

## **INFLUENCE OF OWNERSHIP PATTERN ON FINANCIAL PERFORMANCE OF AUTOMOBILE FIRMS IN INDIA**

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### **Abstract**

The present study attempts to focus on the relationship between ownership pattern and financial performance of selected automobiles firms in India working in the car manufacturing sector during the period 2015 – 2022 which also includes the COVID-19 pandemic period. It also evaluated the influence ownership pattern variables (institutional, managerial, and foreign) on firms' performance (Return on Assets and Return on Equity). The study based on secondary, adopting correlation and regression technique and observe that Indian promoters and foreign ownership has positive and significant influence on firms value while other pattern has insignificant. In this study tries to light on influence of ownership pattern on corporate performance.

**Keyword:** Ownership pattern, institutional and foreign ownership, financial performance and COVID-19

### **INTRODUCTION:**

This research seeks to analyze the influence of equity ownership structure on firm financial performance of Indian automobile sectors and focuses on the role of three main dimensions of the ownership structure, ownership identity (especially institutional investors and foreign investors) and Indian promoters investors. Ownership is one of the most important mechanisms of corporate governance. The relationship between ownership structure and performance is a

vital and continued subject in the field of financial management (Ezazi, Sadeghi Shari, Alipour & Amjadi, 2011)

The automobile industry is one of the fastest rising industries in India. Its contribution in the GDP of India is one of the largest in the world. This industry is the sixth largest in the world in terms of passenger car and commercial vehicle manufacturing and also helps to raise foreign currency by exports averagely of 1.5 million vehicles every year. (R, Rajavathana, 2012).

**Financial Performance:**

Financial performance refers to the assessment of a company's overall position *vis a vis* its liquidity, assets, liabilities, share capitals, overall profit earning expenses and revenue aspects. It is measured through various accounting related formulas that allow financial users to analyze exact details regarding a company's potential effectiveness. For internal users, financial performance is examined to determine a company's well-being and standing, among other benchmark, that will give them upcoming growth. For external users, financial performance is analyzed to dictatd potential investment opportunities.

**Ownership pattern / structure:**

The form of organization whether domestically owned or foreign owned has an important bearing on the success of the enterprise. The right choice would promote good administration which would lead to sound management and efficient production or service. On the other hand, a wrong choice could hinder good administration which would result into uneconomic production, inefficient service and unscientific management. (Gupta 1984)

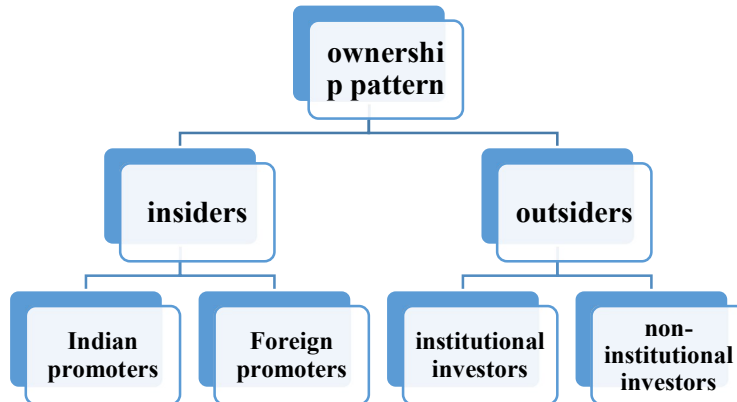
If agency problems can be ascribed to the fact that firms are incorporated, no longer can firm value and investment decisions be expected to be independent from ownership structure and concentration (Smith 1776). Shareholding pattern shows how the total equity shares outstanding in the company are divided among various stakeholders. It shows how ownership is divided among the entities that constitute are its owners. It consists of the following extensive divisions that are further alienated in various categories:

