



SmartDG Analysis

A case study

Abstract

How regular maintenance of Diesel Generator through our SmartDG can increase the productivity & profitability of the company

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Industrial automation process uses computers precisely IT services to handle different process and machines. Being in use it provides the advantages of improving Productivity, Quality and increase in Safety etc. On the contrary it reduces man made errors & wastage which adds flexibility to the whole industrial process.

Why needed to invest in this??

In a large scale industry or production unit there exist some processes which are *consistent in nature and does not require much skills in order to perform it* ie in order to perform it there is a need of unskilled or contractual labours on which company depends to perform it on regular basis. On the other hand there is always a question of trust factor in this as we don't have enough time to monitor them on regular basis. It can be summarized as follows:

Consistent Process→Repetitive nature→Extra manpower→Cost Involvement

Hence from above it is quite clear that there is a tendency of dependency on someone which involves:

- a. Regular cash flow
- b. Increase in burden of monitoring them
- c. Trust issues are there
- d. There is always a chance of errors or mishandling done by them
which may leads/might be leading to huge losses

Hence by automating these above processes we are reducing the organization's dependency on someone in order to perform a certain type of repetitive tasks.

Now different questions arising can be...

Why we need instruments that tests stand?

What we will do through data we collect?

And more importantly....

Why spend the money now???

Thus by installing our product:

1. Reduce employee/labour fatigue

Which is mostly physical but here it can be mental also due to

Repetitive nature of operations involved

2. Will act as a right hand in labour intensive operations.

3. Increase efficiency, as it introduce consistent execution ie

Performing the same thing in exactly same way whenever required cant be possible with human

4. Better data acquisition, also it removes accidental data entry or

Missed data points from logging.

5. Improved database metrics which helps in taking wise decision by

Means of predictive analysis

You will simply to visualize....

Is the process or operation really improving??

Why I see more failures now then in past??

What is causing and how to rectify it??

6. Dealing with labour shortage.

7. To accomplish some processes that should not be done manually

Which may leads to health problems

Hence the above is eliminating the routine manual and clerical task that are boring and quite fatiguing in nature.

Here we are also increasing the worker safety by automating certain operation which should not be done manually.

Generates a high ROI for investors:

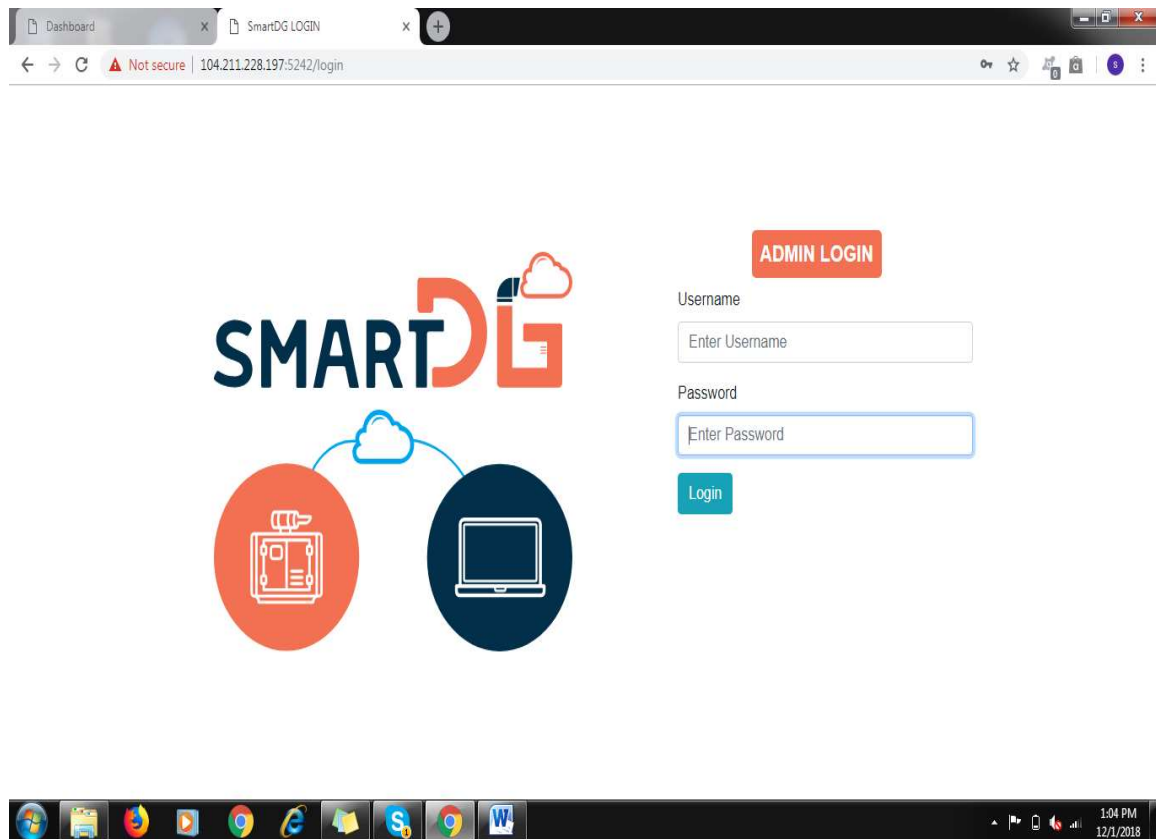
The concerned system do incur a initial investment, but they also save manufacturer's substantial amount of money in long run

