

## Hand Sanitizer Market During and After Covid-19 Outbreak -in India

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### ABSTRACT

The recent pandemic SARS-CoV-2 (COVID-19) has affected lives globally. Medical advisories suggest the use of alcohol based hand- sanitizers to slow down the virus transmission. Hand sanitizers are used to get rid of bacteria quickly. The recommendation for effective sanitization use of hand sanitizer in community settings was developed based on data from number of careful studies and research. Many studies conclude that Hand Sanitizers work well in Medical settings like hospitals, where hands generally come in contact with germs but not heavily soiled or greasy hands. Many studies also conclude that sanitizers with 60-95% of alcohol concentration are more effective at killing germs than those with lesser concentration. Hand Sanitizers with low or no alcohol concentration may not work well for many types of germs and merely reduce the growth of germs rather than killing them. Here we will be study and analyze the use of hand sanitizers after careful study and observations on data before and after Covid-19. The main objective of this paper is to predict the use of hand sanitizer in near future by using linear regression machine learning algorithms based on past values.

**Keywords** - Sanitizer, alcohol concentration, market research, linear regression, market prediction, Machine Learning techniques

### I. INTRODUCTION

Hand sanitizer, also known as hand antiseptic or hand rub is applied and rubbed on the hands to remove pathogens (disease causing organisms). These come in foam, gel, or liquid form. But they are recommended only when soap and water are not available. The Covid-19 pandemic has transformed the growth of sanitizer market in India drastically. Dabur India Ltd., Emami Ltd., Dettol, Lifebuoy, The Himalaya Drug Co., Savlon, Godrej, Multani, are some of the major market participants. The increasing incidences of pandemic will offer immense growth opportunities. Aiming to help players

strengthen their market foothold, this hand sanitizer forecast study will provide a detailed analysis of the market changes before and after the pandemic. The report also empowers the industries to focus on the competitive landscape and insights into the product. For predicting use of hand sanitizer, we proposed Machine learning supervised algorithm Linear Regression.

### II. RELATED WORK

We went through various research papers and articles to find that after COVID-19 the market for sanitizer

has shown tremendous growth. It is one of the major market in concern after the Pandemic.

The demand for hand hygiene products has been rapidly exceeding the supply in both online as well as on ground. Shifting consumer preferences towards convenient hygiene products such as sanitizers is expected to host the market. In addition, the recent COVID-19 pandemic since of 2019 has boosted the market for hand sanitizer.

Jain Arpita in 2020 in “Hand Sanitizer Market Share, Growth Factors and Forecast Analysis to2026”. Hand Sanitizer Market report published by Value Market Research provides a detailed market analysis including market size, share, value, growth, and trends for the period 2019-2026. This report covers regional and country market in detail. [Year-2020] [1]

Pallavi Singh , Ipshita Potlia , Shitanshu Malhotra , Himagi Dubey , Himanshu Chauhan, in , “Hand Sanitizer an Alternative to Hand Washing- A Review Literature”. Published on July 19 , 2020, evaluated that using soap and water for washing hands are more practical and effective than using sanitizer for oily and greasy hands. But if used correctly , an alcohol-based sanitizer in appropriate volume can eliminate certain types of micro-organisms. The study also suggest to use Sanitizers with alcohol content between 60 to 95% in form of ethanol, isopropanol, or n-propanol. [2].

Jane Lee Jia Jing, Thong Pei Yi, Rajendra J.C. Bose, Jason R. McCarthy, Nagendran Tharmalingam and Thiagarajan Madeshwaran in “Hand Sanitizers: A Review on Formulation Aspects, Adverse Effects, and Regulations” concluded that the use of ABHS is becoming more common because of rapidly and efficiently killing of microorganisms. It is very important to select ABHS with appropriate alcohol concentration [3].

Astrid Schneider Et.al offered linear regression model on medical data. It enables the description and representation of relationships among multiple factors. It expedites the description of predict relevant risk factors and the computation of risk scores [7].

G.K.Uyanik and N.Guler suggested a study on multiple linear regression analysis. This analysis carried out by considering student’s data with more than one independent variable [8]

### III. DATA SET AND IT’S DESCRIPTION IN MARKET

Data collection: we gathered market data through extensive database of reliable secondary sources online.

