

Formulation of Mathematical Model of Picketing of Liquor Shops and Warehouses*

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Abstract

Before getting independence of India from British regime, large number of Leaders of India were required to take strong agitation against British Government for getting freedom. One of the prominent leaders was Mr. M.K. Gandhi. During the period 1920 to 1942 in Central Provinces and Berar specifically pertaining to the period June 1930 to September 1930 (1)** strong agitations took place towards reducing income to Government by way of reducing liquor consumption. Several events took place towards this objective.

Based on the facts, the attempt is made in this paper to present the entire agitation as one social phenomena in the form of a Mathematical Model cd-relating the fall in liquor revenue in terms of various causes responsible for this fall in revenue.

It is only through the Mathematical Model that it, is possible to get quantitative idea of intensity of interaction of causes on effects of any phenomena may be it be scientific or socio-economic or of any other type. Particularly the approach of Field Data Based Model (2) is applicable in such a situation as this is a Field Phenomena.

Such models serve as most reliable tools to plan future such activities. This could be known as a process of Prognosis.

1.0 Brief idea of formulation of mathematical model of any socio-economic activity

Just as with any physical activity any socio-economic activity has four features namely (i) system constants (ii) Inputs (causes) (iii) Outputs (effects) and (iv) Extraneous Variables.

By system constants is meant the fixed parameters magnitude wise of the activity under consideration. By

inputs is meant time varying causes of the activity. By outputs is meant the effects of the action of causes on the system. Whereas by Extraneous Variables is meant the causes which do have influence on the activity but which cannot be quantified (3).

The exact meaning of these aspects is explained in detail in the later part of this paper.

If information about these aspects is available then the information can be simulated in terms of numerical quantities. Subsequently Mathematical Model simulating the activity can be formed.

This is detailed in this paper in the context of 'Picketing Of Shops And Ware Houses Of Liquor' /as a part of agitation towards freedom struggle of India.

2.0 Details of facts of picketing of shops and ware houses in CP and berar during June to sept 1930 in India

Nine such events occurred which are detailed as under.

2.1 Picketing of Liquor Shop

An important feature of the Civil Disobedience Movement was the ambition of liquor shops and the temperance movement. This was aimed at reducing the evils of drinking as well as preventing the Government from raising income through excise duty on alcoholic drinks.

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** Numbers in the square brackets denote references listed at the end of the paper.

1. Picketing of liquor shops was started by the Congress workers in Nagpur on 29th June 1930. The volunteers picketed the liquor shops and tried to dissuade people from drinking liquor. Gradually, their efforts were rewarded as indicated by the fall in excise revenue collection. All the picketing and other activities of Congress volunteers were peaceful. Even the police posted at various liquor shops did not find any excuse to take action against the volunteers. In the sale of liquor went down.
2. The liquor shops in Jabalpur were picketed by volunteer Satyagrahis. This brought down the liquor trade, and merchants and liquor contractors were adversely affected.
3. Through the public meetings, the evils of drinking were highlighted. Poonam Chand Ranka, a prominent Congress leader of Nagpur, president over two meetings, are held at Babulal's and other at Billmoria's. In these meetings appeals were made against drinking by important political leaders such as N.S. Khare, Dharmadhikari, etc.

As a result of the agitation against drinking and sale of liquor, the illicit liquor production and trading increased.

4. On 14th July Congress volunteers started picketing the Government warehouses near the cotton market, in Nagpur, to prevent the issue of liquor to contractors. Speaking at the usual meeting in front of the Cotton Market liquor bar on the evening of the 14th Dharmadhikari and Punamchand, who president, urged the social boycott of liquor drinkers as well as vendors, since mere picketing of liquor steps had not been enough and they appealed to caste panchayats to use their influence in this direction. Picketing of warehouses had been successful and outside contractors were then unable to take delivery to stocks.

In the interior of C.P. Marathi province intense picketing of liquor shops continued and at certain places sales completely ceased.

Although picketing of liquor shops did not stop the sale of liquor completely at all places, it reduced the sale considerably. In Central Provinces, liquor bids went down by 60%. Moreover picketing associated with the gathering of people generated greater awareness among the people about the struggle in progress. There was more political awakening in masses and Civil Disobedience movement got greater support.

