

## **Adoption of mobile money among internal migrant workers during the corona pandemic in India: a study focused on moderation by mode of payments**

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**Abstract:** The paper studies the impact of the corona pandemic on the adoption and diffusion of mobile payments (m-payments) among internal migrant workers in India. These internal migrant workers in India constitute approximately one-third of the workforce. Protection motivation theory (PMT) and unified theory of acceptance and use of technology (UTAUT) are models used to examine the impact of the corona pandemic on the adoption of m-payments systems among internal migrant workers in India. A schedule was filled by 400 such migrant workers in India during the pandemic period. The data were analysed using structural equation modelling (SEM). Analysis shows that social influence, effort expectancy, facilitating conditions, perceived severity, self-efficacy, and response efficacy during the corona pandemic significantly influence the migrant workers' behavioural intention. The mode of payment convenience acts as a moderator between response efficacy and behavioural intention.

**Keywords:** migrant workers; unified theory of acceptance and use of technology; UTAUT; protection motivation theory; PMT; mobile payments; behavioural intention; moderator; structural equation modelling; SEM; India.

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## 1 Introduction

Historically, payments have been confined to cash, debit, or credit cards. Payment through mobile money has become a method of banking for unbanked residents and the system is also gaining patronage among citizens around the world (Alhassan et al., 2021). This type of payment is very easy for people to use, as it is based on user-friendly technology (Raman and Ashish, 2021). Due to the almost universal presence of mobile devices, it is no surprise that worldwide adoption of payments through mobile money is increasing and non-cash transactions are on the rise. Rapidly increasing mobile consumers can use mobile payments (m-payments) by applying various technologies such as short message service (commonly known as texting or SMS), Java application using general packet radio service (commonly known as GPRS), a wireless application protocol (commonly known as WAP) using interactive voice response (commonly known as IVR), unified payments interface (UPI), etc. (Bansal, 2019).

Such services associated with m-payments have rapidly expanded into often underbanked markets in Africa, Asia, and Latin America, fuelling their global growth by enabling millions of people to participate in large numbers of electronic transactions for the first time. These transactions happen in a matter of seconds. The beauty of the technology is that the customer can pay or receive money from any bank in the country

with an instant message about the transfer. Tan et al. (2012) reported that learning mobile applications related to m-payments is also relatively easy for both men and women. Earlier, Hasan et al. (2009) remarked that the adoption of m-payments affects the general national economy by improving the income distribution of households. This prompts us to conduct this study to understand the adoption of m-payments among internal migrant workers during the period of the corona pandemic in India. Contactless m-payments are seen as the most hygienic form of payment, as no physical contact will be required to complete the transaction.

While many studies like Alhassan et al. (2021), Smith et al. (2019), Darmon et al. (2016), and Maurer (2012) have been devoted to shedding light on the adoption of m-payment, the study on the adoption of m-payments among internal migrant workers during the period of corona pandemic is scarce, especially, in the areas of retailing, entertainment, financial services, and marketing. Given the danger of contaminated surfaces, many organisations are forced to adapt to this new form of m-payment system for the foreseeable future. Notably, the coronavirus is anticipated to alter the applicability of m-payments related to security, trust, and privacy. Nevertheless, the adoption of m-payments among the lower-middle-income group has remained low for several reasons like financial inclusion (Abor et al., 2018), awareness (Chavda, 2018), income level (Bamasak, 2011). In India, migrant workers constitute about a significant fraction of the total workforce but are often cut off from government schemes, including the benefit of subsidised rations in fair-price shops (Nilekani and Shah, 2016). However, there is no official data for the inter-state migrant workers in the country. Notably, the inter-state migrant crisis after the lockdown was felt more in cities like Delhi, Mumbai, and Surat (Jha, 2021). Such migrant workers are primarily employed/self-employed in temporary, unqualified jobs, characterised by low wages, job insecurity, and economic vulnerability that are typical characteristics of informal working environments. Although these migrant workers are socially and politically vulnerable, basic information about where they work and live, as well as how they are recruited, is often not available.