**Table-1 classification of ownership**

<p><b>Promoter Shareholding</b> (responsible for floating the company)</p> <p><b>A. Domestic Promoters</b></p> <ol style="list-style-type: none"> <li>1. Individuals</li> <li>2. Government</li> <li>3. Corporate Bodies</li> <li>4. Financial Institutions/Banks</li> </ol> <p><b>B. Foreign Promoters</b></p> <ol style="list-style-type: none"> <li>1. Individuals (NRI/Foreigners)</li> <li>2. Corporate Bodies</li> <li>3. Institutions</li> <li>4. Qualified Foreign Investors</li> </ol>	<p><b>2. Public Shareholding</b></p> <p><b>A. Institutions</b></p> <ol style="list-style-type: none"> <li>1. Mutual Funds</li> <li>2. Financial Institutions/Banks</li> <li>3. Government</li> <li>4. Venture Capital Funds</li> <li>5. Insurance Companies</li> <li>6. Foreign Institutional Investors (FIIs)</li> <li>7. Foreign Venture Capital Investors</li> <li>8. Qualified Foreign Investors</li> </ol> <p><b>B. Non-Institutions</b></p> <ol style="list-style-type: none"> <li>1. Corporate Bodies</li> <li>2. Individuals</li> <li>3. Others such trusts clearing members NRIs, etc.</li> <li>4. Custodians (in case of foreign depository receipts)</li> </ol>
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Source: sptulsian.com

**Fig.1 Types of ownership Pattern/structure**



In this study the automobile sectors which taken for analysis, the ownership pattern divided into three categories such as Indian promoters group, institutional investors and foreign investors because such company generally is manufacturing company.

**LITERATURE REVIEW**

Many studies previously analyzed different aspects of Covid pandemic influences on people’s standard of living and GDP of countries and their growth and also the effect on financial performance of difference industries but here the study based on the ownership pattern factors

refer to the shareholding pattern which taken or hold by difference persons and institutions within the country and out of country, while Return on Assets and Return on Equity (ROE and ROA) are considered as parameters of financial performance. That use to analyze the relation between different variables used in this study. The studies considered as literature review are mentioned below:

- **Abor, (2005).** This study reveals that permutation factors affect the firm's performance and earning ability and shows how effectively companies manage their resources. But an adverse impact is noticed in long-term debt to profitability articulated through return on equity.
- **Huang and Song, (2006) Chakraborty, 2010)** This research carried on in the Chinese firms concludes that an adverse correlation between leverage and performance of a company depends on the ratio to earnings before interest and tax to total assets.
- **Serghiescu and Vaidean, (2013)** In this research, impact of financing decision on performance and profitability was analyzed for capital structure determinants. In this analysis, no significant impact was found among capital structure choices and financial performance of selected firms. The literature shows mixed impact of the disaster on the choice of capital structure during recessions. The survey conducted by Cappello, Graham & Harvey in 2010 (in US, Europe and Asia) on the effect of financial fetters during financial crises supported the usage of internal funding and requirement on bank credits.
- **Indeed, Busta (2007)** in this study, he wants to analyzed the effect of majority ownership on financial performance and identified to role of this relationship over a period (1993-2005) while using GMM estimation of dynamic panel or panel data technique on a sample from European bank. Then found that concentration of ownership has been a negative effect while the level of ownership pattern from 50%, increased competition that may be benefitted for bank. His recommendation is that after the legal defense pay for to minority shareholders, it can be better favorable for bank.
- **Riewsathiratorn et al (2011)** in this research, to defined two different things about the concentration of ownership variables in which first is the ownership concentration and financial performance showed a positive relationship in between, wen (2010) and reduces the performance of bank because the concentration of ownership is required more operating cost.
- **Aymen Mohamed Ben Moussa. (2014)** examined the effect of ownership structure on financial performance of bank in Tunisia through used a sample of nineteen banks from the professional association of banks in Tunisia for the period 2000 to 2010 and found that there was no influence of capital structure on the bank's financial performance in the selected country context.
- **Lee Sanghoon (2008)** the research seeks to analyzed the impact of equity ownership structure on South Korea firms' financial performance and the study period was 2000-2006. He used panel data technique to identified it he focuses on the role of two variables that is concentration of ownership and identity of owners (especially, foreign ownership and institutional ownership) he firms financial performance found that the effect of institutional investors and foreign investors are insignificant, but it improves

as concentration of ownership increase. The empirical analysis founds shed light on vital role of ownership pattern plays in corporate performance of the firms.

