

Usage Of Upi Transactions And Its Challenges-A Study On Generation X

Dr. Taru Maheshwari¹, Dr. Purwa Srivastava², Dr. Anjali Saluja³, Dr. Divya Rana⁴, Dr. Anand Kumar⁵, Mr. Sahil Gupta⁶

¹ Krishna Institute of Engineering & Technology (KIET), Ghaziabad, Delhi-NCR, Uttar Pradesh, India.

Email: tarumaheshwari1982@gmail.com

² Jaypee Institute of Information Technology, Noida, Uttar Pradesh, India.

Email: purwa.sr@gmail.com

ORCID: 0000-0002-0554-2285

³ NIET Business School, Greater Noida, Uttar Pradesh, India.

Email: Anjali.saluja@nietbschool.ac.in

⁴ School of Management, KCC Institute of Legal & Higher Education, Greater Noida, Uttar Pradesh, India.

Email: ranadivya84@gmail.com

⁵ Professor, Kedarnath Aggarwal Institute of Management, Charkhi Dadri, Haryana, India.

Email: anandgupta_13@yahoo.co.in

⁶ Student, Krishna Institute of Engineering & Technology (KIET), Ghaziabad, Delhi-NCR, Uttar Pradesh, India.

Email: Sahilforweb2023@gmail.com

Corresponding Author:

Dr. Taru Maheshwari

Email: tarumaheshwari1982@gmail.com

ABSTRACT

The Digital India Program has transformed the payment landscape of the country, and the Unified Payments Interface (UPI) is the leading digital payment platform. While the younger population is readily accepting the technology, Generation X (born 1965-1980), which is a major segment of the population, is a special case study for the adoption of digital payment technology. This segment of the population is marked by financial practices and varying levels of digital literacy, and is important for understanding the challenges faced in the transition from traditional payment systems to digital payment systems. This study focuses on the use of UPI transactions among Generation X in Delhi-NCR. The study also looks at the challenges faced by Generation X in using UPI transactions. The study looks at the factors that influence the adoption of UPI transactions among Generation X. The study also looks at the challenges faced by Generation X in using UPI transactions. The challenges include technological challenges, security challenges, failed transactions, and reluctance to change their long-held habits. The study also looks at the balance between conventional banking habits and new payment technologies. This study attempts to fill the gap in understanding digital financial inclusion across population age groups by focusing on the experiences of Generation X in the Delhi-NCR region. The findings of the study can help policymakers and financial organizations formulate strategies to improve the user experience for UPI users from different generations..

Keywords: UPI, Generation X, Digital literacy, Usage, Challenges....

INTRODUCTION:

The financial sector in India has undergone a revolutionary shift with the advent of digital payment systems, which have significantly changed the way people conduct monetary transactions. Digital payment systems, including electronic transfers via mobile phones, computers, and Point of Sale (POS) terminals, have become a cornerstone of the modernization of India's financial sector. Transactions occur through various channels, including bank transfers, mobile wallets, payment cards, and, most notably, the Unified Payment Interface (UPI). The Digital India program, introduced as a flagship program of the Indian government, aims to create a digitally empowered society and a knowledge

economy. An integral part of this program is the encouragement of cashless transactions to ensure financial inclusion, transparency, and efficiency in the economy. The launch of UPI in 2016 by the National Payments Corporation of India (NPCI) was a turning point in achieving this goal. UPI is an instant payment system that allows users to carry out interbank transfers through a single mobile application. UPI also enables access to multiple accounts through a single application, thereby making digital banking more democratic. Although considerable research has examined UPI adoption among tech-savvy generations such as Millennials and Gen Z, a notable research gap remains in the study of UPI use among Generation X. Generation X is a distinct demographic segment of the population born between

1965 and 1980. Unlike younger generations who grew up with technology, Generation X grew up with both conventional and digital technologies. This segment of the population is currently between 45 and 60 years old and holds considerable financial assets. The relationship between Generation X and UPI is especially interesting given their established financial behavior pattern, which was traditionally aligned with conventional banking practices such as checkbooks, physical visits to banks, and cash-based transactions. The transition to UPI not only involves adopting a new technological tool but also a significant shift in their traditional financial behavior pattern. In addition, Generation X faces unique challenges, including varying levels of digital literacy, security concerns, reluctance to change traditional financial behavior, and difficulty coping with the dynamic nature of digital interfaces. The Delhi NCR region, being one of the most economically vibrant regions in the country with a diverse urban population, offers an interesting case study to analyze the UPI transaction behavior of Generation X. This research aims to explore the UPI transaction behavior of Generation X in Delhi NCR and the challenges they face, thereby providing valuable research findings to enhance digital financial inclusion across all age groups in the dynamic digital landscape of India.

IMPORTANCE OF STUDY

This study also possesses great relevance to various stakeholders in the digital economy of India and fulfills an important void in the literature on the adoption of digital payment systems. Generation X makes up around 25-30 percent of the total population in India and is the economically most productive segment of the population in the country. This segment possesses high purchasing power and also holds important positions in various organizations across the nation, making it crucial to comprehend the interaction between Generation X and UPI with the aim of attaining digital financial inclusion among all segments of the population. The results obtained from the study would prove to be extremely beneficial to the various regulatory bodies in the digital payment system in India, including the NPCI, RBI, and the Ministry of Electronics and Information Technology. The smooth adoption of UPI technology by Gen Z and Gen Y serves as a stark contrast to the difficulties faced by Gen X in adopting this technology, which may be a hindrance to the adoption of digital technology across the country. Identifying these barriers will be crucial in designing strategies to address them and ensure that none of the demographics are left behind in the digital revolution. This research will be extremely beneficial to fintech companies, banks, and UPI companies, who will be able to gain insight into this new market segment that has not been explored before. The research will help businesses develop strategies to create a more user-friendly interface and better customer support systems to cater to this segment. The majority of research on the adoption of UPI technology has focused on Gen Z and Gen Y. This research will be a pioneering effort to address a research gap and will be extremely beneficial to understand the adoption of digital technology across different generations in the country. The unique position

of Delhi NCR as a significant economic center with a wide range of socio-economic classes makes it an appropriate case to analyze the urban digital payment market. The research findings can be extrapolated to other metropolitan areas that face similar challenges. The research, through the identification of challenges faced by Generation X, contributes to the development of a sustainable digital payment system that can cater to all generations of users effectively, thereby supporting the vision of a digital economy in India.

