Digital Transformation at Fuel Stations in Sulaymaniyah, Kurdistan Iraq - Petro-retails Experience on Adoption of Digital Payment by the Consumers.

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Abstract

The study investigates the adoption of digital payment systems by consumers and Petro-Retailers at fuel stations in Sulaymaniyah, Kurdistan, Iraq. Using a quantitative methodology with a sample of 200 participants, the research evaluates the impact of perceived ease of use, perceived usefulness, perceived risk, and trust on digital payment adoption through regression analysis and ANOVA. The results show significant positive correlations between perceived ease of use, perceived usefulness, trust, and the adoption of digital payments, while perceived risk had a lesser impact. The findings highlight the transformative potential of digital payments in enhancing transaction efficiency, customer satisfaction, and operational transparency in the fuel retail sector.

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1. INTRODUCTION

Over the last twenty years, the rapid advancement of digital technologies and the widespread adoption of payment applications have transformed the commercial landscape (Sahi et al., 2021; Liébana-Cabanillas et al., 2015). The modern digital era has revolutionized business operations through electronic payment systems, enhancing the efficiency and effectiveness of financial transactions. In this context, effectiveness means achieving optimal results, while efficiency involves maximizing output with minimal resources (Owuor et al., 2023).

The Central Bank of Iraq (CBI) established the "National Company for Electronic Payment Systems in Iraq," a major financial infrastructure initiative aimed at innovating national electronic payment and settlement systems (CBI, 2023). This entity's development underscores the rapid growth of electronic financial services, aligning with government goals to promote advanced electronic payment systems.

Consumers increasingly prefer digital payment options due to their efficiency and convenience (Caddy et al., 2020). Digital payment, encompassing methods such as bank transfers, mobile money, QR codes, and debit/credit cards, offers advantages like financial inclusion, transparency, cost savings, and time efficiency (Dwijendra et al., 2022). Governments and financial institutions globally are advocating for digital payment systems to enhance accountability and streamline transactions (Argimbayeva et al., 2020).

This digital shift has extended to vital sectors like fuel stations, integral to economic infrastructure. Fuel stations have incorporated digital payment options to manage transactions more efficiently, particularly during peak hours, enhancing the customer experience (Johan & Subramanian, 2022).

Oil and gas companies are integrating contactless payment systems as part of their digital transformation, aiming to boost customer satisfaction by reducing transaction time (Purohit & Jain, 2021). These companies leverage AI and machine learning for demand prediction, big data analytics for personalized offers, and IoT for security enhancements (Sircar et al., 2021).

This study investigates the adoption of digital payment systems by consumers and the experiences of Petro-Retailers at gas stations in Sulaymaniyah, Kurdistan, Iraq. Sulaymaniyah is a city in Kurdistan where the Central Kurdish language is spoken Its population is entirely Kurdish (Abdullah, and Veisi, 2022; Veisi et al., 2024). It aims to understand the impact of electronic payment methods on consumer behavior, efficiency, and transparency in the oil and gas procurement industry. By analyzing these aspects, the research seeks to provide insights into the transformative potential of digital payment systems in Sulaymaniyah's fuel retail industry, with implications for similar sectors and regions modernizing their procurement practices.

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The Kurdistan region, especially Sulaymaniyah CITY has seen significant improvements in the efficiency and security of transactions at petrol stations with the adoption of digital payment systems. Previously, cash payments led to numerous issues such as handling old and damaged currency, which was often a vector for spreading diseases. This not only posed health risks but also created significant financial management challenges for accountants. The transition to digital payments has streamlined operations, reduced the risk of counterfeit currency, and minimized the physical exchange of money, thus enhancing overall transaction security and efficiency. This shift is part of a broader trend towards modernization and digitization in the region, aligning with global movements towards cashless societies and demonstrating the transformative potential of digital payment systems in improving economic infrastructure and public health.

1.2 Objectives of study

The Aim is to investigate factors influencing digital payment usage at fuel stations in Sulaymaniyah, Kurdistan Iraq, focusing on consumer perceptions. Our Objectives are to Assess the perceived ease of use of digital payments, examine the perceived risk associated with digital payments, evaluate the perceived usefulness of digital payments, analyze trust in digital payment systems, and Investigate the relationship between perceptions and digital payment usage intensity. Provide recommendations for enhancing digital payment adoption at fuel stations.

