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# Mobile apps for SME business sustainability during COVID-19 and onwards

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## ABSTRACT

Small and Medium-Sized Enterprises (SMEs) are struggling to cope with the business uncertainty caused by the COVID-19 pandemic. This study examines how SMEs in developing economies have used mobile apps to improve their business efficiency during the pandemic. We aim to recognize effective measures and actions taken by SMEs that have turned to mobile-app-based business to improve their sustainability during the crisis. The study bridges a literature gap by extending the Theory of Consumption Values and the Theory of Planned Behavior to SMEs that incorporate mobile-app-based business. Data was collected from 343 SMEs from three Industrial Development Corporations (IDCs) in India. Using the covariance-based structural equation modeling method, we investigated the efficiency of a conceptual model of mobile-app-based business for SMEs. The results revealed that consumer choice behavior, perceived behavior control, subjective behavior control and attitude towards the mobile app all influence SMEs' decision-making and business strategy. As such, SMEs need a powerful mobile-app-based business network to succeed in the entrepreneurial business process. Using instrumental variable analysis, we discovered that increased mobile app usage significantly improves SMEs' long-term efficiency. The analysis provides several theoretical and managerial ramifications.

## 1. Introduction

Mobile app browsing is common among smartphone users. The handset is often within reach, so users browse the installed applications, including shopping apps, and make impulse purchases at their convenience. This is distinct from physical retail outlets, as users do not go to retail stores until they want to purchase something. Furthermore, the number of items available in physical retail outlets is often insufficient, and it is inconvenient and tiring to browse various divisions of the shop over an extended period. Apps allow companies to reach out to clients virtually every day with their goods and services, and to send out exclusive deals and coupons.

The use of mobile apps is increasing in business communities at a tremendous pace during the COVID-19 pandemic (Cenamor, 2021; Talwar, Talwar, Kaur, Islam, & Dhir, 2020, Talwar, Dhir, Kaur, & Mäntymäki, 2020, Talwar, Dhir, Khalil, Mohan, & Islam, 2020). It is evident that mobile apps are useful for everything: selling and purchasing goods, booking transportation, booking restaurants, and food deliveries, and obtaining shared accommodations (Khaskheli, Jun, & Ahmed Bhuiyan, 2017). SMEs need to welcome and keep pace with app developments to take advantage of these opportunities. Mobile apps

could assist SMEs via: increasing business penetration, higher sales, enhanced cooperation with customers and suppliers, improved image of the company, speedy operation, and better productivity of workers (Rahayu & John, 2016; Talwar, Talwar, et al., 2020, Talwar, Dhir, Kaur, et al., 2020, Talwar, Dhir, Khalil, et al., 2020). Although mobile apps have revolutionized the way people shop, it is essential to consider how SME customers see these services (Khanra, Dhir, Kaur, & Joseph, 2021). While academics are becoming more interested in researching different aspects of these applications, our exhaustive literature review shows a lack of research on mobile apps for SME sustainability (Laato, Islam, Farooq, & Dhir, 2020). More scholarly studies will help further development in this field.

Studies show that SMEs from developing nations are far behind in adopting a mobile-app-based business process (MAP) and measuring its sustainability performance (SSP) (Owoseni & Twinomurinzi, 2018). This study thus reflects on the linkage between MAP and SSP. Through a literature synthesis we have identified essential factors using the Theory of Consumption Values (TCV) (Kaur, Dhir, Talwar, & Ghuman, 2020; Sheth, Newman, & Gross, 1991; Thongmak, 2020) and the Theory of Planned Behavior (TPB) (Fishbein & Ajzen, 1975; Sun, Law, & Schuckert, 2020; Zaremohzzabieh et al., 2019) that influence MAP

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acceptance in the SSP. Therefore, the study examines how an SME owner should strategically handle the interdependencies between different entities, in order to create a sustainable mobile-app-based business during the pandemic and onwards (Gomeseria, 2019; Ho & Chung, 2020).