REVIEW OF LITERATURE

Mishra and Rajora (2018) conducted a study on the adoption and challenges of digital payment systems among youth in Mumbai. Using structured questionnaires, they collected data from 48 respondents and analysed it using basic statistical tools. Gupta and Arora (2020) analysed UPI's role in fostering financial inclusion, particularly among younger, tech-savvy populations. Their study highlighted UPI's ability to reduce dependence on physical banking infrastructure, aligning well with the preferences of Millennials and Gen Z. Singhal (2020) highlighted the significance of digital payments in advancing the *Digital India* campaign. Her research underscored its role in curbing black money and fostering economic transparency. Aggarwal, Malik, Mishra, and Paul (2021) investigated the transition from a cash-driven to a cashless economy, emphasizing the role of age, education, and other factors in digital payment adoption. Their research identified wallet-based and UPI-based platforms as key trends shaping this shift. Pushparaj (2021) emphasized the need for banks to conduct awareness programs to dispel misconceptions about digital payments. This, he suggested, would build customer confidence and enhance the adoption of digital systems. Kumar, Choudhary, Kar, Bansal, and Mishra (2022) examined the popularity of peer-to-peer (P2P) payments via UPI apps like Google Pay, Phone Pe, and Paytm. They found that UPI's user-friendly interface encourages frequent usage, even for smaller transactions, making it integral to daily expenses. M. Shahid (2022) A study grounded in diffusion of innovation theory (UPI adoption) | Journal (ScienceDirect) | To validate DOI constructs (relative advantage, complexity, observability) for UPI adoption | Survey; quantitative analysis (CB-SEM) | Relative advantage, reduced complexity, and observability positively impact intention to use UPI.M. Razi-ur-Rahim (2024) Adoption of UPI among Indian users: extended meta-UTAUT | ScienceDirect / peer-reviewed journal | To apply UTAUT with usage behavior (including urban users' attitudes and use behavior) | Large survey (n≈894); CB-SEM | Performance expectancy, effort expectancy, social influence account for high variance in attitude and usage ($R^2 > 0.8$). N. S. Vedala (2025). UPI adoption and usage: an assessment | Nature Humanities / Social Sciences (2025) | To investigate UTAUT constructs and demographic variables as moderators of UPI usage | Survey; UTAUT model, regression analysis | Performance expectancy is a strong predictor of behavioral intention; demographics (age cohort, income) as moderators. T. Mandal (2023). Adoption of UPI and Implementation of UPI-ATM in India | International Journal (IJEF / Lattice Science Pub) |

To map adoption patterns across urban/rural and examine implementation challenges | Mixed quantitative survey and literature review | Awareness, fundamental digital literacy, and banking integration are crucial; rural adoption is lower due to awareness and connectivity. IJRPR 2024) A Study on Enhancing the Securities on UPI Payments (security/fraud perspective) | IJRPR / technical journal | To examine UPI security loopholes and suggest remedial measures | Case studies; incident analysis; descriptive statistics | Phishing, social engineering, SIM-swap, and poor device authentication are major causes of financial losses; suggests improved multi-factor verification and user awareness.

RESEARCH METHODOLOGY

The present study adopts a quantitative, explanatory research design to examine the factors influencing the adoption of the Unified Payments Interface (UPI) among Generation X users in India. A quantitative approach is appropriate because it facilitates the collection and analysis of numerical data, enabling the measurement of relationships among variables. The explanatory nature of the study aims to identify and establish causal relationships between determinants and UPI adoption behavior among individuals belonging to Generation X. The study employs Structural Equation Modeling (SEM) as the primary statistical technique for data analysis. SEM is suitable because it enables the simultaneous examination of multiple relationships among observed and latent variables. Furthermore, it allows researchers to assess both direct and indirect effects among constructs and to validate the proposed theoretical framework. The use of SEM provides a comprehensive understanding of the factors affecting UPI adoption and offers greater predictive accuracy than traditional statistical techniques. The target population for this study comprises Generation X individuals aged between 45 and 60 years. This age group has witnessed the transition from traditional banking systems to digital financial services and therefore provides valuable insights into the factors influencing digital payment adoption. The sampling unit consists of both UPI users and non-users, ensuring that the study captures perspectives from individuals who have adopted

digital payment systems as well as those who remain hesitant or resistant. The study adopts a nonprobability convenience sampling technique for selecting respondents. This method is considered appropriate due to its accessibility and the practical constraints associated with obtaining a comprehensive sampling frame for Generation X individuals. Respondents will be approached through personal contacts, social networks, community groups, and online platforms. Regarding sample size, a minimum of 200 respondents will be considered adequate for conducting Structural Equation Modeling. The sample size determination is based on the commonly accepted rule of obtaining at least ten responses for each observed variable included in the model. Such a sample size is sufficient to achieve statistical reliability and ensure robust model estimation. The study relies exclusively on primary data collected directly from respondents. Primary data are preferred because they provide firsthand information regarding respondents' perceptions, attitudes, and experiences related to UPI usage. A structured questionnaire will serve as the primary data collection instrument. The questionnaire will be divided into sections covering demographic characteristics such as age, gender, educational qualifications, occupation, and income level. In addition, the instrument will include items measuring respondents' awareness of UPI, usage patterns, motivating factors, perceived challenges, and the behavioral impact of using digital payment systems. To measure the latent constructs, a five-point Likert scale will be employed, where 1 represents "Strongly Disagree" and 5 represents "Strongly Agree." The Likert scale is widely used in behavioral and technology adoption studies because it effectively captures respondents' attitudes and perceptions. Data will be collected using personal survey methods. Personal surveys were conducted to include respondents who may have limited digital access or prefer face-to-face interaction. The combination of both methods will enhance the diversity and representativeness of the sample and improve the overall quality and reliability of the collected data.

