

# Petro-Retail Automation - As a Marketing Tool in Near Future

Sankalp Kohli

Education & Research in Computer Networking India, Ministry of Electronics and Information Technology  
Government of India

**Abstract:** Automation is there to address certain critical issues, primarily to curb adulteration and to deliver quality and quantity to the customer. Automation being a part of a larger branding strategy cannot be studied in isolation. The study analyses the present status of 19 outlets in the pilot phase of automation by dint of mapping dealer response. The responses are further statistically treated. It intends to measure their satisfaction level and identifies areas of requiring concern. It delves into the technicalities of the prevailing automation and subsequently proposes suggestions. There are both technical and socio-economic issues which may act as a can of worms and thus need to be resolved. As automation is in an embryonic stage, there are myriad of parameters, if analysed, could act as grist for the mill. Automation per se, isn't quite a tool for marketing. But as the deplorable status quo in India suggests, Quality and Quantity cannot be taken for granted owing to presence of nefarious elements, and hence any means bringing respite from these can certainly serve as a vantage point for a company, provided the company is agile enough to take stock of the situation and position it well. Automation is certainly propitious for a business as it provides a better control over the resources. The report intends to acquaint Indian Oil corp. with the present status of the automation project (the gamut restricted to pilot phase). It also provides some suggestions based on the observations.

**Keywords:** Automation, downstream petroleum, market research, statistics

## 1.Introduction

### Reasons for Adulteration

Main reason for adulteration: Economic incentive on account of sizeable difference in prices of Petrol/Diesel and Adulterants.

### Retail Automation System

#### 1. Introduction:

This describes the control sub system of Retail Outlet storage and dispensing units and its ability to include within the retail automation system. Specifically it is outlines hardware, operating system and application software, necessary Retail station infrastructure, as well as the general operational functionality of this control sub-system.

#### 2. Retail Automation Objective:

The objective of the Retail Outlet (RO) automation system is on line monitoring of sales, volume reconciliation and analysis of customer pattern.

It takes care of receipt of product from supplying locations i.e. Depot /Terminals thru sealed parcel delivery (SPDS) system.

It records all fuelling transaction with attendant tagging and payment mode (cash, credit, fleet card).

Reports of sales, stocks and other configured reports are generated in a pre-configured format.

It records all abnormal conditions, alarm annunciation and easy diagnostics. It also records and generates reports of loyalty card customer transaction.

#### 3. System Architecture:

RO automation system is interfaced with Dispensing Units (DUs) and other field equipments for controlling fuelling operation and monitoring of online stocks and provides means to identify the attendant who performs fuelling transaction. It records the receipts of products using Sealed Parcel Delivery System. It monitors the overall operation and generates reports.

Supply is divided into two parts on the operational point of view:

- Back Office System
- Fore Court System

#### 4. Important reports generated at the back office:

- Shift sales summary
- Attendant wise sales summary
- Fuel sales reconciliation
- Pump wise product delivery
- Fuel sales summary-vehicle type wise/product wise
- Cash/credit sales
- Transaction detailed report
- Alarms and events
- Tank inventory
- Local fleet account summary
- Sampling/delivery/own use

## 2.Research Elaborations

Research

**1. Introduction****a. Statement of the Problem**

In order to curb the unscrupulous activities, the govt. of India ordered the Public sector OMCs to implement techniques to tackle the issue. Due to skewed prices, the incentive to adulterate was very high. Govt's motive of giving subsidies on kerosene and naphtha was to cater to the underprivileged. A marker system was introduced which was not very effective. Companies like NCR, HAIL, and TCS formed partnerships with the PSUs and initiated end to end automation. The purview of this project restricts to Indian oil joint automation project with Honeywell.