For example our monitoring control system(SmartDG) is able to work 24 Hrs a day except some rare scheduled routines and also it's much easier to manipulate/program our dashboard then to train a human worker.

Key selling points of our products:

- a. Accurate measurements.
- b. Real time notification & monitoring of fuel events
- c. Self explanatory dashboard
- d. Tabular reports of data available in pdf & exel format
- e. System tempering alert
- f. Affordable

Effect of automation & maintenance on PROFITABILITY



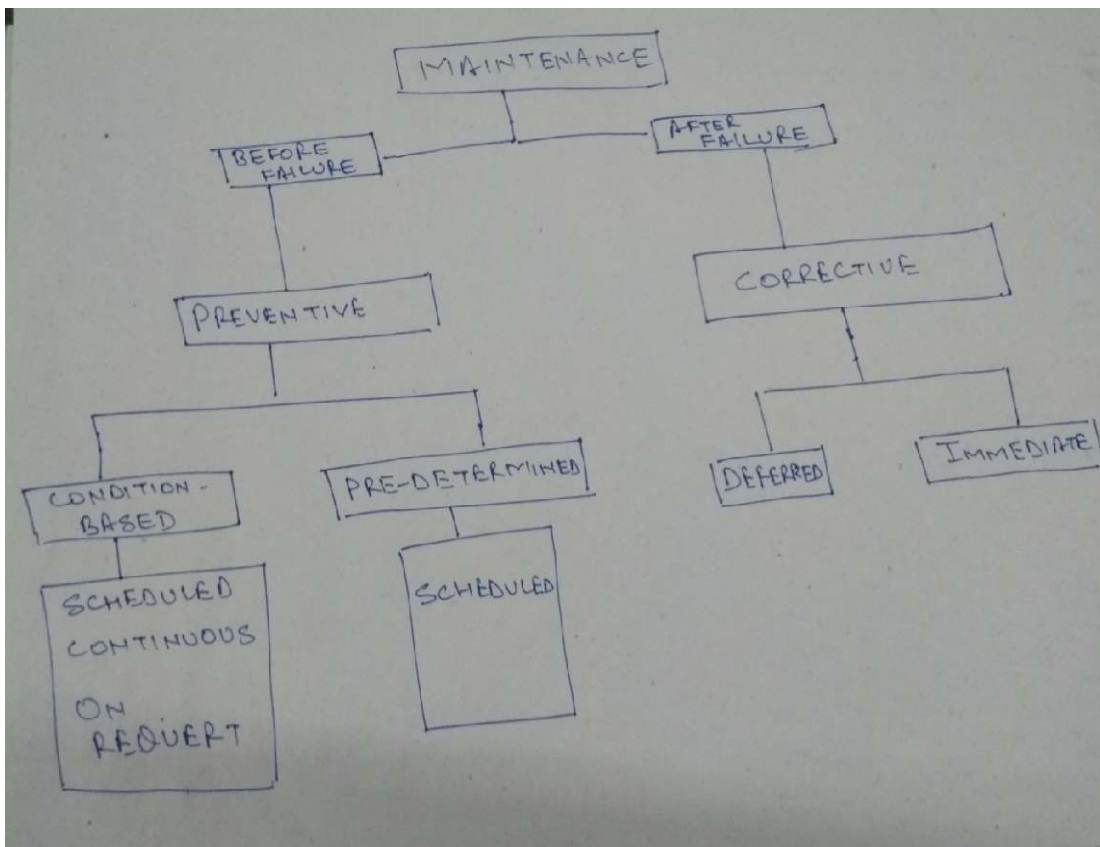
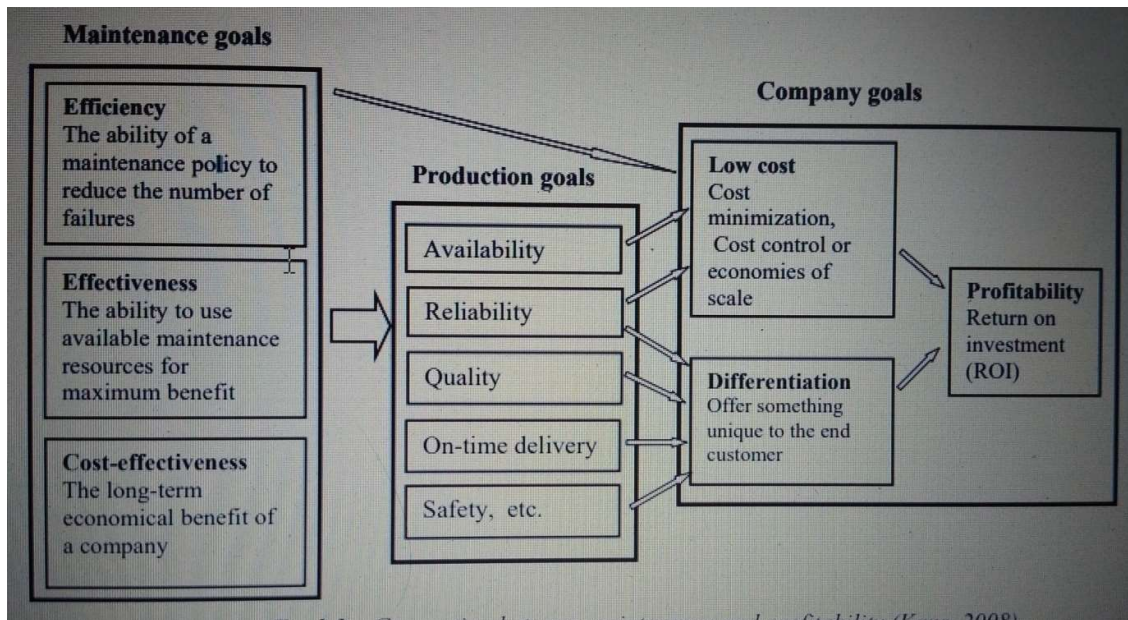
Problem Formulation:

“How maintenance implementations in a Diesel Generator can improves profitability”