2. RELATED WORK

2.1 Digital Payment

Advancements in digital technology have significantly impacted every sector and business. Changes in banking services and financial transactions have positively influenced the management of funds, facilitating both the receipt and transfer of funds through electronic mediums For the study researcher has selected 200 (Yalcintas & Alizadeh, 2020). Hoseini and Valizadeh (2021) emphasized that the emergence of digital payment services allows people to make and receive payments from anyone at any time, enhancing convenience and flexibility. Digital payment involves the transfer of funds between payment accounts via digital devices such as points of sale (POS) or digital communication channels like SWIFT or mobile wireless data. Unlike traditional transactions, these digital services do not rely on middlemen or third-party organizations like banks or financial institutions.

Santosa et al. (2021) noted that digital payment is one of the most beneficial financial services, offering clients speed, ease, and resilience in managing their financial activities. Digital banking, particularly mobile money transfer, has emerged as a crucial enabler of financial inclusion in developing and rising countries, supporting marginalized and underprivileged members of society. However, this shift towards a cashless, paperless, digitally banked society raises concerns, especially in regions like Kurdistan. Despite the broad advantages highlighted by these studies, they often lack a detailed examination of specific sectors such as fuel stations.

2.2 Perceived Ease of Use and Digital Payment Adoption

Kurniasih et al. (2022) and Khiong (2022) identified a strong correlation between perceived ease of use and the intention to use digital payment applications. They emphasized that an intuitive user interface significantly enhances user engagement, even among those with limited experience. This aligns with our study, which seeks to determine if similar ease-of-use perceptions influence digital payment adoption at fuel stations in Sulaymaniyah.

Moreover, Huang et al. (2022) claimed that perceived enjoyment positively influences the intention to use digital payment systems. This suggests that applications designed to be user-friendly and enjoyable can significantly boost adoption rates. Previous studies, however, often generalized their findings across various industries without focusing on specific contexts like fuel stations, which our research addresses. By examining the specific context of fuel stations, we aim to provide more targeted insights that can inform industry practices and strategies.

Furthermore, Sharma et al. (2022) and Surur et al. (2020) found that system flexibility and development also impact users' intentions to adopt digital payments. This highlights the need for continuous improvement and adaptability in digital payment systems to meet user expectations. Therefore, the following hypothesis is proposed: **H1:** The intensity of digital payment usage is significantly affected by perceived ease of use.

2.3 Perceived Risk and Digital Payment Usage

Extant literature, such as Bhatt et al. (2023), mainly focuses on the perceived risks of theft and monetary loss associated with digital payments. Chawla et al. (2023) discussed macroeconomic disruptions as additional risk factors, highlighting that increased perceived uncertainty and mistrust in the financial system lead consumers to hold cash for precautionary purposes.

However, specific risks related to digital payment adoption at fuel stations remain underexplored. Factors unique to this industry, such as the reliability of payment systems during peak hours and potential transaction errors, are considered. Understanding these sector-specific risks can help develop more effective strategies to mitigate concerns and enhance digital payment adoption. Additionally, broader risks like data privacy and system security are analyzed to improve consumer trust. By providing a detailed analysis, the study offers insights to enhance the security and reliability of digital payment systems at fuel stations. Therefore, the following hypothesis is proposed: **H2:** Intensity of digital payment usage is significantly influenced by perceived risk.

2.4 Perceived Usefulness and Digital Payment Adoption

Research by Malureanu et al. (2021) and Siagian et al. (2022) has shown that perceived usefulness significantly impacts the adoption of digital payments, suggesting that users are more likely to embrace technology they find beneficial and convenient. This is supported by the Technology Acceptance Model (TAM), which posits that perceived ease of use and perceived usefulness are key determinants of technology adoption. While their findings underscore the relevance of perceived usefulness, they often do not delve deeply into sector-specific applications.