SMEs are essential for all countries in this age of globalization. The world economy's current state contributes to SMEs' obstacles and prospects by using smartphone applications for long-term growth. However, COVID-19 has posed significant obstacles for small businesses in many countries and industries. SMEs comprise the majority of all businesses in developing countries like India. As a result, having completely functional support measures for SMEs is critical for developing economies' economic growth (Juergensen, Guimón, & Narula, 2020). It is commonly accepted that the use of smartphone applications in SMEs will make a significant contribution to business growth. It is evident that SMEs are witnessing a significant effect of the COVID-19 pandemic (Shafi, Liu, & Ren, 2020). We claim that the epidemic's impacts fall disproportionately on SMEs, compared to large enterprises, as SMEs typically do not have adequate resources (Paul, 2020), especially financial and operating ones (International Trade Centre, 2018), to survive. They are not equipped for such long-lasting disturbances (Bartik et al., 2020).

SMEs are now struggling to cope with the business uncertainty generated by COVID-19 (Juergensen et al., 2020). Under normal circumstances, SMEs often have to fight in the challenging business climate because of the market's scope and complexity, and scarce capital (Owoseni & Twinomurizi, 2018). A transition to mobile-app-based technologies (Ho & Chung, 2020) has been reported as one of the techniques SMEs are using to adapt to disruptive environmental changes (Swani, 2020): in particular, mobile apps assist businesses in recognizing emerging business practices (Richter, 2020). As such, mobile-app-based business is seen as an acceptable solution to the disruptive changes (Gerde & Mahto, 2004; Singhal et al., 2020; Islam, 2017) induced by the COVID-19 pandemic (Gupta & Bose, 2019). Furthermore, the COVID-19 pandemic has triggered drastic business environmental changes (Saleh, 2020) that enable SMEs to take on the challenges and to follow a broader scale and adopt mobile-app-driven business (Eggers, 2020; Priyono, Moin, & Putri, 2020).

Data for this study was collected from 343 SMEs from three Industrial Development Corporations (IDCs) in India. We used structural equation modelling (SEM) to evaluate observable and unobservable constructs of MAP implementation. This study, therefore, examines the influence of MAP on SSP in Indian SMEs, and explores the strategic decisions taken by SME owners/stakeholders to create sustainable SMEs (Ardito, Raby, Albino, & Bertoldi, 2021; Kautonen et al., 2020).

The study's contribution is three-fold. First, we contribute to symbolic interactionism, emphasizing the influence of the TCV and TPB theories on SMEs mobile app-based market applications. Second, we contribute to current SME research to better understand mobile apps' impact on SMEs. Third, our research demonstrates mobile apps' value to SMEs' long-term stability, both during the COVID-19 pandemic and onwards. In forecasting the general use of technology, the literature on mobile apps for business connectivity relies on either mobile or economic influences.

The paper is structured as follows. A literature synthesis is provided in Section 2. The proposed model and hypothesis formulation is covered in Section 3. Next, Section 4 presents the results, and Section 5 presents discussions on the research findings. Finally, Section 6 provides conclusions and suggestions for future work.

## 2. Theoretical framework

Theory of Planned Behavior (TPB) is a widely used social-psychological paradigm for interpreting and describing human actions in the context of internet communication (Fishbein & Ajzen, 1975). According to the TPB, user intentions are predicted by attitude,

subjective norm, and perceived behavioral control (PBC). The degree to which consumption principles influence consumer behavior is an essential feature. Sheth et al. (1991) suggested the Theory of Consumption Values (TCV), which provides a systematic analytical lens for analyzing consumption values. Many academics have used the TCV to study customer decision behavior since its inception in 1991 (Kushwah, Dhir, & Sagar, 2019). Recent experiments have used the TCV to analyze customer preference behavior, demonstrating its continued validity. As a result, applying TCV to mobile app users can provide valuable insights into SMEs' activities (Dhir, Kaur, & Rajala, 2020).