- **Lawal Rodiat, Yahaya Khadijat (2018)** in this study, analyzed the impact of ownership structure on firms worth of Nigerian deposit money banks and examined the relationship between ownership structure variables (foreign, concentrated and managerial) on financial performance (ROA and ROE) for the period of 9 years (2008-2016). Found that others variables have insignificant impact on financial performance while only institutional investors positive and significant effect. He also recommended for control over the management institutional shareholders learn and expertise to exercise and best utilized their resources.
- **Yixiang Zhou (2011)** in this research paper he chooses sample size 509 listed companies of Shenzhen and Shanghai for the period of 10 years (1999 - 2008) and on the basis of used static or dynamic panel technique the proportion of managerial ownership is uncorrelated; the relationship not stable and corporate performance and proportion of large shareholding is a two-way interaction effect between variables used.

#### RESEARCH METHODOLOGY:

- A. Objectives** The main objectives of the research are narrated thus: (a) to analyze the components of ownership pattern/structure that affect the financial performance of automobile firms in India; (b) to analyze the influences factors of ownership structure on performance of Indian automobile industry; (c) to analyze the association between ownership pattern (especially considered promoters groups, institutional ownership and foreign ownership) and financial performance (Return on Assets, ROA and Return on Equity, ROE); and (d) to analyze the effect of ownership structure on Indian automobile industry.
- B. Sample** In this research, the sample analyzed includes selected automobiles firms listed in National Stock Exchange (NSE) and Bombay Stock Exchange of India (BSE). Here also one sector was chosen in order to find out correct outcome and to reduce the false results. The factor, such as economic risk, varies in corporate terms and affects the capital structure decisions.
- C. Nature and type of research** the research which is descriptive in nature focuses on what is currently in existence; what can be the new fact and meaning. In this process, attempt has been made to observe, narrate and undertake documentation of the identified subject in a way it naturally happens.

In this study was panel data model employed on the basis of the model used by Lawal Rodiat, Benjamin et al. (2018). For each cross-section variables as unit  $i$  and time  $t$  the following model is predictable:

$$PERFORMANCE_{it} = \beta_0 + \beta_1 MOWN_{it} + \beta_2 INOWN_{it} + \epsilon_{it}$$

Where: Where:  $PERFORMANCE_{it}$  stand for dependent variable (Return on Equity and Return on Asset),  $B$  stand for the model parameters  $MOWN_{it}$  is managerial ownership and  $INOWN_{it}$  is institutional investors.

Here this model was used as modified below:

$$PEFORMANCE_{it} = \beta_0 + \beta_1 IPOWN_{it} + \beta_2 INOWN_{it} + \beta_3 FOWN_{it} + \epsilon_{it}$$

Where:

Performance = Financial performance (performance factors with ROA and ROA)

FOWN = Foreign ownership, IPOWN = Indian promoters ownership

INOWN = Institutional Ownership

$\beta_0$  = the intercept or constant;  $\beta_1$ -  $\beta_3$ = are the parameters;  $\mu$  = error term;  $i$  = number of firms;  $t$  = time period 7 years (2015-2022)

A priori expectation is that  $\beta_1$ ,  $\beta_2$ , and  $\beta_3$ ,  $> 0$

- D. Source of data** in this study, data were collected by using secondary source. The data were especially collected from audited annual report of firms, books, internet, related articles, magazines, newspapers and National Stock Exchange of India, etc.
- E. Sampling techniques** in this study, judgement sampling method was adopted and this was selected based on knowledge and professional judgement.
- F. Period of study** period of study cover 2014-21 which includes the Covid pandemic period.
- G. Variables** Here, there are three independent variables the institutional ownership, foreign ownership and promoters groups. Out of these variables to identified the relationship with firms' performance regression model has been used. Three performance factors were taken as dependent variables – (a) Return on Assets as net income to total assets, (b) Return on Equity, the ratio of net income the equity shareholders, and (c) Tobin's Q, that is, market indicator of firms or the market value of the company divided by its asset's replacement cost.