Site Id	Location	Last Maintenance	Next Maintenance	DG Runhours	DATA
Myanmar-002	Plot No. 36, Nagundkar Layout, Behind Shat-Tarka Apartment, Khamla Road, Nagpur, Maharashtra 440015	2018-09-10	2018-09-30	491.04	CHECK REAL TIME DATA
Napino-003	Plot No. 36, Nagundkar Layout, Behind Shat-Tarka Apartment, Khamla Road, Nagpur, Maharashtra 440015	2018-09-10	2018-09-30	81.99	CHECK REAL TIME DATA
Jaika-001	Palm Road, Civil Lines, Nagpur, Maharashtra - 440001	2018-09-10	2018-09-20	58.5	CHECK REAL TIME DATA
Kirloskar-004	Trimurtee Nagar, Nagpur, Maharashtra 440015	2018-09-10	2018-09-30	0	CHECK REAL TIME DATA
Demo-PCC	36, Narkundkar Layout, Nagpur, Maharashtra 440015	2018-09-10	2018-09-30	2.5	CHECK REAL TIME DATA

Now maintenance can be defined as *“the combination of all ie the Technical, administrative and managerial action during the life cycle of an item intended to retain it in or restore it in a state in which it can perform required function”*

It can be better understood from below flow chart:



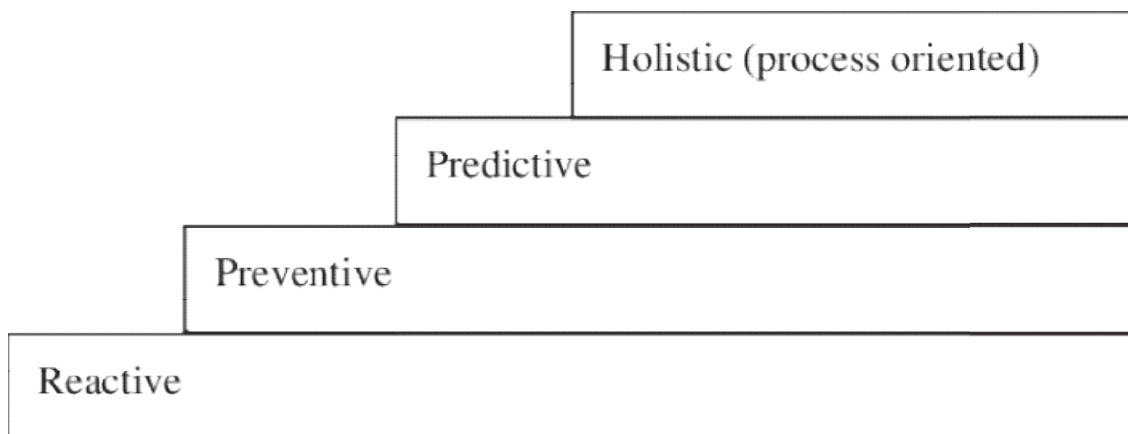
From above it is quite clear that maintenance operation in case of Diesel generator can be carried out in two ways; **after it has failed or before the failure** by identifying and analysing its different parameters.

The one taking place after failure will be corrective in nature hence it either can be postponed or will require immediate expenditures.

While on contrary we can go by preventive measures which either can be predicted based on different aspects and conditions or simply it can be predetermined scheduled checkups. Here preventive measures will involve real time data analysis through which we will monitor its condition.

Hence in above the sole of the discussion is that if the condition of DG system is out of bound i.e. it has failed or stopped it will surely lead to high expenditure and risk situation which with increment in time will become worse only.

On the other hand if we go by *preventive measures we have sufficient amount of time and there is a less involvement of risk or total breakdown and in the mean time we can provide the services as soon as possible which will increment competitive advantages of organization.*



Life cycle cost analysis:

It involves the total cost of all the activities that occur or any type of expenditure that occurs in the whole life cycle of product.

