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# METHODOLOGICAL ISSUES IN OPINION POLLS: CASE STUDY OF GUJARAT LEGISLATIVE ASSEMBLY ELECTIONS

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#### **ABSTRACT**

During the election times, opinion polls are stimulating considerable debate among the voters, politicians and the media. They have a profound psychological impact on some voters' choice of a political party while voting. In India, the media plays a vital role in conducting opinion polls and disseminating its results. Media houses are the direct beneficiary of opinion polls as it increases their reach. In one of the legislative assembly elections of 'Gujarat', a western state of India, such opinion polls were conducted, disseminated and condemned because of their wrong predictions. This case presents the details of the output of various opinion polls conducted in Gujarat assembly elections and compares it with actual results. The potential reasons for imprecision in this opinion polls are also narrated.

**Keywords:** Opinion Polls, Elections, Politics, Sampling, Research Methodology.

### Introduction

It is said that conversation on politics and religion should be avoided for sustainable friendship. It is sensitive to talk about political issues as there is always a chance of rebuttal. Nowadays, this fact seems overlooked as the

publication of opinion polls is very common among the print and audio-visual media (Stromback, 2012). For the political parties, an opinion poll is an inevitable component of their poll campaign, which needs to be carefully managed (Stromback, 2012). Last five decades have been characterized by mass production and the rapid expansion of the use of opinion polls (Stromback, 2012; Moon, 1999). The triangular relationship between public opinion, the mass media, and the political parties have multiple effects not only on the operation of the media but also on political parties (Holtz-Bacha&Strömbäck, 2012; Varma&Sardesai, 2014), which leads to the ultimate impact on election results. Also, the opinion polls have brought a transformation in the relationship between a political party and the media (Lavrakas& Holley, 1991; Kavanagh, 1995; Lavrakas&Traugott, 2000). Though the changing opinion of the voters and last movement aggressive campaigning by the political parties increases the possibility of error (Rai, 2014), still the opinion polls are considered as the best guide to judge the mood of voters on political parties and social issues.

From the last two decades, the Indian audience has witnessed a mixture of success and failure of opinion polls. The opinion polls of parliament elections of 1998 and 1999 were considered fairly accurate while that of 2004 and 2009 were miserably failure (Rai, 2014). The opinion polls for legislative assembly elections of the states like Delhi (Heena & Ranjan, 2015), Gujarat (The Economic Times, 2017; Hindustan Times, 2017), Uttar Pradesh and Uttrakhand (Singh, 2017) were condemned for weak predictions. These media comments foster the need for discover the errors in Indian opinion polls and to devise a suitable methodology which leads to accuracy in predictions.

### **Role of Opinion Polls**

The research agencies conduct political surveys for their clients, namely mass media, local authorities, NGO, advertising agencies, political parties, communication companies, and even prospective candidates. However, out of these, most of the opinion polls are conducted for mass media and published by their editorial platform. The transformation in the opinion polls is the result of transformation in politics, political parties and the form of democracy (Ferrajoli, 1985; Panebianco, 1988; Mair, 1997; Katz & Mair 1994, 1995). Rapid penetration of audiovisual media has served as a growth engine in an increasing number of opinion polls.

This development is mainly based on three trends (Mavris). First is the change within the political parties which have led to their bureaucratization and the strengthening of the role of the party leadership. The decreasing role of base level activists in the formation of political strategies leads to the transfer of political function to professional agencies. Secondly, the role of mass media had also expanded from reporting to creation and exaggeration of political issues. Because of this, mass media is significantly able to affect the political environment. Now media is acting as a mediator between people and political party. The primary role of the political party of formulating strategy and policy is being shifted towards formulating the 'communication techniques'. In the majority of cases today, the role of representing the citizen is informally

assigned to media (McNair 1998, Mavris, 1996). This increases the reach of media in the formation of the attitudes of voters (Cushion *et al.* 2018). The third crisis of democracy is decreasing the importance of representative institutions, i.e. trade union (Klingemann & Fuchs, 1995; Mavris, 1996). Due to the reasons mentioned above, the importance of opinion poll is increasing for the political parties, and the media is acting as a link between them and the voters.