**b. Significance of the Problem (and historical background)**

Oil Corp. has embarked a project to fight adulteration through automation of its retail outlets. Automation allows the Indian Oil Corp. (IOC) to closely monitor fuel inventory levels and sales on a real-time basis. Fuel adulteration - blending of kerosene and naphtha with diesel and petrol respectively - is partly a result of loose inventory control by oil companies. "IOC also proposes to install global positioning system (GPS) systems on its vehicles transporting fuel from storage depots to trucks," IOC Chairman and Managing Director Sarthak Behuria said. In the first phase, IOC plans to cover 1, 000 retail outlets and expects to cover 1, 200 petrol pumps by the end of fiscal year 2007, which ends March 31, 2007. The network of automated outlets will eventually reach 1, 800 - these petrol pumps account for about 70 percent of Indian Oil's retail sales. The total cost incurred by the company on the automation project is \$85 million. IOC has already automated several plants and processes at its refineries and is now into automation of its retail business.

In a move to curb fuel adulteration and to face the competition from the private sector, the state-owned oil marketing companies are implementing an end-to-end automation of the fuel delivery network. Apart from making it more difficult for fuel adulterators, the companies are confident of offering improved customer service and enjoying greater control over the retail outlets. The electronic locking system on tanker-trucks and underground tanks would be linked to a central computer system. It would help the company monitor sales and stocks.

The automation covers various aspects of the outlets, including level gauges in underground tanks and gauges to check quality parameters of the fuel. Every time fuel is dispensed, a bill, giving details of the date, time, quantity of the purchase, the pump and the attendant who delivered the product, will be generated automatically.

Automation of pumps will give oil companies accurate data on sale and control over any adulteration, which might happen at the retail end. These benefits will also flow to the customer.

**c. Statement of Hypothesis**

There are 2 hypotheses to be tested;

1. "Automation can be regarded as an efficient and beneficial tool for Indian oil retail outlet dealers".

Expectation: It is obviously understandable that automation is indispensable due to various reasons.

2. Null hypothesis: "The 19 sets of ranking of features, done by dealers are independent of each other".

Expectation: There should be some concordance amongst rankings.

**d. Assumptions**

- Independence of observations from each other (statistical independence).
- Independence of observational error from potential confounding effects.
- Exact or approximate normality of observations.

**e. Limitations**

- As we have deliberately earmarked 19 of the total 155 retail outlets to be automated in Delhi and Haryana, i.e. the outlets under pilot phase of the project, it signifies quota sampling. Quota samples are essentially judgment samples and inferences drawn on their basis are not amenable to statistical treatment in a formal way.

**2. Design of the Study****Description of Research Design and Procedures Used:**

The research is a Descriptive research.

To start with, it includes the overview of the project, the technical details, the benefits and the status of the outlets in the pilot phase. The responses of the dealers were taken with regard to the systems. A questionnaire<sup>1</sup> was developed aimed to map dealer response. It was devised to glean dealer's response towards automation. A 5 point summative (or likert-type scales) was used. The scale consists of a number of statements which express either a favourable or unfavourable attitude towards automation, to which the dealer is asked to react. The dealer indicates his agreement or disagreement with each statement in the instrument. Each response numerical is given a score, indicating its favourableness or unfavourableness, and the scores are totalled to measure the respondent's attitude. In other words, the overall score represents the respondent's position on the continuum of favourable-unfavourableness towards the issue.

**Measurement Scale:**

- Interval scale (As a likert scale)
- Ordinal scale

Sources of Data:

Data used for analysis is primary data. The sources are as follows:

- Dealers and attendants of retail outlets under study.
- IOCL Officials.
- HAIL engineers.

Sampling Design:

i. Universe

The universe or population in this case is the 155 outlets of Delhi and Haryana, which are under the automation project.

ii. Sampling Unit

Indian Oil retail outlet dealer.

iii. Sampling Frame

List of all relevant information of the 155 outlets in the population.

iv. Size of sample

Sample size is the outlets in the pilot phase i. e. 19.

Parameters of interest Average/Mean, Median

v. Sampling Procedure

Quota Sampling (Non probability sampling) has been used in our study. The 19 2 automated outlets in the pilot phase have been taken as sample out of the total proposed 155 outlets.