Here we will enquire:

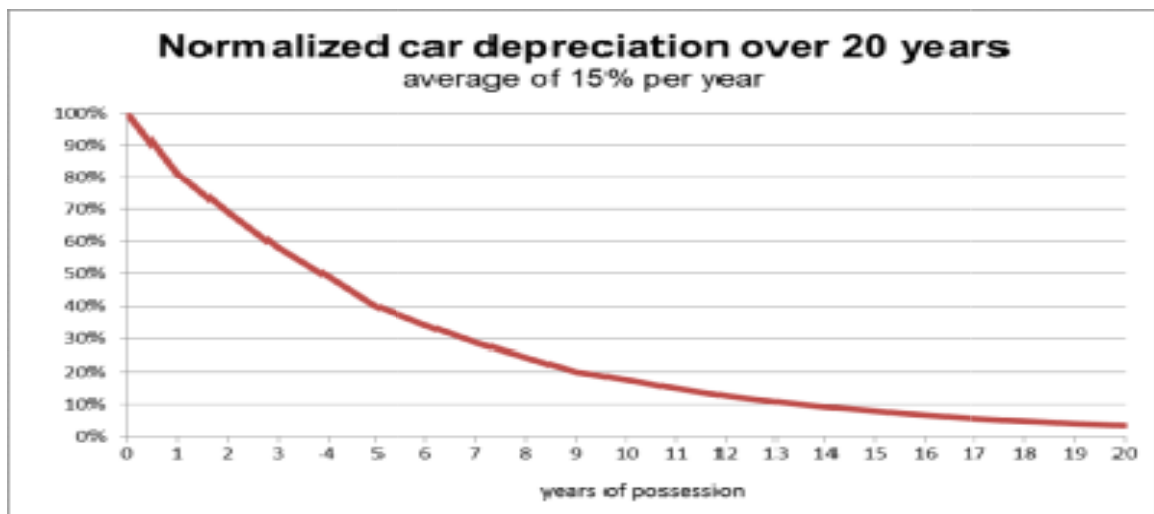
Cost vs Benefits

Depreciation Rate

Depreciation rate:

It refers to two aspects of same concept:

- The decrease in value of asset (fair value depreciation)
- The allocation of cost of assets to periods in which assets are used.



Methods of computing depreciation and the period over which assets are depreciated may vary between asset types in a company and may vary for tax purposes. They may be specified by law or accounting standards which may vary country to country

There exist several methods for depreciation, out of which straight line depreciation indicates:

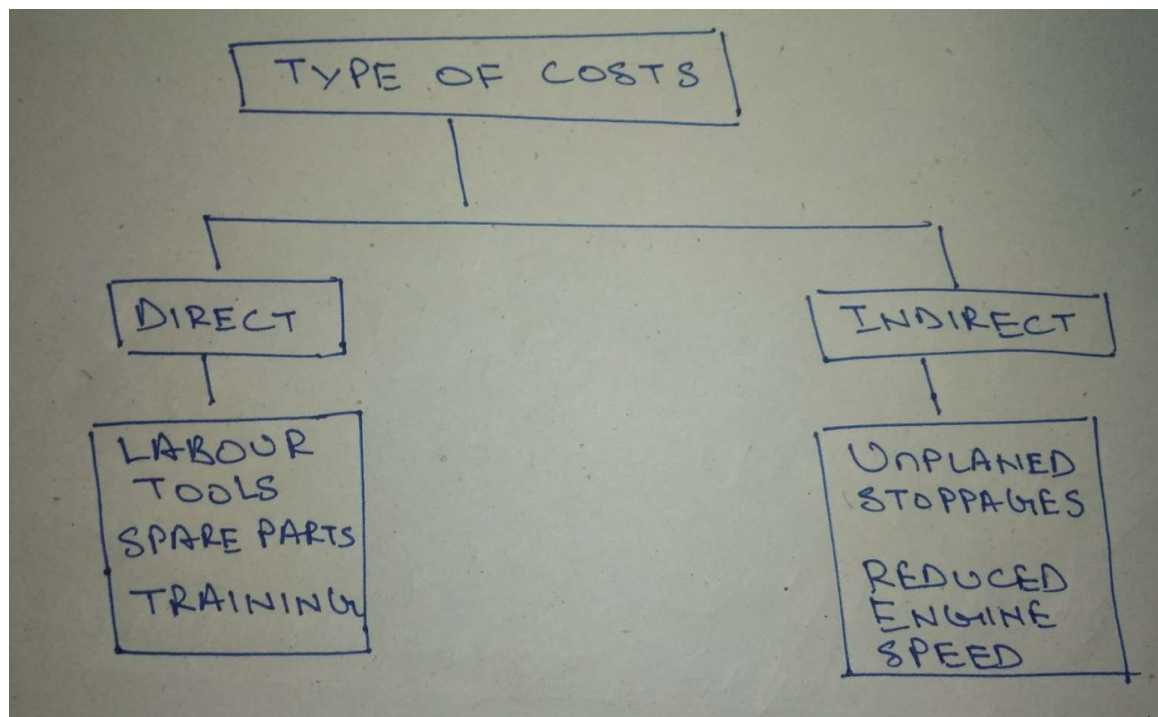
$$\text{annual depreciation expense} = \frac{\text{cost of fixed asset} - \text{residual value}}{\text{useful life of asset (years)}}$$