# **Indian Political System and Opinion Poll in Gujarat**

India is a democratic nation where the president of India is head of the state, and the prime minister is the head of the government. India has two structured governments, the union government at the centre and states at the periphery. The Constitution of India defines the powers and limitations of both central and state governments. Commonly, at the end of every five years, separate elections are held to choose the representatives for the centre (parliament) and state level (legislative assembly).

The state of Gujarat is located in the northwest part of India, and it had a population of around 60 million (Population Census, 2011). The people of Gujarat were known for entrepreneurship, flourishing business, and a unique 'money mindedness' (Jayswal & Jayswal, 2013). The state was divided into four socio-economic regions, namely Central Gujarat, Kutch-Saurashtra, North Gujarat and South Gujarat. The Gujarat legislative assembly had 182 members out of which 40 were reserved on caste basis, bifurcating 27 for scheduled tribes and 13 for scheduled castes. These 182 memberships were addressed as 182 seats in political terminology. Members of the legislative assembly were elected based on adult suffrage from one of 182 constituencies. The leader of the majority party or coalition in the legislature or his or her designee was acting as the leader (chief minister) of the legislative assembly. The chief minister was acting as the chief of administration of the state. Since last four assembly elections only two parties, namely 'Bharatiya Janata Party' (BJP) and 'Indian National Congress' (INC), were main competitors for ruling the state(Jayswal, 2017).

In the Gujarat legislative assembly election, there were around 43 million voters who were expected to cast their votes among 0.05 million polling stations (Summit Mukherjee, Principal Secretary, 2017). The polling was scheduled in two phases in the second week of December 2017. Various media houses had published the outcome of their opinion poll about this election. There were six opinion polls published in leading dailies with a mismatch in its results. The audience was confused because each media house was claiming that its predictions were accurate. These media houses can be categories based on the language of communication (Gujarati, Hindi, and English), sponsoring body, mode of communication (print and audiovisual), geographic presence (national or regional) etc. Few of them were also known for their political affiliations which could not be authenticated. The details of opinion poll prediction by various media for the elections of the legislative assembly of Gujarat (Table I) is presented ("BJP will get 109-128, INC will get 52-80", 2017).

Table -I Opinion Poll Results

(Number of assembly seats)

Name of Media House/ Political Party	ABP CSDS	TV 9 C- Voter	India TV	Times Now	India Today-Axis	Sahara	Average
ВЈР	95	109	116	111	115	128	111
INC	80	73	63	68	65	52	68
Others	07	00	03	03	02	02	03

Source: Compiled from secondary data

The opinion polls were in buzz, and the results were widely shared by mass as well as social media platforms. However, there was no publication about the methodology used in these surveys. It was observed that in the vast majority of reporting on opinion poll results, the methodological information was not provided by the newspapers (Bhatti & Pedersen, 2015). The political activists of the winning party in the opinion polls (BJP) were confidently claiming their victory in media while the political activists of the losing party (INC) were defending their position. Unfortunately, during discussions and debates, neither the political parties nor any media houses considered the methodology of these surveys to be significant for discussion. Apart from the methodological part, the surveys also seemed to be incomplete as they did not reveal the constituency wise results. However, region wise survey results were published by the Times Now-VMR Opinion Poll (Table-II), which was conducted by Voters mood Research (VMR). The survey results were as under ("BJP looks all set to retain", 2017).

Table –II Region wise Opinion Poll Results

(Number of assembly seats)

Region	ВЈР	INC	Others	Total
Central Gujarat	25	15	0	40
Kutch-Saurashtra	29	25	0	54
North Gujarat	32	20	1	53
South Gujarat	25	8	2	35
Grand Total	111	68	3	182

Source: Compiled from secondary data

In this survey, a total of 6000 interviews was conducted at 684 polling stations/booths across all four socio-economic regions of Gujarat. Interviews among eligible voters - covering all age groups, gender, and the urban/rural divide were conducted using completely digital hands-free interface, straight from tablet to computer. The study was undertaken before two weeks of polling with a margin of error three percent ("BJP looks all set to retain", 2017). However, it should be noted that some time mythical marginal error can lead to unsupported and even wrong interpretation of the opinion polls (Peterson, 2018).