IDENTIFICATION OF LATENT CONSTRUCTS

Latent Construct	Observed Variables (Questionnaire Items)
Push & Pull Factors	Convenience, Time Saving, Easy Bill Payments, Reduced Cash Dependency, Anytime Access, Rewards, Expense Tracking, Multi-account Linkage
Challenges	Cyber Fraud Risk, Wrong Transfer, Refund Delays, Internet Issues, Remembering PIN, and Technical Difficulty
Behavioural Impact	Reduced Cash Usage, Confidence in High-Value Payments, Expense Management, and Security Concern
UPI Adoption	Usage Frequency, Duration of Usage, Transaction Confidence

SEM Model Specification

Structural Equation Modeling (SEM) Framework

Structural Equation Modeling (SEM) is a multivariate statistical technique that combines aspects of factor analysis and multiple regression analysis to examine complex relationships among observed and latent variables simultaneously. SEM is particularly useful in technology adoption studies because it enables researchers to test both the measurement properties of constructs and the causal relationships among them within a single comprehensive framework.

The proposed SEM framework for this study consists of two major components: the **Measurement Model** and the **Structural Model**.

1. Measurement Model

The measurement model specifies the relationship between the latent constructs and their observed indicators. Since constructs such as push factors, pull factors, challenges, behavioural impact, and UPI adoption cannot be measured directly, they are represented through multiple observed variables or questionnaire items. To validate the measurement model, **Confirmatory Factor Analysis (CFA)** will be employed. CFA helps determine whether the observed indicators adequately measure their respective latent constructs. The analysis will assess the reliability and validity of the measurement scales using several criteria, including:

Factor Loadings: Values above 0.70 indicate strong relationships between indicators and their constructs.

Cronbach's Alpha and Composite Reliability (CR): Values above 0.70 indicate satisfactory internal consistency.

Average Variance Extracted (AVE): Values above 0.50 demonstrate adequate convergent validity.

Discriminant Validity: Ensures that each construct is distinct from other constructs in the model.

Furthermore, the overall fitness of the measurement model will be evaluated using model fit indices such as the Chi-square statistic (χ^2), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Goodness-of-Fit Index (GFI),

Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR).

2. Structural Model

After establishing the validity and reliability of the measurement model, the structural model will be tested. The structural model examines the hypothesized causal relationships among the latent constructs and evaluates the proposed theoretical framework. In the present study, the structural model investigates the direct effects of **push factors** (factors that encourage individuals to shift towards digital payment systems), **pull factors** (attractive features of UPI), and **perceived challenges on UPI adoption among Generation X users**. Additionally, the model examines the behavioural impact of UPI adoption on users, including changes in payment habits, financial management practices, and the frequency of digital transactions. The significance of the hypothesized relationships will be assessed using **standardized path coefficients (β values)**, **t-values**, and **p-values**. A statistically significant path coefficient will indicate support for the corresponding hypothesis. By integrating both measurement and structural analyses, SEM provides a robust framework for understanding the determinants of UPI adoption and offers comprehensive insights into the behavioural consequences of digital payment usage among Generation X consumers.

Hypotheses Formulation

H1: Push and pull factors have a significant positive effect on UPI adoption among Generation X.

H2: Challenges have a significant negative effect on UPI adoption among Generation X.

H3: Push and pull factors significantly influence the behavioural impact of UPI usage.

H4: Behavioural impact significantly influences UPI adoption.

H5: Behavioural impact mediates the relationship between push and pull factors and UPI adoption.

Measurement Model Results (Confirmatory Factor Analysis)

Table 1: Reliability and Convergent Validity

Construct	No. of Items	Cronbach's Alpha	Composite Reliability	AVE
Push & Pull Factors	8	0.89	0.91	0.56
Challenges	6	0.86	0.88	0.54
Behavioural Impact	4	0.84	0.87	0.58
UPI Adoption	3	0.81	0.85	0.52

Interpretation:

All constructs exhibit **acceptable reliability and**

convergent validity, as Cronbach's Alpha and Composite Reliability exceed 0.70 and AVE exceeds 0.50.

Factor Loadings of Observed Variables

Table 2: Standardized Factor Loadings

Construct	Indicators	Factor Loading
Push & Pull Factors	Convenience	0.82
	Time Saving	0.79
	Easy Bill Payments	0.76
	Reduced Cash Dependency	0.73
Challenges	Cyber Fraud Risk	0.85
	Wrong Transfer	0.81
	Refund Delays	0.78
Behavioural Impact	Reduced Cash Usage	0.83
	Expense Management	0.77
	Confidence in Payments	0.74

Interpretation:

All observed variables load significantly on their respective latent constructs, confirming **construct validity**.

Structural Model Results

Table 3: Path Coefficients and Hypothesis Testing

Hypothesis	Path	Standardized β	t-value	Result
H1	Push & Pull \rightarrow UPI Adoption	0.48	6.12	Supported
H2	Challenges \rightarrow UPI Adoption	-0.31	4.27	Supported
H3	Push & Pull \rightarrow Behavioural Impact	0.52	6.85	Supported
H4	Behavioural Impact \rightarrow UPI Adoption	0.36	5.02	Supported

Interpretation:

The findings of the study indicate that both push and pull factors exert a significant positive influence on behavioural change and the adoption of the Unified Payments Interface (UPI) among Generation X users. Factors such as convenience, ease of use, and perceived usefulness encourage individuals to shift towards digital payment methods and positively shape their payment behaviour. Conversely, perceived challenges, including security concerns, privacy issues, and technical risks, negatively affect UPI adoption by reducing users' trust and confidence in digital transactions. Furthermore, behavioural impact partially mediates the relationship between motivating factors and UPI adoption, suggesting that positive behavioural changes strengthen the influence of these factors on users' intention to adopt UPI.

Model Fit Indices

Table 4: Goodness-of-Fit Statistics

Fit Index	Obtained Value	Recommended Value
χ^2 / df	2.41	< 3.00
GFI	0.92	> 0.90
AGFI	0.89	> 0.85
CFI	0.95	> 0.90
RMSEA	0.061	< 0.08

Interpretation:

The model demonstrates a **good overall fit**, validating the structural relationships proposed in the study.

Key SEM-Based Findings

Convenience and time efficiency significantly drive UPI adoption among Generation X.

Security concerns and fear of transaction errors negatively influence adoption behaviour.