### 3.Methods and Instruments of Data Gathering

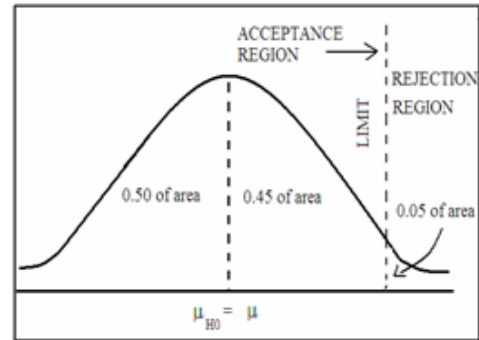
Methods

- Interview method
- Observation method

Instrument

- Questionnaire/Schedule

Statistical Treatment:



Alternative hypothesis	$H_a: \mu_{H0} \geq 70$
Null hypothesis	$H_o: \mu_{H0} < 70$

Assuming observations to be from a normal population, parametric test has been applied here. Considering the fact that sample size is small and that the variance of the population is unknown, t-test has been utilized in this case.

$$t = \frac{\bar{X} - \mu_{H0}}{\left( \frac{\sigma_s}{\sqrt{n}} \right) \times \sqrt{\frac{(N-n)}{(N-1)}}}$$

Test statistic,

Where, N is the population size n is the sample size,

$\bar{X}$  is the sample mean

$\mu_{H0}$  is the hypothesized mean

$\sigma_s$  is the standard deviation of the sample

$$\sigma_s = \sqrt{\frac{\sum (x_i - \bar{X})^2}{(n-1)}}$$

$$\bar{X} = 740/19 = 38.94$$

$$\sigma_s = 44$$

$$\mu_{H0} = 70$$

As,

Calculating from the figures, we get,

$$t = \frac{38.94-70}{\sqrt{10.09 \cdot 0.939}} = -3.27$$

With D. O. F= (n-1).

As  $H_a$  is one sided, we shall determine the rejection region applying one tailed test at 5% level of significance, and it comes to as under, using table of t-distribution for 18 d.f.:

$R: t > 1.734$

As observed value of  $t$  (i.e., -3.27) is in the acceptance region, we accept  $H_0$  at 5% level and conclude that sample mean is not consistent with population mean. Thus the alternative hypothesis formed in the beginning is rejected which states that automation is beneficial to dealers.

Assumptions

- The parametric test is based on the assumption of normality i.e. source of data is normally distributed.
- Considering the fact, that in order to comment on the congenial status of automation, there should be consensus among dealers favouring automation. Having said that, it becomes obvious to assume the mean score on the favor scale at least equal to the 'agree' factor i.e. equal to 70. Hence, population parameter, mean,  $\mu$ , is assumed = 70.

Hypothesis No.2:

Question number 12th of the questionnaire intends to analyze the relative importance of the salient features of automation. It uses a rank order scale i.e. an ordinal scale. Since the numbers of this scale have only a rank meaning, the appropriate measure of central tendency is the median.

Therefore, the responses to each of the five features have been arranged in decreasing order of beneficence. They are collated as follows;

S. No.	Attendant Check	Customer Satisfaction	Stock Reconc. Report	Fuel Vol. Forecast Report	Outside Printer Usage
1	1	1	2	3	1
2	1	1	2	3	1
3	1	1	2	4	1
4	1	1	3	4	1
5	1	1	3	4	2
6	1	1	3	4	2
7	1	1	3	4	3
8	2	1	3	4	3
9	2	2	3	4	4
10	2	2	3	4	5
11	2	2	4	4	5
12	2	2	4	5	5
13	2	2	4	5	5
14	2	2	4	5	5
15	2	3	4	5	5
16	3	3	4	5	5
17	3	3	4	5	5
18	3	3	4	5	5
19	4	3	5	5	5

Now as the number of R. O. s is 19 which is odd, the median is the middle term i.e. 10th term. Thus individually, the median scores are:

Attendant Check            2  
 Customer Satisfaction /  
 Sales Reconciliation      2  
 Stock Reconc. Report    3  
 Fuel Vol. Forecast Report 4  
 Outside Printer Usage    5

As the ranking ranges from 1 to 5, 1 depicting the most beneficial and likewise 5 depicts the least. It can be gleaned that the first two features are equally favorite among the dealers.

Then the third feature, stock reconc. Reports come third in the preference order. Similarly, fuel forecast reports are perceived of lesser utility and finally printer is least favored.