# Exit Polls in Gujarat

On the day of voting, post-vote casting responses were collected by the media houses and research agencies. On that basis, an exit poll was published within an hour of completion of voting. The results of the exit poll (Table III) were as under ("Twenty seven temples will not give seventy-two seats", 2017).

Table -III Exit Poll Results

(Number of assembly seats)

Politic	ABP	TV	Indi	Time	India	Sahar	Chanaky	News	Republi	News	Averag
al	CSD	9 C-	a	S	Today	a	a	Natio	c C -	X	e
Party /	S	Vote	TV	Now	-Axis			n	Voter	CNX	
Name		r		-							
of				VM							
Media				R							
House											
BJP	110	108	109	109	107	115	135	125	108	115	114
INC	71	74	70	70	74	67	47	55	74	65	67
Others	01	00	02	03	01	00	00	02	00	02	01

Source: Compiled from secondary data

There was cutthroat competition among the television channels for being first in publishing the exit poll results. The results were eagerly awaited and resulted in higher Television Rating Points for the media houses. In this hurry, the methodological part was ignored, and the predictions were made by making a simple average of different exit poll results be it overall or specific. Region wise exit poll conducted by ABP CSDS ("Twenty seven temples will not give seventy-two seats", 2017) is given in Table-IV.

**Table –IV Region wise Exit Poll Results** 

(Number of assembly seats)

			,	•
Region	ВЈР	INC	Others	Total
Central Gujarat	24	16	00	40
Kutch-Saurashtra	34	19	01	54
North Gujarat	35	18	00	53
South Gujarat	25	09	01	35
Grand Total	118	62	02	182

Source: Compiled from secondary data

All these predictions placed the defender (INC) in an uncomfortable position, especially when the second phase of voting was remaining and predictions for the first phase of elections were viral in social media by some unreliable sources. They were not only required to defend their claim of victory in media but also in the minds of those voters who would cast their vote in the second phase. In elections, there is always a class of voters who are less concerned with political ideology and more with the probable winners (Marsh, 1985), as they have a myth that to cast a vote in favor of losing party is wastage of voting power. However, it was banned to publish the exit poll results of the

first phase of elections by the election commission of India<sup>1</sup> (The Economic Times, 2017).

# **Results of Gujarat Elections**

The result of Gujarat elections had proved most these predictors wrong (The Economic Times, 2017; Hindustan Times, 2017) and there was a marginal gap of nine seats only between BJP and INC. In these elections, INC won seventy-seven seats while their alliance secured three. The region wise breakup of actual election results (Table V) was as under ("District-wise bifurcation of seats", 2017).

**Table –V Region wise Actual Results** 

(Number of assembly seats)

Region	BJP	INC	Others	Total		
Central Gujarat	22	16	02	40		
Kutch-Saurashtra	23	30	01	54		
North Gujarat	30	23	00	53		
South Gujarat	24	11	00	35		
Grand Total	99	80	03	182		
(includes three seats of the alliance)						

Source: Compiled from secondary data

The local daily had published these results with the headline 'BJP loses even after the victory, INC wins despite defeat'. These results put a question mark on the credibility of opinion polls. Yes, it can be argued that the mindset of voters may change as the opinion polls were published at least before (Rai, 2014)48 hours of the first phase of voting as per guidelines of election commission of India (The Economic Times, 2017). On the contrary, it can also be argued that these opinion polls have affected the mindset of some voters who voted in favor of possible winner as predicted by the opinion polls (Aalberg& van Aelst, 2014; Marsh, 1985).

# **Possible Methodological Issues**

The methodological issues pertain to political opinion polls can broadly divide into four parts, namely research environment, sampling, measurement, and research instrument.

#### Research Environment

Before considering some of the factors which might have affected the outcomes of these opinion polls, one must address if the opinion polls satisfy the basic rules for conducting a fair poll (Mitchell, 1992). Secondly, were the responses taken scientifically and severe or were they just loose opinions which have a high probability of change. The environment under which elections were conducted in Gujarat was different from the environment

<sup>&</sup>lt;sup>1</sup>Election commission of India is an autonomous constitutional authority responsible for administrating the election process in India.

where the data for these opinion polls were collected. Confidentiality of vote was at prime (Baldauf, Suette, &Frohlich, 2014) in elections of Gujarat while in opinion polls, no such simulation was created. Generally, in public, a voter would like to be with the majority (David & Malhotra, 2014) as it is human psychology to feels safe in the crowd. The opinion polls reflect opinions, and elections reflect the citizens' wishes for government, and both need not be the same every time. Wishes can be so latent that can be people express them in personal environments, which probably is provided in the polling booth.