For example a diesel generator that depreciates over 5 years is purchased at a cost of \$17000 and has a salvage value of \$2000 then it will depreciate at \$3000 per year.

$$(17000 - 2000) / 5 = 3000$$

Hence from above formulated concept it is quite clear that by providing preventive or condition based maintenances we are slowing or reducing the impact of depreciation rate exponentially which will prove to be a long lasting value or majorly an asset to the company.

Type of costs involved and how it reduce profitability:



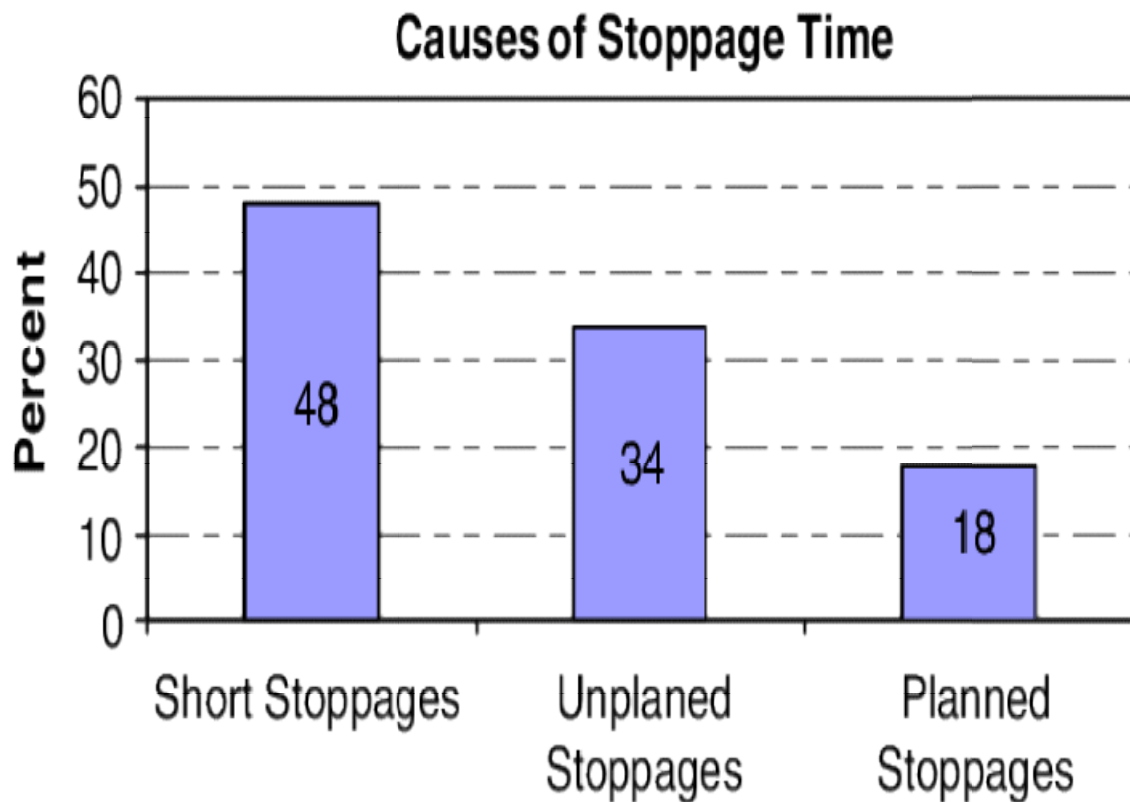
In this there exist two type of cost:

