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Antecedents of QR code acceptance during Covid-19: Towards sustainability

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Abstract

This is an exploratory study of Quick Response (QR) code usage in India in Bangalore city during the Covid-19. QR is a ubiquitous tool extensively used in many developed countries to attract customers through sustainability marketing. The significant penetration among smartphone users in developing countries like India has increased the usage of QR codes for various services like digital information sharing, digital payments, digital shopping, digital coupons, etc. The digital payment method is one of the top 17 agendas of United Nations sustainable development goals. This research paper aims to identify the critical elements of behavioural intention towards QR code acceptance (BIQRA) among Indian smartphone users. This research uses survey data from 432 smartphone users from Bangalore city during COVID-19. This research paper focuses on the knowledge gap of sustainability marketing using QR codes and helps beginners understand how PLS-SEM uses sustainability marketing research. The research finding found increased QR-code usage among the customers during the Covid-19 in Bangalore city.

Keywords: *Quick Response (QR) Code; UTAUT2; Technology Acceptance; Covid-19; Green Self-Efficacy; Sustainability; PLS-SEM*

Introduction

The QR refers to the Quick Response Code tool, which uses the two-dimensional barcode or matrix type of the barcode was first introduced by a Japanese company called "Denso Wave" in 1994, mainly in track vehicles and parts of the manufacturing process (Hung et al. 2019). The initial purpose of the QR code is to track the components inside the manufacturing operations (Canadi et al., 2010; Shumack et al., 2013). But over the years, the usage of QR codes has increased, and companies started using them in various sectors. QR codes have been used extensively across multiple fields in the last two decades. For example, as a marketing communication and advertising strategy (Dou & Li, 2008; Okazaki et al., 2012; Demir et al., 2015), education management (Ramsden, 2008), library management (Elmore & Stephens, 2012; Shettar, 2016), gaming (Ceipidor et al., 2009), robots management (Li & Huang, 2018), tourism management (Alshattnawi, 2012; Kumar et al., 2020), healthcare management (Jamu et al., 2016), museums management (Schultz, 2013), online surveying (Ramsden, 2008), e-governance (Lorenzi et al., 2014), generate an invoice (Zhang, 2018), online ticket booking (Kuncara et al., 2021) and online shopping (Atkinson, 2013).

The QR Code health cards have helped the governments of China, the UK, UAE, Italy, and KSA to track infected patients and to effectively curb the spread of the Covid-19 outbreak

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(Sharara, & Radia, 2021; Wu et al., 2021; Min-Allah et al., 2021). Forbes magazine 2012 reported that the QR Code usage would drop across because of its low popularity, poor interactivity, and in-built app inconsistency (Pozin, 2012). But the massive surge of smartphone adoption across the globe after 2012 had simultaneously increased its usage (Buamber, 2020; Moran, 2019; Ozkaya et al., 2015). The QR Code coupon usage jumped from 1.3 billion in 2017 to 5.3 billion in 2019 worldwide (Roselle, 2021). According to the Global Web Index report (2019), India has the second-largest QR code in the Asia Pacific Region, next to China (Roselle, 2021). According to a Statista report (2021), India will have more than 1.5 billion smartphone users by 2040 (Sun, 2021).

There was a drastic increase in QR code payments in India due to demonetisation in 2016, when the government created an alternative payment method that increased digital mode payments. The Government of India is giving immense support through the Reserve Bank of India (RBI), which controls the country's monetary policies by launching a new standard QR code payment system called 'Bharat QR code.' The new QR code enables merchants to accept electronic payments without needing an Electronic Data Capture (EDC) machine (e-marketer report, 2017). Indian consumers' purchasing power has increased and will spend more than 2.5 billion dollars on mobile payments by 2021 (eMarketer, 2017). India had 320 million mobile internet users at the end of 2016, and it may cross over 500 million by the year 2021 (Statista, 2017).

Čović et al. (2016) stipulated that restaurants and cafes are the best places to launch QR code advertising and use more QR codes during the holidays. Sago (2011) states that the use of QR codes helps consumers in sustainability to reduce waste and protect the environment. The significant advantages of QR codes are their i) ability to handle several dozens of information, ii) damage resistance, iii) high-speed reading, iv) structured data appending (Garg and Singh, 2013), and v) increased security of data (Sahu and Gonnade, 2013). QR Codes usage in the marketing field enhances customer experience (Meyer, & Schwager, 2007; Lou et al., 2017). However, there is limited knowledge of the acceptance behaviour of QR code technology through mobile smartphone devices (Alamoudi, 2022; Shankar et al., 2016; Naseer & Aktaş, 2019).

United Nations (2020) report states that cashless transactions with the help of technology like QR codes are one of the critical sustainable development goals. Brundtland Commission report (1987) on 'Sustainability' states that "*Developments that meet the needs of the present without compromising the ability of future generation*s" (Brundtland, 1987). Ng et al. (2021) and Świecka et al. (2021) recommended analysing the financial literacy and adoption of cashless payments with technology like QR codes is helpful in contactless solutions during a pandemic leads to a sustainable marketing business environment today as well as in the future (Al-Maroof et al., 2020). This research paper identifies the research gaps in the literature during the Covid-19 pandemic on QR code usage. The QR Code adoption in the marketing arena will lead to sustainability, and there is a lack of studies addressing this issue (Chahana et al., 2021; Edirisuriya et al., 2018; Lou et al., 2017; Shukla & Gupta, 2019; Song et al., 2021; Sharara, & Radia, 2021; Tai et al., 2021; Waibel et al., 2018; Wu et al., 2021; Min-Allah et al., 2021). Tanveer et al. (2021) recommended more investigation on the impact of sustainability and going green and its technology adoption in marketing. The current research will explain the factors that affect QR adoption, which will lead to sustainability marketing. Various factors affecting it will lead future researchers' attention towards QR code usage.

Theoretical Background

The linkage of theoretical background is the most significant part of business research in business research (Zikmund et al., 2013, p.38). The UTAUT2 model is the best model for understanding the information & communication technology acceptance in consumer behaviour (2017; Raman & Don, 2013; Kranthi & Ahmed, 2018 Tamilmani et al., 2019; Tamilmani et al., 2021; Castanha & Pillai, 2021). The variables that affect technology acceptance may vary according to the type of technology used, so there is a need to apply the UTAUT2 theory in different cultural and technological contexts (Tamilmani et al., 2021). The two essential aspects of UTAUT2 theory are i) Explanatory power of behavioural intention, and ii) Suitable to understand the technology acceptance in the consumer context

The various literature provided only limited information and usage of UTAUT2 theory. This research explores the UTAUT2 as a theoretical background to understand QR Code usage and in the COVID-19 scenario in particular, which has enabled this research to address this gap. This research applied UTAUT2 theory to understand the various factors affecting consumer behaviour. The behaviour intention towards QR Code technology acceptance (BIQRA). Table 1 shows the UTAUT2 theory model in a diverse mobile technology context.