# Sampling

There was a high possibility for sampling frame error as samples were not drawn from all polling booths, which were thousands in numbers. In India, usually, a booth has around one thousand voters who reside in the same area. Each area has its demands and problems from the political parties and the candidates. In many cases, especially in rural areas, the people of the same caste are leaving in the same area, so they are part of the same polling booth. Sometimes they have common issues on which they are convinced to vote in favor of a particular party. Under these circumstances, selection of some polling stations means going for a sampling frame which is non-representative of the population. In the publications, the method or logic for choosing the booths was also not revealed by the media houses publishing these opinion polls. Some surveys were carried out on the street, where they bifurcated the respondents solely based on gender and age. The sampling error can be significant. Such polls do not use a sampling frame such as the electoral register and the list of polling booths. As a result, there exists the possibility of bias in favor of the big political party in that area where the survey is conducted. On the contrary, Wei et al.(2015) support the use of nonrepresentative polling in election forecasting.

The sampling process of the opinion polls is always questionable. The issues on the sampling method and the sample size are always debatable. A selection of few thousand samples out of millions is not the proper representation especially, where the population is diverse in terms of caste, income, religion, occupation, education, locality, etc. to name a few. These variables have a substantial impact on voting in India, and it is not possible to justify these demographic features with a sample size of a few thousand (Rai, 2014). In statistical terms, a small sample size which was less than one percent of the population entitles the research for the type –II error (Wilson, VanVoorhis, & Morgan, 2007). In this case, it has been observed that the results of opinion polls were almost the same as that of the opinion of the researchers. The large sample size will increase the power and reduces the chances of type-II error (Wilson, VanVoorhis, & Morgan, 2007), but whether the inferential statistics was used or not is a big question. It is unfair to assume that the media is excused for not using inferential statistics (Bhatti & Pedersen, 2015). The agencies involved in opinion polls should adopt an established probability sampling method(s) as the electoral roll (population) is readily available.

#### Measurement

Measurement error consists of the problem of respondents not revealing the truth. Measurement error is caused by a difference between the information desired by the researcher and the provided by the measurement process (Tull and Hawkins, 1990). Opinion about the vote in favor of political party is a sensitive issue about which voters prefer to give a socially desirable response instead of their true feelings. This possibility is high in terms of face-to-face and telephone interviews because they involve social interaction. In the case of telephonic interviews, the possibility of call recording significantly affects the respondent to give a socially popular opinion or not to give an opinion at all. Factors like the social class, age, sex, race, authority, expectations, opinions, their appearance, their way of speaking, the intentional and unintentional cues provided and the style of probing by the interviewers significantly affect the responses and thus increases the chance of error. As a result, the consistency in the interview process is not maintained (Collins and Butcher, 1983; Tucker, 1983).

#### Research Instrument

Framing of questions also significantly impacts the results of the poll. By simply asking, "For which political party will you vote for?" the researcher is eliminating the possibility of voting in favor of small parties and independent candidates. This will overestimate the support for the few large parties because the question emphasizes only on few political allegiances and the response is based mainly on the memory. Increasing it is observed that small parties and independent candidates can significantly affect the election results.

### Conclusion

Although all arguments predictions of opinion polls' are considered necessary, it is the only systematic method to fulfill the curiosity of the people about the election results. It is not suggested here that opinion polls should not be conducted. It stimulates a broad gossip among the voters who try to find out the possible causes of these predicted results (Singh, Roy, & Fournier, 2018). This will highlight the critical issues that the voter should consider before casting a vote. By this way, it serves the purpose of voters' awareness, which is highly desirable. It is also believed that the polls are the victim of their success as because of the successful past predictions, which is sometimes a mere coincidence. Voters have high expectations from opinion polls and endow them with greater predictive powers than they warrant.