a. Direct cost: Cost associated directly to the maintenances

eg- Labour, tools, spare parts, training etc.

b. Indirect cost: Indirectly related or associated with maintenance which can be attributed to issues like profit loss due to unplanned stoppages or reduced engine speed or any other factors related to diesel generators.

This can lead to losses in market share, reputation or customer and can be surely tackled through SmartDG systems.



Machine Life length:

From analysis framework the life length of the diesel generator is the fundamental property affecting profitability in the plant. It can be simply calculated by cost associated for running the machines like maintenance, operation, disposal, transportation etc.

The priority of above factors associated can be visualized from below table:

Influencing Factors (Life cycle cost element)	Priority (%)
Utilities cost	48.34
Depreciation cost	24.57
Maintenance & Operation cost	17.89
Transportation & Installation cost	5.97
Disposal cost	3.23

Now from above mentioned table it is quite clear that by effectively handling the Depreciation & Maintenance cost we can boost the productivity up to $(24.57+17.89)$ approx 42.46 % directly and since there is interdependency in these factors it will surely enhance other factors also.

Machine performance:

According to the surveys conducted machine performance depends upon:

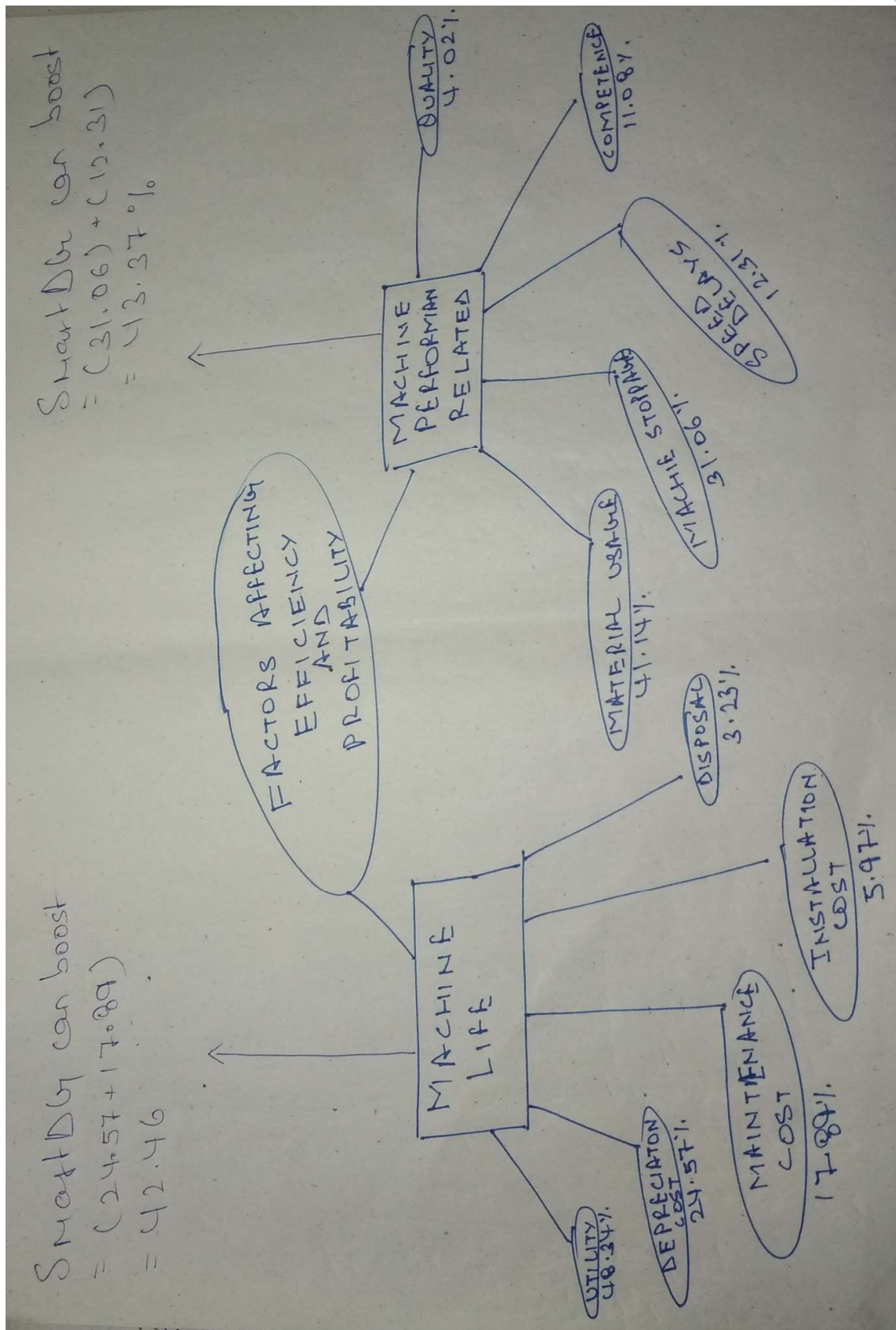
- a. Material usage
- b. Machine stoppage
- c. Speed delays
- d. Competence
- e. Product Quality