**Table 2 Variable definition**

Variables	Definition's
Return on assets	This is calculated by dividing earnings after interest and tax into total assets of firms or net income to total assets which is based on the study of Jiraporn an Liu (2018)
Return on equity	The ratio of net income to the equity shareholders or calculate by dividing profit after interest and tax into total equity of the firms which is based on the research of Tian and Zeitun (2007)

Tobin's Q (TQ)	That is market indicators of firms or the market value of the firms divided by its asset's replacement cost. This ratio is the total assets value of the firm divided by its market value. (First develop by Nicholas Kaldor in 1996) <sup>1</sup> .
Institutional Ownership	As the number of shares held by institutional investors to the total shares issued by firms which is based on the study Lamba and Stapledon (2001) and Kouki and Guizani (2009)
Foreign Ownership	Out of total numbers of share issued which the total of shares held by foreigners. Which is based on measured in line with Salehi, Mohamoud and Heydari (2012)
Indian Promoters groups / managerial ownership	As the proportion of shares hold by Indian promoters, managers and executive directors divided by total number of shares issued by the companies. Which is based on measured in line with Salehi, Mohamoud and Heydari (2012).

**H. Limitations** in this research paper there are some limitations: the period of study limited, in this study considered only one industry of India and based on secondary source of data.

### I. Result and discussions

**(1) Expressive statistics** Table3 is below reflects summery of variable used in the research analysis to make general observations about data used through expressive statistics measure dispersion and central tendency which are useful for it. In this study, report on the pattern of data, the trends and helpful for comparisons between variables.

**Table 3: Expressive Statistics data**

Variables	Mean	Standard Deviation	Minima	Maxima
ROE	26.45	22.132	-14.2	243.14
ROA	0.301	0.289	- 0.400	0.282
TQ	5.105	6.059	0.162	53.460
IPOWN	39.202	26.221	0.012	95.27
FOWN	12.081	23.001	0.01	73.50
INOWN	27.527	14.201	0.1	76.85

In this empirical analysis include data of 10 Indian listed automobile firms over a period of 7 years. Which shown the whole of companies' essential information (Ownership Structure, performance parameters and others specific information of firms) during the sampling period

of this analysis from 2015 to 2022. In the expressive statistic show in Table-3 mean, standard deviation, minima and maxima value of studying variables of selected firms.

In this table the mean value of Indian promoters' ownership (IPOWN) is highest at 39.20% while the foreign ownership holding is just 12.08%. the maximum ownership pattern for IPOWM, FOWN, and INOWN are 95.27, 73.50 and 76.85% respectively its means IPOWN shareholding varies between 0.12 and 95.27. in considered to dependent variables out of that ROE with mean, standard deviation, minima and maxima is highest while ROA is low. On the basis of this table, we say that Indian promoters are having the highest average holding, the dependent variable are wide variation in their value and Tobin's Q indicate that market value of assets are greater than their book value.

**(2) Correlations** The correlations between variables are presented in Table 4 below. The correlation represents that institutional ownership has adverse impact on ROA and ROE, while Indian promoters holding and foreign ownership significantly effect on both the financial performance indicators variables. There is a high correlation between ownership structure and firms value. The table show that all three independent variables have significant positive correlation with each of dependent variables used in this study.

**Table-4 Correlation among variables**

	Roa	roe	Ipown	fown	inown	Infl
roa	1.					
roe	0.146	1				
Ipown	-0.685	-0.076	1			
Fown	-0.411	-0.095	-0.0769	1		
Inown	-0.289	-0.168	-0.155	-0.040	1	
infl	0.097	0.079	0.112	-0.062	-0.057	1

In order to avoid false variable correlations, unit-root tests were made functional to the panel data. Fisher test was used because of the missing value in the variable set. The verified analysis found that all panels comprise of unit-root and it failed to accept presentation that all variable considered have an immobile trend. In this study, to analyze the relationship between Ownership pattern and financial performance of automobiles industry of India, the influence factors of financial performance, that is, Return on Assets, Return on Equity and Tobin's Q as a dependent variable were considered and Indian promoters shareholding, institutional ownership and foreign ownership as independent variables correlation technique were used to analyze the measure factors of performance.