Table 1. The studies which applied UTAUT2 with the BIQRA model involve the following aspects

Theory	Context	Sources
UTAUT2	Mobile Internet	Nikolopoulou et al. (2021)
UTAUT2	Mobile Banking	Asraar and Sathish (2017); Kwateng et al (2019); Farzin et al (2021)
UTAUT2	Mobile Online Payment	Slade et al (2013a); Morosan, & DeFranco (2016)
UTAUT2	Mobile Shopping	Tak & Panwar (2017)
UTAUT2	Mobile Health	Slade et al (2013b); Yu et al (2021)
UTAUT2	Mobile Games	Ramírez-Correa et al (2019)
UTAUT2	Mobile Wallet	Megadewandanu (2016)
UTAUT2	Mobile Device	Nikolopoulou et al. (2020)
UTAUT2	Mobile eLearning	Kang et al (2015); Ameri et al (2020)
UTAUT2	Mobile Marketing	Eneizan et al (2019);
UTAUT2	Mobile News App	Cheng et al (2020)
UTAUT2	Mobile Recruitment App	Dhiman & Arora (2018)
UTAUT2	Mobile Food App	Palau-Saumell et al (2019)
UTAUT2	Mobile Travel App	Ahmed & Kranthi (2019)

Many other non-UTAUT2 constructs are part of the study available in Table 2. The variables such as Trust (TRT) (Wahsheh, & Al-Zahrani, 2021), Privacy (PRIV) (Liu et al., 2021), Security (SEC) (Focardi et al., 2019), Market Maveneism (MMAV) (Lambordi et al., 2017) Knowledge about QR code app (Kongarchapatara, & Rodjanatara, 2018), Personal Innovativeness (PIV) (Alamoudi, 2021; Suebtimrat & Vonguai, 2020) and Perceived Fear (PRFR) (Al-Maroof et al. 2020) will have an impact on BIQA. A lack of studies exists that integrate factors like Green Self-Efficacy (GSEY), Perceived fear of Covid-19 and Market Maveneism, and UTAUT2 usage. The primary aim of this study is to determine the variables and their impact on behavioural intention and user behaviour towards QR Code acceptance among smartphone users of Bengaluru city during the Covid-19 pandemic.

Table 2. A literature inventory on BIQA

Author and Year	Theory	Results & Remarks	Country
Alamoudi (2022)	-	PEU, PU, PIV, and ATT will impact BIQA and lead to sustainability in marketing.	Saudi Arabia
Song et al. (2021)	-	Digital Economy investments will lead to a sustainable economy.	China
Wahsheh & Al-Zahrani (2021)	-	PRK and TRT had a significant impact on BIQA	Saudi Arabia
Tai et al. (2021)	-	PEU had a significant impact on BIQA	China
Yan et al. (2021)	TAM	PEU and SEY had a significant impact on BIQA	Malaysia
Sharara, & Radia, (2021)	-	QR contactless solution is a helpful technology for patient registration, treatment consulting, and discharge helped medical staff to serve patients safely without any physical contact, so QR Code was beneficial in the Covid-19 era. There is a need for more research on BIQA.	United Kingdom
Min-Allah et al. (2021)	-	Coloured QR- Code health cards mobile technology helped UAE medical authorities to prevent the spread of COVID-19. There is a need for more research on BIQA.	United Arab Emirate
Wu et al. (2021)	-	Coloured QR- Code health cards mobile technology helped Chinese medical authorities to prevent the spread of COVID-19. There is a need for more research on BIQA.	China
Liu et al. (2021)	-	Payment pleasure was high for QR- Code payment users	China
Suebtimrat & Vonguai (2020)	TAM and DOI	PEU, PU, and PIV are essential determinants that affect and impact BIQA	Thailand
Nakamoto et al. (2020)	-	QR codes help trace infected people with different colours coding system based on the patient's symptoms helped medical staff contain the spread of Covid-19 in China sustainably.	China (2020)
Faggiano, & Carugo, (2020)	-	The use of QR Code technology integration for patient registration, treatment consulting, and discharge helped medical staff to serve patients safely without any physical contact, so QR Code was beneficial in the Covid-19 era.	Italy
Rabu et al. (2019)	UTAUT2+	PU, PEU, FCN, and ATT were major determinants affecting BIQA among Malaysian Students.	Egypt
Naseer & Aktaş (2019).	-	Limited literature is available in QR Codes related to the marketing and communication Arena.	Turkey
Singh, Gambhir, Taneja, & Singh, (2019).	-	QR Code included in the hard copy of Map for easy synchronisation.	India
Anitha et al., (2019).	-	The application of QR codes in hotel services impacts Customer Satisfaction and Loyalty.	India
Focardi, Luccio, & Wahsheh,(2019).	-	Standard security measures in QR code affects their usability and trust.	Italy
Evans, (2019).	-	QR Code helped in monitoring the medicine manufacturing supply chain effectively.	USA

Author and Year	Theory	Results	Country
Gao et al.(2018)	UTAUT	PEY, EEY, and SCI are significant QR code continuity adoption determinants.	China
Chong (2017)	DOI	TS &T, SOB, PENJ, and WOM identified the various motivating factor in consumer behaviour related to QR codes.	China
Ali et al. (2017)	TAM	ATT, PU, and PEU are significant determinants for BIQA.	UAE
Yang et al. (2017)	-	SEY, PV, and SCI are significant determinants for BIQA.	USA
Lombardi et al. (2017)	TPB	SCI, ATT, PBC, HBT, ENJ, and MMAV are significant determinants for BIQA.	Italy
Ho & Yang, (2017).	TRA	ATT and SCI are significant determinants for BIQA.	Taiwan
Gönül et al. (2016)	-	PU is a significant predictor for BIQA.	Belgium
Eyüboğlu and Sevim (2016)	TAM	PU and ENJ are significant determinants for BIQA.	Turkey
Fahmy, & Al-Azab, (2016).	TAM	PU and PEU are significant determinants for BIQA.	Egypt
Chen et al. (2016)	TAM	PU and PEU are significant determinants for BIQA.	Malaysia
Santos (2015)	TAM	PU, PEU, and PV are significant determinants for BIQA.	Portugal
Demir et al. (2015)	-	Awareness affects adoption, and it differs across gender.	Turkey
Koo and Kim (2015)	-	PU is a significant predictor for BIQA.	South Korea
Sago (2011)	-	Adoption differs across gender.	USA
Mendelson and Bergstrom (2013)	-	Awareness and SEY are significant factors for BIQA.	USA
Meydanoğlu et al., (2015).	-	Need for Recognition and information search are significant determinants.	Serbia
Atkinson (2013)	U & G theory	TRT, GCON, and market knowledge were significant determinants for BIQA.	USA
Shin et al. (2012)	TAM	ATT, PU, PEU, SCI, PIQ, and PSQ are major determinants for BIQA.	South Korea
Ertekin and Pelton (2014)	TAM	PU, INVL, PEU, PENJ, and SCI are significant determinants of BIQA.	USA
Ramsden (2010)	-	Awareness affects BIQA.	UK
Cox & Shiffler (2014)	TAM	PEU is a significant predictor for BIQA.	USA
Ryu & Murdock (2013)	TAM and U&G	PU, PEU, ENJ, and MMAV were significant predictors for BIQA.	USA
Kim, & Yu, (2013).	-	PIV and PRIV are the significant determinants for BIQA.	South Korea
Chooi et al. (2014)	UTAUT2	PEY, EEY, FCN, HMN, and SCI are the significant determinants for BIQA.	Malaysia
Kim, & Yoon, 2014).	-	LBI, UBI, and WINF are the significant determinants for BIQA.	South Korea
Narang et al., (2012).	ELM Model	Involvement is a significant determinant for BIQA.	India