5. The government warehouses were also picketed and the contractors were not able to replenish their stocks

from the warehouses. On 19th July 1930, a big crowd of volunteers picketed the liquor warehouses in Jabalpur, preventing the entry of the contractors. Even the vehicles carrying the liquor from warehouses were not spared. In order to curb down the growing illicit-liquor smuggling and trade, it was decided to give police protection to the contractors to collect liquor from the government warehouses. Accordingly, city Magistrate of Jabalpur Mr. Skinner and District Excise officer Mr. Scutt along with police force escorted the contractors to the warehouse. The volunteers were arrested, but they were successful in stopping the loaded vehicles from taking out the liquor. Police tries to remove the volunteers forcibly, but they could not do much because of the large number of volunteers and opened fire injuring four persons.

The picketing of liquor shops and distilleries was peaceful to a great extent, but few violent incidents also occurred. In Jabalpur, an effective method adopted by the Satyagrahis to stop the sale of liquor was to prevent the vehicles carrying the stock from leaving the warehouses. On 19th July, when truck loaded with barrels attempted to move from the warehouses, a volunteer Nana Naidu, lay flat on the road in front of the truck and refused to move. Finding the volunteers adamant the police opened fire injuring four of them.

warehouses in Katni were similarly picketed.

The campaign resulted in a fall in the consumption of country liquor in Jabalpur by 75% during this period.

6. In Saoner near Nagpur, picketing had started on 21st July 1930, and was persistently followed up by Congress volunteers. There also the volunteers prevented contractors from using the road by lying in front of their cars. Police protection was required.

On 6th September, a hired lorry as sent under police escort to help liquor contractors to obtain their liquor consignments. They left Saoner with a load of liquor and the volunteers who lay across the road, were removed. At Patansaongi, the lorry was again obstructed by volunteers and liquor was taken back to Saoner.

7. The situation in Saoner worsened. On 12th September 1930, police force of forty was sent in lorry to Saoner to deal with the Congress volunteers engaged in picketing. The lorries were loaded up with liquor from the warehouse and moved off. About fifty volunteers lay down in front of the lorries but were forcibly removed. Further on, the road was blocked by boulders etc. At one place trees had been felled and laid across the road.

The police was thus wedged in and reinforcement was wired for from Nagpur. The D.S.P., Deputy Commissioner, and two A.SP's proceeded with a party to Saoner, and under a shower of stones, dispersed the mob by a lathi charge. Subsequently punitive police were quartered in Saoner.

8. The picketing of liquor shops assumed a special aspect in Nagpur where the biggest liquor contractor, Billimoria had to have special police arrangements. During January 1931, handwritten bills were sent round the city, advising people to boycott him. One case came to light in which a customer having a bottle of liquor from his shop was persuaded and forced to throw away the bottle. In another Case, Picketers refused to allow a man to buy from his shop, brandy prescribed for a patient by a doctor.

Picketing constituted an important part of Civil Disobedience movement.

3.0 The Analysis of Events

The analysis of above stated nine events is to be done in terms of 3 aspects, viz. i) The background of occurrence of these events ii) Qualitative analysis of these events, and iii) The quantitative analysis of these events. These three issues are being detailed as under.

3.1 The Background of Occurrence of These Events

The social status of the entire country was under considerable depression due to ruling by British Government. This is on account of different types of torture caused to the population by various awkward rules imposed rules by the government. This situation prompted some people to take lead in properly. 1) Influencing people to support the agitation which was to follow shortly against British Government 2) To have involvement in agitation by action, 3) To have the preparedness for sacrificing their belongings even to some extent sacrificing the life.

In view of above the leaders planned various obstacles in ruling the country by British Government. These obstacles were various agitation like 1) boycotting consumption of salt imported from Britain, 2) boycotting consumption of liquor imported from Britain 3) resisting the stand of British Government towards prevention in use of produce of Forest by people of India.

In this investigation focus is on picketing of the liquor shops and warehouses of liquor from the point of view of drastically reducing revenue earned by British Government by sell of liquor.