As a part of our primary data analysis, we collected raw data from wits. World bank and took it under pre-processing. We conducted exhaustive studies with verified intelligence regarding the market size, share, key drivers, and forecast along with supply chains. The data we got was much balanced and well categorized. Then we began with Data cleaning, Pre-processing, removing unwanted columns and feature selection.

### IV. DATA EXTRACTION

#### Dataset Description:

We have worked on the dataset of India. Our data set consist of Export data of India to about 88 countries in the year 2018 and 2019. The dataset consist of 9 attributes listed below:

1. Reporter country
2. Trade flow ( Import / Export )
3. Product code
4. Product description
5. Year

6. Partner
7. Trade value (1000 USD )
8. Quantity

Reporter country is the country whose data for export market is being considered in the report. Trade flow is the import/export information. Product code and product description gives the detail of product being analysed. Year dataset tell us about the year we are analysing. Partner attribute tells you about the Partner country in the export and import market. Trade value in 1000USD gives us the idea of the trade profit being earned by the reporter country and Quantity is simply the quantity being imported / exported to the partner country.

## V. RESEARCH METHODS

We used observation, exploratory analysis and proposed experiment method for this work using Machine Learning Linear regression algorithm.

### A. LINEAR REGRESSION THEORY

Linear regression is of two types:

simple linear regression and multiple linear regression. For our study, we required simple linear regression model, which will analyse the relations between independent variable and dependent variable. Our independent variable will be use of hand sanitizer in near future. Our independent variables will be more than one like period, trade value, situation (pandemic/on pandemic), etc. We will set the model of dependent variable  $y$  and the independent variable  $x$  ( $i=1,2,3,\dots$ ) that will influence the variable  $y$  and the predict the development trend of  $y$  ,Simple linear regression model will be expressed as followed:  $y = \theta_0 + \theta_1 x + e$   $y$  is the dependent variable and  $x$  is the independent variable.  $\theta_0$  , the constant term, is the intercept of the regression line on the vertical axis and  $\theta_1$  is regression coefficient that is the slope of the regression line.  $e$  is the random error which will be

used to express the effect of random factors on dependent variable.[6]

### B. PROCESSING AND FEATURE SELECTION

We only studied and applied algorithms on the Export market data of India. Hence, focusing on Export the Import data was automatically eliminated. Along with that for clear calculation and observation we have considered the data of 10 countries out of 88 countries.

The final dataset is a clearer representation of sample data. We selected the final data sets after careful observations and analysis from various sources.

## VI. EXPLORATORY ANALYSIS

- For year 2018 :-



**Figure 1.** Trade value in year 2018

The graphs above show the trade value in export market from India to various other countries in the year 2018. It was comparatively low as to 2019.

Partner vs Quantity for 2018

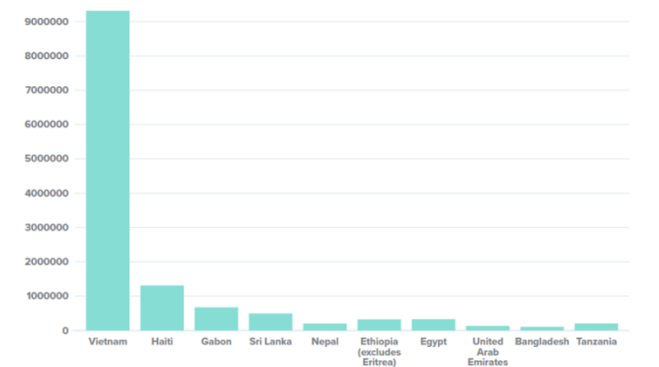


Figure 2. Export quantity in year 2018

The above graph shows the Quantity (in Kgs) of Hand Sanitizer being exported from India to the analyzed countries in the year of 2018. It is again low as compared to the year 2019.

