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Impact of the COVID-19 on Indian Printing Industry with Special Reference to Sales Volume in INR

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ABSTRACT: COVID-19 was a serious pandemic for all human beings, and a serious market crisis was evaluated in the whole world. The global economic crisis coincided with the pandemic period. Each and every sector of the business and service market was disturbed due to the COVID-19 pandemic. The printing industry is also one of them. The pandemic COVID-19 spoils the various mechanisms of the regular working systems of the industries. A lot of government rules and regulations were also implicated in the pandemic situation. Not only were the working rules of the industries affected at the pandemic time, but a lot of bans and stoppages were also imposed. The printing industry is also disturbed with all these pandemic market situations. This research provides information regarding the market situation of the printing industry in reference to sales volume before, after, and during the pandemic situations.

I. INTRODUCTION

Printed text, graphics, and combinations of both convey messages to the human brain. The message is an education-related, research-related, current news (society, politics, economics, business, sports), product description, promotional, advertisement, and social message. Printing is an art, science, and technology that involves reproducing a number of copies from a master copy in the form of text or graphics [1]. The main reasons for the growth of Indian printing were the literacy rate and GDP in the last two decades. In India, the education sector is continuously growing due to an inclined literacy rate, so the publishing industry (newspapers and books) regularly grows [2]. The literacy rate of Indians was 14% in 1945. According to the census report, the 2011 literacy rate was 74.04%. The literacy rate continuously increased with the time period [3]. According to a World Bank report, Indian GDP was 3.84% of GDP in 2000. After 2000, the GDP of India was continuously growing and reached 8.25%. The GDP and literacy rate have continuously grown in India, so the printing industry has also continuously grown.

The global printing and printed packaging industry's value was \$551.4 billion in 2002, \$255.9 billion in 2007, and, respectively, 252 billion in 2012 and \$269.5 billion in 2017. But 2007-12 was the 2nd fastest growing industry in the world. In 2017, India was the 7th largest market in the world with \$28.3 billion [4]. In the Asian printing market, India is the 3rd largest printing industry with \$32.5 billion in 2018 and its value in 2013 was \$24.6 billion [5].

The Indian print market has major products like newspapers, magazines, and periodicals; books; directories; printed advertising; sales and mail-order catalogues; commercial and promotional; security printing; stationery; packaging; labels and other products, etc [6]. According to the source of Pira International Ltd., India's printed value was 8454.057 euros in 2005. Between 2005 and 2012, the compound annual growth rate was 12.2%. It was worth EUR 18311 million in 2017 [6].

In Wuhan, China, the first case of coronavirus 2 (SARS-CoV-2) has been identified. After some spread this virus across the world, In the India COVID-19 first case in Kerala on January time on March 23, 2020, The COVID-19 national wide lockdown was extended to the 4th phase up to May 31. During this time, Indian industry, with the exception of necessary firms, virtually shuts down. COVID-19 imposed a second lockdown in India from April 5th to June 15th. Many challenges faced the business, particularly micro, small, and medium-sized enterprises.

Impact of covid-19 on Indian printing industry was identifying throw the sales, profit after tax and total assets financial indicator are main component. Sales is exits between two and more than two party's buyers take a tangible or intangible goods, service throw the money. [7] profit after tax is the earning after paying of the operation, non-operation and all taxes is called profit after tax [8]. Total assets represented which after dictate all the deprecation of building, machine, other equipment including some financial component is called total assets [9].

II. REVIEW OF LITERATURE

According to Pira International Ltd, offset has 52.6%, gravure has 13.5%, flexo has 20.3%, screen has 3.9%, digital has 5.6%, and other printing processes have a 5.1% contribution in the global printing industry [10]. The Printing, Publishing, and Recorded Media industry's value was 239584 lakhs, which represents 1.33% of the GDP. In 2003-04, its industry value was Rs 300878 lakh, which represented 1.352% of the G.D.P [11]. Commercial/advertising printing accounted for 46% of the global printing industry, while packaging and labels accounted for 18%, newspapers accounted for 16%, magazines accounted for 9%, books accounted for 7%, and catalogues accounted for 4% [12]. According to Pira International Ltd., print market share in India according to region wise, northern India has a 33% share, eastern India has a 28% share, western India has a 28% share, and southern India has a 27% share in the Indian printing markets [6]. During the period 2012-17, the global printing industry grew by 6.7%, while the Indian printing industry grew by 33.4% [4].