3.2 Qualitative Analysis of the Events

Every event is synonymous with a phenomenon, Just as in any phenomenon we have 4 aspects, such as (a) system (b) inputs (causes), (c) outputs (effects) and (d) extraneous variables. Similarly for these events it is possible to decide what are the system parameters, inputs, outputs and extraneous variables. This is possible by critically analyzing the details of happening of events, and system parameters. As regards the system parameters are concerned those all are pertaining to what was the background of the location where the event occurred. This background comprises mainly the population, culture and history of Socio economic conditions of the population of the location.

Inputs: As regards the inputs are concerned those will be specific day in a total duration in which the event took place, the geographical location of the event, the number of volunteers involved in the agitation, the degree of agitation, number of police involved in resisting the agitation, the number of police officers included in resisting the agitation, the intensity of curbing the agitation, number of leaders included in motivating society towards boycotting, use of liquor and trading of the liquor.

Outputs: For every event the extent of reduction in (1) Sell of liquor and 2) Trading of liquor can be considered as outputs or effects.

Extraneous Variables: These are the factors which do affect the events but are very difficult to individually recognize. These are in the context of these events, the culture of the population, the History of Socio Economic Culture of the location where the events have occurred.

3.3 Quantitative Analysis of the Event

It is necessary to decide the quantitative intensity of all aspects of inputs & outputs. This is possible by considering the concept of wattages, by properly analyzing the facts as they have occurred.

For example: If the police are organized at liquor shop but if the agitation is not so intense that police has no excuse to take an action other than mere vigilance, then we can say that this police action is simulated numerically by number 10. As against this, if the agitation is so intense that police is required to arrest some agitators or set fire for curbing agitation then this action can be simulated by number 50 and 250 respectively.

Accordingly, in this investigation by proper analysis of the facts as they have occurred, the intensity of action is simulated by numbers. This is detailed in Table 2 of the paper. However, to facilitate this numerical simulation, it is essential to crystallize the important facts based on which this numerical simulation can be done. This is detailed in Table 1.

Sl. No	Independent Quantities (Causes)							Response Variables (Effects)					
	A	B	C	D	E	F	G	H	I	Y1	Y2	Y3	Y4
	Date of Incidence	No. of volunteers	Place of Agitation	Involvement of police	Involvement of Police Officers	Intensity of police action	Intensity of agitation	Speeches of leaders	Social boycott	Fall in sale of liquor	Fall in illicit liquor	Fall in trading of illicit	Status of social C
1	29.6.30	Congress Volunteers	Nagpur	Police deputed at various stops could not take action			Though the No. of volunteers was sizable the agitation was peaceful	Pavanch and Raka-2 meeting N.B.Khare & Dharma dhikari	Tried to dissuade people from drinking liquor	Gradually fall in revenue collection			
2	30.6.30		Kamptee							Sale went down			
3	1.7.30	Volunteer Satyagrahis	Jabalpur							Brought down the liquor trade		Merchants and contractors adversely affected	
4	10.7.30	Big crowd, large no. of volunteers	Katani	Large no. of police	City Magistrate and district excise officer	*volunteers were arrested * Opened fire * Four persons injures	* Stopped vehicles of liquor * Nana Naidu laid flat on the road			+10%	+15%	+12%	
5	14.7.30		Nagpur					Dharma dhika					

Table 1: Crystallisation of facts based on Qualitative Analysis

Sl No	Independent Quantities (Causes)							Response Variables (Effects)					
	A	B	C	D	E	F	G	H	I	Y1	Y2	Y3	Y4
	Date of Incidence	No.of volunteers	Place of Agitation	Involvement of police	Involve ment of Police Officers	Intensity of police action	Intensity of agitation	Speeches of leaders	Social boycott	Fall in sale of liquor	Fall in illicit liquor	Fall in trading of illicit	Status of social C
6	19.7.30	Big crowd large no. of volunteers	Jabalpur	Large No of police	City Magistrate and District excise officer	*volunteers were arrested * Opened fire * Four persons injures	* Stopped vehicles of liquor * Nana Naidu laid flat on the road			Considerable	Curb smuggling	Curb Trade	
7	21.7.30	Congress Volunteers	Saiber	Police Protection was required			*Stopped vehicles of Liquors by laying cars						
8	6.9.30	Large No. of Volunteers	Saoner	Lorry full of police and contractors			Large No. of volunteers laid across the road patansawan gi Lorry was again obstructed			Toa very invent extent as lorry was sent back to saoner			
9	12.9.30	Congress Volunteers	Saoner	40 Police +DSP+ Deputy Commissioner S+2 ASP's		* Police was thus wedged in * Reinforcement were wived for from Nagpur * Stones were showered * Lathicharge for dispersion of MOB	* Police was thus wedged in * Stones were showered						

