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## STATISTICAL MODELING OF DIGITAL PAYMENTS

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**Abstract:** Digital Payments have been increasing in India. Cashless economy and paperless economy have been the key words for the development of the nation. Digital Payments are increasing due to infiltration of Digital technologies and Financial Inclusion. Under Digital Payments, there are many types. Among them, one is Retail Digital Payments. The Retail Digital Payments are the payments which are generally concentrating the retail sector in the country. Retail Digital Payments are the digital payments which have been done in the retail industry by the customer to the retailers. Retail Digital Payments have contributed to the development of Digital Payments in India. This paper deals with the extent to which retail digital payments have contributed to the Digital Payments. The Contribution of Retail Digital Payments towards Digital Payments can be framed under a linear regression model.

**Index Terms:** Digital Payments, Retail Digital Payments, Linear Regression Analysis.

### I INTRODUCTION:

To achieve the cashless economy and paperless economy, Digitalization was initiated in India. After Digitalization, Digital payments have taken greater heights in the country. Digital Payments are those payments where financial transaction takes on digital platforms like UPI, NACH, IMPS, Credit Card and Debit Card etc. Digital Payments have helped financial Inclusion to infiltrate in the Indian scenario. The Digital Payments have been done successfully at all the levels of the market. Among them one of the most important levels is Retail Industry. Under Business levels, Retail Industry is one such industry which has played an important role in getting the direct contact with the customer. Retail Industry helps in knowing the customer lively and understands the necessities of the customers. Retail Industry in India is also moving towards Digital Payments. Digital Payments done in the Retail Sector of the market is called as Retail Digital Payments. Retail Digital Payments are part of Digital Payments. Retail Digital Payments have grown successfully in India. Growth in Retail Industry has simultaneously seen rise in growth of Retail Digital Payments. Availability of Digital Platforms has boosted the use of Digital Payments in the Retail industry. Not only that but it has also managed to reach the customers' queries and problems more effectively. The share of Retail Digital Payments to the Digital Payments can be evaluated by understanding the statistical relationship between these two parameters. The Statistical relationship will give the exact understanding about to what extent Retail Digital Payments are contributing to the Digital Payments.

### II LITERATURE REVIEW

To spread the idea of Digital payments and Digital literacy, Government of India initiated Program called 'Pradhan Mantri Gramin Digital Saksharta Abhiyan'(PMGDISHA) [S Sahayaselvi (2017)]. Also the rise in Digital payments has occurred due to usage of technology [K. Suma Vally and K. Hema Divya (2018)]. The factors of Digital Environment such as usage of smartphone and Internet users have promoted Digital Payments. India is under transformational phase where the digital payments are increasing day by day [Dr. G. Ilankumaran(2019)]. In the coming days India will be moving towards Digital Payments [Dorothy Sagayarani (n.d.)]. There are many technological platforms which are available for Digital Payments. New technologies are coming up to replace the present technologies for better customer service. [1 Prof. Sana Khan, 2Ms. Shreya Jain(2018)]. Digital Payments have infiltrated so much in India that small retail shops have also started using this option for better transaction and better business [ Ravi Seethamraju, Krishna Sundar Diatha(2018)]. Due to Digitalization there has been large cost savings in retail market. Digitalization has also affected the retail industry. Online Retail industry is turning its pace from cash paid transactions to Digital transactions. SIFMIs and Retail payments are the important components of Digital Payments. SIFMIs and Retail Payments have contributed upto 11% and 89% independently for the year 2017-18 in India [Ravikumar T., Murugan N., Suhashini J., Rajesh R ( 2020)]. Retail Digital Payments in India can be increased to a greater extent by building a strong security towards the cashless transactions[Subho CHATTOPADHYAY, Payal GULATI, Indranil BOSE(2018)]. The contribution of Retail Digital Payments towards Digital payments can be framed using regression analysis.

### III METHODOLOGY

#### Sample Size:

Five years sample size has been taken from 2014-15 to 2018-19. The sample has been taken from 2014-2015 because the Digitalization was initiated from the year 2015.

#### Data and Sources of Data

Secondary source has been taken as the source of data collection. Data has been taken from <https://m.rbi.org.in/Scripts/PublicationsView.aspx?id=19417>

#### Theoretical Framework:

The two variables which have been taken are Digital Payments and Retail Digital Payments. Here Digital Payments is taken as dependent variable and Retail Digital Payments have been taken as independent variable.

#### Hypothesis:

Null Hypothesis and Alternate Hypothesis have been framed for analysis. Under Null Hypothesis, Digital Payments and Retail Digital Payments are independent of each other. Under Alternate Hypothesis, Digital Payments and Retail Digital Payments are dependent of each other.