- For year 2019 :-

Partner vs Trade Value (1000USD) for 2019

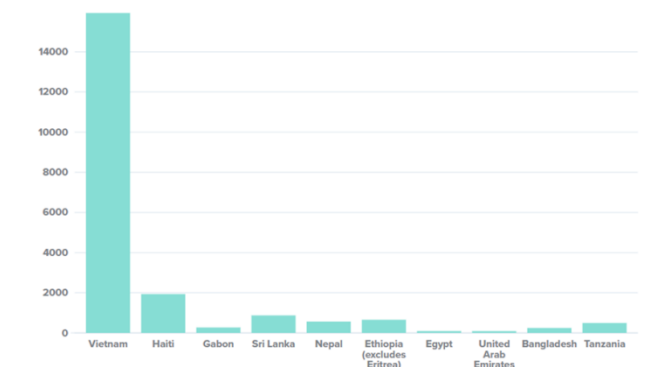


Figure 3. Trade value in year 2019

The above graph shows the trade value in export market from India to various other countries in the year 2019. It clearly shows a considerable increase as compared to the year 2018.

Partner vs Quantity for 2019

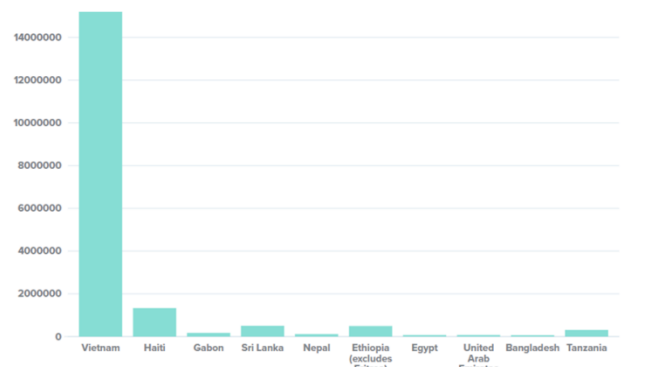


Figure 4. Export quantity in year 2019

The above graph shows the Quantity (in Kgs) of Hand Sanitizer being exported from India to the analyzed countries in the year of 2019. It again shows a considerable increase as compared to the year 2018.

Partner	Trade Value 1000USD	Trade Value 1000USD	% INCREASE IN TRADE
	2018	2019	FROM 2018 TO 2019
Vietnam	15934.59	9407.69	40.96
Haiti	1936.26	1873.93	3.219
Sri Lanka	873.39	798.04	8.627
Ethiopia(excludes Eritrea)	656.33	447.78	31.775
Nepal	685.88	566.10	17.463
Tanzania	494.93	273.68	44.703
United Arab Emirates	415.80	300.12	27.821
Gabon	1072.33	272.32	74.604
Egypt, Arab Rep.	432.86	93.69	78.355
Bangladesh	297.41	246.69	17.053
			AVG.= 30.858

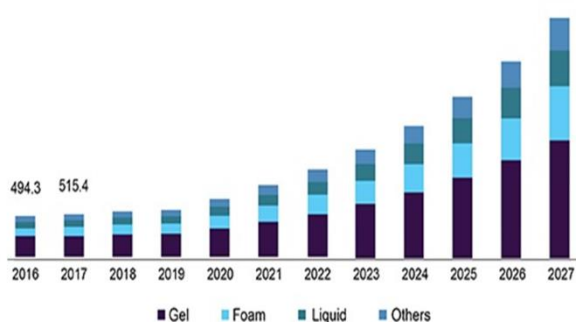
Figure 5. Calculation for percentage increase in trade value (1000USD) from year 2018 to 2019.

The above table shows the data for the selected countries.

Partner	QUANTITY (2018)	QUANTITY (2019)	% INCREASE IN QUANTITY
	(IN KGS)	(IN KGS)	FROM 2018 TO 2019
Vietnam	1.51984e+007	9.31289e+006	79.71
Haiti	1.335e+006	1.312e+006	0.64
Sri Lanka	505841	496455	1.85
Ethiopia(excludes Eritrea)	494880	323588	34.61
Nepal	203376	118263	41.86
Tanzania	313804	205805	34.41
United Arab Emirates	179156	133555	25.45
Gabon	675000	175000	74.07
Egypt, Arab Rep.	329010	75021	77.19
Bangladesh	106526	66864	37.23
			AVG. = 40.702

Figure 6. Calculation for Percentage increase in Quantity exported from year 2018 to 2019.