Table 2: Numerical Quantification of Causes & Effects

Sl.No	A	B	C	D	E	F	G	H& i	Y1
1	1 Day	30%	65%	40%	5%	5%	20%	80%	65%
2	2 Days	35%	50%	43%	5%	5%	25%	25%	70%
3	3 Days	40%	90%	45%	5%	5%	25%	10%	65%
4	16 Days	60%	100%	50%	20%	15%	10%	60%	75%
5	21 Days	100%	120%	120%	90%	95%	50%	5%	100%
6	22 Days	100%	100%	120%	90%	95%	50%	5%	95%
7	23 Days	40%	40%	70%	40%	35%	70%	10%	120%
8	70 Days	150%	50%	130%	60%	40%	130%	15%	150%
9	76 Days	300%	50%	50%	200%	140%	170%	20%	175%

4.0 Formulation of the Model

Based on the numerical data established as in Table-2 and applying the methodology of model formulation detailed by H.Schanck Jr. (4), The mathematical model for falling liquor sell is formulated as under. For this purpose the MAT_LAB software (5) is used

$$Y1 = 54.5 [(A)^{0.123} (B)^{0.4} (C)^{-1.27} (D)^{-0.3} (E)^{0.127} (F)^{-0.25} (G)^{0.7} (H)^{0.25}] \dots\dots\dots (1)$$

5.0 Interpretation of Models

Interpretation of Model is being reported on terms of several aspects viz. (1) Order of Influence of Various Inputs (i.e. Causes) on Output (i.e. Effects) 2) Relative influence of causes of effect 3) Interpretation of Curve fitting constant 4) Sensitivity of causes 5) Optimization.

5.1 Order of Influences of various Inputs and their Relative Influence

Equation (1) is established based on field data. It indicates that maximum influence on reduction of fall in revenue is of location where agitation is organized as the index of this cause is highest i.e. 1.23 where as the lowest effect is of the day of agitation from the commencement of the agitation, resisting the sale of liquor as it's index is positive lowest i.e. 0.123. Further, the influence of other causes in descending order on reduction of self is of speeches by leaders, number of volunteers involved in agitation, degree of social boycott of consumers and sellers of drinks, involvement of extent of police officers and other senior civil administrators respectively as their indices are 0.7, 0.4, 0.25, 0.127. The relative influence of these causes as compared to the day of commencement of operation is

$$1.21/0.123 = 9.83 \quad ; \quad 0.7/0.123 = 5.69 \quad ; \quad 0.4/0.123 = 3.25$$

$$0.25/0.123 = 2.03 \quad ; \quad 0.127/0.123 = 1.032; \text{ times as that of day of commencement of the agitation.}$$

As regards the degree of involvement of police and intensity of police action in resisting the agitation is concerned their indices are -0.3 and -0.25 respectively. The negative index of

these causes itself confirms in a way that the concept of weightages in view of detailed description of event is very rightly done in this research. Further, the influence of number of Police involved is more effective than their intensity of action because numerically the index of cause number of police involved is (-0.3) more than that of the cause of intensity of police action (-0.25) logically; The effect of both these causes should be to reduce the fall in cell and it has come out to be that way as their indices are negative. The relative influence of number of police involved as compared to their action is $0.3/0.25 = 1.2$; times in reducing the fall in sell.

5.2 Interpretation of Curve Fitting Constant

The value of curve fitting constant in this model is 54.5 This collectively represents the combined effect of all extraneous variables. Further, as it is positive is the indication that there are good number of causes which have influence on increasing the fall in sell. The major component of this should be indirectly the change in mental attitude of the people of society in promoting reduction in consumption of liquor, thereby improving general health condition and life in general of society. The relative influence of these extraneous variables is certainly to the extent of $54.5/1.21 = \text{times that of location where the incidence has occurred.}$

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