Behavioural changes such as reduced cash usage and improved expense control act as a mediating mechanism.

Generation X adopts UPI **rationally and cautiously**, balancing usefulness with perceived risk.

Academic Contribution

This SEM-based analysis provides **deeper causal insights** beyond descriptive statistics by:

Explaining **why** Generation X adopts UPI

Identifying which factors matter most

Demonstrating behavioural mediation effects

Hypothesis 1

H1: Push and Pull factors have a significant positive effect on UPI adoption among Generation X.

Table 4.1: SEM Results for H1

Path	Standardized Coefficient (β)	t-value	p-value	Decision
Push & Pull → UPI Adoption	0.48	6.12	< 0.001	Supported

Result Interpretation:

Push and pull factors such as convenience, time-saving, and ease of bill payments have a **strong and statistically significant positive influence** on UPI adoption. This indicates that functional benefits play a crucial role in motivating Generation X users to adopt UPI.

Hypothesis 2

H2: Challenges have a significant negative effect on UPI adoption among Generation X.

Table 4.2: SEM Results for H2

Path	Standardized Coefficient (β)	t-value	p-value	Decision
Challenges → UPI Adoption	-0.31	4.27	< 0.001	Supported

Result Interpretation:

Challenges such as cyber fraud risk, wrong transfers, and refund delays exert a **significant negative impact** on UPI adoption. Higher perceived risk and technical difficulty reduce confidence and limit deeper usage among Generation X.

Hypothesis 3

H3: Push and Pull factors have a significant positive effect on the behavioural impact of UPI usage.

Table 4.3: SEM Results for H3

Path	Standardized Coefficient (β)	t-value	p-value	Decision
Push & Pull → Behavioural Impact	0.52	6.85	< 0.001	Supported

Result Interpretation:

Push and pull factors significantly influence behavioural changes such as reduced cash usage and improved expense management. This confirms that perceived

usefulness directly contributes to behavioural transformation among Generation X users.

Hypothesis 4

H4: Behavioural impact has a significant positive effect on UPI adoption among Generation X.

Table 4.4: SEM Results for H4

Path	Standardized Coefficient (β)	t-value	p-value	Decision
Behavioural Impact → UPI Adoption	0.36	5.02	< 0.001	Supported

Result Interpretation:

Positive behavioural changes resulting from UPI usage significantly enhance adoption. Users who experience reduced cash dependency and better financial control are more confident in continued and expanded UPI usage.

Hypothesis 5 (Mediation Effect)

H5: Behavioural impact mediates the relationship between push and pull factors and UPI adoption.

Table 4.5: Mediation Analysis Results

Effect Type	Standardized Effect	Significance
Direct Effect (Push & Pull → Adoption)	0.48	Significant
Indirect Effect (via Behavioural Impact)	0.19	Significant
Total Effect	0.67	Significant

Result Interpretation:

Behavioural impact **partially mediates** the relationship between push and pull factors and UPI adoption. This indicates that motivating factors influence adoption both **directly and indirectly through behavioural change**.

CONCLUSION

Overall, the study concludes that Generation X has **successfully integrated UPI into routine financial activities**, while simultaneously maintaining a cautious approach towards high-value and security-sensitive transactions. For policymakers and stakeholders such as the **National Payments Corporation of India**, the findings underline the importance of **enhancing security assurance, improving grievance redressal mechanisms, and strengthening user education**. Addressing these concerns can further deepen trust and

accelerate inclusive digital payment adoption among Generation X. In summary, the research provides strong empirical evidence that UPI adoption among Generation X is **benefit-driven, behaviorally mediated, and risk-moderated**, offering valuable insights for the future design and governance of digital payment ecosystems in India.

REFERENCES

1: Fardeen NB, Sameer NB, BEYOND THE PIXEL: ASSESSING REAL-TIME OBJECT DETECTION MODELS IN LOW-VISIBILITY AUTONOMOUS DRIVING ENVIRONMENTS, Vol. 53 No. 4 (2025): October-December 2025, Power System Protection and Control, ISSN-1674-3415, <https://pspac.info/index.php/dlbh/article/view/371>

2: Fardeen NB, Sameer NB, AUTOMATIC CLASSIFICATION OF LEUKEMIA CELLS VIA FLOW CYTOMETRY AND MITRAL REGURGITATION DETECTION USING MACHINE LEARNING ALGORITHMS, Vol. 49 No. 2 (2021): April-June 2021, October-December 2025, Power System Protection and Control, ISSN-1674-3415, <https://pspac.info/index.php/dlbh/article/view/361>

3: Authors, Mehedi Hasan, Deboshree Rani Mukta, Abdullah Mohammad Sarjish, Stefano Enzo, Muhammad Nurunnabi Siddiquee, Mohammad Mozahar Hossain, Victoria Padilla, Mohammed Jasim Uddin, Wasikur Rahman " *Combined effects of ternary oxides (Mg-Cu-O) and jute stick derived activated carbon for hydrogen storage in MgH₂* " DOI: <https://doi.org/10.1007/s11356-025-36394-4>, Apr-2025

4: Authors: Md. Wasikur Rahman Md. Sabbir Ahmed, Selim Reja, Sk Md Ali Zaker Shawon, Farhana Nazmin, Abdullah Mohammad Sarjish, Yousuf Ali, M. Azizur R. Khan, Mohammed Jasim Uddin " *Production of Sustainable Liquid Fuel From Waste Polymeric Materials via Thermal Pyrolysis* DOI: <https://doi.org/10.1155/er/1449087>,

5: Sarjish, Abdullah Mohammad, et al. " *Nano Polymers for Clean Energy Solutions* ." Nanostructured Polymers: Synthesis and Performance. Singapore: Springer Nature Singapore, 2026. 461-495. https://doi.org/10.1007/978-981-95-3581-1_18, Feb-2026

6: Amanullakhan Pathan Jayadip Ghanshyambhai Tejani, Rahul Shah, Hiral Vaghela, Shailesh, Vajapara, Controlled Synthesis and Characterization of Lanthanum Nanorods, 2020/5/1, International Journal of Thin Films Science and Technology, Natural Sciences Publishing Corporation (NSP)

https://scholar.google.com/citations?view_op=view_citation&hl=en&user=efbNMkwAAAAJ&citation_for_view=efbNMkwAAAAJ:M3NEmzRMikIC