The use of smartphone applications continues to expand. Alongside this, SMEs' usage of mobile apps is increasing, but research flows are still highly inconsistent and scattered. Researchers have studied SMEs for a long time (see Table 1) and understand the need for SMEs to postulate plans to compete and succeed in global pandemic circumstances (Liñán, Paul, & Fayolle, 2020). SMEs face many internal and external threats in the new ultra-competitive market climate during COVID-19 (Paul, 2020). Focused primarily on a smartphone app business, academics, start-ups, and technologists work closely together to play a significant role in finding creative solutions for SMEs to survive.

In terms of its geographical scale, economic impact, and political power, this crisis is exceptional. In the context of a mobile app, pragmatic factors such as reliability, customizability, accessibility, gratification, and ease of use have been highlighted as important factors in delivering a positive customer experience (Magrizos, Apospori, Carrigan, & Jones, 2020). The evidence on using discount promotions, service attributes, and other incentives to deliver competitive advantages and reinforce mobile-app-based repurchase intention is consistent with the existing literature on a geographic scale, economic impact, and SMEs' political power. The factors that influence SME sustainability vary depending on internationalization's geographic scope (Bodlaj, Kadic-Maglaljic, & Vida, 2020). Other factors have a selective impact on SME sustainability performance, while product innovation positively impacts export destination.

We aim to provide new empirical and scientific perspectives with direct implications for practitioners in the mobile-app-based business for SMEs (Ritter & Pedersen, 2020). Based on the literature synthesis above, Fig. 1 illustrates a proposed conceptual model. It consists of six factors: Customer Choice Behavior (CCB), Perceived Behavior Control (PBC), Subjective Behavioral Control (SBC), Mobile App Attitude (ATM), Mobile-App-Based Business Process (MAP), and SMEs Sustainability Performance (SSP). Research into mobile apps' benefits for SMEs' long-term viability and their consequences is still ongoing. A brief review of recent research into SMEs' use of mobile apps reveals that previous studies can be categorized into three subcategories. These surveys focus on the effect and acceptance of mobile apps, mobile app purchasing decisions, and the effects of mobile user interaction dimensions.

This argument identifies three gaps: (1) little research has concentrated on SMEs' behavior towards the mobile app based business process; (2) there is a shortage of theory-driven studies in the context of mobile-app-based business for SMEs, and; (3) SMEs' customer preference behavior in the context of the mobile app based business process's consumption values has remained entirely undiscovered. The current study uses the TCV and TPB theories to understand SMEs' business sustainability through mobile applications to close these gaps. We identified the following steps to address the research gaps: (1) Conduct a literature review to clarify previous research specific to mobile-app-based businesses, SMEs, TCV and TPB; (2) Contextualize TCV and TPB to mobile-app-based business parameters for SMEs, using an exploratory combined process research approach for focus group interviews; (3) Suggest a research model on the relationship of related parameters and how to evaluate this. Additionally, in making the SMEs mobile app successful, the following features should be taken care of: i) the app can be downloaded by the users easily; ii) the app should be very user-friendly; iii) the app must be highly secure. Therefore, the apps are possibly more beneficial for SMEs within the competitive environment