Now here we have tried to glean responses regarding five features of automation. The responses are rendered by 19 independent people (dealers).

Now to determine the degree of association between the rankings given by the dealers, there needs to be a statistical procedure. That again is preceded by a hypothesis. As the data is ordinal in nature, measure of central tendency applicable in this case is median, while the statistical treatment should be nonparametric in nature.

Hypothesis Statement:

Null hypothesis: the k (19) sets of ranking are independent of each other.

Ho: S calc. < S table Ha: S calc. > S table

Statistical technique which is best suited for the above data is Kendall's concordance test. Kendall's coefficient

of concordance, represented by symbol W, is an important non parametric measure of relationship. It is used for determining the degree of association among several (k) sets of ranking of N objects or individuals.

In our case k refers to the R. O. Dealers, while N is the features. Thus, k=19, N=5.

Retail outlet	Check on Attendants	Customer Satisfaction /Sales Reconc.	Stock Reconc.	Fuel Vol. / Forecast Report	Outside Printer Usage
19th hole	1	3	2	4	5
JG, JKpuri	2	1	3	4	5
100% dwarka	2	1	4	3	5
COCO, Nehru place	2	1	3	5	4
Cpuri, P vihar	2	1	4	5	3
Raj Kumar, IIT	2	1	3	4	5
Super Auto, SNPuri	1	3	2	4	5
Amar Auto	2	1	4	3	5
Shaheed, Ballabgarh	2	1	3	4	5
Maitri, Manesar	3	1	4	5	2
Shivalik, Dwarka	4	2	3	5	1
CM, JKpuri	2	1	3	4	5
Yashokamal, Pbagh	1	3	5	4	2
Sherkhan, JKpuri	2	1	4	5	3
COCO, PBagh	3	2	4	5	1
National, Wazirpur	3	2	4	5	1
Dhingra, Chirag Delhi	2	1	3	4	5
Captain, YNR	1	3	2	4	5
Gautam, Rohtak rd.	2	3	4	5	1
Rj	39	32	64	82	68

$\left( R_j - \overline{R_j} \right)^2$	324	625	49	625	121
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$$s = \sum \left( R_j - \overline{R_j} \right)^2$$

$$\overline{R_j} = \sum R_j / N$$

$$W = \frac{s}{\frac{1}{12} k^2 (N - N^3)}$$

Where k= no. of sets of rankings i.e. the number of dealers; N= no. of objects ranked;

Taking values from above and substituting in the formulae, with k=19. N=5, we get;

$$\overline{R_j} = 57$$

$$S = 1744$$

$$W = 0.483$$

Now the table value of s at 5% level for k=19 and N=5, is 444.7 So S table = 444.7

$$S \text{ calc.} = 1744$$

=> S calc. > S table, which rejects our null hypothesis.

Hence, the value of W is significant and it can be inferred that dealers are applying essentially the same standard in ranking the 5 features i.e. there is significant agreement in ranking by different dealers at 5% level of significance.

The lowest value observed amongst Rj is 32 and as such the best estimate of true rankings is in case of Sales reconciliation feature which leads to customer satisfaction.

## 4.Results or Findings

The above manifestations are statistical evidences. It shows the relative importance of 5 major and commonly used features of automation, amongst the dealer fraternity.

But the observations/interviews surfaced some important facts which deserve due attention. While the first two features are rated high on the scale, there are reasons to why the least preferred are ranked so.

The dealer knew how to settle dispute with a disgruntled customer, by using sales reconciliation feature. So they found it quite useful.

The dealers were keen to use the volume forecast feature but they didn't know how to go about it. Hence a lack of requisite training was felt.

Secondly, the dealers were optimistic on usage of printers but the statistics have a different story to tell. The reason for this is that the printers at most places were not working, and the outlets where they worked, the dealers complained of no paper provision by the company.

This certainly doesn't augur well for the company as the printers form the only visible element of automation for a customer.

Many issues surfaced during the research. Although, the observations and findings have their own limitations, the message is quite clear. The purview of the research is mainly confined to the dealer's response which again cannot be regarded as sacrosanct. There are other facets to the issues as well. But as the status quo suggests, some problems are narrated in unison.