The research on the adoption of mobile phones among these migrant workers is important. But adoption of m-payments and their impact during the corona pandemic is still not studied. This research has implications for using contactless payments during and after the time of the COVID-19 pandemic. Therefore, the following research questions were developed for studying the adoption of payments through mobile money among internal migrant workers during the corona pandemic:

- Whether the migrant workers in India have adopted the m-payments system? If yes, how is the diffusion of mobile payments studied?
- What is the impact of the corona pandemic on the usage of the m-payments system by migrant workers in India?
- What is the impact of mode of payment convenience on behavioural intention (BI) of migrant workers?

This research paper aims to investigate the adoption of m-payments by migrant workers in India especially during the outbreak of COVID-19. Additionally, it also intends to evaluate its influence on BI. Finally, the study also examines the moderating effect of mode of payment convenience on response efficacy (RE) and behavioural intention. Therefore, this study attempts to make an original contribution to the adoption of

m-payments among migrant workers by seeking an explanation for the moderating effect of the mode of payment during the pandemic period.

## 2 Review of literature

The study reviews the literature on technology adoption, m-payments around the world, and the impact of the COVID-19 pandemic on m-payments.

### 2.1 Literature on technology adoption

The adoption of technology around the world has been the subject of much research because of its importance to human society in the twenty-first century (Lazer et al., 2021). Technology has helped in increasing the productivity, quality, and business performance of mankind (Prakash et al., 2017). It also helps to result in ease of use (Adams et al., 1992), financial inclusion (Gangopadhyay, 2009), and online convenience (Dekimpe et al., 2020).

Gruber (2001) unravelled the determinants of the diffusion of mobile telecommunications in Central and Eastern Europe. The study argued that the diffusion speed was faster in countries that had adopted mobile telecommunications late. The diffusion speed was found to increase with the size of the fixed telecommunications network and the length of the waiting list. It was also realised that mobile telecommunications were not immediately adopted by all potential customers like many innovations. The decision to adopt usually takes time and it was described using so-called 'epidemic' diffusion models, where the diffusion of the new technology was found to follow an S-shaped function, which was based on the *diffusion of innovation theory*, developed by Rogers in 1962 (Rogers, 2010).

Nevertheless, lack of user acceptance has long impeded the success of new information systems in many organisations, causing huge economic loss to their businesses (Davis, 1989). As a result, several technology acceptance theories and models have been developed to study the acceptance of new technology in the field of information systems. Apart from the *diffusion of innovation theory*, some other important models include *theory of reasonable action* (TRA) (Fishbein and Ajzen, 1975), *theory of planned behaviour* (TPB) (Ajzen, 1985, 1991), *decomposed TPB* (Taylor and Todd, 1995), *technology acceptance model* (TAM) (Davis et al., 1989), *technology acceptance model 2* (TAM2) (Venkatesh and Davis, 2000), and *technology acceptance model 3* (TAM3) (Venkatesh and Bala, 2008).

Of all these, the *TAM* is the most used framework in forecasting information technology adoption (White et al., 2012). Researchers have also extended TAM (Wixom and Todd, 2005). For instance, some researchers introduce many other factors to the model based on a context, such as subjective norms, perceived behavioural control, and self-efficacy (SE). Hampshire (2017) examined British consumers using TAM and mixed methods to understand the confidence, risk, and efficacy of m-payments. Customers in the UK have considerable mobile payment risks and confidence concerns. In addition, perceived usefulness significantly and positively influences British consumer attitudes leading to the adoption of m-payments (Hampshire, 2017). Bailey et al. (2017) joined the TAM implementers to understand adoption issues, new technology anxiety, and privacy

concerns related to m-payments in the USA. Further, Bailey et al. (2017) argued that the SE of m-payments has a significant impact on its usage and the perceived ease of use.

Based on the most significant constructs from the developed theories and models, Venkatesh et al. (2003) formulated a new model through evaluation and convergence of the predecessors called the *unified theory of acceptance and use of technology* (UTAUT) to explain the adoption of information systems. UTAUT suggested that three constructs, namely, performance expectancy (PE), effort expectancy (EE), and social influence (SI) are the main determinants of intention to use information technology. The construct PE has five root constructs, namely, perceived usefulness (from TAM or TAM2, combined TAM, and TPB), extrinsic motivation, relative advantage (from the Innovation Diffusion Theory), and outcome expectations. Venkatesh et al. (2003) also found that the influence of facilitating conditions (FC) on usage was moderated by age and experience of the individual. This model has also been applied in various sectors (Marchewka and Kostiwa, 2007; Al Qeisi and Al-Abdallah, 2014; Tam and Oliveira, 2017). For example, Teo et al. (2015) studied the effects of m-payments, comfort, and speed using UTAUT to demonstrate that the BI is impacted by FC and EE. Sobti (2019) implemented UTAUT to examine the antecedents of BI to demonstrate a significant and positive impact on mobile payment service adoption in India with age as the moderating variable. UTAUT was also applied to study the adoption of online banking using correlation and regression analysis (Chong et al., 2010).