Finally, the weak opinion poll reports which are mostly because of faulty methodology have consequences for the media themselves. In the European countries where the publication of opinion polls is allowed, it has been found that the large share of parliamentary politicians is in favor of restricting it (Aalberg & VanAelst, 2014). Repeated publications of unsubstantiated poll stories may drive the intellectual class of the society away from it. The media should consider strengthening the methodology of opinion polls to diminish the possible resentment.

#### **Issues for discussion:**

- **Q-1** Suggest an appropriate research methodology for the opinion poll of upcoming elections of Gujarat Legislative Assembly in the light of the following issues.
- 1. Research Environment
- 2. Sampling
- 3. Measurement
- 4. Research Instrument

# REFERENCES

- Aalberg, T., &Van Aelst, P. (2014, January 15). Who is afraid of preelection polls? How perceptions of polls influence support for polling regulations among Elites. *International Journal of Public Opinion Research*, 01-14.
- Baldauf, M., Suette, S., & Frohlich, P. (2014, September 23-26). Interactive opinion polls on public displays studying privacy requirements in the wild. *MobileHCI 2014- Poster Presentation*. Toronto, ON, CA.
- Bhatti, Y., & Pedersen, R. T. (2015, April 9). News reporting of opinion polls: journalism and statistical noise. *International Journal of Public Opinion Research Advance*, 01-13.
- BJP will get 109-128, INC will get 52-80 seats (2017, December 7), *DivyaBhasker*pp 01 Retrieved from http://epaper.divyabhaskar.co.in. The article is published in *Gujarati* language.
- BJP looks all set to retain Gujarat but 150 seats unlikely, says poll (2017, December 7) Times of India Ahmedabad edition. Retrieved from https://epaper.timesgroup.com.
- Collins, M., & Butcher, B. (1983, January). Interviewer and clustering effects in an attitude survey. *Journal of Market Research Society*, 39-58.
- Cushion, S., Thomas, R., Kilby, A., Marina, M., & Sambrook, R. (2018). Interpreting the media logic behind editorial decisions: Television news coverage of the 2015 U.K. general election campaign. *The International Journal of Press/Politics, IV* (21), 472-489.
- David, R., & Malhotra, N. (2014, July-September). Are public opinion polls self-fulfilling prophecies? *Research and Politics*, 1-10.
- District wise bifurcation of seats (2017, December 19) *Gujarat Samachar* pp 02 Retrieved from http://gujaratsamacharepaper.com/ The article is published in *Gujarati* language.
- Ferrajoli, L. (1985). Authoritarian democracy and criticism of politics. Athens: Stochastis.
- Heena, K., & Ranjan, R. (2015, February 11). *Mail Online India*. Retrieved July 20, 2018, from Website of News From Mail India: http://www.dailymail.co.uk/indiahome/indianews/article-2948233/Not-close-exit-polls-failed-predict-force-AAP-landslide.html
- Hindustan Times. (2017, December 18). Retrieved July 20, 2018, from Website of Hindustan Times: https://www.hindustantimes.com/india-news/exit-polls-