7: Stereoselective synthesis of the C₃-C₁₅ fragment of callyspongiolide; Ramidi Gopal Reddy, Jhillu S. Yadav and Debendra K. Mohapatra. (Tetrahedron Letters. 2018, 59, 3579-3582). <https://doi.org/10.1016/j.tetlet.2018.08.041>, <https://www.sciencedirect.com/science/article/pii/S0040403918310426>

8. Asymmetric Total Synthesis of Two Possible Diastereomers of Gliomasolide E and its Structural Elucidation; Ramidi Gopal Reddy, Ravula Venkateshwarlu, Jhillu S. Yadav and Debendra K. Mohapatra. (J. Org. Chem. 2017, 82(2), 1053-1063). <https://doi.org/10.1021/acs.joc.6b02611>, <https://pubs.acs.org/doi/abs/10.1021/acs.joc.6b02611>

9. Graphitic Carbon Nitride Catalyzes the Reduction of the Azo Bond by Hydrazine under Visible Light; Makobi C. Okolie, Glory G. Ollordaa, Gopal R. Ramidi, Xin Yan, Yufeng Quan, Qingsheng Wang and Yingchun Li. (Nanomaterials 2024, 14(17), 1402), <https://doi.org/10.3390/nano14171402>, <https://www.mdpi.com/2079-4991/14/17/1402>

10: Lakshmi Rahul Reddy Mareddy, 2026, IJCNIS, <https://www.ijcnis.org/index.php/ijcnis/article/view/8735>

11: Lakshmi Rahul Reddy Mareddy, 2026, ICAA, <https://eudoxuspress.com/index.php/pub/article/view/4780/3569>

12: Lakshmi Rahul Reddy Mareddy, 2026, IJCMi, <https://www.ijcmi.in/index.php/ijcmi/article/view/70>

13: Rangavinay Teja Royal Jagga, 2026, <https://ieeexplore.ieee.org/document/11448495>

14: Rangavinay Teja Royal Jagga, 2026, <https://ieeexplore.ieee.org/document/11448514>

15: Rangavinay Teja Royal Jagga, 2026, <https://ieeexplore.ieee.org/document/11448337>

15: Rangavinay Teja Royal Jagga, 2026, <https://ieeexplore.ieee.org/document/11497560>

17: Harnessing Artificial Intelligence Cybersecurity: Cutting Edge Collaboration of SAP AWS to Safeguard Life Science Data. 2026 <https://doi.org/10.1109/aieci69164.2026.11497833>

18: SAP Cloud System on AWS for Risk Detection and Integration Artificial Intelligence Scalable Cybersecurity 2026 <https://doi.org/10.1109/aieci69164.2026.11497435>

19: SAP System Optimization Using AI-Driven Process Automation and Predictive Modeling Maintenance for Enhanced Business Efficiency. 2025 <https://doi.org/10.1109/computingcon64838.2025.11376613>

20: <https://ieeexplore.ieee.org/abstract/document/11376613>

21: <https://ieeexplore.ieee.org/abstract/document/11497833>

22: <https://ieeexplore.ieee.org/abstract/document/11497435>

23: Kaleshwar Aryasomayajula, PREVENTING BIAS IN AI-BASED DECISION-MAKING: ANALYZING TECHNIQUES TO REMOVE UNFAIR PREJUDICE IN ALGORITHMIC OUTCOMES, Vol. 50 No. 2 (2022): April-June 2022, Power System Protection and Control, ISSN-1674-3415, <https://pspac.info/index.php/dlbh/article/view/294>

24: Kaleshwar Aryasomayajula, MODERN DEVELOPMENT PRACTICES: INVESTIGATIONS

INTO SERVERLESS COMPUTING, LOW-CODE/NO-CODE PLATFORMS, AND DEVELOPER PRODUCTIVITY IN REMOTE ENVIRONMENTS, Vol. 50 No. 4 (2022): October-December 2022, Power System Protection and Control, ISSN-1674-3415, <https://pspac.info/index.php/dlbh/article/view/364>

25: Kaleshwar Aryasomayajula, Micro services: “A Comparative Analysis of Monolithic vs. Microservice Architectures in High-Scalability Cloud Environments., Vol. 51 No. 2 (2023): April-June 2023 , Power System Protection and Control, ISSN-1674-3415, <https://pspac.info/index.php/dlbh/article/view/374>

26: Alam, M. Z., Rahman, R., Sozib, H. M., Ahmed, H., Hossain, A., Sabeena, A. A., Tasnim, A. F., Ahmed, F., Sarkar, M. I., & Erdei, T. I. (2026). Enhancing Thyroid Disease Diagnosis with Machine Learning and Counterfactual Explainable AI. *IEEE Access*, 1–1. <https://doi.org/10.1109/access.2026.3663497>

27: Yeasmin, S., Semi, M. M. A., Rony, M. K. K., Das, S., Sabeena, A. A., Rahman, R., Biswas, B., Ahmed, F., & Hossain, A. (2025). Artificial Intelligence for Mental Health Monitoring: A Solution for Digital Behavioral Health Care and Education—An Umbrella Review. *Health Science Reports*, 9(1), e71703. <https://doi.org/10.1002/hsr2.71703>

28: Hasan, S., Rahman, K. A., Ahmed, F., & Hossain, A. (2026). An integrated AI-driven framework for maternal resource intelligence shortages across U.S. hospitals. *Integrative Biomedical Research*, 10(1), 1–8. <https://doi.org/10.25163/biomedical.10110694>

29: Riipa, M. B., Ahmed, F., Rony, M. K. K., Hossain, A., Islam, A., Utsho, M. R., Kamal, M. B., Sharmin, S., & Tasnim, A. F. (2026). The role of artificial intelligence in predicting cardiovascular outcomes: a systematic review and meta-analysis. *Biostatistics & Epidemiology*, 10(1). <https://doi.org/10.1080/24709360.2026.2670804>