Notes: ATT= Attitude, BIQA= Behavioral intention towards QR Codes, DOI= Diffusion of Innovation, EEY= Effort Expectancy, ELM= Elaboration Likelihood Model, HMN= Hedonic Motivation, INVL= Involvement, SEY= Self Efficacy, PU= Perceived Usefulness, PEU= Perceived Ease of Use, FCN=Facilitating Conditions, PEY= Perceived Expectancy, LBI= Location-Based Information, MMAV= Market Mavenism PENJ=Perceived enjoyment, PIV= Personal Innovativeness, PRIV= Privacy, PRK=Perceived Risk, PRFR= Perceived Fear, SEY= Self Efficacy, SCI= Social Influence, SOB=Sense of Belonging, TAM= Technology Acceptance Model, TRA= Theory of Reasoned Action, TS&T=Technical support and training; TRT= Trust, UBI= Ubiquity, U&G= Uses and Gratifications theory, UTAUT2= Unified Theory of Acceptance and the Use of Technology, WINF= Wireless infrastructure, WOM=word of mouth.

Literature Review

The crucial determinants identified from the literature that affect BIQA are in Table 2 and their definitions are available in Table 3. From the various studies that focussed on QR code acceptance, we can conclude that the essential determinants that emerged as the most significant are PEY, EEY, SCI, FCN, HMN, HBT, TRT, PRFR, GSEY, PIV, and MMAV, which affects BIQA.

Table 3. The definition of constructs is as follows

Construct	Definition	Source	Page Number
PEY	"*The degree to which user of a technology will provide the benefits to consumers in performing certain activities*"	Venkatesh et al. (2012)	p. 159
EEY	"*The degree of ease associated with the consumer's use of the technology.*"	Venkatesh et al. (2012)	p. 159
SCI	"*The extent to which users perceive those important others, such as the family and friends, will believe that they should use a particular technology.*"	Venkatesh et al. (2012)	p. 159
FCN	"The *consumers' perceptions of the resources and the support available to perform a behavior*"	Venkatesh et al. (2012)	p. 159
HMN	"*The fun or pleasure which is derived from using a technology.*"	Venkatesh et al. (2012)	p. 159
PV	"The *consumers' cognitive trade-off between the perceived benefits of the applications and the monetary cost for using them*"	Dodds et al. (1991)	p.315
HBT	"*The extent to which the people tend to perform the behaviors automatically because of learning*"	Limayem et al. (2017) and Venkatesh et al. (2012)	p.711 and p.160
TRT	"*A subjective belief that a party shall fulfill their obligation*"	Gefen et al. (2003)	p.71
PRFR	"*a feeling of uncertainty outcome and a threat of losing health through infectious disease like Covid-19 by performing a behavior.*"	Al-Maroof et al. (2020)	p.5
GSEY	"*The belief in one's knowledge on green and ability to use a technology to solve environmental problems*"	Chen et al. (2015)	p.1176
PIV	"The *willingness of an individual to adopt the technology and try out any new information technology*"	Agarwal & Prasad (1998)	p.207
MMAV	Market Mavenism states "*a particular group of consumers who are influential among their peers and mainly characterised by general marketplace expertise.*"	Feick and Price (1987)	p.91

Note: PEY= Performance Expectancy, EEY= Effort Expectancy, SCI= Social Influence, FCN=Facilitating Conditions, PV= Price Value, HMN= Hedonic Motivation, GSEY= Green Self-Efficacy, HBT= Habit, HMT= Hedonic Motivation, TRT= Trust, PRFR= Perceived Fear, PIV= Personal Innovativeness, and MMAV= Market Mavens.

Performance Expectancy (PEY)

The main reason for adopting the new technology of QR depends upon various benefits. The most critical factor of adopting a QR code is simplicity, convenience, and saving time. Other than those mentioned above, it helps perform tasks like making a payment or registering a form or sending/receiving an e-mail or viewing and, or joining virtual meetings, or medical consulting through technology very quickly by just scanning using a phone. Table II above deals with various definitions related to the model constructs. The operational purposes of PEY can be stated as "*if the QR Code technology benefits the person to complete the task quickly and*

conveniently, without sacrificing any resources like paper, he/she will adopt it." PEY constitute an important tool in technology usage (Davis, 1989; Venkatesh et al., 2003; Venkatesh et al., 2012b; Slade et al., 2014). The studies by Jiang et al. (2021), Yan et al. (2021), Kou & Liu (2020), Zulherman et al. (2021), Gao et al. (2018), Ali et al. (2017), Gönül et al. (2016), Eyüboğlu and Sevim (2016), Chen et al. (2016), Santos (2015), Koo and Kim (2015), Ertekin and Pelton (2014), Atkinson (2013), Ryu & Murdock (2013), and Chooi et al. (2014) on the usage of QR code adoption have proved that the PEY has a significant impact on BIQA. During the pandemic, QR code technology will be beneficial through which users can avoid physical touch or physical transactions of currency notes while making payments (Ng et al., 2021; Świecka et al., 2021; Alamoudi, 2022; Jiang et al., 2021); they can also avoid the use of paper bills (Atkinson, 2013) and creating a retail invoice (Chun, 2019), indoor classroom education (Kou & Liu, 2020; Robertson & Green, 2012) and outdoor classroom education (Lai et al., 2013). Thus, leading to sustainability (Atkinson, 2013; Alamoudi, 2022; Song et al., 2021). Therefore, the hypothesis H1 can be formulated as

H1: The PEY will be a significant determinant factor in Behavioral consumer intention on the QR Code adoption (BIQA).

Effort Expectancy (EEY)

The operational definition of EEY referred as "*If the QR code technology is easy to use, then the user will use it more frequently*." User-friendliness of technology plays a vital role in its adoption (Taylor & Todd, 1995). The studies of Chang et al. (2021), Jiang et al. (2021), Yan et al. (2021), Kou & Liu (2020), Zulherman et al. (2021), Gao et al. (2018), Chong (2017), Yang et al. (2017), Lambordi et al. (2017), Ho & Yang (2017), Shin et al. (2012), Ertekin and Pelton (2014), and Chooi et al. (2014) have proved that the EEY as an essential determinant of BIQA. Providing accessible technology to the customers will lead to a new sustainable business environment (Alamoudi, 2022; Ng et al., 2021; Świecka et al., 2021; Jung et al., 2012; Ryu & Murdock, 2013; Solon, 2011; Atkinson, 2013). Therefore hypothesis H2 can be formulated as

H2: The EEY will have a significant impact on BIQA.