Integrating advanced technologies like AI and machine learning for demand prediction and IoT for security enhancements can further enhance the perceived usefulness of digital payment systems. These technologies not only streamline transactions but also offer personalized services and heightened security, thus increasing the attractiveness of digital payments. The integration of these innovations provides a more comprehensive understanding of how perceived usefulness influences digital payment adoption. By focusing on the practical benefits perceived by users, these insights can help tailor digital payment solutions to better meet user needs and expectations, thereby driving broader adoption across various sectors. Therefore, the following hypothesis is proposed: **H3: The intensity of digital payment usage is significantly affected by perceived usefulness.**

2.5 Trust in Digital Payment Systems

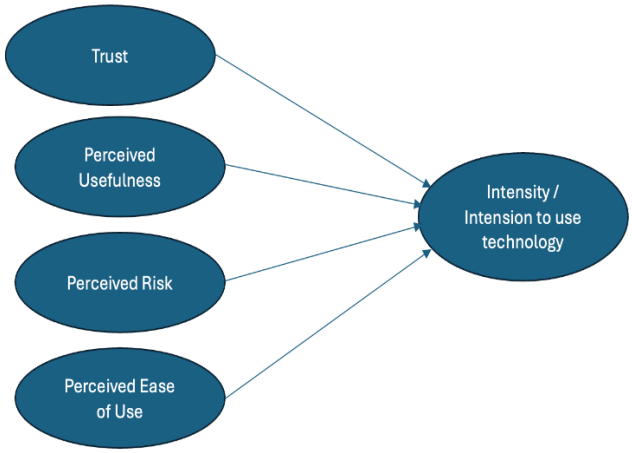
Trust is a critical factor in technology adoption, as highlighted by Li, Freeman, and Wohn (2021), who emphasized that trust in digital payment systems stems from the communicator's intentions, credibility, and dependability. Trust influences consumer behaviors across various domains, and its multidimensional nature has been elaborated by Sheppard and Sherman (1998) and Shao and Yin (2019). They argue that trust comprises elements such as integrity, concern, and benevolence, forming a deep dependence between two parties, particularly when risks of misconduct or neglect are present.

In the context of digital payment systems, building trust is paramount. Trust can be developed through the reliability of the payment system, transparency in transactions, and robust security measures to protect user data. The level of interpersonal trust placed in a digital payment system is significantly affected by the system's performance and the confidence it inspires among its users. This aspect of trust is particularly relevant in sectors where financial transactions are frequent and critical, such as the fuel retail industry.

The presence of numerous third parties offering alternative retail payment systems also underscores the importance of establishing trust. Consumers are more likely to adopt digital payment methods if they trust the system to be secure, reliable, and efficient. The high reliance on cash in certain regions, such as Kurdistan, indicates a significant challenge in shifting consumer habits toward digital payments. Enhancing trust in these systems through improved communication, transparent practices, and enhanced security protocols can lead to

greater adoption rates. Therefore, the following hypothesis is proposed: **H4: The intensity of digital payment usage is significantly influenced by trust.**

The Technology Acceptance Model (TAM) was first introduced by Davis (1989) and is defined as a model designed to understand and analyze the factors influencing the acceptance of the use of IT (information technology). Based on the above model, the following model is proposed for the present study:



3. Fig(1) research Variables

4. MATERIALS AND METHODS

Variables and item pools were defined considering the body of research on digital transformation and technology adoption that is currently available. A Likert scale with five points was designed to assess the constructs. Following the completion of the pilot study, professional opinions were consulted to finalize the questionnaire's wording and structure. For the study, the researcher selected 200 participants using the non-probability sampling method. This method has helped the researcher to select the participant as per own convenience and choice. The researcher has involved staff members and management authorities of fuel stations in Iraq to gain knowledge about the experience and benefits of using digital payment options. Based on a review of the literature, earlier studies, and relevant measurements, the researchers created a multi-item measure. Measures were validated using statistical techniques such as item and scale reliability assessments. The final measures' psychometric qualities were evaluated using Cronbach's alpha and exploratory analysis.

This study employed a non-probability sampling method, specifically convenience sampling, to select 200 participants from staff members and management authorities of fuel stations in Sulaymaniyah, Kurdistan, Iraq. While this method facilitated the collection of data from accessible participants, it introduced several potential biases and limitations that must be acknowledged.

One significant limitation of non-probability sampling is the lack of representativeness. Because participants were selected based on ease of access rather than random selection, the sample may not accurately reflect the

broader population's experiences and perceptions. This overrepresentation or underrepresentation of certain groups can lead to skewed results. For instance, the perspectives of general consumers who frequent fuel stations may differ from those of the staff and management included in the sample.

Another limitation is the reliance on self-reported data, which can introduce biases such as social desirability bias. Participants may respond in ways they perceive to be favorable, affecting the reliability and validity of the data collected.