H0: Digital Payments and Retail Digital Payments are not related to each other

H1: Digital Payments and Retail Digital Payments are related to each other

#### Data Recording:

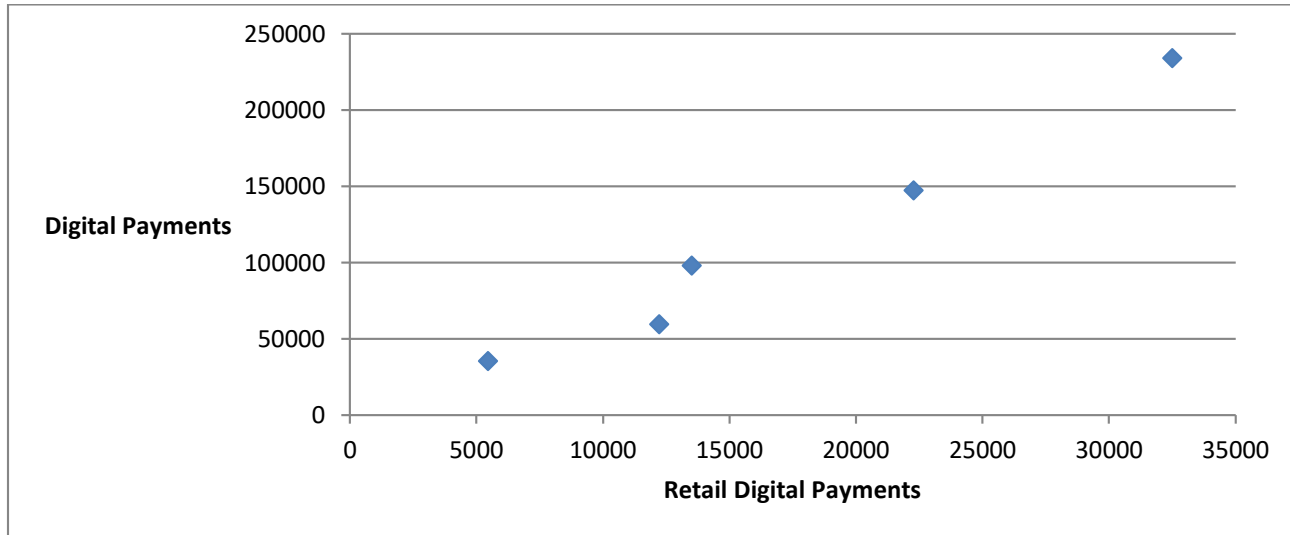
The data has been recorded in lakhs from year 2014-15 to 2018-19 for both Digital payments and Retail Digital Payments.

Year	Retail Digital Payments(Lakhs)	Digital Payments(Lakhs)
2014-15	5455	35200
2015-16	12230	59500
2016-17	13516	97800
2017-18	22271	147100
2018-19	32509	233900

## IV DATA ANALYSIS

## SCATTER DIAGRAM:

Scatter Diagram is drawn between two variables which are Digital Payments and Retail Digital Payments. Independent variable is drawn on X axis and dependent variable is drawn on y axis. Retail Digital Payments governs the X axis and Digital Payments governs the y axis.



## CORRELATION ANALYSIS

X	Y	X <sup>2</sup>	Y <sup>2</sup>	XY
5455	35200	29757025	1239040000	192016000
12230	59500	149572900	3540250000	727685000
13516	97800	182682256	9564840000	1321864800
22271	147100	495997441	21638410000	3276064100
32509	233900	1056835081	54709210000	7603855100

## Correlation Coefficient Calculation

$$r = \frac{n(\sum XY) - (\sum X)(\sum Y)}{\sqrt{[n\sum X^2 - (\sum X)^2][n\sum Y^2 - (\sum Y)^2]}}$$

$$\begin{aligned} \sum XY &= 13121485000 \\ \sum X &= 85981, \sum Y = 573500 \\ \sum X^2 &= 1914844703, \sum Y^2 = 90691750000 \end{aligned}$$

By Substituting all the value in the above equation the value of r is calculated.

$$r = 0.98868127$$

**REGRESSION ANALYSIS:** Regression Analysis consists of dependent variable and independent variable. Retail Digital Payments is taken as independent Variable and Digital Payments is taken as dependent variable.