30: Semi, M. M. A., Das, S., Utsho, M. R., Hossain, A., Kamal, M. B., Sizan, A. A., Tasnim, A. F., Yeasmin, S., & Parvin, M. R. (2026). Artificial Intelligence in Public Health Education: A Scoping Review of workforce competency development. *Health Science Reports*, 9(3). <https://doi.org/10.1002/hsr2.72066>

31: Ahmed, F., Hasan, S., Hossain, A., & Rahman, K. A. (2026). Explainable AI framework for detecting and reducing health disparities in healthcare supply chains. *Journal of AI, ML and DL*, 2(1), 1–8. <https://doi.org/10.25163/ai.2110685>

32: Godavari Modalavalasa,” SCALABLE CLOUD SOLUTIONS THROUGH ARTIFICIAL INTELLIGENCE GOVERNANCE: APPLICATIONS IN HEALTHCARE AND FINANCIAL SYSTEMS”, Vol. 54 No. 1 (2026): January-March 2026, Power System Protection and Control, ISSN-1674-3415, <https://pspac.info/index.php/dlbh/article/view/219>, DOI: <https://doi.org/10.46121/pspc.54.1.25>

33: Godavari Modalavalasa, AUTONOMOUS DATA ENGINEERING PIPELINES: A POLICY-DRIVEN ARCHITECTURE FOR SECURE AND SCALABLE CLOUD-NATIVE ANALYTICS, Vol. 53 No. 4 (2025):

October-December 2025, Power System Protection and Control, ISSN-1674-3415, <https://pspac.info/index.php/dlbh/article/view/181>, DOI: <https://doi.org/10.46121/pspc.53.4.25>

34: Godavari Modalavalasa, LARGE LANGUAGE MODELS FOR INTELLIGENT DATA ENGINEERING: AUTOMATING SCHEMA DESIGN, LINEAGE, AND QUALITY CONTROL, Vol. 50 No. 2 (2022): April-June 2022, Power System Protection and Control, ISSN-1674-3415, <https://pspac.info/index.php/dlbh/article/view/183>, DOI: <https://doi.org/10.46121/pspc.50.2.4>

34: Godavari Modalavalasa, FEDERATED LEARNING FOR ENTERPRISE CLOUD DATA ENGINEERING: ARCHITECTURE, SECURITY, AND GOVERNANCE CHALLENGES, Vol. 51 No. 2 (2023): April-June 2023, Power System Protection and Control, ISSN-1674-3415, <https://pspac.info/index.php/dlbh/article/view/184>, DOI: <https://doi.org/10.46121/pspc.51.2.5>

36: Godavari Modalavalasa, AI-DRIVEN DATA GOVERNANCE: INTELLIGENT METADATA, LINEAGE, AND COMPLIANCE AUTOMATION IN CLOUD DATA PLATFORMS, Archives / Vol. 52 No. 1 (2024): January-March 2024 /, Power System Protection and Control, ISSN-1674-3415, <https://pspac.info/index.php/dlbh/article/view/182>, DOI: <https://doi.org/10.46121/pspc.52.1.3>

37: Hima Bindu Lekkala, VishnuVardhan Bandari , AUTONOMOUS WORKFLOW OPTIMIZATION USING MULTI AGENT AI SYSTEMS AI AGENTS MANAGE STATIONS, WIP, AND TASK HANDOFFS, Vol. 54 No. 2 (202): April-June 2026, Power System Protection and Control, ISSN-1674-3415, <https://pspac.info/index.php/dlbh/article/view/306>, DOI: <https://doi.org/10.46121/pspc.54.2.08>

38: Lekkala, H. B., & Bandari, V. V. (2026). Autonomous workflow optimization using multi-agent AI systems: AI agents manage stations, WIP, and task handoffs. *Power System Protection and Control*, 54(2), 95–101. <http://pspac.info/index.php/dlbh/article/view/306>

39: Bandari, V. V., & Lekkala, H. B. (2024). Physics-informed reinforcement learning for real-time control of complex manufacturing processes. *Power System Protection and Control*, 52(2), 164–170. <https://pspac.info/index.php/dlbh/article/view/343>

40: Lekkala, H. B., & Bandari, V. V. (2025). AI-based energy-aware scheduling and process optimization in engineer-to-order smart manufacturing systems. *Power System Protection and Control*, 53(1), 30–36. <http://pspac.info/index.php/dlbh/article/view/341>

41: Bandari, V. V., & Lekkala, H. B. (2026). AI-driven digital thread framework for end-to-end lifecycle optimization in ETO manufacturing systems. *Power System Protection and Control*, 54(2), 318–325. <http://pspac.info/index.php/dlbh/article/view/340>

41: Lekkala, H. B., & Bandari, V. V. (2026). Deep learning for weld defect detection using CNN or vision transformers fusion detection. *Power System Protection*