Social Influence (SCI)

The operational definition of SCI can be stated as "the positive/negative comments about the QR code technology received from the friends, family or colleagues circles of a user then he/she will likely adopt or reject it." The studies of Tretiakov & Hunter (2021), Rabu et al. (2019), Gao et al. (2018), Yang et al. (2017), Lombardi et al. (2017), Ho & Yang (2017), and Jung et al. (2012) have proved that the SCI has a significant impact on BIQA. SCI is a critical element of technology adoption (Davis, 1989; Venkatesh, 2012) and during pandemic emergencies like Covid-19. SCI had a significant influence on BIQA (Alamoudi et al., 2022; Tretiakov & Hunter, 2021; Sharara & Radia, 2021; Min-Allah et al.;., 2021). Therefore hypothesis H3 can be formulated as

H3: The SCI will have a significant impact on BIQA.

Facilitating Conditions (FCN)

The operational definition of FCN states, "if the resources that are necessary to use QR code technology such as (Internet Connection, Camera and App which supports to extract data or

desired link from QR code) with supported technology then the person will adopt it." The studies of Alamoudi (2020), Song et al. (2021), Wahsheh & Al-Zahrani (2021), Chong (2017), Chooi et al. (2014), and Kim & Yoon (2014) have proved FCN as an essential determinant in BIQA. FCN is a significant variable in understanding and adopting technology by the consumer (Venkatesh et al., 2012; Venkatesh & Bala, 2008). During pandemic times, QR Code technology helped health workers in the UK, UAE, New Zealand, and China avoids the spread of Covid-19 (Yan et al., 2021; Sharara & Radia, 2021; Min-Allah et al., 2021; Wu et al., 2021). Inconsistency of the in-built QR code scanning technology was the primary reason for the fall in QR code acceptance (Pozin, 2012). There is a need for more investigation to understand the impact of FCN on BIQA (Alamoudi et al., 2022; Rabu et al., 2019). Therefore hypotheses H4A and H4B can be formulated as

H4A: The FCN will have a significant impact on BIQA

H4B: The FCN will have a substantial effect on QR Code use behaviour

Hedonic Motivation (HMN)

The operational definition of HMN states, "*if the QR code technology gives pleasure and joy of using it, then the person will adopt it*." The previous studies conducted by Ryu & Murdock (2013), Ertekin and Pelton (2014), Chooi et al. (2014), Chong (2017), Lombardi et al. (2017), Anitha et al. (2019), and Liu et al. (2021), have proved HMN as an essential determinant of BIQA. Therefore, hypothesis H4 is

H5: The HMN will have a significant impact on BIQA.

Price Value (PV)

The operational definition of PV states, "*if the cost of using the QR code technology gives more benefits, then the person will adopt it*." The studies of Katlav (2020), Yang et al. (2017), Santos (2015), and Chooi et al. (2014) have found that the PV is a significant determinant of BIQA. PV is also a significant predictor of technology use behaviour (Venkatesh et al., 2012). Acuti et al. (2020) examined the effect of QR value content delivery through wine bottles and concluded that PV impacted BIQA. The Reserve Bank of India (RBI), in 2020, issued various reforms and offered cashback incentives for the payment made through the Unified Payment Interface (UPI). The main reason is to boost the cashless economy and increase sustainability to avoid the usage of notes. Based on the various incentives, major UPI payment service providers like Paytm, Phonepe, ICICI, Google Play, and Amazon started offering cashback for QR code payments (Press Trust of India, 2020). The QR code has become an essential platform for advertising & promotion (Çeltek, 2017; Meydanoğlu et al., 2018; Trivedi et al., 2019; Fortin & Surovaya, 2018; Katlav, 2020). Suo et al. (2020) recommended more investigation on BIQA. Therefore, hypothesis H6 can be stated as

H6: The PV will have a significant impact on BIQA.

Habit (HBT)

The HBT states, "*People will automatically use QR code because of learning*." The studies of Suo et al. (2022), Suo (2019), Meydanoğlu et al. (2018), Lombardi et al. (2017) have proved PV as an essential determinant of BIQA. HBT is also a strong predictor of QR technology use behaviour (Alamoudi, 2022; Ngo & Nguyen, 2021; Suo et al., 2022). Kou & Liu (2020), Suo

et al. (2020), and Suo (2019) recommended more investigation on the impact of HBT on BIQA and user behaviour. The HBT of using such contactless technology will lead to sustainability (Atkinson, 2013; Alamoudi, 2021; Suo et al., 2022). Hypotheses H7A and H7B are as follows:

H7A: The HBT will have a significant impact on BIQA.

H7B: The HBT will significantly impact QR code use behaviour.

Trust (TRT)

The TRT states, "*a belief of a user that the QR code technology service provider will help complete the task without any discrepancies*." The TRT is a critical element of technology adoption studies (Bahmanziari et al., 2003; Lu et al., 2005; Venkatesh, 2006; Warkentin et al., 2002). TRT is a strong determinant of BIQA (Atkinson, 2013; Baskoro & Amini, 2020; Lou et al., 2017; Ryu & Murdock, 2013; Wahsheh & Al-Zahrani, 2021). TRT towards QR code technology will increase its usage, leading to sustainability (Anitha et al., 2019; Atkinson, 2013; Alamoudi, 2022). Therefore, hypothesis H8 is stated as

H8: The TRT will have a significant impact on BIQA.

Perceived Fear (PRFR)

Al-Maroof et al. (2020) defined Perceived Fear (PRFR) as "a feeling of uncertainty outcome and a threat of losing health through infectious disease like Covid-19 by performing a behaviour" (p.5). Operationally PRFR can be defined as " users will use QR Code technology to avoid the risk of getting infected with Covid-19 disease". Lee et al. (2012) defined it as "the degree to which a person feels risky to perform or not perform a behaviour with fear of the vulnerable outcome" (p.95). PRFR plays an essential role in technology adoption studies (Johnston & Warkentin, 2010; Son & Han, 2011; Slade et al., 2014). PRFR was impacted mainly by the technology used during the Covid-19 pandemic (Al-Maroof et al., 2020; Raza & Khan, 2021; Zheng & Montargot, 2021). Therefore hypothesis H9 is

H9: The PRFR will have a significant impact on BIQA

Green Self-Efficacy (GSEY):

The GSEY for this study states, "belief of a user to have sufficient knowledge about 'green' and ability to solve environmental problems by using QR code technology." Chen et al. (2015) addressed the impact of GSEY on sustainability. Guo et al. (2019) state that GSEY had a significant effect on Sustainable waste management. Zhang et al. (2020), Mishra et al. (2014), and Jayaprakash & Pillai (2016) states that including GSEY among employees will lead to sustainable organisational development. Rasul et al. (2017) addressed the contribution of QR code usage towards sustainability. GSEY is an important determinant that affects BIQA (Chuah & Balachandran, 2019). There is a need for more investigation on the effect of GSEY on BIQA (Kongarchapatara, & Rodjanatara, 2018; Chuah & Balachandran, 2019; Rasul et al., 2017). Therefore, hypothesis H10 can be stated as

H10: The GSEY will have a significant impact on BIQA

Personal Innovativeness (PIV):