## CONCLUSIONS:

The study for the period 2015-2022 that include the covid period show that most of the automobile car manufacturing companies which financial performance were affected by ownership structure. In the performance parameter, Indian promoters and foreign ownership



has a positive association with Return on Assets and Return on Equity (ROA and ROE) in addition IPOWN is found to be statistically important and certainly correlated to Tobin's Q. While institutional ownership has insignificant impact.

Automobile industry should undertake some initiatives to build their financial performance by optimal ownership pattern, reducing price and giving some initiative offer during such type of pandemic period and should take steps for better understanding as to how capital mix may influence the financial performance of Indian automobile industry-

On the basis of analysis conclude that the study thereafter recommends that foreign and promoters ownership should be ongoing taking their knowledge, expertise, power and resources to exercise whole management abuse of authority that can affect the financial performance of Indian firms. For further research will be done in this area especially considering different and more than industry and other types of ownership structure.

## REFERENCES:

- ✓ Serghiescu, L., Vaidean V.L. (2013) *Determinant factors of the capital structure of a firm – an empirical analysis*, Working paper EMQFB Tg Mures 2013.
- ✓ Abor. (2005) *the effect of capital structure on profitability an empirical analysis of listed firms in China*, *risk finance journal*, 6(5), pp.438-447
- ✓ Huang, S., Song, F. (2006) *The determinants of capital structure: evidence from China*, *China Economic Review*, 17(1), pp.14-36
- ✓ Aymen Mohamed Ben Moussa. (2014) "Impact of ownership Structure on Financial performance of Banks: Case of Tunisia" *Journal of Applied Finance & Banking*, vol. 4, no. 2, 2014, ISSN: 1792- 6580, pp.163-182
- ✓ Lee, Sanghoon (2008): *Ownership structure and financial performance: Evidence from panel data of South Korea*, Working Paper, No. 2008-17, The University of Utah, Department of Economics, Salt Lake City, UT
- ✓ Lawal Rodiat, Yahaya Khadijat (2018): *in title Effect of ownership Structure on financial Performance of Deposit Money Bank in Nigeria*, *Journal of accounting and Management*, ISSN: 2284 – 9459. JAM vol. 8, no. 2 (2018).
- ✓ Yixiang Zhou (2011): "Empirical Research on Ownership Structure and Corporate Performance Based on the Perspective of Dynamic Endogeneity" *ScienceDirect, Energy Procedia* 5 (2011) 1878-1884.
- ✓ Ansarullah, S. I., Saif, S. M., Andrabi, S. A. B., Kumhar, S. H., Kirmani, M. M., & Kumar, D. P. (2022). *An intelligent and reliable hyperparameter optimization machine learning model for early heart disease assessment using imperative risk attributes*. *Journal of Healthcare Engineering*, 2022. <https://doi.org/10.1155/2022/9882288>.
- ✓ Kumhar, S. H., Ansarullah, S. I., Gardezi, A. A., Ahmad, H., Abd Elgawad, A. E. E., & Shafiq, M. (2023). *Translation of English Language into Urdu Language Using LSTM Model*. *Computers, Materials & Continua*, 74(2), 3899-3912. <https://doi.org/10.32604/cmc.2023.032290>.
- ✓ G. S. P. Ghantasala et al., "Tech-Enabled Banking Revolt: The Transformational Era of IT in the Financial Sector," 2023 Seventh International Conference on Image