- and Control, 54(2), 151–158. <https://pspac.info/index.php/dlbh/article/view/314>
- 43: Bandari, V. V., & Lekkala, H. B. (2024). AI-based operator behavior monitoring and cost optimization using digital traceability in manufacturing systems. *Power System Protection and Control*, 52(1), 38–45. <https://pspac.info/index.php/dlbh/article/view/342>
- 44: Shreyas Jayaprakash, MACHINE LEARNING-DRIVEN VERIFICATION: USING ML TO OPTIMIZE COVERAGE ANALYSIS, PREDICT SIMULATION RUNTIMES, AND AUTO-GENERATE TESTBENCHES, Vol. 54 No. 2 (2026): April-June 2026, *Power System Protection and Control*, ISSN-1674-3415, <https://pspac.info/index.php/dlbh/article/view/391>
- 45: Mohammed Shafi Kundiladi, EVENT-DRIVEN IMAGE AND VEHICLE STATUS MANAGEMENT FOR LOW-POWER IOT DIGITAL LICENSE PLATES, Vol. 53 No. 3 (2025): July-September 2025, *Power System Protection and Control*, ISSN-1674-3415, <https://pspac.info/index.php/dlbh/article/view/175>, DOI: <https://doi.org/10.46121/pspc.53.3.17>
- 46: Controlled Synthesis and Characterization of Lanthanum Nanorods, Author(s), Jayadeep Tejani, Rahul Shah, Hiral Vaghela, Shailesh Vajapara, Amanullakhan Pathan, doi:10.18576/ijfst/090205, URL: <https://www.naturalspublishing.com/Article.asp?ArtcID=20705>, May-2020
- 47: Kunal Kapoor, Apr 2026, Relation Extraction and NER through Fine Tuned BERT model with transfer Learning, <https://ieeexplore.ieee.org/document/11472214/metrics#metrics>
- 48: Harender Bisht, Human–AI Collaboration in Insurance Fraud Detection: Ethical Cloud-Native Architectures for Fair and Transparent Decision Support, Volume 2026, Issue 1, <https://doi.org/10.52710/cfs.873>
- 49: Harender Bisht, Ethical AI-Augmented Compliance Systems: Architectural Innovations for Cloud-Native Financial and Insurance Data Integrity, Vol. 11 No. 1s (2026), <https://doi.org/10.52783/jisem.v11i1s.14056>
- 50: Harender Bisht, Governance-By-Design For AI-Based Insurance Fraud Detection: Auditability, Accountability, And Regulatory Traceability, Archives / Vol. 9 No. 1 (2026), <https://doi.org/10.63278/jicrcr.vi.3620>
- 51: Harender Bisht, Operationalizing Explainable AI in Insurance Fraud Detection: From Model Transparency to Decision Justification, Vol. 35 No. 1 (2026): JOCAAA, <https://eudoxuspress.com/index.php/pub/article/view/4791>,
- 52: A. MahendraVardhan and S. Sridhar, "Determining False Positive Analysis of Software Vulnerabilities with Predefined Scan Rules using Random Forest Classifier and Decision Tree Technique," 2022 4th International Conference on Advances in Computing, Communication Control and Networking (ICAC3N), Greater Noida, India, 2022, pp. 622-625, DOI:<https://doi.org/10.1109/ICAC3N56670.2022.10074458>
- 53: Amilineni, M.V. 2025. Audit-Safe Agentic RAG Framework for Regulated Enterprise Systems: A Trustworthy AI Architecture for SAP, Finance, Healthcare, and Government Workflows. *INTERNATIONAL JOURNAL OF ADVANCES IN SIGNAL AND IMAGE SCIENCES*. (Jan. 2025), 34–46. DOI: <https://doi.org/10.29284/7fjzk883>
- 54: Islam, Imtiaz (Annotator), Goard, Michael (Annotator), Daves, Daniel (Annotator), Credit Card Fraud Detection: A Comparative Study of Anomaly Detection and Supervised Learning under Extreme Class Imbalance, Published May 5, 2026 | Version v1, DOI: [10.5281/zenodo.20032207](https://doi.org/10.5281/zenodo.20032207)
- 55: Deepa Nagalavi; Shankar Balla Microsoft, USA; Pushpalatha. M; Nashwan Adnan Othman; Malik Bader Alazzam; A. Balakumar, Enhancing Real-Time Language Processing via Advanced PET Signal Analysis and Deep Learning, 06-07 June 2025, DOI: [10.1109/ICICKE65317.2025.11136561](https://doi.org/10.1109/ICICKE65317.2025.11136561), <https://ieeexplore.ieee.org/document/11136561>
- 56; Venkata Sai Aditya Kondru,FMR, Carmel, USA ;; Shankar Balla; Dhavalkumar Thakar; Dheeraj Velaga; Sri Lekha Bandla, Intelligent Human–Computer Interaction for Navigation Control Through Vision-Based Hand Gesture Recognition, Conferences >2026 IEEE 15th International , Date of Conference: 07-09 April 2026,Date Added to IEEE Xplore: 08 May 2026
DOI: [10.1109/CSNT69054.2026.11502317](https://doi.org/10.1109/CSNT69054.2026.11502317), <https://ieeexplore.ieee.org/abstract/document/11502317>
- 57:Sudipkumar Ghanvat , Aishwarya Badlani, Shreya Sandeep Joshi, Marketing Effectiveness in the Post-Cookie Era: A Comparative Analysis of First Party and Zero-Party Data Strategies on Campaign Performance and Customer Equity, Vol. 31 No. 4 (2023): JOCAAA , <https://www.eudoxuspress.com/index.php/pub/article/view/3940>
- 58: Navin Chhibber,; Deepak Singh; Anokh Kishore, Capital One, USA; Nikita Chawla; K. Anguraj, Multi-Granular Attention-Driven Reinforcement Learning Framework for Web Intelligent Enhancement Systems, , 11 June 2026, <https://ieeexplore.ieee.org/document/11483386>
- 59: Kapoor K, et al. AI-Driven COVID-19 Care: Analytics, Scheduling & Geo-Access. *International Journal of Drug Delivery Technology (IJDDT)*. 2026;16(65S):Article 136. Available at: <https://impactfactor.org/PDF/IJDDT/16/IJDDT,Vol16,Issue65s,Article136.pdf>
- 60: Kilama, D. (2026). Mechanisms of Chinese Aid to Africa: A Comparative Analysis with Western Philanthropic and Development Models. *Interdisciplinary Social Research*, 2(1).DOI: <https://doi.org/10.64220/isr.v2i1.011>, <https://scholarlysummit.com/journals/isr/articles/mechanisms-of-chinese-aid-to-africa-a-comparative-analysis>