The aspects of consumer effect, automaticity, and monetary costs were later integrated with the UTAUT2 model (Venkatesh et al., 2012) to overcome the limitations in UTAUT. The UTAUT2 framework comprises four constructs (PE, EE, SI, and FC) from the UTAUT model and three new constructs (hedonic motivation, price value, and habit) as antecedents of BI and user behaviour. Venkatesh developed this UTAUT model and came up with the UTAUT2 model. For example, Morosan and DeFrancos (2016) incorporated the perceived security within the UTAUT2 framework to reveal intentions to use near-field communication (NFC) m-payments in hotels.

## 2.2 *Literature on m-payments adoption*

The main trigger for m-payments came in 1999 when the first version of the PayPal electronic payments system was launched. Established in 1998 as Confinity, PayPal went public through an initial public offering (IPO) in 2002. Shortly after its IPO, the company was acquired by eBay (Van Alstyne et al., 2016). At the time, eBay was the dominant e-commerce player on the web, and PayPal was an upstart payment service that squeezed out most of eBay's in-house payment options. Since that time, a lot of big players like Google, Amazon, Apple, Samsung, and many others have entered into the business of m-payments. Such growth of m-payments can be attributed to the large customer base of people having smartphones and internet affordability (Kalyani, 2016). With the advancement of smartphones, payments today can be conducted simply by waiving or tapping a smartphone over a terminal reader making people shift from 'click' to 'tap'. This alternative payment method is known as NFC m-payment.

M-payments can be grouped into five categories including action bill payments, mobile device network payments, application payments, contactless payments, and SMS-based payments. Cao et al. (2018) investigated the process of developing trust for switching to m-payments system from online payment. Fan et al. (2018) investigated how perceived security (PS) and confidence influence user's attitudes to mobile use of

payments and why mobile payments develop differently in the USA and China. Further, Holm et al. (2018) compared mobile payments growth, opportunities, and limitations and analysed global trends and consumer behaviour in three continents (Europe, Asia, and North America). This study of Holm et al. (2018) examined four case studies (in the UK, Germany, China, and the USA) relating to various methods of payments, particularly concerning mobile payments for goods and services. Although worldwide adoption of m-payments was low compared to mobile technology, some of the important factors influencing its adoption were public policy, switching costs, brand equity, and quality of service (Yeh, 2020). Zhao et al. (2020) studied adults' experiences and beliefs towards m-payments in the USA to report that adults using cards prefer NFC m-payments compared to a cash-only payments system.

Yet research on technology adoption among internal migrant workers is limited, for example, Leonhardt and Chu (2017) identified several factors that influence the acceptance of online banking by migrant workers in China. The results of Leonhardt and Chu (2017) indicate that migrant workers in China are more likely to take online banks when their economic, biological, and social resources are increased. In a developing country environment, Hussain et al. (2019) reviewed the adoption of m-payments for the bottom of pyramid (BOP) segment. The results show that the behavioural intent of the BOP segment significantly influences performance expectations (PE), FC, effort expectations, habit, and society. Further, it has also shown that PE compatibility with lifestyle. Humbani and Wiese (2019) designed and tested an integrated model to explain the adoption and the intention of mobile payment application(s) using the structural equation model for the validation of the factor structure for the measurement items.

### *2.3 Literature on the impact of COVID-19 pandemic on m-payments*

In the wake of the deadly 2019 novel coronavirus pandemic, hundreds of thousands of human lives have been lost. Given the danger of contaminated surfaces, NFC contactless payments are seen as the cleanest form of payment, as no physical contact will be required to complete the transaction. According to the World Health Organisation, one of the transmission mechanisms of the coronavirus is coins and paper money passed between buyer and seller. As such, m-payments which were earlier considered as a mode of convenience are now becoming a necessity in the light of the pandemic; the payment habits and social behaviour of consumers have changed drastically.