- failed-to-project-victory-margin-for-bjp-in-gujarat/story-M5Dlrl4i5SJDhVf9tsujeM.html
- Holtz-Bacha, C., & Strömbäck, J. (2012). Regulation of opinion polls: A comparative perspective. In T. Petersen, *Opinion Polls and the Media* (pp. 47-68). london: Palgrave Macmillan.
- Jayswal, M. M. (2017). Comparative study of negative political advertisements with specific focus on attach and rebuttal television campaigns from Indian perspective. *Journal of Creative Communication, II* (12), 134-149.
- Jayswal, M., & Jayswal, R. (2013). Karnavati Pagarkha Bazaar- A giant step of tiny traders). South Asian Journal of Business and Managment Cases, II (2), 133-138.
- Katz, R., & Mair, P. (1994). How parties organize change and adaptation in party organizations in western democracies. London: Sage.
- Kavanagh, D. (1995). *Election campaigning the new marketing of politics*. Oxford: Blackwell.
- Klingemann, H.-D., & Dieter, F. (1995). *Citizens and the state*. Oxford: Oxford University Press.
- Lavrakas, P., & Holley, J. (1991). *Polling and presidential election coverage*. London: Sage-Focus.
- Lavrakas, P., & Traugott, M. (2000). *Election polls, the news media and democracy*. New York London: Chatham House Publishers.
- Mair, P. (1997). Party system change. New York: Oxford University Press.
- Marsh, C. (1985). Back on the bandwagon: the effect of opinion polls on public opinion. *British Journal of Political Science*, *I* (15), 51-74.
- Mavris, Y. (1996). Political parties on the threshold of the new era. 38-49. Gnosi, Athens: Announcement in: Institute for Research and Policy Strategy (ed.).
- Mavris, Y. (n.d.). *Public Issue*. Retrieved July 5, 2018, from Public Issue is one of the leading opinion polling companies in Greece: http://www.publicissue.gr/wp-content/uploads/2007/09/PoliticalPartiesMassMediaAndOpinionPollsInGreece 06 en.pdf
- McNair, B. (1998). An introduction to political communication. Athens: Katarti.
- Mitchell, V.-W. (1992). Opinion polls: right or wrong? A lesson in social research. *Marketing Intelligence & Planning, X* (09), 04-09.
- Moon, N. (1999). *Opinion polls*. Manchester and New York: Manchester University Press.
- Panebianco, A. (1988). *Political parties: organization & power*. Cambridge: Cambridge University Press.
- Peterson, R. A. (2018). On the myth of reported On the myth of reported. *International Journal of Marketing Research*, 0 (0), 01-09.
- Population Census. (2011). Retrieved July 25, 2018, from Web site of Census of India: https://www.census2011.co.in/census/state/gujarat.html
- Rai, P. (2014). Fallibility of opinion polls in India. *Economic & Political Weekly*, *XLIX* (18), 13-17.
- Singh, S. P., Roy, J., & Fournier, P. (2018). The effect of opinion polls on political information seeking. *Annual Meetings of the European Political Science Association* (pp. 01-24). Vienna: Social Science and Humanities Research

- Council of Canada.
- Singh, R. (2017, March 12). *Hindustan Times, New Delhi*. Retrieved July 20, 2018, from Website of Hindustan Times: https://www.hindustantimes.com/assembly-elections/how-exit-polls-failed-to-gauge-the-extent-of-bjp-victories-in-up-uttarakhand/story-3riCFaUxvUbm87AlVTYLGO.html
- Strömbäck, J. (2012). The media and their use of opinion polls: Reflecting and saping Public Opinion. In C. Holtz-Bacha, & J. Strömbäck, *Opinion polls and the media Reflecting and shaping public opinion* (pp. 1-24). London: Palgrave Macmillan.
- Summit Mukherjee, Principal Secretary. (2017, October 25). Pressnote. *Schedule for the general election to the legislative assembly of Gujarat-2017*. Delhi, Delhi, India: Election Commission of India.
- The Econiomic Times. (2017, November 07). Retrieved July 25, 2018, from The Econiomic Times Web site: https://economictimes.indiatimes.com/news/politics-and-nation/no-exit-poll-results-before-dec-14-evening-election-commission/articleshow/61550195.cms
- The Economic Times. (2017, December 18). Retrieved July 20, 2018, from Website of The Economic Times: https://economictimes.indiatimes.com/news/politics-and-nation/exit-polls-failed-to-project-victory-margin-for-bjp-in-gujarat/articleshow/62123914.cms
- Tucker, C. (1983, Spring). Interviewer effects in telephone surveys. *Public Opinion Quarterly*, 84-85.
- Tull, D. S., & Hawkins, D. I. (1990). *Marketing research: Measurement and method.* Macmillan Publishing Co., USA.
- Twenty seven temples will not give seventy two seats: Survey (2017, December 15), *Divya Bhasker* pp 01 Retrieved from http://epaper.divyabhaskar.co.in. The article is published in *Gujarati* language.
- Varma, R., & Sardesai, S. (2014). Does media exposure affect voting behaviour and political preferences in India? *Economic & Political Weekly, XLIX* (39), 82-88.
- Wei, W., Goelb, S., Gelm, A., & Rothschild, D. (2015). Forecasting elections with non-representative polls. *International Journal of Forecasting, XXXI* (03), 980-991.
- Wilson, C. R., VanVoorhis, & Morgan, B. L. (2007). Understanding power and rules of thumb for determining sample sizes. *Tutorials in Quantitative Methods for Psychology, III* (2), 43-50.