**Table 1**  
Mobile app-based business research context.

Primary topic	Key References	Research Context
To app or not to app: Choices of a business-to-business vendor	(Swani, 2020)	The adoption of B2B smartphone applications has many theoretical and managerial consequences.
RANAS plan for Singapore's recycling behavioral change.	(Shan et al., 2020)	The RANAS smartphone app-aided solution can resolve recycling behavioral improvements and can be used as an action-based training instrument to teach people about the environmental effects of recycling.
From the viewpoint of consumption value theory, the value proposition of food delivery apps	(Kaur et al., 2020)	For "Food Delivery App" service providers striving for larger market shares, the outcomes of the study are insightful by helping them understand how to affect customer choice and purchasing intentions.
Assessment of the effect of smart phone technology on the balanced eating behavior and diet awareness of consumers	(Samoggia & Riedel, 2020)	The recommendation is that customer behavior psychologists, marketing analysts, nutritionists, and software developers collaborate to create applications to increase the efficacy of nutrition awareness apps.
Phase of digital transformation and SMEs	(Ulas, 2019)	With the adoption of new technology, digital transformation is a restructuring of the corporate sector, generating benefits such as efficiency gains, cost savings, and innovation.
Use and dynamic capacities of mobile apps: a structural equation model for SMEs in Lagos, Nigeria	(Owoseni & Twinomurizi, 2018)	This study shows how SMEs in Lagos use mobile applications to boost their market through the dynamic capabilities (DCs).
M-Trade and smartphone apps: SME prospects in developed countries	(Islam, 2017; Khaskheli et al., 2017)	SME versatility makes it possible to make large-scale decisions, such as implementing emerging technologies, changing or even revamping an existing company method to satisfy consumer needs, and taking advantage of existing or future opportunities.
Mediating behavioral impacts, subjective expectations, and assumed behavioral regulation for mobile payment-based hotel bookings	(Sun et al., 2020)	Within the sense of mobile payments for hotel reservations, the mediating impact of customer loyalty is established.
Policy alternatives to endorse business models digitalization during COVID-19	(OECD, 2020)	The implementation of SME policy goals will be facilitated in the following areas: mid-term COVID-19 recovery, access to finance, and restructuring of local business funding.
Effects of the COVID-19 pandemic on Pakistan-based micro-, small- and medium-sized enterprises	(Shafi et al., 2020)	The findings reveal that most participating businesses have been seriously impacted and face many challenges, such as financial instability, supply chain disruption, market decline, revenue, and profit loss.
Working women's study of mobile-app-based household buying in a developed country: an observational validation of Theory of Planned Behavior	(Kumar, 2019)	It can be inferred that mood, subjective norm, and perceived utility substantially affect online shopping.
Why do people buy from online travel agents (OTAs) - A view on consumption values	(Talwar, Dhir, Kaur, & Mäntymäki, 2020; Talwar, Dhir, Khalil, Mohan, & Islam, 2020)	The findings show that OTAs' purchasing intention is predicted by quality-of-benefits, monetary, social status, choice, and knowledge values, with the chief factor being the importance of quality-of-benefits, followed by the value of preference.
The effect of the tendency to trust in the attitudes of smartphone users towards in-app advertising: an extension of the theory of planned behavior	(Cheung & To, 2017)	To positively predict the intention of users to watch in-app ads, subjective standards and perceived behavioral influence were identified, which in turn influenced their behavioral reaction. Practical consequences are provided to enhance the trust of consumers and foster favorable attitudes to in-app ads
ICT, social networks and COVID-19: facts from casual residence business culture in Kuwait City	(Saleh, 2020)	ICTs and social media allow these firms to grow their operations and expand the company in numerous places.
Pandemic and economic recession of COVID-19: the experience and socioeconomic roots of Nigeria	(Ozili, 2020)	Appropriate digital infrastructure needs to be developed to encourage the change from face-to-face business operations to digital or online business activities that will help the digital economy expand.

(Gomeseria, 2019).

### 2.1. Theory of Consumption Values (TCV)

The Theory of Consumption Values (TCV) is a framework for understanding customers' actions in choosing services and products. It posits actions based on five principles for customer choice: operational, mental, social, epistemic, and conditional values (Sheth et al., 1991). The value components may impact users' purchasing decisions and a variety of other positive user behaviors. The discovery of additional good actions (such as in the current study) may go beyond the theory's identified boundary. The TCV further demonstrates that the significance of value components varies from situation to situation, indicating the importance of applying it to specific platforms and encouraging the current study to reframe value components to fit MAP features. As a result, this theory should be applicable to MAP research. This theory has also explained how users' consumption values influence their acceptance of digital services, destination services, and perceived dating app use frequency. As a result, this theory can address user adoption issues in

