

LITERATURE REVIEW ON DIGITAL PAYMENT ADOPTION IN THE LPG SECTOR

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Abstract: Digital payments have become crucial for any economy as we move towards cash less society. They are fast and offer unmatched ease to users. Proliferation of smart phones and internet being available even in the remote corners of the country has exploded the landscape of digital payments. This SLR started by examining 60 papers in the sector of digital payment adoption by customers, the factors and theories and a look at the LPG sector in India and the status therein and has in deep examined 25 papers. It has also taken help of Government websites wherever relevant. While enumerating on the existing status in LPG sector the SLR has examined in deep the theories governing the research in digital payment adoption as well as the future trends which are exciting.

Keywords: Digital Payments, LPG Sector, UTAUT, TAM, DFT, Technology Adoption.

I. INTRODUCTION TO OIL INDUSTRY

Mankind is said to have taken a leap in its evolution when it discovered fire accidentally.

A significant event, occurring thousands of years later, was the discovery of oil in Pennsylvania in 1859, followed by the Spindletop discovery in Texas in 1901. These discoveries were instrumental in laying the groundwork for the contemporary oil economy. (Source-EKT interactive-history of oil).

The drilling of first oil well in 1859 set the stage for a new era of industrial revolution where the petroleum was going to have a major impact on innovations and other discoveries and was going to change the face of the world.

Oil not only impacted the economic growth and technological growth but also had a profound effect on the entire social and political landscape. It also led to many civil conflicts and wars to control the limited resources. (Bell & Wolford, 2011)

Approaching home The Burmah-Shell Oil Storage and Distributing Company of India Limited was established in 1928 when Asiatic Petroleum (India) partnered with the Burmah Oil Company, a prominent producer, refiner, and distributor of petroleum products, primarily in the Indian and Burmese markets. Beginning with the import and marketing of kerosene, Burmah Shell quickly established itself as a trailblazer in a number of areas. The company sent its large imports of oil goods throughout India in 4-gallon and 1-gallon tins.

Burmah Shell was the first company to bring LPG to India in 1955. The kitchen revolution was then sparked by the brand name "Bursane," which was a clean and effective cooking fuel. Thanks to its 6,042 distributors, Bharatgas is able to carry on the tradition today, bringing joy and warmth to millions of households around the nationⁱ.

In order to provide rural and underprivileged households that were previously using traditional cooking fuels like firewood, coal, cow dung cakes, etc. with access to clean cooking fuel like LPG, the Ministry of Petroleum and Natural Gas (MOPNG) launched the Pradhan Mantri Ujjwala Yojana (PMUY) in May 2016. Both the ecology and the health of rural women suffered from the use of traditional cooking fuels. By March 2020, the Pradhan Mantri Ujjwala Yojana (PMUY) aimed to provide 8 crore LPG connections to underserved families. With the approval of an additional 75 lakh connections under the PMUY Scheme, the Indian government has raised the program's overall aim to 10.35 crore, which is the amount that connections are being given against.

The scheme was launched on 1st May 2016 in Ballia, Uttar Pradeshⁱⁱ.

A. UNDERSTANDING LIQUEFIED PETROLEUM GAS (LPG) -OVER VIEW

The three Public sector oil companies viz Bharat Petroleum, Hindustan Petroleum and Indian Oil are the key drivers for growth in LPG sector in the country.

As on 1.10.2024 IOC, BPC and HPC together have 32.84 active domestic LPG consumers in the countryⁱⁱⁱ. Liquefied petroleum gas or LPG is an environment friendly and clean fuel preferred as cooking fuel the world over. It is estimated that roughly 2.5 billion people all over the world use it for cooking and other household needs like heating etc. Traditional biomass fuels have much higher rate of emission compared to LPG. This makes LPG contribute to environmental protection in a big way. Also, LPG contributes to health of users by lowering the indoor pollution caused by traditional fuels. Currently LPG is produced as a by product of crude oil processing in Oil refineries but it is possible to get LPG using agricultural and other bio mass and solid waste. This further enhances the contribution of LPG to sustainability (Hsu et al., 2021).