To mitigate these limitations in future research, it is recommended to employ probability sampling methods, such as random sampling, to enhance the representativeness of the sample. Additionally, utilizing longitudinal designs can help establish causal relationships between variables and provide a more comprehensive understanding of the dynamics of digital payment adoption.

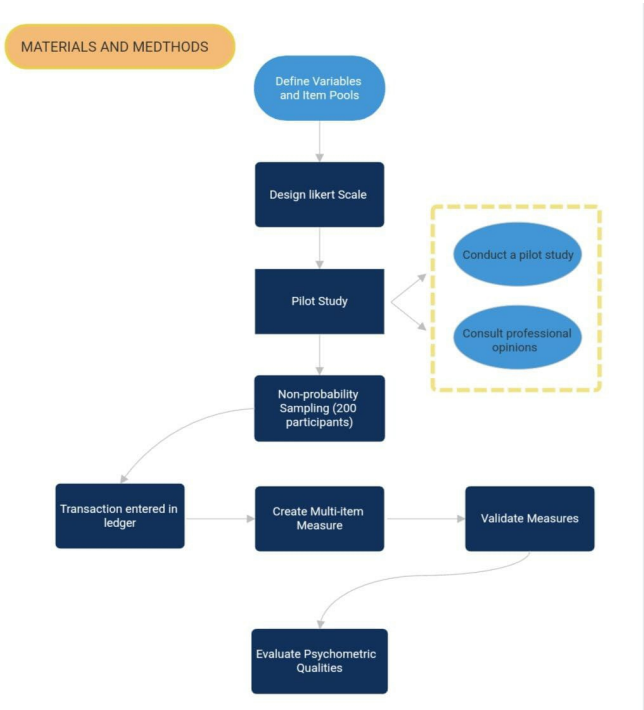


Fig. (2) Material and methodology

5. RESULTS

There was a total of 200 participants, who represented customers at gas stations in Sulaymaniyah, Kurdistan, Iraq. The age distribution of the participants was as follows: 30 participants (15%) were older than 31 years old, 120 participants (60%) were between the ages of 26 and 30, and 50 participants (25%) were between the ages of 20 and 25. With 180 participants (or 90% of the total), men made up the majority of the participants in terms of gender; only 20 participants (10%) were female. Understanding the age and gender distribution of study participants is essential for comprehending the adoption of digital payment methods in the context of

the region's fuel stations, and this demographic profile offers insight into that composition.

60% of participants stated that information storage is the primary driving force behind digital payments. This demonstrates how the digitalization process is valued for data management purposes. Furthermore, it appears that consumers have reacted favorably to digital payment methods, as evidenced by the majority of participants' positive customer feedback (50%) regarding digital payment.

Furthermore, data indicates that the digital revolution in gas stations has had a noticeable impact on consumer behavior and experience. For example, a sizable majority of participants concur that fuel purchases have changed in terms of volume and frequency as a result of digitalization. Additionally, improvements in in-store purchase procedures have been observed; 35% of participants suggested making adjustments to tracking data and daily collection analysis.

Furthermore, a noteworthy proportion of participants indicated that digital payment had an impact on demographic profiles. This further highlights the impact of digital payment on demographic profiles. This suggests that different consumer demographic groups may be affected differently by digital payment methods.

Nonetheless, difficulties persist, with 45% of participants citing server problems as a primary barrier. This emphasizes how crucial it is to resolve technical problems in order to guarantee the seamless operation of digital payment systems.

Despite these obstacles, the majority of participants (90%) acknowledge the additional benefits of digital payment. This acknowledgment is in line with the favorable customer experiences that have been reported, including the hassle-free methodology and shortened processing times linked to digital payment methods.

Furthermore, with 50% of participants strongly agreeing that it influences their decision to invest in technology, there is a clear influence of digital payment on investment decisions. This implies an understanding of how digital payment systems can revolutionize corporate strategy and technology spending.

Finally, security measures are acknowledged to be crucial, as indicated by the fact that 50% of participants said that using password protection would increase security. This emphasizes how crucial it is to put strong security measures in place to protect consumer information and digital payment systems.

Overall, the information shown in the many tables and figures offers a thorough summary of the complex effects of fuel stations adopting digital payments, highlighting both the advantages and disadvantages of this shift.