various situations, such as this article's Attitude Towards Mobile App (Vahdat, Alizadeh, Quach, & Hamelin, 2020). This concept has been used to explain hedonic issues in online contexts, such as accepting hedonistic digital evidence and the desire to purchase virtual goods. As a result, this theory should apply to MAP issues. The literature above, however, has a limit: namely, Attitude towards Mobile Apps. In the background of both web-based goods and services, as well as in the service industry and food delivery applications (Kaur et al., 2020), TCV is used to help our choice of theory to model the drivers of customer choice behavior against the business model for SMEs focused on mobile apps.

### 2.2. Theory of Planned Behavior (TPB)

The Theory of Planned Behavior (TPB) is a popular social psychology theory which has been used in the SMEs domain. Based on reasoned action, TPB was established by Fishbein and Ajzen (1975). It is the only social psychology theory that considers intentions as influential predictors of behavior, primarily in the case of planned and team behavior

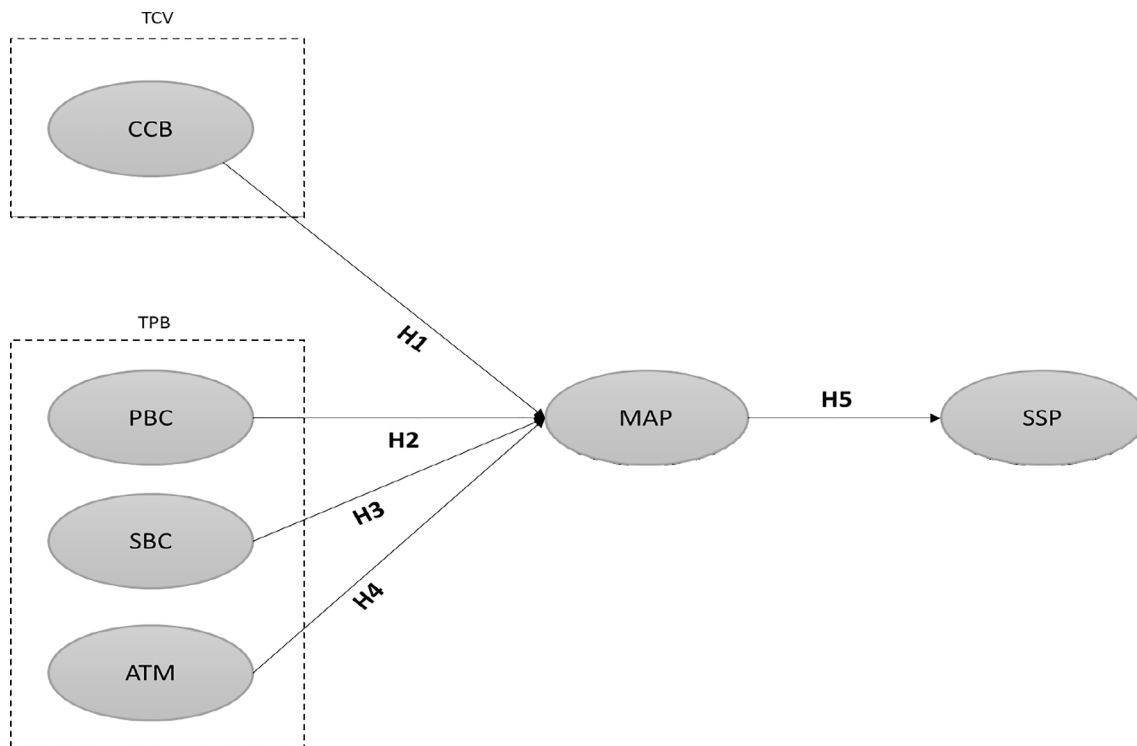


Fig. 1. A conceptual framework from the perspective of TCV and TPB theories.