In the global packaging industry, per capita consumption of packaging was \$115 per cent per person per year. In India, per capita packaging consumption was \$55 per person per year. So the biggest scope of the packaging industry is in India [13]. The Indian printing industry continuously grows by 12% per year. There were approximately 250000 small, medium, and large printers employed in the Indian printing industry. According to NPES reports, the Indian newspaper industry produces more than 8000 daily newspapers [14].

The impact of COVID-19 on industrial research papers explores only manufacturing industries, which contribute 20% to the GDP. Of this 20%, approximately half the contribution is by the automobile industry. Due to the COVID-19 lockdown, decreased sales and production in the manufacturing industry. We can see a crisis in the Indian economy as well as an employment crisis. [15] Print media was highly affected by COVID-19. During the covid-19 lockdown spread the message on social media virus is spreading through the newspaper, distributor also refused for distribution for newspaper, newspaper transport facilities also shut down due to covid-19 virus [16].

In the Indian paper industry, per capita paper consumption was very little as compared to the global average per capita paper consumption. It means the biggest scope for expanding the industry and the best for investment [17]. (2018 Paper Industry Report) The COVID-19 lockdown had a significant impact on paper and paper products because, beginning with the first phase of the lockdown, demand for education institutes, offices, newspapers, and other paper and paper consumption products was muted [18].

Objective

The printing industry is the fastest growing industry in the world as well as in India. The printing industry plays a major role in the Indian economy and GDP. During COVID-19, the industry faced numerous challenges for small, medium-sized, and large-scale enterprises. So that needs study and is necessary for the manufacturing sector as well as the printing industry. To corelate impact of COVID-19 on the Indian printing industry, with special reference to sales volume in INR.

Research Methodology

In this study, all of the data were in balanced panel form, and the random affect regression model was used. However, the Hausman specification test for the hypothesis was rejected, so the fixed affect regression model was used. of sales, profit after tax, and total assets of 2015-21 time series data for the impact of the COVID-19 on the Indian printing industry.



Random effect models

A random effect model may be defined as the interference variable being interconnected between cross-section/individual and time series and is called a random effect regression model. The random effect model, also known as the error component model, and the generalised least square technique $i = 1, 2, 3, \dots, 87$ and $t = 2015, 2016, \dots, 2021$

Random effect equation $y_{it} = \alpha + \beta' X_{it} + u_i + E_{it}$

N = the number of companies or cross-section

" T = time periods

E_{it} = time series and cross section residual

Individual residual = U_i

Hausman test

Hausman test is determine whose is the best model between random effect model and fixed effect model. The Hausman test was significant and the p value was less than 0.05, so the null hypothesis was rejected. The statement was the null hypothesis rejected, so that the random effect regression model was not appropriate for that panel data discussion. Now we run the fixed effect model.

Fixed Effect Model(FE)

A fixed effect regression model may be defined as the different individual and cross-section and different intercepts due to varying companies' having different management, different work, and different incentive cultures, and is called a fixed effect regression model. n is the number of cross-sections and individuals, and t is the time series. The N number of companies was 87. The time series was 2015, 2016...2021 means a 7-year series. E_{it} is the residual combination of individual and cross-section time of the model.

$y_{it} = \alpha + \beta_1 X_{it} + \beta_2 X_{it} + E_{it}$; fixed effect equation

Data collection & analysis

During the data collection, 87 companies per sales, profit after tax, and total assets per crore (2015–21) 7-year data was collected. All the data is converted into panel data format. Each and every component has 609 observations. Panel data is imported into the data analysis EViews software for the random effect model. In the panel data, there are three parameters: sales, profit after tax, and total assets. But regression is mainly divided into two types: simple regression and multiple regression. The panel data has three parameters, so a simple regression model was not executive. So, they used the multiple regression model, in which you need the dependable and undependable variables. In this regression model, sales were a dependable variable and profit after tax and total assets were undependable variables. The EViews random effect regression model output is shown below.