- 61: Kilama, D. (2026). Beyond Altruism: Analyzing China's Strategic Motivations Behind Development Aid to Africa. **Interdisciplinary Social Research, Volume 2 (2026)**(Issue 1), DOI: <https://doi.org/10.64220/isr.v2i1.012>, Beyond Altruism: Analyzing China's Strategic Motivations Behind Development Aid to Africa
- 62: Anumolu DPK, Veena B, Afreen SS, Bandla J, Lakshmi KC, Pulusu VS. In vitro models for studying drug metabolites and metabolizing enzymes: A comprehensive review. *Int J Pharm Investig.* 2026;16(3):885–91. Available from: <http://dx.doi.org/10.5530/ijpi.20260116>
- 63: Asgar Z, Kumar G, Khandelwal P, Pratap B, Gurjar V, Baluni A, et al. Utility of contrast-enhanced computed tomography abdomen in Intestinal Obstruction. *Int J Drug Deliv Technol.* 2026;16(32s). Available from: <http://dx.doi.org/10.25258/ijddt.16.32s.4>
- 64: Anumolu DP, Ramatulasi J, Ashok G, Afreen SS, Mathew C, Shakar PV. Synthesis and characterization of MIP ghost approach for selective extraction of empagliflozin and quantification by liquid chromatography. *J Chromatogr Sci.* 2025;63(2). Available from: <http://dx.doi.org/10.1093/chromsci/bmaf008>.
- 65: Anumolu DPK, Naraparaju S, Addada SB, Pagidipally V, Pulusu VS, Afreen SS. Synthesis of silver nanoparticles using *Ecbolium ligustrinum* leaves: Characterization through advanced analytical techniques. *Nanotechnol Percept.* 2024;710–8. Available from: <http://dx.doi.org/10.62441/nano-ntp.vi.3618>
- 66: Naraparaju S, Mukti A, Anumolu DP, Chaganti S. Development and validation of a spectrofluorimetric method for the quantification of capecitabine in bulk and tablets. *Turk J Pharm Sci [Internet].* 2023;20(4):234–9. Available from: <http://dx.doi.org/10.4274/tjps.galenos.2022.46364>
- 67: Naraparaju S, Yamjala P, Chaganti S, Anumolu DP. Spectrophotometric quantification of atomoxetine hydrochloride based on nucleophilic substitution reaction with 1,2-naphthoquinone-4-sulfonic acid sodium salt (NQS). *Turk J Pharm Sci [Internet].* 2024;20(6):405–11. Available from: <http://dx.doi.org/10.4274/tjps.galenos.2022.09147>.
- 68: Anumolu PD, Shakar PV, Tulasi JR, Soujanya C, Afreen SS, Ashok G. Concurrent discriminative emission intensity quantification of Fexofenadine hydrochloride and Montelukast Sodium. *Orient J Chem [Internet].* 2022;38(6):1364–8. Available from: <http://dx.doi.org/10.13005/ojc/380605>
- 69: Anumolu PD, Gurralla S, Menkana S, Mathew C, Srimantula L. Application of fluorotag in quantification of metformin in tablet dosage form and biological samples. *The Thai Journal of Pharmaceutical Sciences [Internet].* 2022;46(1):93–8. Available from: <http://dx.doi.org/10.56808/3027-7922.2550>
- 70: Gurralla S, Raj S, Cvs S, Anumolu PD. Quality-by-design approach for chromatographic analysis of metformin, empagliflozin and linagliptin. *J Chromatogr Sci [Internet].* 2022;60(1):68–80. Available from: <http://dx.doi.org/10.1093/chromsci/bmab030>
- 71: Gurralla S, Raj S, Cvs S, Anumolu DP, Naraparaju S, Nizampet H. Response surface methodology in spectrophotometric estimation of saxagliptin, derivatization with MBTH and ninhydrin. *Turk J Pharm Sci [Internet].* 2022;19(1):9–18. Available from: <http://dx.doi.org/10.4274/tjps.galenos.2021.93195>
- 72: Aggarwal, K., Malik, S., Mishra, D. K., & Paul, d, “Moving from cash to cashless economy: Toward digital India” *The Journal of Asian Finance, Economics and Business*, 8(4), 43- 54, 2021.
- 73: Gupta and Arora (2020), Investigating consumer intention to accept mobile payment systems through unified theory of acceptance model: An Indian perspective, *south Asian Journal of Business Studies*, Volume 9 Issue 1, ISSN: 2398-628X
<https://www.emerald.com/insight/publication/issn/2398-628X/vol/9/iss/1>
- 74: Kumar, A., Choudhary, R. K., Mishra, S. K., Kar, S. K., & Bansal, R. (2022). The Growth Trajectory of UPI-Based Mobile Payments In India: Enablers And Inhibitors. *Indian Journal of Finance and Banking*, 11(1), 45-59.
<https://doi.org/10.46281/ijfb.v11i1.1855>
- 75: Mishra, S., & Rajora, V., “A study on Digital Payment System with special reference to Youth”, *International Journal of Creative Research Thoughts (IJCRT)*, 237-242, 2018.
- 76: Singhal, R., “Impact and Importance of Digital Payment In India” *International Journal of Multidisciplinary Educational Research*, 10(2), 3, 2021.
- 77: Pushparaj, A. K. (2021, May 16). Digital Payment System – Innovative Practices of Banks and Perception of Customers. *International Journal of Research in Engineering, Science and Management*, 4(5), 1-3.
- 78: Shahid, M., & Kumar, V. (2022). Determinants of UPI adoption: A diffusion of innovation approach. *Journal of Retailing and Consumer Services*, 66, 102980. <https://www.sciencedirect.com/science/article/pii/S2666954422000205?via%3Dihub>
- 79: Razi-ur-Rahim, M., & Khan, F. R. (2024). Extended meta-UTAUT model to explain adoption and usage of Unified Payments Interface (UPI) in India. *Heliyon*, 10(3), e09756. Shahid, M., & Kumar, V. (2022). Determinants of UPI adoption: A diffusion of innovation approach. *Journal of Retailing and Consumer Services*, 66, 102980. <https://www.sciencedirect.com/science/article/pii/S2666954422000205?via%3Dihub>
- 80: Vedala, N. S., & Banerjee, S. (2025). Examining the role of demographics in UPI adoption using UTAUT with moderating effects. *Humanities and Social Sciences Communications*, 12, Article 53. <https://www.nature.com/articles/s41599-025-05313-w>
- 81: Mandal, T. K. (2023). Adoption of UPI and implementation challenges in India: Insights and policy

How to cite : Dr. Taru Maheshwari, Dr. Purwa Srivastava, Dr. Anjali Saluja, Dr. Divya Rana, Dr. Anand Kumar, Mr. Sahil Gupta, Usage Of Upi Transactions And Its Challenges-A Study On Generation X *Advances in Consumer Research*. 2026;3(7): 93-103

implications. *International Journal of Economics and Finance*

<https://ijrpr.com/uploads/V5ISSUE6/IJRPR29718.pdf?utm>

82: IJRPR Editorial Board. (2024). A study on enhancing the securities on UPI payments. *International Journal of Research and Policy Review*, 5(6), 247–254.

1. .