The reduction in indoor pollution is critical, as highlighted by (Ali et al., 2021) Solid fuel burning inside the home is a leading cause of indoor air pollutants which leads to 3.55 million deaths annually. At very high risk are women and children due to the high exposure. To reduce the risk, it is important that government intervention is sufficiently done to encourage use of clean cooking fuels. The research has conclusively proved that there is strong evidence to low birth weight, anaemia, stunted growth in children, lung cancer, asthma and CVD in women having a direct association with the use of solid fuel.

LPG has vast potential to not only to be used for cooking purposes in the household sector but also to provide clean fuels to industries and commercial sector. But when we have to introduce LPG to developing and poor economies it faces the challenges of price barrier from more traditional fuels like wood and coal. But recent developments of many governments in providing subsidies and encouraging public private partnerships has helped including India, in taking it to underserved areas .(Lemaire & Kerr, 2018, n.d.)

II. INTRODUCTION TO DIGITAL PAYMENT SYSTEMS IN LPG SECTOR

LPG cylinder distribution in the nation has predominantly relied on cash transactions or the Cash on Delivery (COD) model. However, a move towards digital payment methods for LPG transactions has been sparked by two noteworthy events: the COVID-19 pandemic and demonetisation. Oil companies have responded by launching digital transformation projects to create strong digital payment systems. Transparency in the system is naturally improved by the use of digital payments. The availability of data in rural areas and cybersecurity concerns, however, continue to be the two main obstacles. Customers must be sure that the digital systems they use will protect their data and guarantee financial security. Since the great majority of people use LPG for cooking, encouraging digital

B. DIGITAL PAYMENT ADOPTION IN LPG: CURRENT LANDSCAPE IN INDIA

In wake of initiatives like Digital India program digital payments received wide spread acceptance. There were various modes of payments which became popular like UPI, Cards, mobile wallets, internet banking and mobile banking. Customers adopted digital payments for speed and efficiency. Development of Information and communication technology (ICT) paved the way for movement of business transactions from cash to digital. Making payments through mobiles also helped customers to keep tab on the payments to be made as they got notifications and reminders. Ghosh (2021) in his study claimed that as the sales of smart phones will increase and data will be available more and more people are sure to adopt digital payments in day to day lives making India's digital program a successful one. Click or tap here to enter text.

Demonetization was one big factor which hastened the growth of digital payments. Shortage of cash forced customers to switch to digital payments. Demonetization showed that digital payments can considerably reduce the cost of cash handling and can contribute in a major way to efficiency of economy. Causal evidence could also be established that when one spends using digital mode one spends more due to subdued endowment effects.(Agarwal et al., 2024)

III. THEORETICAL FRAMEWORKS-

C. UTAUT AND TAM

As per (M. Sharma & Sharma, 2019), UTAUT- Unified theory of acceptance and Use of Technology is used to understand the behaviour of various users across fields in information technology. Widely used in mobile banking, mobile internet, mobile payments and mobile health. In context of payments, there are four hypothesis which are worth examining particularly within Indian framework. They are-**Performance expectancy**- This says that consumers will use a system if they find it useful. Performance expectancy is a major indicator whether customer accepts or rejects a technology. The rural population in India is particularly used to cash and to shift them towards digital PE has a positive role to play.

D. EFFORT EXPECTANCY

Customers in rural India will use the technology if it is easy to use and the effort is minimum. When people are in early stage of technology adaption then EE is a significant factor for positively influencing adaption for mobile payments.

E. SOCIAL INFLUENCE

India is a country heavily influenced by culture and operates in small social units. Hence social influence is a major factor. Chances of acceptance of a new technology is high if they see the people around them are using it. So it has a positive influence for making digital payments.

Facilitating Conditions- This is availability of resources which make it possible to adapt technology. Support plays a big role. Availability and cost of internet is also another big factor. Thus FC contributes positively towards adaption for digital payments.

(Dzogbenuku et al., 2022) used this theory to study the effect of age and gender in an underdeveloped economy and have concluded that UTAUT is a robust model.

(Manrai et al., 2021) Extended the UTAUT to UTAUT-2 to understand the behaviour of semi rural woman combining it with credibility and self determination theory. Some key elements which they brought out was that trust and ease of use were important factors in digital payment adoption. Dropping hedonic value, as usage of smart phone is now utilitarian, they studies habit, intrinsic motivation and perceived autonomy which in their view were more compelling factors.