III. RESULT AND DISCUSSION

Random effect model

Table of random effect model output

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTAL_ASSETS	0.480973	0.015857	30.33140	0.0000
PAT	0.997917	0.090360	11.04375	0.0000
C	147.5678	27.10021	5.445265	0.0000

Effects Specification		S.D.	Rho
Cross-section random		236.4638	0.7656
Idiosyncratic random		130.8300	0.2344

Weighted Statistics			
R-squared	0.607111	Mean dependent var	83.74590
Adjusted R-squared	0.605815	S.D. dependent var	227.6552
S.E. of regression	142.9314	Sum squared resid	12380214
F-statistic	468.2109	Durbin-Watson stat	1.768576
Prob(F-statistic)	0.000000		

Unweighted Statistics			
R-squared	0.869751	Mean dependent var	409.1325
Sum squared resid	63643769	Durbin-Watson stat	0.344030

In the random effect regression model sales was a dependable variable, profit after tax and total assets was undependable variable. According this model equation;

$$\text{Sales} = c + \beta_1 \text{PAT} + \beta_2 \text{TA} + u_i + E_{it}$$

$$\text{Sales} = 147.56 + 0.48\text{PAT} + 0.99 \text{TA}$$

If profit after was increased by one unit, sales would also increase by 0.48 units. Another factor remains constant. If total assets increased by one unit, sales would increase by 0.99 units if all other factors remained constant. In the profit after tax and total assets, the p value is 0.0000, so that the chance of error was negligible. If the p value is greater than 5%, the result of this model was not considered because the model's error rate is very high. The model's output will be considered if the p value is less than 5%, indicating that the model has a very low chance of error.

Correlated Random Effects - **Hausman Test**

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	119.291564	2	0.0000

The Hausman test was to determine which model is best between the random effect and fixed effect regression models. If the cross section random prob p value is greater than 5%, then the random effect regression model was better as compared to the fixed effect regression model for the panel data. However, the cross section random prob p value is now less than 5%, indicating that the Hausman test is significant, and we run the fixed model on panel data.

Fixed effect model

Table of fixed effect model output

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTAL_ASSETS	0.253942	0.027062	9.383577	0.0000
PAT	0.808653	0.092065	8.783540	0.0000
C	265.1268	14.80966	17.90229	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.981785	Mean dependent var	409.1325
Adjusted R-squared	0.978702	S.D. dependent var	896.4764
S.E. of regression	130.8300	Akaike info criterion	12.71997
Sum squared resid	8900576.	Schwarz criterion	13.36472
Log likelihood	-3784.230	Hannan-Quinn criter.	12.97079
F-statistic	318.4932	Durbin-Watson stat	1.837648
Prob(F-statistic)	0.000000		

In the fixed effect regression model sales is a dependable variable, undependable variable profit after tax and total assets. Equation of the fixed effect model;

$$y_{it} = \alpha + \beta_1 X_{it} + \beta_2 X_{it} + E_{it}$$

$$\text{sales} = 265.12 + 0.253942 \text{ TA} + 0.808653 \text{ PAT}$$

In the fixed effect model, total assets will increase by one unit and sales will increase by 0.253 units. Another factor was constant. If profit after tax is increased by one unit, then sales will be 0.808 increased and another factor will be constant. All values have a p-prob less than 0.5, indicating that they are significant.

R-squared is the coefficient of the determination it means 98.17% of the independent variable was depend on the dependable variable. The coefficient of the determination mean independent variable is adjusted R-squared. Its advanced prediction as compared to the R-square the adjusted R-square value is 0.978702, which means 97% depends on the dependable variable. S.E. of regression means standard error of regression. Its smaller value is better. Log likelihood is the difference between the log likelihood values of the restricted and unrestricted versions of the model. F-Statics Prob (F-statistic) the probability value of 0.0000 is the probability value that indicates the statistical significance of the *F* statistic. You will prefer to have a p-value that is less than 0.05. F Statics represents the combined effect of independent variables on dependable variable, but the prob value is less than 0.5 (5%). The result is significant. The mean value of the dependable variable is 409.1325 crore. The standard deviation of the dependable variable is 896.4764. A Durbin-Watson statis used to find out if there is first-order serial correlation in the error terms. As a general rule, DW 2 equals evidence of positive serial correlation.

IV. CONCLUSION

In this research paper, sales, profit after tax, and total assets of (2015–21) 7 years of 87 companies across India were converted into the balance panel data format. Integrate panel data analysis into EViews software. We run the random effect model on the balance panel data. In the random effect model output, R square and adjusted R square values are 60%, which means the mean corelation between dependable variable and undependable variable is 60%. After the random effect model, we run the Hausman test to determine which model is best in the random and fixed effect regression models. According to the output of the Hausman test, the prob value was 0.0000, so it represented the null hypothesis. Then we run the fixed effect regression model. According to the fixed effect model output, R square value is 0.9817. It means R square is 98%. So that proves the correlation between sales, profit after, and total assets was 98%.

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