340
	Sig. (2-tailed)		.371
	N	9	9
Corrosion monitoring	Pearson Correlation	.340	1
	Sig. (2-tailed)	.371	

Correlations

		Age	Corrosion monitoring
Age	Pearson Correlation	1	.340
	Sig. (2-tailed)		.371
	N	9	9
Corrosion monitoring	Pearson Correlation	.340	1
	Sig. (2-tailed)	.371	
	N	9	9

Conclusion:- There is positive correlation between age and corrosion monitoring.
There is no significant difference.

Correlations

		Age	Air sampling
Age	Pearson Correlation	1	-.014
	Sig. (2-tailed)		.971
	N	9	9
Air sampling	Pearson Correlation	-.014	1
	Sig. (2-tailed)	.971	
	N	9	9

Conclusion:- There is negative correlation between age and Air sampling. There is no significant difference.

Correlations

		Age	Material testing
Age	Pearson Correlation	1	.096
	Sig. (2-tailed)		.806
	N	9	9
Material testing	Pearson Correlation	.096	1
	Sig. (2-tailed)	.806	
	N	9	9

Conclusion:- There is positive correlation between age and material testing.
There is no significant difference.

Correlations

		Age	Site surveys
Age	Pearson Correlation	1	-.129
	Sig. (2-tailed)		.741
	N	9	9
Site surveys	Pearson Correlation	-.129	1
	Sig. (2-tailed)	.741	
	N	9	9

Conclusion:- There is negative correlation between age and site surveys. There is significant difference.

Correlations

		Age	Technical advisory services
Age	Pearson Correlation	1	.287
	Sig. (2-tailed)		.453
	N	9	9
Technical advisory services	Pearson Correlation	.287	1
	Sig. (2-tailed)	.453	
	N	9	9

Conclusion:-There is positive correlation between age and technical advisory services.
There is no significant difference.

Correlations

		Age	Your next order will be to BGGTS
Age	Pearson Correlation	1	.467
	Sig. (2-tailed)		.205
	N	9	9
Your next order will be to BGGTS	Pearson Correlation	.467	1
	Sig. (2-tailed)	.205	
	N	9	9

Conclusion:- There is positive correlation between age and Your next order will be to BGGTS. There is no significant difference.

Correlations

		Age	Stisfied by services delivered
Age	Pearson Correlation	1	.572
	Sig. (2-tailed)		.108
	N	9	9
Stisfied by services delivered	Pearson Correlation	.572	1
	Sig. (2-tailed)	.108	
	N	9	9

Conclusion:- There is strong positive correlation between age and satisfied by services delivered.
There is no significant difference.

Correlations

		Age	Services worth money paid
Age	Pearson Correlation	1	.453
	Sig. (2-tailed)		.220
	N	9	9
Services worth money paid	Pearson Correlation	.453	1
	Sig. (2-tailed)	.220	
	N	9	9

Conclusion:- There is positive correlation between age and services worth money paid.
There is no significant difference

Correlations

		Age	BGGTS response time is satisfactory
Age	Pearson Correlation	1	.340
	Sig. (2-tailed)		.371
	N	9	9
BGGTS response time is satisfactory	Pearson Correlation	.340	1
	Sig. (2-tailed)	.371	
	N	9	9

Conclusion:- There is strong correlation between age and BGGTS response time is satisfactory.
There is no significant difference.

Correlations

		Age	Technical support is satisfactory
Age	Pearson Correlation	1	.539
	Sig. (2-tailed)		.134
	N	9	9
Technical support is satisfactory	Pearson Correlation	.539	1
	Sig. (2-tailed)	.134	
	N	9	9

Conclusion:- There is Strong positive correlation between age and technical
 support is satisfactory.
There is no significance difference.

Findings:-

H1	There is significant difference among the association in the age group, <30, 30-45 & >45, respondents in their choice of "Service" as the critical parameter for after sales service for their plant
H2	There is significant difference among the association in the age group, <30, 30-45 & >45, respondents in their choice of "Maintenance" as the critical parameter for after sales service for their plant
H3	There is significant difference among the association in the age group, <30, 30-45 & >45, respondents in their choice of "Online support" as the critical parameter for after sales service for their plant
H4	There is significant difference among the association in the age group, <30, 30-45 &>45, respondents in their choice of "High combined cycle efficiency" as the key driver for O&M(Operation & maintenance) for their plant
H5	There is significant difference among the association in the age group, <30, 30-45 &>45, respondents in their choice of "Low specific cost(per KW)" as the key driver for O&M(Operation & maintenance) for their plant
H6	There is significant difference among the association in the age group, <30, 30-45 &>45, respondents in their choice of "High availability" as the key driver for O&M(Operation & maintenance) for their plant
H7	There is significant difference among the association in the age group, <30, 30-45 &>45, respondents in their choice of "High simple cycle efficiency" as the key driver for O&M(Operation & maintenance) for their plant
H8	There is no significant difference among the association in the age group, <30, 30-45 &>45, respondents in their choice of "Pressure ratio" as the key driver for O&M(Operation & maintenance) for their plant