F. TAM (TECHNOLOGY ADOPTION MODEL)

TAM was developed to understand why a user accepts or rejects any product or service. It is a theoretical framework utilized by many researchers who try to study the adoption of technologies. The literature review cited here explains that TAM is the most frequently used theoretical framework. TAM tells us about the inter-relationship among the simplicity of use, perceived usefulness, attitude and whether the technology will get adopted or not.

Though UTAT is an extension of TAM but research has shown that TAM alone is not able to express the complex nature of what a customer thinks and does. Hence, TAM has been combined with other constructs trying to study the digital payments such as pricing, reliability, mobility, suitability, speed, usage situation, social reference groups, enabling conditions and technological anxiety. IDT or the innovation diffusion theory is another construct studied along with TAM. The diffusion theory is very useful in forecasting consumer adoption behaviour. IDT and TAM are complementary to one another in their approach. Researchers continued to develop and expand TAM to TAM 3, and found that TAM 3 is a broader, integrated model, which can measure the determinants of acceptance and use at the individual level and has better predictive power than IDT. Similarly, IRT or Innovation Resistance Theory is used to research the barriers and resistance towards various types of user innovations like online shopping, m-banking, m-commerce and e-banking. The limitation of this study is the incapacity of explaining the role of culture in the adoption of mobile payments. Therefore, this limitation necessitates the need for further theoretical development. Some critical areas suggested for future studies are – how service attributes, flow experience, risk types, personal influence and grievance redressal may affect the behaviour of consumers. (Sahi et al., 2021)

(Dieman & Berg, 2023) combined TAM with theory of planned behaviour to study digital payment adoption in an underdeveloped economy which preferred to deal in cash. It highlights the influence as a big factor and recommends using training and coaching to raise awareness towards adoption.

IV. DFT-DUAL FACTOR THEORY

The Dual Factor Theory (DFT) studied the enablers and inhibitors of mobile payments in rural India. The DFT tries to answer the question, “Why does a technology get rejected by people.” DFT builds on the hypothesis that enablers and inhibitors are not opposite to each other but only different from each other. Some examples of enablers are – utility, functional and hedonic value, and social prestige. The inhibitors are – cost, prerequisite knowledge and fear. The DFT also investigates the expectation confirmation theory and empowerment theory. DFT tested the hypothesis whether the enablers and inhibitors, as mentioned above, aid in continued usage of mobile payment systems. It further classified and tested the hypothesis that mobility, perceived security and empowerment are enablers and the hypothesis that perceived risk, design constraints and perceived cost are inhibitors. This was done while controlling variables like gender, age and education. DFT concluded that it is critical to understand the enablers and equally, inhibitors cannot be ignored as only then can we truly understand why users accept or reject mobile payments. This study offered many practical suggestions for mobile manufacturers, banks and other relevant stakeholders. Digital payment operators need to focus on key advantages of mobile payments compared to other payment options. Also, the consumers in rural areas are very sensitive

to the safety of their personal information which might be revealed while making use of mobile devices for digital payments. Hence, it is the responsibility of the decision makers to create security protocols for data privacy as well as educate the rural residents regarding measures taken by them to protect their data. DFT had used purely quantitative methods, it suggests that for future research, the critical realism approach or the mixed method approach may be adopted to broaden the base of findings (S. K. Sharma & Mishra, 2023)