The COVID-19 pandemic has put a sudden spotlight on both buying and shopping habits. Many countries around the world have gone into lockdown and are practicing social distancing measures that will define the months and years ahead. The sudden implications of social distancing such as an increase in working from home, e-learning, online shopping, panic buying, and hoarding present economic and social shortcomings as well as opportunities. There is an urgent need to understand the natural impact of mobile money, the way it develops, and its effective management through case studies, data sharing, and information analysis.

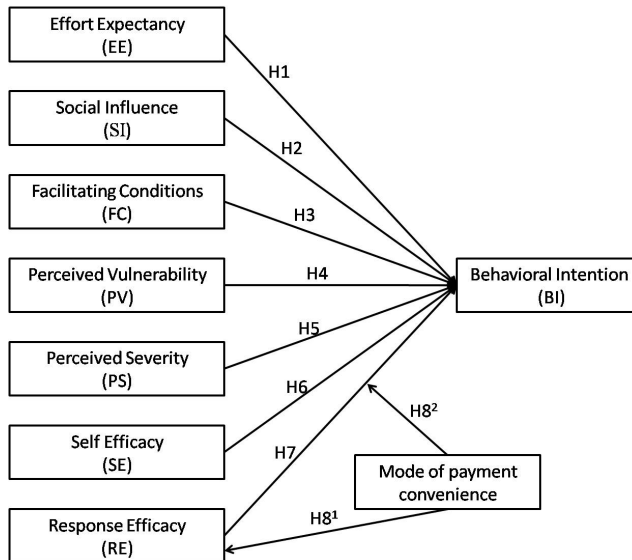
Donner and Tellez (2008) illustrated data from exploratory work with small enterprises in urban India to argue that contextual research is a critical input to the effective 'adoption of m-payments. Maurer (2012) explored the field of mobile money primarily in the developing world, which is heralded as signal interventions in the effort to broaden financial inclusion and bank the 'unbanked'. Choo (2013) reviewed FATF

mutual evaluation reports published between 1st of January 2010 and 31st of December 2012 for new payment methods applying to the regime of anti-money laundering/counter-terrorism financing (AML/CFT), particularly stored value prepaid cards and mobile money transfer systems. Darmon et al. (2016) made a theoretical analysis on the usage of m-payments and remittances in developing countries. Recently, Alhassan et al. (2021) studied the impact of mobile money, remittances, and financial development on innovative growth in sub-Saharan Africa, where the level of financial inclusion is low. Although mobile money has become an option of banking for the unbanked residents and the system has been gaining patronage among citizens of developing countries (Ratten, 2009), it can be stated that the study on the impact of coronavirus on the usage of m-payment is scarce.

### 2.4 Development of hypotheses

Considering the importance of social distancing during the period of the COVID-19 pandemic, this study intends to incorporate widely used protection motivation theory (PMT) in healthcare systems along with UTAUT. Rogers’s (1975) theory of PMT aims to describe how individuals are motivated to react in a self-protective way towards a perceived health threat. PMT is an appropriate theory for studying social and health behaviour among individuals (Siponen et al., 2014). Several other theories are potentially applicable to fear appeal like TPB (Ajzen, 1991), extended parallel processing model (EPPM) (Witte, 1992), terror management health model (TMHM) (Goldenberg and Arndt, 2008), and protective action decision model (PADM) (Lindell and Perry, 2012). However, the literature suggests that PMT is robust, versatile, and is still in widespread use after four decades.

**Figure 1** Conceptual research model



PMT has four key elements: ‘threat appraisal’, followed by ‘coping appraisal’, which comprises ‘RE’ – the belief that certain processes will mitigate the threat – and ‘SE’, an individual’s idea of their ability to implement the required actions to mitigate the threat (Rippetoe and Rogers, 1987). This study has considered measures of ‘threat appraisal’ as perceived vulnerability (PV) and perceived severity (PS), and ‘coping appraisal’ has been assessed with SE and RE.

Applying both PMT and UTAUT together implies that several intervening constructs and exogenous variables operate to produce effects to prevent the perceived COVID-19 threat to health when using services of m-payments. It has been argued that the effects of moderation by mode of payments would not be stable across all possible conditions in which it is implemented. Therefore, we formulate the hypothesised relationships between three constructs of the UTAUT model (EE, SI, and FC) and all four constructs of the PMT model (PV, PS, SE, and RE) through moderating for convenient mode of payment as shown in the conceptual research model of Figure 1.