Suggestion:-

Parameters	Facts
Service	the critical parameter for after sales service for their plant
Maintenance	the critical parameter for after sales service for their plant
Online support	the critical parameter for after sales service for their plant
High combined cycle efficiency	the key driver for O&M(Operation & maintenance) for their plant
Low specific cost(per KW)	the key driver for O&M(Operation & maintenance) for their plant
High availability	the key driver for O&M(Operation & maintenance) for their plant
High simple cycle efficiency	the key driver for O&M(Operation & maintenance) for their plant
Pressure ratio	the key driver for O&M(Operation & maintenance) for their plant

V.   Conclusion: -

BGGTS customers are satisfied in most of the aspects being tested. There is difference in the perception of customers on the basis of age group, Customers greater than 45 years age group seems to be more satisfied then customers in the age group 30-45, where as customers smaller than 30 years of age groups are sometime neutral in their response but in most of the case their perceptions are matching with customers in the age group greater than 45.

Weighted Average Method

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total	Weighted average	Rank
	5	4	3	2	1			
High combined cycle efficiency	4	5	0	0	0	40	2.666	
Low NOx emission	3	6	0	0	0	39	2.6	
Low specific cost (Per KW)	6	3	0	0	0	42	2.8	1
High availability	6	3	0	0	0	42	2.8	1
Operating flexibility	4	5	0	0	0	40	2.666	
High reliability	5	4	0	0	0	41	2.733	
High simple cycle efficiency	6	3	0	0	0	42	2.8	1
Cooling technology	4	5	0	0	0	40	2.666	
Firing temperature	4	5	0	0	0	40	2.666	
Pressure ratio	6	3	0	0	0	42	2.8	1
Mass flow	3	5	1	0	0	38	2.533	

Conclusion:-1

[Low specific cost (Per KW), High availability, High simple cycle efficiency, Pressure ratio] are the first ranked, and hence the key drivers for the O&M of their plant.

	Least important	Slightly important	Important	Quite important	Very important	Total	Wattage average mean	Rank
	1	2	3	4	5			
Planned outage frequency	0	0	3	3	3	36	2.4	
Outage duration	0	0	0	3	6	42	2.8	2
Parts replacement frequency	0	0	2	4	3	37	2.466	
Parts replacement cost	0	0	0	3	6	42	2.8	2
Uncertainty repair / maintenance	0	0	0	2	7	43	2.866	1
Daily operation costs	0	0	2	1	6	40	2.666	
NOx abatement	0	0	1	4	4	39	2.6	

Conclusion:-2

Uncertainty repair / maintenance is the top O&M cost factors, And followed by Outage duration as the next 2nd ranked O&M cost factors.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total	Wattage average mean	Rank
	5	4	3	2	1			
Long time surety of price	7	1	1	0	0	42	2.8	2
Provision of high quality outage services	7	1	1	0	0	42	2.8	2
Local project management & execution	5	4	0	0	0	41	2.733	
Rapid supply of key parts in case of emergency failures	9	0	0	0	0	45	3	1
Remote expert monitoring of plant	1	4	4	0	0	33	2.2	
An onsite expert to provide immediate advice & coordinate activities	3	5	1	0	0	38	2.533	

Conclusion:-3

Rapid supply of key parts in case of emergency failures is the first services BGGTS needs to improve in future followed by Long time surety of price, and Provision of high quality outage services

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total	Wattage average mean	Rank
	5	4	3	2	1			
Fuel system conversions	5	1	1	2	0	36	2.4	3
Emission abatement systems	4	2	2	1	0	36	2.4	3
Auxiliary system modification	4	3	2	o	0	38	2.533	2
Fuel system conversions	5	2	2	0	0	39	2.6	1

Conclusion:-4

[Fuel system conversion is the most important services for their plant followed by Auxiliary system modification.]

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total	Wattage average mean	Rank
	5	4	3	2	1			
Corrosion monitoring	6	2	0	1	0	40	2.666	1
Air sampling	4	3	1	1	0	37	2.466	
Material testing	5	2	1	1	0	38	2.533	2
Site surveys	2	5	1	1	0	35	2.333	
Technical advisory services	5	3	0	0	1	38	2.533	2

Conclusion:-5

[Corrosion monitoring is the most priorities service needs to be improved followed by Material testing and Technical advisory services.]