- Information Processing (ICIIP)*, Solan, India, 2023, pp. 133-136, doi: 10.1109/ICIIP61524.2023.10537647.
- ✓ Shaik, R. B., Banu, S. B., Siddiqui, S. A., Jyothi, M. K., Bhaumik, A., Chandini, S., & Aarif, M. (2023). *Organizational Commitment Of Employee A Rising Risk In The Educational Sector*. *Boletin de Literatura Oral-The Literary Journal*, 10(1), 2496-2505.
  - ✓ Banu, S. R., Banu, S. B., Shaik Chandini, D. V., Jyothi, M. K., & Nusari, M. S. (2022). *Assessment of research skills in undergraduates students*. *Journal of Positive School Psychology*, 6938-6948.
  - ✓ S. B. Banu, S. W. Akhtar, S. Arshad, S. R. Banu, S. Chandini and G. P. Ghantasala, "High Heels Are No More an Accessory of Fashion for Women- A Study Unrevealing the Health Effects of Wearing High Heels," 2024 10th International Conference on Communication and Signal Processing (ICCSP), Melmaruvathur, India, 2024, pp. 406-410, doi: 10.1109/ICCSP60870.2024.10543799.
  - ✓ Sahu, G., Anant, M., & Tiwari, S. *The Impact of Social Media on the Positive Development of Teenagers in the Contemporary age*
  - ✓ Sahu, G., Anant, M., Tiwari, S., & Gupta, T. C. (2024). *SEZ-Led Economic Growth: Evaluating The Impact Of Export Promotion Policies On Developing Countries, With A Focus On India—An Analytical Study*. *Educational Administration: Theory and Practice*, 30(4), 1215-1220.
  - ✓ Sahu, G., Anant, M., & Tiwari, S. (2023). *Information and Communication Technology (ICT) in the context of Rural Women Empowerment*. *The journal of contemporary issues in business and government*, 29(3), 323-329.
  - ✓ Sahu, G., Anant, M., & Tiwari, S. *The Impact of Social Media on the Positive Development of Teenagers in the Contemporary age*.
  - ✓ Malik, A., Gautam, S., Abidin, S., & Bhushan, B. (2019, July). *Blockchain technology-future of IoT: including structure, limitations and various possible attacks*. In *2019 2nd international conference on intelligent computing, instrumentation and control technologies (ICICT)* (Vol. 1, pp. 1100-1104). IEEE.
  - ✓ Abidin, S., Swami, A., Ramirez-Asís, E., Alvarado-Tolentino, J., Maurya, R. K., & Hussain, N. (2022). *Quantum cryptography technique: A way to improve security challenges in mobile cloud computing (MCC)*. *Materials Today: Proceedings*, 51, 508-514.
  - ✓ Abidin, S., Vadi, V. R., & Rana, A. (2021). *On confidentiality, integrity, authenticity, and Freshness (CIAF) in WSN*. In *Advances in Computer, Communication and Computational Sciences: Proceedings of IC4S 2019* (pp. 87-97). Springer Singapore.
  - ✓ Sucharitha, Y., Vinothkumar, S., Rao Vadi, V., Abidin, S., & Kumar, N. (2021). *Wireless communication without the need for pre-shared secrets is consummate via the use of spread spectrum technology*. *J Nucl Ene Sci Power Generat Techno*, 10(9), 2.
  - ✓ Abidin, S. (2019). *Enhancing security in WSN by artificial intelligence*. In *International Conference on Intelligent Data Communication Technologies and Internet of Things (ICICI) 2018* (pp. 814-821). Springer International Publishing.