X	Y	X- $\bar{X}$	Y- $\bar{Y}$	(X- $\bar{X}$ ) <sup>2</sup>	(X- $\bar{X}$ )(Y- $\bar{Y}$ )
5455	35200	-11741.2	-79500	137855777.4	933425400
12230	59500	-4966.2	-55200	24663142.44	274134240
13516	97800	-3680.2	-16900	13543872.04	62195380
22271	147100	5074.8	32400	25753595.04	164423520
32509	233900	15312.8	119200	234481843.8	1825285760
85981	573500	0	0	436298230.8	3259464300

Formula for Regression Equation

$$b = \frac{\sum(X-\bar{X})(Y-\bar{Y})}{\sum(X-\bar{X})^2}$$

$$b = 7.470725458$$

$$(Y-\bar{Y})=b(X-\bar{X})$$

$$Y-114700= 7.470725458 (X-17196.2)$$

$$Y = 7.470725458X-128468.0891+114700$$

$$Y= 7.470725458X-13768.0891$$

## V RESULTS AND DISCUSSION:

### I. Scatter Diagram:

The above scatter diagram signifies the following points:\

1. The scatter values lie in the first quadrant of the XY Plane.
2. Almost a straight line trajectory is being formed.
3. Scatter values have stretched over the XY Plane.
4. As the values lie in the XY Plane, it forms a positive relationship between Digital Payments and Retail Digital Payments.

### II. Correlation Coefficient's Findings:

- 1) The value of correlation coefficient is 0.98868127
- 2) Correlation Coefficient is very close to 1.
- 3) Retail Digital Payments and Digital Payments, both are positively correlated to each other..

From the above analysis, it can be seen that there is a correlation between two variables. Hence Null Hypothesis is rejected. Retail Digital Payments and Digital Payments both are related to each other

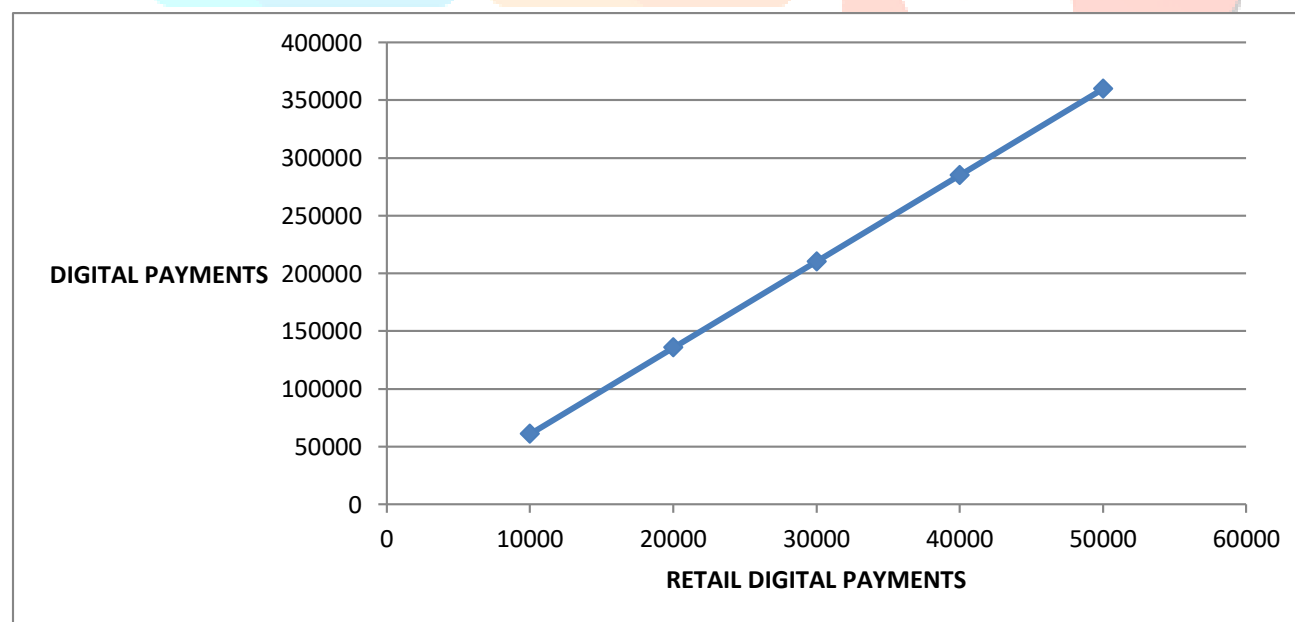
### III. Regression Analysis findings:

- 1) The Value of Regression Coefficient is 7.470725458.
- 2) The value of constant is -13768.0891.
- 3) Slope of the regression line  $Y = 7.470725458X - 13768.0891$  is positive.

### CROSS VERIFICATION:

Cross Verification of generated regression model can be done by drawing the graph of it.

Retail Digital Payments	Digital Payments
10000	60939.16548
20000	135646.4201
30000	210353.6746
40000	285060.9292
50000	359768.1838



### VI CONCLUSION

Digital Payments and Retail Digital Payments, both are positively correlated to each other. Digital Payments and Retail Digital Payments, both have linear regression relationship with each other with a slope of 7.470725458 and a constant of -13768.0891.

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