Table 1: Regression Analysis for Predicting Independent and dependent Variables

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.730[a]	.532	.523	2.862
a. Predictors: (Constant), Perceived Ease of Use, Perceived Risk, Trust, Perceived Usefulness				

A very significant model with an R-value of.730 was uncovered by this study's regression analysis, as shown in Table 1. This points to a strong linear relationship between the dependent variable (outcome) and the independent variables (trust, perceived usefulness, perceived risk, and perceived ease of use). The model's predictors explain around 53.2% of the variation in the outcome variable, as shown by the R-squared value of.532. In addition, the adjusted R Square stayed high.523, suggesting that the model's explanatory power remains resilient, even after accounting for the number of predictors in the model. With a value of 2.862, the standard error of the estimate captures the mean discrepancy between the anticipated and actual values.

We can see from the regression findings that there is a solid and consistent association between the outcome variable and the predictors: Trust, Perceived Usefulness, Perceived Ease of Use, and Perceived Risk. It appears that these characteristics have a substantial impact on how consumers in Sulaymaniyah, Kurdistan, and Iraq, perceive and use digital payment methods at gas stations.

Table 2: ANOVA to determine the regression model

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1818.243	4	454.561	55.464	.000[b]
	Residual	1598.137	195	8.196		
	Total	3416.380	199			
a. Dependent Variable: Intensity / Intension to use Technology						
b. Predictors: (Constant), Perceived Ease of Use, Perceived Risk, Trust, Perceived Usefulness						

Looking at the analysis of variance (ANOVA) presented in Table 2 of this study, it will be noted that the regression model has a high significance level. The F-value of the regression model as calculated is 55. 52, while the p-value is less than 0.01. Thus, H1 is supported; the regression model (F = 001) is statistically significant. This means that the outcome variable, "Intensity/Intention to use Technology," is significantly predicted by at least one of the predictor variables: Perceived Ease of Use, Perceived Risk, Trust, and Perceived Usefulness are the key factors that influence the consumer's decision-making process in e-commerce websites. Total of the

sum of squares of the regression, which is 1818. R2, signified by the numeral 243, shows the proportion of the outcome variable's total variance that the regression model explains. The average coefficient of variability of the outcome variable accounted for per predictor variable is 454. 561, with 4 degrees of freedom in the regression. On the other hand, the residual sum of squares (1598. 137) is the variance in the outcome variable that has not been captured and explained by the model. The total sum of squares (3416. 380) is the total amount of variability in the outcome variable. The MS for the residual stands for the average amount of unexplained variability in the outcome variable; equal to 8. 196 with 195 d. The figures mean that out of the 196 tests conducted, 195 were free of degrees of freedom. In sum, the analysis of variance indicates that Perceived Ease of Use, Perceived Risk, Trust, and Perceived Usefulness significantly affect the level of intensity/intention to use technology among consumers in Sulaymaniyah, Kurdistan, Iraq.

Overall, the ANOVA results indicate that a sizable amount of the variability in the Intensity/Intention to use Technology can be explained by the regression model, which includes the predictors of Perceived Ease of Use, Perceived Risk, Trust, and Perceived Usefulness. This suggests that these predictor variables play a significant role in determining how likely people are to use technology, which offers insightful information about the factors influencing technology adoption in the study's context.

Table 3: **Coefficient table for Multiple regression analysis**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.329	1.974		0.167	0.868
	Perceived Easy of Use	0.481	0.102	0.359	4.710	0.000
	Perceived Risk	-0.118	0.060	-0.114	-1.982	0.049
	Perceived Usefulness	0.298	0.089	0.237	3.337	0.001
	Trust	0.175	0.082	0.161	2.138	0.034
a. Dependent Variable: Intensity / Intension to use Technology						

Perceiving the relationship between the dependent variable- Intensity/Intention to use Technology and the predictors -Perceived Ease of Use, Perceived Risk, Perceived Usefulness, and Trust, it is appropriate to look at Table 3; Coefficient.

First of all, the coefficient by the constant term is equal to 0. 329, which gives the estimated value for the dependent variable when all the predictor variables are held at their mean. However, the t-value is obtained as 0 which is less than the t-critical value of 2. 167 and p = 0. 868, this constant term is not statistically significant hence it may not have a significant influence on the forecast of the dependent variable.