- ✓ Bhoopathy, V., Behura, A., Reddy, V. L., Abidin, S., Babu, D. V., & Albert, A. J. (2021). *WITHDRAWN: IOT-HARPSECA: A SECURE DESIGN AND DEVELOPMENT SYSTEM OF ROADMAP FOR DEVICES AND TECHNOLOGIES IN IOT SPACE*.
- ✓ Abidin, S. (2017). *Greedy Approach for Optimizing 0-1 Knapsack Problem*. *Communications on Applied Electronics*, 7(6), 1-3.
- ✓ aqid, M., Jawed, M. S., Abidin, S., Shahid, M., Ahamad, S., & Singh, J. *Capacitated Vehicle Routing Problem Using Algebraic Harris Hawks Optimization Algorithm*. In *Intelligent Techniques for Cyber-Physical Systems* (pp. 183-210). CRC Press.
- ✓ Abidin, S., Raghunath, M. P., Rajasekar, P., Kumar, A., Ghosal, D., & Ishrat, M. (2022, July). *Identification of disease based on symptoms by employing ML*. In *2022 International Conference on Inventive Computation Technologies (ICICT)* (pp. 1357-1362). IEEE.
- ✓ Malik, A., Parihar, V., Srivastava, J., Kaur, H., & Abidin, S. (2023, March). *Prognosis of diabetes mellitus based on machine learning algorithms*. In *2023 10th International Conference on Computing for Sustainable Global Development (INDIACom)* (pp. 1466-1472). IEEE.
- ✓ Vadi, V. R., Abidin, S., Khan, A., & Izhar, M. (2022). *Enhanced Elman spike neural network fostered blockchain framework espoused intrusion detection for securing Internet of Things network*. *Transactions on Emerging Telecommunications Technologies*, 33(12), e4634.
- ✓ Abidin, S., Dhariwal, M. K., Rane, K. P., Sivakumar, G., Babu, D. V., & Kumar, I. R. (2021). *Development and Organize of Wireless Sensor Network in Home Management using IoT*. *International Journal of Aquatic Science*, 12.
- ✓ Chadha, S., Mittal, S., & Singhal, V. (2020). *Ancient text character recognition using deep learning*. *International Journal of Engineering Research and Technology*, 3(9), 2177-2184.
- ✓ Chadha, S., Mittal, S., & Singhal, V. (2019). *An insight of script text extraction performance using machine learning techniques*. *International Journal of Innovative Technology and Exploring Engineering*, 9(1), 2581-2588.
- ✓ Gupta, N., Chauhan, R., & Chadha, S. (2020). *Unmanned Aerial Vehicle (UAV) for Parcel Delivery*. *Int. J. Eng. Res. Technol*, 13(10), 2824-2830.
- ✓ Chadha, S., Chauhan, R., & Gupta, N. (2022). *Flood Prediction And Rainfall Analysis Using LightGradient Boosted Machine*. *NeuroQuantology*, 20(9), 1690.
- ✓ Makkar, I. S., & Chadha, S. (2024, March). *Unsupervised Emotion Matching for Image and Text Input*. In *2024 IEEE International Conference on Interdisciplinary Approaches in Technology and Management for Social Innovation (IATMSI) (Vol. 2, pp. 1-6)*. IEEE.
- ✓ Gupta, N., Chadha, S., Chauhan, R., & Singhal, P. (2023, December). *Damage Evaluation Following Natural Disasters Using Deep Learning*. In *International Advanced Computing Conference* (pp. 90-103). Cham: Springer Nature Switzerland.
- ✓ Gupta, N., Chadha, S., Srivastava, G., & Chauhan, R. (2021, October). *Mortality Rate Extrapolation Based on Symptomatic Symptoms of Novel Corona Virus*. In *2021 5th*