The operational definition of PIV is defined as "a person's ability to try out any new & Innovative technologies (i.e., QR Codes) that are available in the market without any hesitation or having a second thought." PIV is a crucial factor that leads to technology acceptance and continuance (Ding, 2019; Lu, 2014; Agarwal & Prasad, 1998). PIV had a significant impact on BIQA (Suebtimrat & Vonguai, 2021; Liébana-Cabanillas et al., 2021; Patil et al., 2020). Studies by Li et al. (2021), Jang & Lee (2018), and Ahn et al. (2016) stipulate that the PIV is an essential antecedent that leads to the inculcation of sustainable behaviour among technology users. Alamoudi (2022), Suebtimrat & Vonguai (2020), and Suo et al.(2022) recommended more investigation on PIV towards BIQA as it leads to sustainability. Therefore, hypothesis H11 is formulated as

H11: The PIV will have a significant impact on BIQA

Marketing Mavenism (MMAV):

The operational definition of MMAV is defined as " *a person who acts as an expert, and he/she influences others with his/her suggestions and opinions to use QR Code."* Goldsmith et al. (2006) and Clark et al. (2008) states that the MMAV is a kind of craziness among consumers who get entirely involved with the marketplace and become an expert opinion maker or advisor of that product or service. MMAV addicted consumers will create a robust environment in the retail setting, so retailers must not let go of such customers (Goldsmith et al., 2012; Goldsmith et al., 2006; Clark et al., 2008). Ryu & Murdock (2013), Ryu (2013), and Atkinson (2013) studies show that MMAV is an essential determinant of BIQA. Awais et al. (2020), Ahn (2020), and Andrews & Benedicktus (2015) state that the MMAV can lead to sustainable behaviour, and hence there is a need for more investigation on MMAV. Therefore, hypothesis H12 can be expressed as

H12: The MMAV will have a significant impact on BIQA

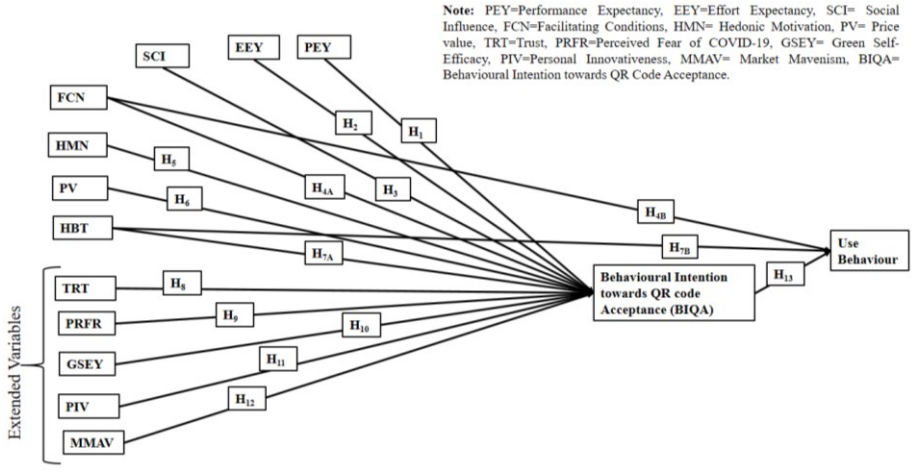


Figure 1. Research Framework

Methodology

Sample and Data Collection

This research study uses the purposive sampling method as the most suitable technique. The respondents are aware, knowledgeable, experienced, and have used QR code applications at least once (Etikan et al., 2016; Zikmund et al., 2013). According to Hair et al. (2019), one variable should have five times or ten times more observations with a 10:1 ratio as an adequate sample size to perform the Structural Equation Modelling (SEM) (p.133). This study consists of 432 valid samples, which is desirable for applying SEM as a data analysis technique (Hair et al. 2019, p.133). The cross-sectional method was employed—the survey data collected from the QR users living in Bengaluru city during Covid-19. The reason for selecting Bengaluru city is that it was one of India's top five cities where smartphone penetration is high (Google and Forrester Report, 2018) and has a high QR code usage frequency (Hegde, 2021). The questionnaire was circulated to only those participants aware of the QR Code technology. The purposive sampling method is more appropriate for the technology adoption studies (Etikan et al., 2016), where the data can be collected from only those prospective respondents. They are aware of the technology to achieve the desired outcome.

Descriptive Statistics of the Sample

The data consist of 54.9 % of males and 45.1 % of females. In terms of profession, the sample data consists of 53.5% of students, 6.9% of Information Technology (IT), 6.3% of Engineering, 2.8% of Marketing, 2.8% of medical and 27.8 % of them belonged from various other sectors by profession. Table 4 shows the results of descriptive demographic statistics of the respondents.

Table 4. Descriptive Demographic Statistics

Descriptive Statistics	Frequency	Percentage
Gender		
Male	237	54.9
Female	195	45.1
Profession		
Student	231	53.5
IT sectors	30	6.9
Engineering	27	6.3
Marketing	12	2.8
Medical	12	2.8
Others	120	27.8
Total	**432**	**100.0**

Measuring Instruments

In this research, suitable questionnaires were adapted from the previous studies in the literature to test the proposed hypotheses. To measure the various relationships of PEY, EEY, SCI, FCN, HMN, PV, HBT, and Behavioural Intention, the items were adapted from Venkatesh et al. (2012). To measure the various relationship of TRT, PRFR, GSEY, PIV, and MMAV towards BIQA, the items were adapted from Johnson et al. (2008), Al-Maroof et al. (2021), Chen et al. (2015) & Guo et al. (2019), Agarwal & Prasad (1998), and Atkinson (2013) respectively. All the items were measured using a five-point Likert scale (1) strongly disagree to (5) strongly agree.

Table 5. The Important Measuring instruments

Constructs	Items	Loadings	Adapted and slightly modified from studies of
PEY	PEY1	0.896	Venkatesh et al. (2012)
	PEY2	0.822	
	PEY3	0.891	
EEY	EEY1	0.866	Venkatesh et al. (2012)
	EEY2	0.879	
	EEY3	0.938	
	EEY4	0.852	
SCI	SCI1	0.881	Venkatesh et al. (2012)
	SCI2	0.849	
	SCI3	0.888	
FCN	FCN1	0.862	Venkatesh et al. (2012)
	FCN2	0.911	
	FCN3	0.879	
	FCN4	0.873	
HMN	HMN1	0.889	Venkatesh et al. (2012)
	HMN2	0.884	
	HMN3	0.864	
PV	PV1	0.902	Venkatesh et al. (2012)
	PV2	0.892	
	PV3	0.860	
HBT	HBT1	0.883	Venkatesh et al. (2012)
	HBT2	0.804	
	HBT3	0.906	
TRT	TRT1	0.886	Johnson et al (2008)
	TRT2	0.875	
	TRT3	0.873	
PRFR	PRFR1	0.832	Al-Maroof et al. (2021)
	PRFR2	0.844	
	PRFR3	0.829	
	PRFR4	0.855	
GSEY	GSEY1	0.842	Chen et al. (2015) and Guo et al. (2019)
	GSEY2	0.820	
	GSEY3	0.845	
	GSEY4	0.822	
	GSEY5	0.824	
PIV	PIV1	0.904	Agarwal & Prasad (1998)
	PIV2	0.895	
	PIV3	0.886	
	PIV4	0.842	
MMAV	MMAV1	0.755	Atkinson (2013)
	MMAV2	0.786	
	MMAV3	0.759	
	MMAV4	0.796	
	MMAV5	0.928	
	MMAV6	0.755	
BIQA	BIQA 1	0.940	Venkatesh et al. (2012)
	BIQA 2	0.920	
	BIQA 3	0.839	
Use behaviour Frequency of QR Code use	*How frequently do you use QR codes?* *During the last 12 months, how frequently did you use QR codes?* *Never, Very rarely, Rarely, Occasionally, very frequently.*		

All the things are reflective types except the QR code use behaviour, measured using formative types as per Venkatesh et al. (2012) guidelines. Table 5 shows all the 48 items were adapted and slightly modified to suit the context of this study. The measuring instrument consists of 48 items; each item was rated on a 5-point Likert scale ranging from '1' as 'Strongly

Disagree to '5' as 'Strongly Agree.' All the adapted instruments are slightly modified to suit the context of the study. The source of measuring instruments is available in Table 5.