The coefficient of Perceived Ease of Use is 0. 481 & a t-value of 4. 710 ($p < 0.001$) and the standardized coefficient (Beta) is 0. 359. This shows a very high and positive correlation with the dependent variable which implies that, as perceived ease of use rises, the perceived behavioral intention to use technology rises significantly.

As for the hypothesis, the coefficient for Perceived Risk is negative, -0. 118 with the t-test equals to -1. 982; p = 0. 049, and a standardized coefficient (Beta) of -0. 114. This shows a negative correlation with the dependent variable where perceived risk has a negative effect on the intention to use technology.

The results of the analysis show that the coefficient of Perceived Usefulness is 0. 298 with a t-value of 3. ,337, (p = 0. 001) and the standardized coefficient (Beta) of 0. 237. This has a very significant positive relationship with the dependent variable, meaning that perceived usefulness is significantly related to the intention to use technology among the higher levels.

The coefficient for trust is 0. 175 with a t-value of 2. 138 (t = 2. 170, p = 0. 034) and a standardized coefficient (Beta) of 0. 161. This shows a very strong correlation with the dependent variable, meaning that increased trust will enhance the intention to use technology.

Therefore, the coefficient table reveals that Perceived Ease of Use, Perceived Usefulness, and Trust are all positively influencing the intensity or the intention to use technology among consumers in Sulaymaniyah, Kurdistan, Iraq. On the other hand, Perceived Risk has a negative effect on the overall equation as estimated by the coefficient of (-0.318).

Table 4: **Hypothesis testing results**

Hypothesis	Result
The intensity of digital payment usage is significantly affected by perceived ease of use.	Accepted
The intensity of digital payment usage is significantly influenced by perceived risk.	Rejected
The intensity of digital payment usage is significantly affected by the perceived usefulness.	Accepted
The intensity of digital payment usage is significantly influenced by trust.	Accepted

Table 4 provides the findings of hypothesis testing that provide a significant understanding of the association between the various factors and the level of digital payment usage. Based on the findings, it can be concluded that the hypothesis that posits that the level of digital payment usage is influenced by the perceived ease of use is valid. This implies that there is literature support that can be used to support the notion that the perceived ease of using digital payment systems is statistically significant in determining the extent and frequency of their use. This is in line with the previous findings showing that ease of use is one of the key factors that affect the adoption of a particular technology. Also, the hypothesis that stated that the level of digital payment is highly determined by perceived usefulness is also accepted. This means that the use of digital payment methods will be high if people consider such methods to enhance their transactions. It also supports the importance of perceived usefulness in the process of the adoption of technology. Therefore, the hypothesis regarding the relationship between perceived risk and the level of digital payments is also not confirmed. This implies that there is inadequate empirical backing to support the premise that the perceived level of risk significantly affects the extent of digital payment adoption. Also, the hypothesis that trust has a significant impact on the intention to use

digital payment is accepted, this means that high trust leads to the use of digital payment methods. Therefore, hypothesis testing results provide insights into the factors that may affect the level of digital payment usage. These findings stress the role of perceived ease of use, perceived usefulness, and trust, on the other hand, indicating that the impact of perceived risk is not as influential in the case of usage behaviors.

6. Results and Discussion

The findings of this study provide valuable insights into the factors influencing the adoption of digital payment systems at fuel stations in Sulaymaniyah, Kurdistan, Iraq. The regression analysis revealed a strong linear relationship between the dependent variable (intensity/intention to use technology) and the independent variables (perceived ease of use, perceived usefulness, perceived risk, and trust), explaining approximately 53.2% of the variation in digital payment adoption.

Perceived Ease of Use:

The significant positive correlation between perceived ease of use and digital payment adoption (coefficient of 0.481, t-value of 4.710, p-value < 0.001) aligns with the Technology Acceptance Model (TAM) and existing literature (Kurniasih et al., 2022; Huang et al., 2022). These findings underscore the importance of user-friendly interfaces and intuitive design in encouraging technology adoption. For stakeholders in the fuel station sector, this implies that investing in the development of simple, easy-to-use digital payment platforms can significantly enhance consumer adoption rates. Enhancements in user experience can reduce barriers to entry, making it more likely for customers to transition from cash to digital payments.