- International Conference on Information Systems and Computer Networks (ISCON)* (pp. 1-5). IEEE.
- ✓ ShikhaChadha, D. S., & Singhal, V. *Ancient Text Character Recognition Using Deep Learning*.
  - ✓ Verma, S., Gupta, N., Anil, B. C., & Chauhan, R. (2022). *A Novel Framework for Ancient Text Translation Using Artificial Intelligence*. *ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal*, 11(4), 411-425.
  - ✓ Mandala, V. (2018). *From Reactive to Proactive: Employing AI and ML in Automotive Brakes and Parking Systems to Enhance Road Safety*. *International Journal of Science and Research (IJSR)*, 7(11), 1992–1996. <https://doi.org/10.21275/es24516090203>
  - ✓ Mandala, V. (2019). *Optimizing Fleet Performance: A Deep Learning Approach on AWS IoT and Kafka Streams for Predictive Maintenance of Heavy - Duty Engines*. *International Journal of Science and Research (IJSR)*, 8(10), 1860–1864. <https://doi.org/10.21275/es24516094655>
  - ✓ Mandala, V. (2019). *Integrating AWS IoT and Kafka for Real-Time Engine Failure Prediction in Commercial Vehicles Using Machine Learning Techniques*. *International Journal of Science and Research (IJSR)*, 8(12), 2046–2050. <https://doi.org/10.21275/es24516094823>
  - ✓ Mandala, V., & Surabhi, S. N. R. D. (2024). *Integration of AI-Driven Predictive Analytics into Connected Car Platforms*. *IARJSET*, 7(12). <https://doi.org/10.17148/iarjset.2020.71216>
  - ✓ Mandala, V. *Towards a Resilient Automotive Industry: AI-Driven Strategies for Predictive Maintenance and Supply Chain Optimization*.
  - ✓ Mandala, V., & Surabhi, S. N. R. D. (2021). *Leveraging AI and ML for Enhanced Efficiency and Innovation in Manufacturing: A Comparative Analysis*.
  - ✓ Mandala, V. (2021). *The Role of Artificial Intelligence in Predicting and Preventing Automotive Failures in High-Stakes Environments*. *Indian Journal of Artificial Intelligence Research (INDJAIR)*, 1(1).
  - ✓ Mandala, V., & Surabhi, S. N. R. D. *Intelligent Systems for Vehicle Reliability and Safety: Exploring AI in Predictive Failure Analysis*.
  - ✓ Mandala, V., & Kommisetty, P. D. N. K. (2022). *Advancing Predictive Failure Analytics in Automotive Safety: AI-Driven Approaches for School Buses and Commercial Trucks*.
  - ✓ Mandala, V., & Mandala, M. S. (2022). *ANATOMY OF BIG DATA LAKE HOUSES*. *NeuroQuantology*, 20(9), 6413.
  - ✓ Mandala, V., Premkumar, C. D., Nivitha, K., & Kumar, R. S. (2022). *Machine Learning Techniques and Big Data Tools in Design and Manufacturing*. In *Big Data Analytics in Smart Manufacturing* (pp. 149-169). Chapman and Hall/CRC.
  - ✓ Mandala, V. (2022). *Revolutionizing Asynchronous Shipments: Integrating AI Predictive Analytics in Automotive Supply Chains*. *Journal ID*, 9339, 1263.
  - ✓ Mandala, V., & Surabhi, S. N. R. D. (2024). *Machine Learning Algorithms for Engine Telemetry Data: Transforming Predictive Maintenance in Passenger Vehicles*. *IJARCCCE*, 11(9). <https://doi.org/10.17148/ijarcce.2022.11926>

- ✓ *Surabhi, S. N. R. D., Mandala, V., & Shah, C. V. AI-Enabled Statistical Quality Control Techniques for Achieving Uniformity in Automobile Gap Control.*
- ✓ *Shah, C. V., Surabhi, S. N. R. D., & Mandala, V. ENHANCING DRIVER ALERTNESS USING COMPUTER VISION DETECTION IN AUTONOMOUS VEHICLE.*
- ✓ *Mandala, V., Jeyarani, M. R., Kousalya, A., Pavithra, M., & Arumugam, M. (2023, April). An Innovative Development with Multidisciplinary Perspective in Metaverse Integrating with Blockchain Technology with Cloud Computing Techniques. In 2023 International Conference on Inventive Computation Technologies (ICICT) (pp. 1182-1187). IEEE.*
- ✓ *Mandala, V., Rajavarman, R., Jamunadevi, C., Janani, R., & Avudaiappan, T. (2023, June). Recognition of E-Commerce through Big Data Classification and Data Mining Techniques Involving Artificial Intelligence. In 2023 8th International Conference on Communication and Electronics Systems (ICCES) (pp. 720-727). IEEE.*

## Bibliography

- ❖ <https://www.google.com/>
- ❖ <https://www.sciencedirect.com/>
- ❖ <https://ggu.ac.in/CentralLibrary.aspx>
- ❖ <http://www.jstor.org/>
- ❖ <https://www.yourarticlelibrary.com/financial-management/capital-structure/capital-structure-meaning-concept-importance-and-factors-accounting/65150>
- ❖ <https://corporatefinanceinstitute.com/resources/knowledge/finance/financial-performance/>
- ❖ <https://www.tandfonline.com/doi/full/10.1080/1540496X.2020.1784717>
- ❖ [https://www.who.int/health-topics/coronavirus#tab=tab\\_1](https://www.who.int/health-topics/coronavirus#tab=tab_1)
- ❖ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8014102/>
- ❖ [https://www.researchgate.net/publication/352377261\\_Impact\\_of\\_Covid19\\_on\\_Automobile\\_Industries\\_in\\_India](https://www.researchgate.net/publication/352377261_Impact_of_Covid19_on_Automobile_Industries_in_India)