The present study largely intends to confirm the following hypotheses derived from the literature of both PMT and UTAUT:

- H1: EE results in the BI of the migrant workers towards mobile payments.
- H2: SI results in the BI of the migrant workers towards mobile payments.
- H3: FC results in the BI of the migrant workers towards mobile payments.
- H4: PV results in the BI of the migrant workers towards mobile payments
- H5: PS results in the BI of the migrant workers towards mobile payments.
- H6: SE results in the BI of the migrant workers towards mobile payments.
- H7: RE results in the BI of the migrant workers towards mobile payments.
- H8<sup>1</sup>: mode of payment convenience moderates the relationship of RE alone.
- H8<sup>2</sup>: mode of payment convenience moderates the relationship between both RE and BI.

### **3 Research methodology**

Different research designs and methodology has been adopted in the literature studying technology adoption and health behaviour. The prominent methodologies adopted are exploratory, descriptive, experimental, etc. Our study is empirical in nature and the research design is both descriptive and causal. The data was collected from migrant workers in Pune city of India using the web-based tools (<http://surveymonkey.com>) and telephonically. Pune is a major industrial and automobile centre in the western region of India, with a population of over 8 million. Migrant workers from many states come to Pune for livelihood. Convenience sampling was used for data collection. A schedule was prepared in the local language (Hindi) by the researchers and filled in through Google forms. A total of 400 responses were taken. The data was collected with a Likert scale with responses from strongly agree (1) to strongly disagree (5). The schedule was administered to only those who have smartphones and any mobile payment application. Data analysis was conducted using a free and open-source software JASP, supported by



the University of Amsterdam, which is called as 'Jeffreys' Amazing Statistics Program (JASP)'. The data were collected in February and March 2021, when there was a corona pandemic in India. The Likert scale items for the constructs SI, FC, and EE are taken from (Venkatesh et al., 2012). The Likert scale items for the constructs, PV and PS are taken from Liang and Xue (2010). The Likert scale items for the construct SE are taken from Kim et al. (2010) and the Likert scale items for RE are taken from Woon et al. (2005).

In this study, migrant workers are understood to be someone, who are mostly employed/self-employed as workers and who are selling daily essentials on moving carts, chicken and mutton shops, hair cutting shops, laundry shops, tea shops, etc. In India, the 1979 Act defines a migrant worker as 'one who is recruited by or through a licensed contractor in one state for employment in an establishment in another state'. But, this Act is now included in the 'occupational safety, health and working conditions (OSH) code 2020' and 'migrant workers now include all workers whose monthly family income is less than Rs 18,000 per month and who go to another state and get employed or self-employed'. Further, this study has applied the following systematic steps to draw results:

### *3.1 Exploratory factor analysis (EFA)*

The EFA is an approach to the statistical analysis of a factor structure based on the grouping of variables based on strong correlations. The analysis reduces the number of extreme (high and low) load variables on one factor to a minimum and helps to identify a factor variable. KMO statistics must be calculated as Bartlett's sphericity test for the appropriateness of data adequacy.

### *3.2 Reliability and validity analysis*

The study aims to measure reliability, or internal consistency, based on Cronbach's Alpha,  $\alpha$  (or alpha coefficient). Another name for consistency is 'reliability'. Alpha tests from Cronbach to determine whether multi-question scale surveys are trustworthy. For social science research, acceptable values for the alpha of Cronbach must be greater than 0.60. Composite reliability (CR) should generally be higher than 0.60 to provide convergent validity, indicating a good model (Raykov, 1997). As a rule of thumb the values of average variance extracted (AVE) can be used to assess discriminant validity when the values of the scale are greater than 0.50 (Fornell and Larcker, 1981).

### *3.3 Confirmatory factor analysis (CFA) and developing structural model*

CFA is the next step to determine the factor structures of your data set after an EFA. Within the EFA we are investigating the structure of factor (as the variable interrelationships relate to and group), and in the CFA the factor structure we extracted in the EFA is confirmed. Specific measures to determine the goodness of fit of the CFA can be calculated to establish nomological validity. Figure 1 shows an initial structural model, a conceptual model for the study.