Perceived Usefulness:

Perceived usefulness was also found to be a strong predictor of digital payment adoption (coefficient of 0.298, t-value of 3.337, p-value = 0.001). This is consistent with findings from Malureanu et al. (2021) and Siagian et al. (2022), highlighting that consumers are more likely to adopt technologies they perceive as beneficial and enhancing their efficiency. In the context of fuel stations, digital payment systems offer practical advantages such as faster transactions and reduced wait times, which can improve customer satisfaction and operational efficiency. Stakeholders should emphasize these practical benefits in their marketing and customer education efforts to drive adoption.

Perceived Risk:

The impact of perceived risk, while statistically significant, was less influential compared to other variables (coefficient of -0.118, t-value of -1.982, p-value = 0.049). This suggests that although concerns about theft, monetary loss, and data security exist, they are not the primary determinants of digital payment adoption. This finding is somewhat contrary to the emphasis on risk in previous studies (Bhatt et al., 2023; Chawla et al., 2023), indicating that in the context of fuel stations, other factors may play a more pivotal role. For stakeholders, this means that while addressing security concerns is important, greater emphasis should be

placed on highlighting the ease of use and practical benefits of digital payments.

Trust:

Trust in digital payment systems emerged as a crucial factor (coefficient of 0.175, t-value of 2.138, p-value = 0.034). This finding is in line with research by Li, Freeman, and Wohn (2021), and Sheppard and Sherman (1998), which emphasize the role of trust in technology adoption. For the fuel station sector, building and maintaining trust through robust security measures, transparent transaction processes, and reliable customer support is essential. Ensuring that consumers feel their data and transactions are secure can significantly enhance adoption rates.

1.1 Limitations of study

Although this research provides valuable insights into the adoption of digital payment systems by consumers and the experiences of Petro-Retailers at gas stations in Sulaymaniyah, Kurdistan, Iraq, it is important to acknowledge several limitations. Initially, the study's sample size of 200 participants may not adequately represent the larger population, which could restrict the applicability of the results. Moreover, the dependence on a single geographical area and industry sector could limit the relevance of the findings to different situations. Furthermore, due to the cross-sectional design of the study, it is not possible to establish causal relationships between variables. Therefore, it is important to exercise care when interpreting the observed associations. Moreover, the utilization of self-reported data can potentially introduce biases and inaccuracies, thereby affecting the reliability of the findings. However, the study's narrow emphasis on perceived ease of use, perceived risk, perceived usefulness, and trust as factors affecting digital payment adoption fails to consider other potentially significant factors that should be investigated in future research.

1.2 Future Research Directions

The practical implications of these findings for stakeholders in the fuel station sector are clear. Firstly, prioritizing the development of user-friendly digital payment platforms will likely yield higher adoption rates. Secondly, marketing efforts should focus on the tangible benefits of digital payments, such as convenience and efficiency. Thirdly, while security concerns should not be overlooked, they should be addressed in a way that does not overshadow the positive aspects of digital payments. Lastly, building trust through transparency and reliability should be a key strategy for encouraging digital payment adoption.

In comparison to existing literature, our findings align with the TAM framework and emphasize the importance of perceived ease of use and perceived usefulness. However, the relatively lower impact of perceived risk suggests that context-specific factors, such as the operational environment of fuel stations, can influence the relative importance of different adoption factors. Future research should explore these contextual differences further and consider employing probability sampling methods to enhance the representativeness of the findings.

5 CONCLUSIONS

This study offers significant insights into the digitization of fuel stations in Sulaymaniyah, Kurdistan, and Iraq, focusing on consumer adoption of digital payment methods. Employing quantitative analysis methods such as regression and ANOVA, the study identifies key factors influencing adoption. The findings reveal strong correlations between perceived ease of use, perceived usefulness, and the extent of digital payment usage, emphasizing the importance of user experience and practical benefits. While perceived risk and trust were found to have less influence, their roles are still notable in understanding consumer behavior.

These results provide valuable implications for stakeholders in the fuel station sector, suggesting that enhancing user-friendliness and highlighting practical advantages can significantly promote digital payment adoption. Additionally, addressing socio-cultural and infrastructural factors unique to the region through tailored interventions can further enhance adoption success. Recognizing the study's limitations, including its reliance on quantitative methods, future research should incorporate qualitative approaches to gain a more comprehensive understanding of the dynamics influencing digital payment adoption in fuel station settings.

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