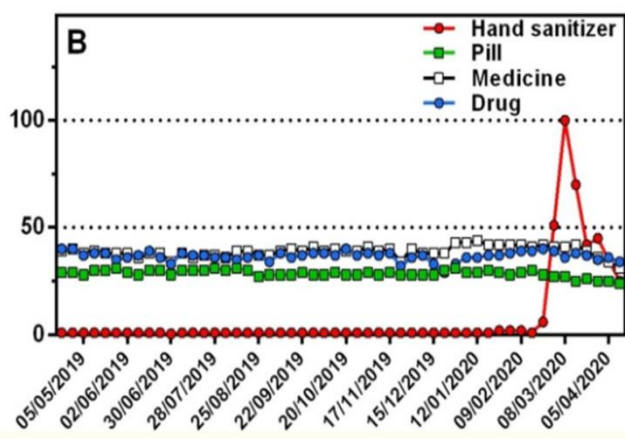
From the above graphs we can conclude that the export trade flow from India has increased for about 30.858% from year 2018 to year 2019. And the increase in the Quantity exported has increased by about 17-18%.



**Figure 7.** Hand sanitizer market year wise chart

The above graph shows the hand sanitizer market analysis from year 2016 to year 2027. This graph visibly shows the growth of hand sanitizer market in the successive years.

[Source: [grandviewresearch.com/industry-analysis/hand-sanitizer-market](http://grandviewresearch.com/industry-analysis/hand-sanitizer-market)]



**Figure 8.** Extracted from Google trends as per 20 April 2020, shows the rapid increase in sales of Hand Sanitizer as compared to pills, medicine, drugs.

This Graph clearly shows that public demand for hand Sanitizer is increasing tremendously as compared to other products compared in graphs.

After careful study, as per our research taking in consideration almost 88 countries, the hand sanitizer export from India went up to 30.858% in just one year from 2018 to 2019 and a similar trend is expected in the coming years. Along with this the global hand sanitizer market which valued USD 2.7 billion in 2019 is expected to grow at CAGR 22.6% from 2020-2027.

The hand sanitizer market growth in India can be credited by increasing awareness among people for healthy lifestyle and wellness with The key driver for the market being COVID-19. We felt that, the Indian hand sanitizer market is expected to surpass USD 280.10 million by 2030. The hand sanitizer market is categorized in parts on the basis of its state into Gel, Foam, Liquid and spray. From these Gel has the most boosting effect in the market in 2019.

In the year 2019 West India dominated the hand sanitizer market and the region is still expected to show immense growth in the market. Some major players being Hindustan Unilever Ltd., Dabur India Ltd., Himalaya Company Pvt. Ltd., ITC Ltd., Dettol Pvt. Ltm., etc.

With this, the companies have even adopted market strategies and technological innovation to increase their shares. For example Procter and Gamble ( P&G ) ,in June 2020 announced to release newly invented “Safeguard Sanitizer”. With this the company is also to increase the manufacture capacity upto 45,000 liters for safeguard hand sanitizer per week.

Such implementation ideas by leading companies are expected to proof considerable opportunities for hand sanitizer market.

**VII. RESULT AND DISCUSSION**

COVID-19 has offered hand sanitizer companies to expand their growth and market as best as they can.

### VIII. CONCLUSION

Now, COVID-19 being major concern drives people's attention to take care of their hygiene and thus driving the sanitizer market uphill. Based on the bar plots plotted we come to conclusion that after COVID-19 all sorts of hand sanitizer companies in India have shown drastic upliftment and the same is expected in the near future. The growing concern of people regarding hygiene after COVID-19 is offering huge profit in the sanitization products. However, the market implemented industrial shutdown but the hand sanitization market has shown growth even during the pandemic period.

As per our research and analysis, the hand sanitizer market is expected to be fueled with the constant growing concern of the public regarding hygiene.

The hand sanitizer market has shown approximately 30.858% growth from the year 2018 (i.e. before COVID-19) to the year 2019 (during COVID-19) in India.

We propose supervised machine learning algorithm, linear regression for systematic analysis and forecasting of use of hand sanitizer.

### IX. REFERENCES

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