Data Analysis and Interpretation

The Statistical Package for Social Sciences (SPSS) and Smart PLS 3 software were used to analyse the data. Hair et al. (2019) define Structural Equation Modelling (SEM) "*as a statistical model used to explain the relationship between the constructs*" (p.607). This research primarily employs the partial least squares structural equation modeling (PLS-SEM) technique to verify the constructs' reliability, validity, and hypothetical relationship. Hair et al. (2019) have given clear guidelines on using PLS-SEM. According to Hair et al. (2019, p.5), the PLS-SEM can be applied in the studies which have

i) complex relationships of variables in the hypothesised model,

ii) objective as extending the theoretical model,

iii) hypothesised model with formative constructs,

iv) test data on non-normality distribution of small data sample and

v) testing of existing theory for predictive purpose

Thus, this study involves extending the UTAUT2 theory in QR code acceptance, so the PLS-SEM is an appropriate technique for data analysis. The main objective of this research article is to identify the critical determinants that affect BIQA among smartphone users of Bengaluru city. Anderson & Gerbing (1988) explained two-step method where the

Step 1: involves measurement model assessment of indicators relationship in forming the constructs (outer model) and

Step 2: involves structural model assessment of constructs to construct a relationship (inner model)

Step 1: Outer Model (Main Measurement Model)

The primary measurement model measures the relationship between indicators (observed variables) and constructs primary observed variables). The measurement model shows the indicators' relevance in explaining the constructs (Hair et al., 2019A). The reliability and validity of the constructs are verified using i) Outer Loadings of Indicators (OLI), ii) Cronbach Alpha (CRA), iii) Composite Reliability (CREL), iv) Average Variance Extracted (AVE), and Discriminant validity using Fornell & Larcker (1981) (DVFL).

i) Outer Loadings of Indicators (OLI)
   a. All the indicators (items) of this study are above 0.7 (see Table 5). The indicators should have minimum loadings above 0.5 (Hair et al., 2019). The best criteria for the outer loadings should be >=0.7 as per (Bagozzi et al., 1991; Hair et al., 2017, p.114A). Thus, we can retain all the indicators without any deletion.

ii) Cronbach Alpha (CRA)
   a. According to Hair et al. (2019B) reliability is defined as "*a scale is reliable when it produces consistent outcomes under similar or the same conditions"* (p.763). The scales

that measure constructs should be reliable to have consistent results in SEM analysis, and the CRA value should be above 0.7 (Hair et al., 2019). All the constructs in this study are above 0.7 (see Table 6). Thus, the constructs are reliable.

iii) Composite Reliability (CREL)

a. According to Hair et al. (2019A, p.112), the higher values (i.e., above 0.7) of CREL is better for the measurement model. This study result shows that all the CREL values are above 0.7 (see Table 6). Thus, the constructs are reliable.

iv) Average Variance Extracted (AVE)

a. Convergent validity is defined as "*the extent to which it can be a measure to correlate positively with other alternative measures of the same construct*" (Hair et al., 2013, p. 102). AVE is a measure of validity which is defined as the "*degree to which a latent construct explains the variance of its indicators*" (Hair et al. 2019A, p.312). It is also defined as "*grand mean value of the squared loadings of the indicators associated with the construct (i.e., the sum of the squared loadings divided by the number of indicators)*" (Hair et al. 2019A, p.114). The AVE values above 0.5 indicate that the indicators are valid. This study result shows that all the AVE values are above 0.5 (see Table 6). Thus, the constructs are valid.

v) Discriminant validity using Fornell & Larcker (1981) (DVFL)

a. DVFL is defined as "*a construct that should have distinct high variance and low correlation with indicators of associated constructs*" (Hair et al. 2019A, p.116). It is also defined as "*the AVE values should be larger than the squared correlation with any other construct*" (Hair et al. 2019A, p.116). Fornell-Larcker (1981) defines for the constructs to be valid if "*the square root of AVE values should be either greater than its highest correlation with any other construct*" (Hair et al., 2013, p. 107). Table 7 shows that the values of squared AVE of all constructs are distinct from other constructs and have lower correlated values than associated constructs. Thus, the constructs are valid.

Step 2: Inner Model (Structural Model)

According to Hair et al. (2019A) guidelines, the multi-collinearity among exogeneous variables (i.e., independent variable) needs to be assessed before estimating the construct's path coefficient. The Variance Inflation Factor (VIF) is defined as an "*Indicator of the effect that the other independent variables have on the standard error of a regression coefficient*" (Hair et al., 2019B, p.265). The VIF values should be less than 3 for an effective model (Hair et al., 2019B, p.320). All the constructs in this study have VIF values less than 3. Thus, there are no multi-collinearity issues with the exogeneous variables.

The path coefficient analysis is carried out using PLS-SEM algorithm method with significance level of 5% and p-value <0.05 (Hair et al., 2019A, p.196). The boostrapping technique with 5000 sub-samples are the best method to find the significant relationship between the constructs in the proposed hypothesized framework (Hair et al., 2019A, p.197). In bootstrapping technique "*a large number of subsamples (i.e., bootstrap samples) are drawn from the original sample with replacement*" (Hair et al., 2019, p.208). The best practice to assess the significance level of the relationship between the constructs is based on the "*the t-values for two-tail test ranges from t=1. 56 (a=0. 10), t=1. 96 (a=0. 05), and t= 2. 57 (a=0. 01)*" (Hair et al., 2019,