V. STRATEGIES TO REDUCE BARRIERS AND ENCOURAGE DIGITAL PAYMENTS

G. ENHANCED DIGITAL LITERACY

(Bakhshi et al., 2024) have brought out in detail the role of education and outreach programs in enabling the people to adopt digital payments. The paper says that the growth of data and connectivity was very crucial for the entire digital services landscape like online banking digital payments and other E-Commerce activities. Covid pandemic was one of the factors which accelerated the growth of all digital mediums. The paper further discusses a number of barriers which may exist in usage by customers of digital services and they have examined number of factors including trust, risk, what benefits customers may get and how the society is impacting the adoption is also a key area which the paper has examined. Also the role which the literacy and awareness can play in digital adoption has been studied. The paper has referred to the existing literature for all these barriers and then goes on to examine them in detail. Researchers have used interpretive structural modelling as a basis to study the barriers and has developed the ISM model based on assignments done of the levels to each of the barriers. The study has highlighted the fact that use of cash is very deeply rooted in the Indian society and therefore the movement towards digital payment needs incentive and education and digital literacy can play a very big role because lack of literacy and lack of financial literacy is a clearcut barrier. Creation of support group and agencies to which customers can reach out if they have any doubts will help greatly towards financial and digital education. Customers will hesitate to adopt digital payments if some costs which they feel is unwarranted is involved rather incentives like cashbacks and discounts will promote it. If users are educated towards the security mechanisms of the digital payments it may encourage for a faster adoption. This study was done purely on quantitative basis and the researchers have concluded that adopting a mixed method approach which can combine the quantitative and qualitative will throw more light in the coming days on the barriers towards digital payment adoption.

(Hussain et al., 2024) The researcher has uniquely studied a geography where the infrastructure on the supply side for digital payment usage is adequate in terms of data availability, bank account, the banking systems, the enablement of Indian rupee cards the unified payment interface available, Aadhaar enabled payment systems and also m banking, all being available but still the adoption is low. The study is theoretical in nature and has studied the digital divide which exist in society meaning the divide between people who are using the digital payments and the people who are not. Study was interview based and a pilot was also conducted to check the relevance of the format created for the interview, the sample size was of 20 participants and in the pilot two participants were interviewed. The sample was equally divided between the uses and the suppliers of the digital ecosystem on the supply side the banking professionals and digital banking supervisors were interviewed, customers in interview included, student's teachers, homemaker's vendors and shopkeepers and they were chosen with the specific design that they may have some inhibition to use digital payments or have not used the digital payments in last 6 months at the time of interview. lack of awareness or education which can also be termed as gap in digital literacy has been highlighted as one of the key reasons towards barriers to digital payment adoption and hence the study says that digital literacy has a strategic role to play towards greater digital payment adoption. (K et al., 2025) The researcher studied the role of digital payments in the agriculture sector where large number of government subsidies are being transferred through DBT or direct benefit of transfers. In agriculture sector digital payments can play a big role in creating transparency and weeding out the middlemen. The key challenge is of digital literacy of farmers. The study suggests robust grievance handling mechanism can help in faster and better adoption.

H. STRENGTHENING INFRASTRUCTURE

(Rana & Goel, 2024) Highlighted in their study the key role infrastructure plays in digital payment adoption. In infrastructure they have counted not only internet connectivity, presence of mobile devices but also availability of electricity has been studied as a key resource. Since the study is in rural India, electricity is a key resource which will make other digital initiatives work smoothly including payments. The study was done based on questionnaire taking a small size and then analysed. In their conclusion they have urged policy makers to study in detail using mixed methods to further strengthen the hypothesis regarding role played by infrastructure in digital payment adoption.

I. COST OF TRANSACTION

The consumers have to pay transaction costs whether they use banking networks or mobile payments. (Simatele, Munacinga, 2021) have highlighted the case of Zimbabwe where the Government itself has taxed all e payments at 2% of transaction cost creating dissatisfaction among users. Apart from this the mobile money operator have their own costs

making the whole echo system of mobile payments unattractive for the users. Hence policy makers have to look at these aspects to overcome barriers for digital payment adoption.

J. SECURITY AND TRUST

(Krishna et al., 2023) The institutions have a very large role to play in tackling cybersecurity and building an environment of trust for users. This includes the performance as well as the response generated by the institutions. This study gains importance in the wake of recent cyber attacks on common citizens and various frauds in the name of OTP etc. In fact recently Government of India has put in a mandatory caller tune which each caller has to compulsorily listen which warns against sharing personal banking and other data with unknown entities. The mobile users value features on their phone which enhance security features reducing tensions in using of digital payments.

(Ravi Vyas1, 2024) Tested the hypothesis between perceived risk and security and found that perceived risk profoundly impacts trust and security concerns in digital payments.