The above can be better understood by following table given:

Influencing Factors	Priority (%)
Material Usage	41.14
Machine Stoppage	31.06
Speed Delays	12.31
Competence	11.08
Product Quality	4.42

From above mentioned table it is quite clear that by effectively monitoring the Machine stoppage & Speed delays we can boost the productivity ranging $(31.06+12.31)$ approx 43.37% directly and others in an indirect way.

Above all can be summarized as follows:



Economic assessment of benefits & losses of prioritized factors:

a. Saving from depreciation:

Operational life length=10 yrs

Spare part cost = 5% increment per year

Eg. If cost in 2018 is Rs100 then in 2019 it will be Rs105

Labour cost= 7% increment per year

Eg. If cost in 2018 is Rs1500 per month then in 2019 it will be
Rs1605

Two person in maintenance= 10% salary increment

Eg. Suppose their annual salary is Rs3,00,000 per annum

By 10% increment in 2019 salary will be Rs3,30,000

Net gross= Rs60,000 increment

Depreciation Rate of Diesel generator=15% per annum

Eg. If current value of its is Rs1,00,000 then in 2019 it will be
Rs85,000

b. Saving from unexpected machine stoppage:

Originally no data is gathered as such considering unexpected loss

Due to machine stoppage

But surely there will be 10% yearly decrease in machine stoppages

c. Saving from material usage defects:

By accounting SmartDG there will be planned material usage.

Assumptions made=5% increment in material cost

Purpose of formulating above report:

1. Improving maintenance process
2. Performing periodic planned replacement
3. Investing in improving the skills & competence of maintenance Staff
4. Performing the maintenance task based on statistical modelling Of failure data
5. Analysing equipment failure causes and effects
6. Use of computerized maintenance management systems (CMMS)
7. Monitoring the machine's real time status

Many maintenance departments do not give their generators the kind of attention which it needs. Even worse many agencies solely rely on annual site visit to ensure that generator is in good condition and will provide its regular services in case of emergency. Many of us go for **Annual Maintenance Contract** for the much needed check up of generators forgetting that even a fault in it can bring can major losses to industry.

A fault/failure can occur anytime, unexpectedly. What needed in this is a **real time monitoring** system or SmartDG.