Limitation of research:-

Research result is the outcome of data being provided by three companies "BGGTS" for which the research is being done, "IPGCL" & "PPCL" which participated in answering the questionnaire and also providing help in validation test for the questionnaire, but outcome is limited as the number of companies participated is only two & due to the complexity of questionnaire only mechanical back ground employee were able to fill the questionnaire, and hence number of people provided feedback is nine including three from "IPGCL" & six from "PPCL". Had the questionnaire being circulated to more companies result would have been more perfect. Also time allocated to this project is limited to 2 months only & most of the time is devoted to understanding the product and framing the questionnaires.

Future research suggestions:-

Those who ever are interested to follow this research, as their future reference for research project should take care of following points:-
   i.   Involve as many companies as you can for data collection, & provide maximum time for data feedback
   ii. Try to focus on more validated and customer concerned areas.
   iii. Analyze the problem of customers first, and then only try to frame the questionnaire.
   iv. Strict to the accuracy of result & to insure that, distribute and collect the questionnaire in personal
   v.   Keep the details given by customers as confidential because it may affect their interrelationships.

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Questionnaire:-

Value addition to customers, through repair of Heavy gas turbine parts, increased partnership with BGGTS (BHEL GE Gas Turbine Services)

Appendices: - Dear sir/madam a survey is conducted by "Ravi Raj", the student of V.I.T University. Pursuing my 4th semester M.B.A, please support me by filling the questionnaire for "Study on the customer satisfaction on after sales services by BGGTS ". All the information's provided by you will be kept as a confidential by me.
* Required

1 Name *

2 Company name *

3 Sex *   ○ Male   ○ Female

4. Age *   ○ <30   ○ 30 – 45   ○ >45

5 Which of the following after sales services parameters is critical for your plant? (Rate on 5 point scale)*

	1	2	3	4	5
Service	○	○	○	○	○
Documentation	○	○	○	○	○
Maintenance	○	○	○	○	○
Online support	○	○	○	○	○
Parts supply	○	○	○	○	○
Upgrades	○	○	○	○	○

6 What is your key driver for O&M (operation & maintenance) of your plant? *

	strongly agree	Agree	Neutral	Disagree	Strongly disagree
High combined cycle efficiency	○	○	○	○	○
Low NOx emission	○	○	○	○	○
Low specific cost (per KW)	○	○	○	○	○
High availability	○	○	○	○	○
Operating flexibility	○	○	○	○	○

High reliability	○	○	○	○	○
High simple cycle efficiency	○	○	○	○	○
Cooling Technology	○	○	○	○	○
Firing temperature	○	○	○	○	○
Pressure ratio	○	○	○	○	○
Mass flow	○	○	○	○	○

7 Please rank below given O&M cost factors, in order of its importance for your plant *

	Least important	**Slightly important**	**Important**	**Quite important**	**Very important**
Planned outage frequency	○	○	○	○	○
Outage duration	○	○	○	○	○
Parts replacement frequency	○	○	○	○	○
Parts replacement cost	○	○	○	○	○
Uncertainty repair / maintenance	○	○	○	○	○
Daily operation costs	○	○	○	○	○
NOx abatement	○	○	○	○	○

8 What services BGGTS needs to improve in future *

	Strongly agree	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
Long time surety of price	○	○	○	○	○
Provision of high quality outage services	○	○	○	○	○
Local project management & execution	○	○	○	○	○
Rapid supply of key parts in case of emergency failures	○	○	○	○	○
Remote expert monitoring of plant	○	○	○	○	○
An onsite expert to provide immediate advice & coordinate activities	○	○	○	○	○

9 Which conversion / modification & upgrade services are important for your plant? *

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Fuel system conversions	○	○	○	○	○
Emission abatement systems	○	○	○	○	○
Auxiliary system modification	○	○	○	○	○
Instrumentation & control system modification	○	○	○	○	○

10 Rate below given suggestions to improve services in the particular area in future *

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Corrosion monitoring	○	○	○	○	○
Air sampling	○	○	○	○	○
Material testing	○	○	○	○	○
Site surveys	○	○	○	○	○
Technical advisory services	○	○	○	○	○

11 What you like about BGGTS services the most? *

- ○ OEM credentials
- ○ Flexible pricing
- ○ User friendly interface
- ○ Design & looks
- ○ Quick service response time
- ○ Technical support

12 What are the most preferred decision making factor? (Select 1 factors) *

- ☐ Visibility of the company
- ☐ Repair price
- ☐ Quick response
- ☐ Maintenance effect
- ☐ Manner of personal
- ☐ Ways to complain
- ☐ Periodic inspection
- ☐ Spare parts price
- ☐ Maintenance price
- ☐ Repair efficiency
- ☐ Knowledgeable & polite sales staff
- ☐ Ways to order
- ☐ Periodic information

13 Rate below given factors *

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Your next order will be to BGGTS	○	○	○	○	○
Satisfied by services delivered	○	○	○	○	○
Services worth money paid	○	○	○	○	○
BGGTS response time is satisfactory	○	○	○	○	○
Technical support is satisfactory	○	○	○	○	○