Indian Oil Corporation Limited is a major in fuel retailing and the status quo thus may be regarded as a storm in a tea cup by them. Probably the solutions are in the pipeline.

But apart from the tangible problems there are bigger issues as well, viz the socio economic conundrum. The social system is moth eaten. Systems have been circumvented. Laws have been flouted.

The very urge to adulterate and make moolah has rendered the systems ineffective in the past. There is mutual unspoken understanding between dealers and attendants owing to which adulteration takes place & attendants usually are paid their rake off. Even attendants tend to steal as the dealers don't pay salaries to them. This explains the reasons for recalcitrance to adopt automation.

The other issues are the ones revealed like lack of much required training. The system installed by IOCL costs around 15-20 lacs per outlet. In contrast to this, at HPCL it is around 40-50 lacs. So there is a cutback in expenditure as far as the technical area is concerned. The plausible reason may be that the company has to carry out this activity throughout its humongous distribution channel. But, even technically there are issues which need attention.

For automation to be successful the above issues should ebb away. Social issues will dilute gradually, but even these entail some major policy changes. Transformations like a market determined price leading to no under recoveries can alleviate the problems. This would in turn increase dealer margins and lessen the tendency to adulterate.

As in the west, Quality is linked with engine efficiency and adulteration is not an issue, the situation in India also might change and the idea of high quality may shift from "no adulteration" to "high efficiency". Even quantity matters won't exist.

The focus on deployment of automation can then be shifted to areas like inventory management in a big way. Emphasis may be laid down on cost cutting through automation, as well.

### Restatement of the Problem:

The issue being sorted out here is whether or not the automation project has fared well and turned out to be a good proposition, both for dealers and the customers.

Automation is certainly enviable given the deplorable status in India.

Though the project is restricted to the pilot phase under automation, it augurs some important information which cannot be negated. The study delves into what exactly are the dealers' opinions and experiences with these systems.

As is evident, the systems are here to benefit. The problem is to find out how much or whether or not it is beneficial.

### Description of Procedures:

Data collection is done through personal interviews with dealers and some engineers. Some observations were also made. A modestly precise instrument (Questionnaire) is designed in order to quantify the opinions and experiences.

### Major Findings

The hypothesis statement states:

Automation can be regarded as an efficient and beneficial tool for Indian oil retail outlet dealers.

Now as we wish to prove that it is an enviable tool. The null and alternative hypothesis is formed accordingly.

The null hypothesis is accepted at 5% level of significance. Apparently the sample data suggests that the project is not regarded as favorable by the dealers. The other hypothesis relating to concordance of rankings was;

"The 19 sets of ranking of features, done by dealers are independent of each other".

As was expected, there was concordance amongst dealers rating a couple of features as beneficial. But again, the under rated features were quite potent and should be deployed effectively.

NOTE: It should be known that accepting  $H_0$  on the basis of sample information does not constitute the proof that  $H_0$  is true. All it means is that there is no statistical evidence to reject it (Although it is taken as true).

## **5.Conclusions**

Indian Oil Corporation Limited is the largest oil marketing company in India. It is the largest in terms of market share, as well as the distribution channels. As of now it is not facing any kind of competition by any other OMC. But one cannot rest on the laurels achieved and marketing is one such field which has come of age. The companies are engaged in all sorts of activities to cajole the customer and to strengthen their brand equity. Customer satisfaction is certainly on top of cards. Given this fierce competition and the frenetic pace at which new competitors are emerging, the existing players need to take stock of the situation. Also there is a paradigm shift in customer demands, and it is imperative to understand these demands and design activities accordingly.

This report is a modest attempt to present the existing situation that being of the pilot phase of the automation project. The facts and findings of the report have been garnered with due diligence. Subsequently appropriate statistical treatments have been applied to these.

The findings of the research are quite unsatisfactory. The systems are in place but there seems to be a slugfest between the dealers and the systems.

There are technical discrepancies, there are training issues involved and most importantly are the need to edify human mentality in terms of accepting a new system and supporting it. The onus completely lies on the company and the issues that have surfaced in this research may be resolved in times to come, but the present situation should be a whistle blower for the company.