p.208).The path coefficient analysis results shows support for all the hypotheses except H7A. The hypotheses which are significant with BIQA are H1 (*PEY with β= 0.291, t-statistics= 9.25, ϱ= <0.001*), H2 (*EEY with β= 0.123, t-statistics=4.96, ϱ= <0.001*), H3 (*SCI with β= 0.155, t-statistics=5.79, ϱ= <0.001*), H4A (*FCN with β= 0.090, t-statistics=3.59, ϱ= <0.001*), H5 (*HMN with β= 0.130, t-statistics=0.130, ϱ= <0.001*), H6 (*PV with β= 0.117, t-statistics=4.99, ϱ= <0.001*), H8 (*TRT with β= 0.136, t-statistics=5.18, ϱ= <0.001*), H9 (*PRFR with β= 0.145, t-statistics=5.007,ϱ= <0.001*), H10 (*GSEY with β= 0.133, t-statistics=5.03, ϱ= <0.001*), H11 (*PIV with β= 0.152, t-statistics=5.06, ϱ= <0.001*), and H12 (MMAV with β= 0.210, t-statistics=8.65, ϱ= <0.001). The hypotheses which are significant with use behaviour are H4B (*FCN with β= 0.124, t-statistics=3.20, ϱ= <0.001*), H7B (*HBT with β= 0.149, t-statistics=4.37, ϱ= <0.001*), and H13 (*BIQA with β= 0.640, t-statistics=14.87, ϱ= <0.001*). The hypothesis which has no significant relatisonhip with BIQA is H7A (*HBT with β= 0.033, ϱ= >0.05*). Table 7 shows the path coefficient for the hypotheses proposed. The co-efficient of determination (R-Square) is defined as "*the amount of variance in the endogenous constructs explained by all of the exogenous constructs linked to it"* (Hair et al., 2019, p,198). Based on Hair et al. (2011) and Henseler et al. (2009) thumb rule "*the research model which has R-square values of 0.75, 0.50, and 0.25 is considered as substantial, medium and low in predicting the variables*" (Hair et al., 2019, p. 199). This study results shows (see Figure 2) that the R-Square value on BIQA= 0.783 and use behaviour= 0.593.

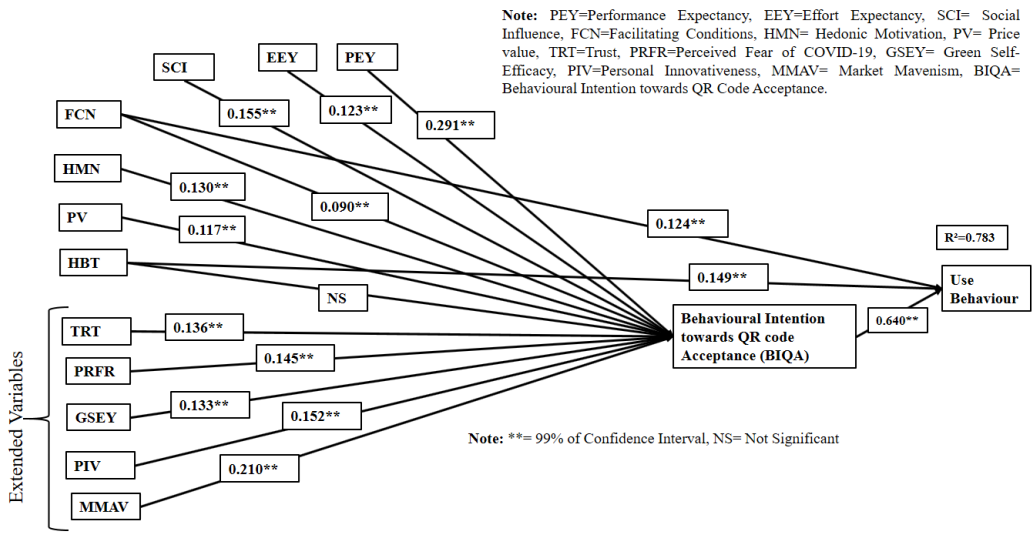
Table 6. Measuring instruments and their loadings

Constructs	AVE	Composite Reliability	Cronbach's Alpha
PEY	0.758	0.904	0.846
EEY	0.782	0.935	0.908
SIC	0.761	0.905	0.844
FCN	0.777	0.933	0.904
HMN	0.772	0.910	0.852
PV	0.783	0.915	0.861
HBT	0.749	0.899	0.833
TRT	0.771	0.910	0.852
PRFR	0.705	0.905	0.861
GSEY	0.693	0.900	0.853
PIV	0.778	0.933	0.905
MMAV	0.652	0.903	0.882
BIQA	0.812	0.928	0.883

Table 7. Discriminant validity (Fornell & Larcker, 1981)

	PEY	EEY	SIC	FCN	HMN	PV	HBT	TRT	PRFR	GSEY	PIV	MMAV	BIQA
PEY	**0.870**	0	0	0	0	0	0	0	0	0	0	0	0
EEY	0.318	**0.884**	0	0	0	0	0	0	0	0	0	0	0
SIC	0.349	0.173	**0.872**	0	0	0	0	0	0	0	0	0	0
FCN	0.368	0.098	0.338	**0.881**	0	0	0	0	0	0	0	0	0
HMN	0.154	0.304	0.211	0.087	**0.878**	0	0	0	0	0	0	0	0
PV	0.359	0.155	0.235	0.365	0.113	**0.884**	0	0	0	0	0	0	0
HBT	0.234	0.121	0.194	0.286	0.140	0.108	**0.865**	0	0	0	0	0	0
TRT	0.256	0.170	0.180	0.293	0.107	0.046	0.093	**0.878**	0	0	0	0	0
PRFR	0.496	0.243	0.189	0.238	0.083	0.256	0.174	0.285	**0.840**	0	0	0	0
GSEY	0.164	0.085	0.076	0.168	0.239	0.114	0.094	0.195	0.275	**0.832**	0	0	0
PIV	0.452	0.014	0.096	0.288	0.179	0.212	0.151	0.158	0.223	0.182	**0.882**	0	0
MMAV	-0.065	0.025	-0.010	0.029	0.006	0.104	0.193	0.038	0.056	0.157	0.189	**0.807**	0
BIQA	0.673	0.390	0.415	0.475	0.357	0.471	0.314	0.389	0.520	0.406	0.504	0.257	**0.901**

Figure 2. PLSPM output for SEM analysis



Results and Implications

Table 8 shows all the supported studies. This study results have shown that apart from UTAUT2 constructs, the other extended constructs such as TRT, PRFR, GSEY, PIV, and MMAV have significantly influenced BIQA and use behaviour towards QR code acceptance. The PEY has the most substantial influence on BIQA, indicating that the QR service providers can offer more sophisticated QR code technology with a high interactive scanning system and quick response time. QR codes sometimes take more response time to make payments, so the QR service providers must note this aspect to have more customer acceptance. The MMAV has the second-largest impact on BIQA, which is a good sign for marketers. The QR service providers can use the market mavens, customers by adding short video testimonials to their websites or apps or mobile ads for effective promotion. The SCI has the third most significant impact on BIQA, which indicates that the QR users share their thoughts with their friends, colleagues, and family members. The QR service providers can provide cashback offers or rewards to promote their QR technology app or web and attract more users. The influence of PIV on BIQA has shown that the consumers are innovative and more accepting of any new technology. So, the QR service providers must launch any new developments or upgrades in QR code technology immediately into the market without hesitation. The impact of HBT on usage by the consumer shows that the users are using QR code technology more frequently, which is a good sign for marketing people. The QR service providers can offer some reminders of various cashback. Suppose the users have stopped using QR technology for some time. In that case, the service providers can remind them by offering cashback and a message of safety/ prevention from COVID-19 disease to avoid physical transactions. The influence of PRFR on BIQA is a good sign from a marketing perspective which indicates that the fear of COVID-19 disease has made the users avoid physical transactions and use QR code technology. The QR service providers can run a campaign on the benefits related to safety and contactless service for using QR codes in

Hospitals, supermarkets, Public Transports, Large Retail outlets, Movie theatres, etc., to curb COVID-19 disease. The influence of TRT on BIQA has shown that users trust QR code technology to make payments of various transactions.