### 3.4 *Moderation analysis*

A moderator analysis is used to find out if there is a (moderated) value of a third variable as part of the relationship of two variables. This study uses the standard method to assess whether a moderate effect exists, which involves adding a (linear) term to a multiple SEM regression model.

## 4 **Data analysis**

Demographically maximum migrant workers as respondents (61%) were in the age group of 31–40 years followed by the age group of 21–30 years (31%). All the respondents were males as females were not eager to give responses. Notably, most of these respondents (76%) have not completed their education beyond the 10th standard. Further, most of the respondents (83%) were found to be married in the strata of low-income. These migrant workers were predominantly from states like Bihar, Uttar Pradesh, West Bengal, Chattisgarh, etc.

### 4.1 *Exploratory factor analysis*

KMO Statistics has satisfied the Bartlett's test of sphericity. Factor analysis was conducted in JASP software. All items loadings below 0.450 have been dropped from the analysis to evaluate the value of Cronbach's alpha. Also, the study reported a total of eight factors explaining 64.820% of the variance. Finally, the values of Cronbach alpha are alright to establish reliability.

### 4.2 *Reliability and validity analysis*

Cronbach's alpha was used to test the reliability of the constructs of EFA. Cronbach's alpha values are found more than 0.60 in accordance with Nunnally (1978). A general accepted rule is that alpha of 0.6–0.7 indicates an acceptable level of reliability, and 0.8 or greater a very good level.

In this study, convergent validity was assessed by factor loading, and CR (Fornell and Larcker, 1981). Each of the constructs' factors loadings surpassed 0.450 after dropping an item 'EE4' as suggested by Hair et al. (2010). Convergent validity was established with the values of CR more than 0.60. Further, the values of AVE of the scale are greater than 0.50 (Fornell and Larcker, 1981), which establishes discriminant validity. Establishing convergent validity and discriminant validity together indicated that the initial EFA model is good for conducting further analysis of CFA (Table 1).

### 4.3 *Confirmatory factor analysis*

In the next step, CFA was carried out first with measurement model for finalised items of all the 8 constructs, namely, EE, PV, SI, PS, SE, RE, FC, and BI. Results of the CFA model were RMSEA = 0.055, RMR = 0.047, CMID/df = 1.72, CFI = 0.902, TLI = 0.887, GFI = 0.98. These results were in line as recommended by Hair et al. (2010), where

cut-off values for RMSEA, RMR, CMID/df, CFI, TLI, and GFI have to be  $< 0.08$ ,  $< 0.05$ ,  $< 3$ ,  $> 0.9$ ,  $> 0.9$ , and  $> 0.8$  respectively.

**Table 1** Results of EFA

<i>Factor</i>	<i>Item code</i>	<i>Standardised item loading</i>	<i>Cronbach's alpha</i>	<i>Composite reliability</i>	<i>Item R-square</i>	<i>Error variance</i>	<i>Average variance extracted (AVE)</i>
Effort expectancy (EE)	EE1	0.482	0.654	0.627	0.232	0.768	0.635
	EE2	0.589			0.347	0.653	
	EE3	0.718			0.516	0.484	
	EE4	0.332*					
Perceived vulnerability (PV)	PV1	0.561	0.781	0.769	0.315	0.685	0.536
	PV2	0.504			0.254	0.746	
	PV3	0.853			0.728	0.272	
	PV4	0.749			0.561	0.439	
Social influence (SI)	SI1	0.759	0.711	0.748	0.576	0.424	0.502
	SI2	0.666			0.444	0.556	
	SI3	0.689			0.475	0.525	
Perceived severity (PS)	PS1	0.569	0.727	0.713	0.324	0.676	0.543
	PS2	0.652			0.425	0.575	
	PS3	0.789			0.623	0.377	
Self efficacy (SE)	SE1	0.665	0.792	0.765	0.442	0.558	0.550
	SE2	0.751			0.564	0.436	
	SE3	0.620			0.384	0.616	
	SE4	0.642			0.412	0.588	
Response efficacy (RE)	RE1	0.646	0.851	0.808	0.417	0.583	0.542
	RE2	0.637			0.406	0.594	
	RE3	0.782			0.612	0.388	
	RE4	0.642			0.412	0.588	
	RE5	0.666			0.444	0.556	
Facilitating conditions (FC)	FC1	0.461	0.671	0.654	0.213	0.787	0.605
	FC2	0.740			0.548	0.452	
	FC3	0.650			0.423	0.577	
Behavioural intention (BI)	BI1	0.491	0.764	0.676	0.241	0.759	0.655
	BI2	0.555			0.308	0.692	
	BI3	0.622			0.387	0.613	
	BI4	0.668			0.446	0.554	

Note: \*stands for dropped item due to low factor loading.