(Aljaradat et al., 2024) Have constructed a game theoretical model where while mapping all the elements in the digital payment chain including banks, app platforms etc have also mapped the cyber criminal and have tried to analyse the possibilities of cyber attack. They have posed number of research question, one of high relevance is how the digital payment service providers investment in mitigating frauds and increasing measures to stop cybercrimes increases digital payment adoption by users and concludes that it is one of the key concerns.

VI. FUTURISTIC TRENDS IN DIGITAL PAYMENTS- BLOCKCHAIN

As we have seen above security concerns are a key factor in large scale adoption of digital payments. Increased threats of cybersecurity, rising cyber frauds erode the trust of users in the system. National Cyber Crime Reporting portal of Government of India reported 1.23 lakh of cyber theft cases in 2024 with Rs 1935.51 crore of losses. This is significant rise compared to previous year cases. As the adoption of digital payment grows with growth in infrastructure, better connectivity, higher penetration of smart phones and digital literacy only education and creation of awareness will not be able to address this menace. It is then up to technology companies to enhance security features and bring technological interventions to usher a new era of secure payments.

(Rattanawiboonsom, 2024) Blockchain technology has the potential to create a more secure environment for mobile transactions. The beauty of blockchain technology is that it offers records which are tamper evident and offers records for all transactions and network activities. This gives an environment which is transparent and auditable for mobile networks. This is an extremely useful feature where the user data needs to be protected, and security of financial transaction is paramount. It is very difficult for hackers and manipulators to break through. Blockchain can significantly reduce risk of Identity theft and unauthorised access to sensitive information.

(Leka (moçka et al., 2023)highlight a number of advantages of blockchain technology which hold a good promise to make banking transactions secure which may further boost financial inclusion and taking financial services to underserved areas but have mentioned scalability and interoperability as concern areas which needs to be worked upon. It is well known that the trust displayed by users in the digital payment echo system is a crucial factor.(Norbu et al., 2024)Policy makers need to study the effect of block chain in digital payments from the user perspective for acceptance and trusting it.

As economies move towards more cash less societies newer technologies are likely to emerge to work in the field of securitisation of digital payments. (Schiansky et al., 2023) A new theory using quantum light using optical fibre to generate cryptograms will be interesting to watch in coming days.

VII. DIGITAL PAYMENTS IN THE LPG SECTOR

LPG or the liquified petroleum gas is the main source of cooking fuel in Indian homes. While we have now natural gas or PNG as per the current data taken from GOI website there are just 1.23 crore PNG connections compared to 32.3 crore LPG connections.

It was only in the last decade that the Oil Marketing Companies (OMCs) such as BPC, HPC, and IOC introduced payment gateways on their websites to enable customers to make payments digitally. However, the adoption of digital payment has been very slow in the oil sector. As per data available in the public domain displayed on the Bharat Bill Payments division of the National Payment Corporation of India, out of the 33 crore existing users of domestic LPG in the country, only 1 crore have used online payment platforms, compared to 6 crores who paid electricity bills using BBPS. This

demonstrates that policy makers need to investigate the underlying reasons for this low adoption of digital payments in the LPG sector. There is a clear research gap in understanding the specific barriers faced by LPG consumers, such as issues related to digital literacy, trust in online transactions, socio-cultural and economic factors, and the effectiveness of existing policy interventions. Furthermore, there is a lack of in-depth, sector-specific studies that employ both quantitative and qualitative methods to explore user behaviour and attitudes toward digital payments in the LPG context. Addressing these gaps is essential for designing targeted strategies that can accelerate the adoption of digital payments among LPG users and ensure the benefits of digitalization reach this critical sector.

VIII. CONCLUSION

This SLR has looked at existing literature on the current state of digital payment adoption at developed and developing economies. It has tried to gain understanding as to how the issues of trust, security, habit, gender, age, geography, economic status affect the adoption. It has also examined the future trends in digital payments like blockchain and quantum digital payments. Further it has highlighted the gap existing in the LPG sector of low adoption by LPG users and has urged policy makers to have a look in this direction.

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E-payment instruments and welfare: The case of Zimbabwe

BIOGRAPHY

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ⁱ BPCL Website-www.bharatpetroleum.in.

ⁱⁱ GOI Website-pmuy.gov.in/about.html.

ⁱⁱⁱ government of India website-ppac.gov.in: Petroleum planning and analysis cell.