Table 8. Path Coefficient

Path	Beta	Hypotheses	T-Statistics	Sig.
PEY -> BIQA	0.291	H1	9.25	**
EEY -> BIQA	0.123	H2	4.96	**
SCI -> BIQA	0.155	H3	5.79	**
FCN -> BIQA	0.090	H4A	3.59	**
FCN -> Use Behaviour	0.124	H4B	3.20	**
HMN -> BIQA	0.130	H5	4.81	**
PV -> BIQA	0.117	H6	4.99	**
HBT -> BIQA	0.033	H7A	1.39	NS
HBT -> Use Behaviour	0.149	H7B	4.37	**
TRT-> BIQA	0.136	H8	5.18	**
PRFR -> BIQA	0.145	H9	5.00	**
GSEY -> BIQA	0.133	H10	5.03	**
PIV-> BIQA	0.152	H11	5.06	**
MMAV -> BIQA	0.210	H12	8.65	**
BIQA -> Use Behaviour	0.640	H13	14.87	**

The QR service providers must keep updating the users about the security features of QR technology to keep their trust intact. The influence of GSEY on BIQA shows that the users are aware of environmental consequences, and it's a great sign towards sustainability. The QR service providers can run a campaign with a message of environmental benefits and the need for a sustainable planet using QR code technology, attracting more customers and leading to better sustainability. QR codes influence the influence of HMN on BIQA. The analysis has shown that it can satisfy the customers by adding the entertainment and fun element in the QR code technology. The QR service providers can consist of hyperlinked games, movies, podcasts, and other streaming media for more frequent usage of QR technology. Zero physical contact and using kiosks for ordering and payment at restaurants to order the product by scanning the product QR code. The influence of PV has shown that the users are still price-conscious, and the QR service providers can offer customers more discounts on using QR technology. FCN is still a significant concern, and the QR providers must look to speed up the QR code transaction processing time and quality of QR code app for better acceptance.

Theoretical Contribution

In Table 9, I show the implication of the UTAUT2 model in technology acceptance contexts. There is a literature gap related to this, and this study was conducted in QR code technology acceptance using the UTAUT2 model will open new frontiers in this research. This research study has contributed to the UTAUT2 theory by extending it with other relevant variables such as TRT, PRFR, GSEY, PIV, and MMAV in the QR Code context. This study empirically has proved that the UTAUT2 possesses good explanatory power on BIQA (R^2=0.783) and QR code use behaviour (R^2=0.593). This study has also contributed to the extension of UTAUT2 with GSEY, which is relevant to the sustainability context, and PRFR, which is highly relevant to the COVID-19 pandemic scenario. The previous studies fail to integrate the concept of GSEY and PRFR. This is the first study that combined GSEY, MMAV, and

PRFR in UTAUT2 theory. This study has shown that the new constructs such as TRT, PRFR, GSEY, PIV, and MMAV have a significant relationship with BIQA. This research is the first study that addressed three constructs: GSEY, PRFR, and MMAV. Thus, this helps marketers to strategise their campaigns in the future.

Table 9. Supported Studies

Relationship	Supported Studies
PEY → BIQA	Jiang et al (2021); Yan et al (2021); Kou, & Liu (2020); Zulherman et al (2021); Gao et al., (2018); Ali et al. (2017); Gönül et al (2016); Eyüboğlu and Sevim (2016); Chen et al (2016); Santos (2015); Koo and Kim (2015); Ertekin and Pelton (2014); Atkinson (2013); Ryu & Murdock (2013); and Chooi et al (2014).
EEY → BIQA	Chang et al (2021); Jiang et al. (2021); Yan et al (2021); Kou, & Liu (2020); Zulherman et al. (2021); Gao et al. (2018); Chong (2017); Yang et al (2017); Lambordi et al. (2017); Ho & Yang (2017); Shin et al. (2012); Ertekin and Pelton (2014); and Chooi et al. (2014)
SCI → BIQA	Tretiakov & Hunter (2021); Rabu et al. (2019); Gao et al. (2018); Yang et al., (2017); Lombardi et al. (2017); Ho & Yang, (2017); Jung et al. (2012) and Shin et al. (2012).
FCN → BIQA	Alamoudi (2022), Song et al. (2021), Wahsheh & Al-Zahrani (2021), Chong (2017), Chooi et al. (2014), and Kim & Yoon (2014)
FCN → Use Behaviour	Song et al. (2021), Wahsheh & Al-Zahrani (2021), Chong (2017), Chooi et al. (2014), and Kim & Yoon (2014)
HMN→BIQA	Liu et al. (2021), Anitha et al. (2019), Chong (2017), Lombardi et al. (2017), Ertekin and Pelton (2014), Ryu & Murdock (2013), and Chooi et al. (2014)
PV → BIQA	Acuti et al. (2020); Katlav (2020), Yang et al., (2017), Santos (2015), and Chooi et al (2014)
HBT→BIQA	Suo et al (2022), Suo (2019), Meydanoğlu et al (2018), and Lombardi et al. (2017)
HBT → Use Behaviour	Alamoudi (2022), Song et al. (2021)
TRT→ BIQA	Wahsheh, & Al-Zahrani, (2021); Atkinson, (2013); Baskoro & Amini, (2020); Lou et al., (2017); and Ryu, & Murdock, (2013).
PRFR→ BIQA	Al-Maroof et al., 2020; Raza & Khan, 2021; Zheng & Montargot, 2021
GSEY → BIQA	*No previous studies are addressing GSEY in the QR code technology context*
PIV→ BIQA	Suebtimrat & Vonguai, (2021); Liébana-Cabanillas et al., (2021); and Patil et al., (2020)
MMAV → BIQA	There are no previous studies except Atkinson (2013), which talks about MMAV, and this is the first study that addressed MMAV and GSEY in the context of QR code technology acceptance.

Conclusions

The research finding found increased QR-code usage among the customers during the Covid-19 in Bangalore city. This study concludes that the variables such as PEY, MMAV, SCI, PIV, PRFR, TRT, GSEY, HMN, FCN, and PV affect BIQRA. This research study is the first study that integrated GSEY, MMAV, and PRFR in UTAUT2 theory. This study has shown that the new constructs such as TRT, PRFR, GSEY, PIV, and MMAV have significant relationships towards BIQA. It addressed three constructs such as GSEY, PRFR, and MMAV together. Thus, this will help marketers to strategise their campaigns.

There are a few limitations to this study. The sample selected is only users of QR codes so that future research can compare between users of QR codes vs. non-users. Second, cross-sectional data collected post COVID-19 pandemic second wave in India can yield differences in perception of QR codes. The longer-term technology usage needs to be addressed, so

conducting a longitudinal data collection method in future studies may be more beneficial. Third, the research aimed at a general acceptance of QR code technology. Future studies can focus on context-specific usage of QR codes for better understanding.

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