Then the subsequent structural model was tested with the JASP software to understand the theoretical connections among all constructs. The results of all the indices were RMSEA = 0.057, CMID/df = 2.133, RMR = 0.029, CFI = 0.901, TLI = 0.89,

GFI = 0.884, which were found are as per values suggested by Hair et al. (2010) to show a good model fit for the structural model to establish the nomological validity.

**Table 2** Hypotheses testing leading to BI

<i>Hypothesis</i>	<i>Path</i>	<i>Beta value</i>	<i>t value</i>	<i>P-value</i>	<i>Result</i>
H1	EE → BI	0.166	3.469	0.000	Supported
H2	SI → BI	0.244	5.135	0.000	Supported
H3	FC → BI	0.216	4.881	0.048	Supported
H4	PV → BI	0.252	5.167	0.045	Supported
H5	PS → BI	0.222	4.582	0.004	Supported
H6	SE → BI	0.274	5.275	0.035	Supported
H7	RE → BI	0.236	4.955	0.000	Supported

The establishment of nomological validity allows to test hypotheses leading to BI statistically. The results of the hypotheses testing leading to BI demonstrated significant positive relationship in all cases. Therefore, H1, H2, H3, H4, H5, H6, and H7 get supported (Table 2).

**Table 3** Model summary of moderation analysis for the relationship between RE and BI

<i>Model</i>	<i>R</i>	<i>R<sup>2</sup></i>	<i>Adjusted R<sup>2</sup></i>	<i>RMSE</i>	<i>R<sup>2</sup> change</i>
H81	0.000	0.000	0.000	0.550	0.000
H82	0.449	0.202	0.196	0.493	0.202

**Table 4** Coefficients of moderation analysis for the relationship between RE and BI

<i>Model</i>		<i>Unstandardised</i>	<i>Standard error</i>	<i>Standardised</i>	<i>T</i>	<i>p</i>	<i>Remark</i>
H <sub>8</sub> <sup>1</sup>	(Intercept)	4.222	0.027		154.029	< 0.001	Rejected
	Which mode of payment you use	-0.526	0.22	-0.689	-2.385	0.018	Rejected
H <sub>8</sub> <sup>2</sup>	(Intercept)	4.082	0.596		6.855	< 0.001	Rejected
	RE	0.076	0.157	0.083	0.485	0.628	Accepted
	RE * Which mode of payment you use	0.124	0.058	0.716	2.13	0.034	Rejected

#### 4.4 Carrying moderation analysis

It was found during the interaction with migrant workers that the income of these migrant workers has been affected by the corona pandemic. To cope with the pandemic, migrant workers were accepting cash as they were concerned about losing the customer if they insist on contactless payment. Therefore, it was necessary to study the moderating effect of mode of payment convenience on RE and BI. The results of Table 3 and Table 4 were obtained from the moderation analysis using regression. The moderation analysis found that the relationship between RE and BI is moderated by mode of payment convenience

with respect to the better model of  $H8^2$  with respect to  $H8^1$  in Table 3 due to the higher value of R-square. As per Table 3 and Table 4, the moderating variable and the interaction term are significant ( $p < 0.001$ ) to influence the relationship between RE and BI (see,  $H8^2$ ). But, the null hypothesis corresponding to RE cannot be rejected for the case of RE alone (see,  $H8^2$ ). It shows that though the migrant workers are aware of the implications of the corona pandemic, the fear of losing money is affecting the BI of the migrant worker.

## 5 Results and discussion

The main objective of this research was to explore the adoption of m-payments among migrant workers in this corona pandemic. The research explored the effect of SI, EE, PS, FC, SE, PV, and RE on behavioural intentions (BI) towards m-payments. The research helps to comprehend the influence of the corona pandemic on the adoption of m-payments in India. EE, SI, and RE emerged as major factors to influence BI towards the adoption of m-payments in India at P-value of 0.000. In fact, Davis (1989) and Lin (2011) have considered EE as an important driver of adoption of technology. Further, there are mixed results found in the literature about SI as an influencer of technology adoption. While Zhou (2014) found SI to have a significant impact on BI, others like Govender and Sihlali (2014) observed that SI has no impact on BI. The significant value for SI can be attributed to low level of education among the respondents. Furthermore, RE has also emerged as an important driver of adoption of technology, which is similar to the results of Venkatesh et al. (2012).

This research has also found PS, SE, PV, and FC to influence BI significantly towards the adoption of m-payments in India at P-value of 0.05. Liang and Xue (2010) have established that PV and PS exhibit considerable impact on BI. Owing to the excellent mobile penetration and ambitious schemes of the Government of India like Jan Dhan Yojana, this research established that FC significantly influences the adoption of mobile payments. Due to schemes like Jan Dhan Yojana migrant workers in India have been helped to open new bank accounts easily. Finally, SE also has been found to be significant in this research, which refers to the belief of the migrant workers in their ability to use m-payments system successfully in support of their work. The significance of SE can be attributed to the fact that the migrant workers had a fear of losing a customer if they insisted on m-payments when they were already suffering from loss of income due to lockdown.

Consistent with theories of social psychology, the significant relationship between SE and BI implies that the interface of UPI was relatively easily learned and used. The results of this relationship between SE and BI agree with previous research on the influence of SE on the acceptance of innovative technologies by Luarn and Lin (2005). The mode of payments convenience as moderating variable has been found to affect RE of migrant workers, as they had fear of losing money if they insisted for m-payments.

## 6 Theoretical and managerial implications

This study provides academics and practitioners with several implications. This research is a foundational study for academics to comprehend the user response towards

m-payments during the corona pandemic since body contact during this crisis has become the main risk to the payment of purchases. The remedy for handling the pandemic problem is a contactless payment mechanism. Prior research has focused on the adoption of contactless payments during normal times (Liébana-Cabanillas et al., 2020). However, research is limited in respect of contactless payments during the COVID-19 pandemic from a behavioural point of view. To comprehend the technology adoption and the safeguard actions of people regarding the use of m-payments facilities during a corona pandemic, this study addressed the major gap by integrating two established theories, UTAUT and PMT. This study is an initial attempt at contactless transactions with an extensive approach as per our understanding. The study aims at understanding the influence of risk factors: the severity and vulnerability of the corona pandemic on payments by individuals. This research will act as a stepping stone for future investigation in the emerging markets, on the adoption of m-payments.

COVID-19 has now become a part of our life. Currently, the online payment industry has greatly contributed to services of m-payments in the form of QR codes (Suo et al., 2022), UPI (Sugiyanto, 2022), NFC-based mobile payments (Ibrahim et al., 2022), etc. But the adoption of m-payments is slower compared to cash transactions. Companies should design and build innovative solutions to increase the usage of contact-free payment services to take advantage of the pandemic. By developing marketing strategies and campaigns to mitigate the risk of PS and PV during the corona pandemic, companies can increase their revenues and profits using advertisements. Such programs can educate people about the importance of m-payments during this corona pandemic. Additionally, managers are need to develop innovative solutions to impact the mode of payment on RE for the greater acceptance of m-payments.

## **7 Conclusions**

This research has attempted to study the impact of corona pandemic on the adoption of m-payments among internal migrant workers in India using the PMT and the UTAUT model. Also, the moderation analysis was carried out to check the impact of moderating variables on the adoption process. The study is unique because hardly any such research has been carried out in a developing country like India.

### *7.1 Contributions*

This study has attempted to make an original explanation for the adoption of m-payments among migrant workers and the moderating role of mode of payment on RE and BI during the period of pandemic. This study contributes to the limited research relating to contactless payments especially during the COVID-19 pandemic from a behavioural point of view.

### *7.2 Limitations*

Due to the coronavirus pandemic situation, data collection was challenging because of the restrictions imposed by the local authority to control the pandemic. In the light of these challenges, data were collected using the web-based tools

(<http://surveymonkey.com>) and telephonically. This study has attempted to integrate the UTAUT model and the PMT model only to comprehend the behaviour of the migrant workers towards m-payments.

### 7.3 Future scope for research

This research has far-reaching implications and will act as a guide for future research on m-payments adoption and diffusion in emerging markets all over the world.

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