(Sun et al., 2020). TPB theory has shown that intentions, attitudes and subjective norms are clarified and projected by behavioral control. The theory describes intention as a cognitive interpretation of an individual's readiness to carry out a given action. As per the theory, attitude is expressed as an individual's good or bad emotions associated with a particular feeling. The theory describes a subjective norm as the perceived social obligation to participate or not participate in an action. Ultimately, perceived behavioral control involves the understanding of people's capacity to execute a specific action. As introduced in the domain of SMEs study, the TPB model is based on the assumption that SMEs' desire to engage in certain behaviors is formed by their need to achieve the behavior and their trust in their ability to do so. This theory suggests that attitude, subjective norms, and perceived actions impact the purpose of the behavior, which influences an individual's actual behavior (Kumar, 2019).

### 2.3. The modified model of TCV and TPB theories

The present mobile app research using TCV concentrates on long-term market viability for SMEs. To extend the mobile-app-based market model for SMEs during COVID-19, three considerations derived from TCV, such as functional, emotional, and social factors, are proposed to be included. Functional value is perceived usefulness that reflects a good or service's perceived functional qualities or advantages (Zhang & Mao, 2013). The functional value is related to the intended usability or its utilitarian purpose (Nina, Stephanie, Ramayah, & Philipp, 2019). Functional value greatly enhances the behavioral intent of consumers in the Mobile-App-Based Business Process (MAP). Social value is one of the presumed qualities of clients, tying those who use a product or service with social recognition, social connections, and social appearance (Omigie, Zo, Rho, & Ciganek, 2017). Social value creates a constructive outlook towards the MAP for SME marketers. Emotional meaning is the emotions or moods of users, such as the pleasure of using smartphone applications. Emotional value is expected to affect the MAP of SMEs (Thongmak, 2020).

TPB theory suggests that attitude, subjective norms, and influence of

perceived behavior impact the purpose of the behavior, which in turn influences an individual's actual behavior (Fig. 2). The TPB notes that a person's attitude towards an action, subjective norm, and assumed behavioral influence form an individual's behavioral intent and actual behavior. This study investigates whether or not the TPB will clarify consumers' actions on SMEs' MAPs. Mobile app consumers of SMEs with behaviors, subjective behavior, and perceived behavioral control have greatly affected mobile app-based businesses. This modified TCV and TPB model offers a unique opportunity to investigate the role of mobile apps in SME sustainability during COVID-19.

### 3. Development of constructs and hypothesis

The COVID-19 pandemic impacted the SME market. Based on the analysis of previous literature on the SME sector in the context of the pandemic, we suggest a mobile-app-based business for SMEs, from the perspective of the TCV and TPB paradigms, to revive the post-COVID-19 global SME industry. The TCV and TPB are widely used theoretical frameworks among management scholars (Archambault, Greene, Cunningham, & Hurley, 2011; Kaur et al., 2020; Talwar, Talwar, et al., 2020; Talwar, Dhir, Kaur, et al., 2020; Talwar, Dhir, Khalil, et al., 2020; Thongmak, 2020). Recently, management researchers have increasingly used the theory to describe actions at both the person (e.g., single consumer) and firm (e.g., SME) levels. According to the TCV principle, a consumer's decisions have a major impact on their actions (e.g., mobile app based business process) and outcomes (e.g., SMEs sustainability performance). According to the theory, the CCB is a significant parameter that produces outcomes valued for SMEs. CCB enables SMEs to reap benefits as a result of their MAP.

A review of the existing literature was carried out to determine the constructs for MAPs and SMEs' long-term performance, identifying SMEs' characteristics. That includes: (i) Creating a questionnaire with a variety of questions representing each construct in the study; and (ii) Developing the SEM model, using latent and observed variables derived from the constructs found in (i). The questionnaire included objective-type questions (lexical variable used for rating) to help researchers



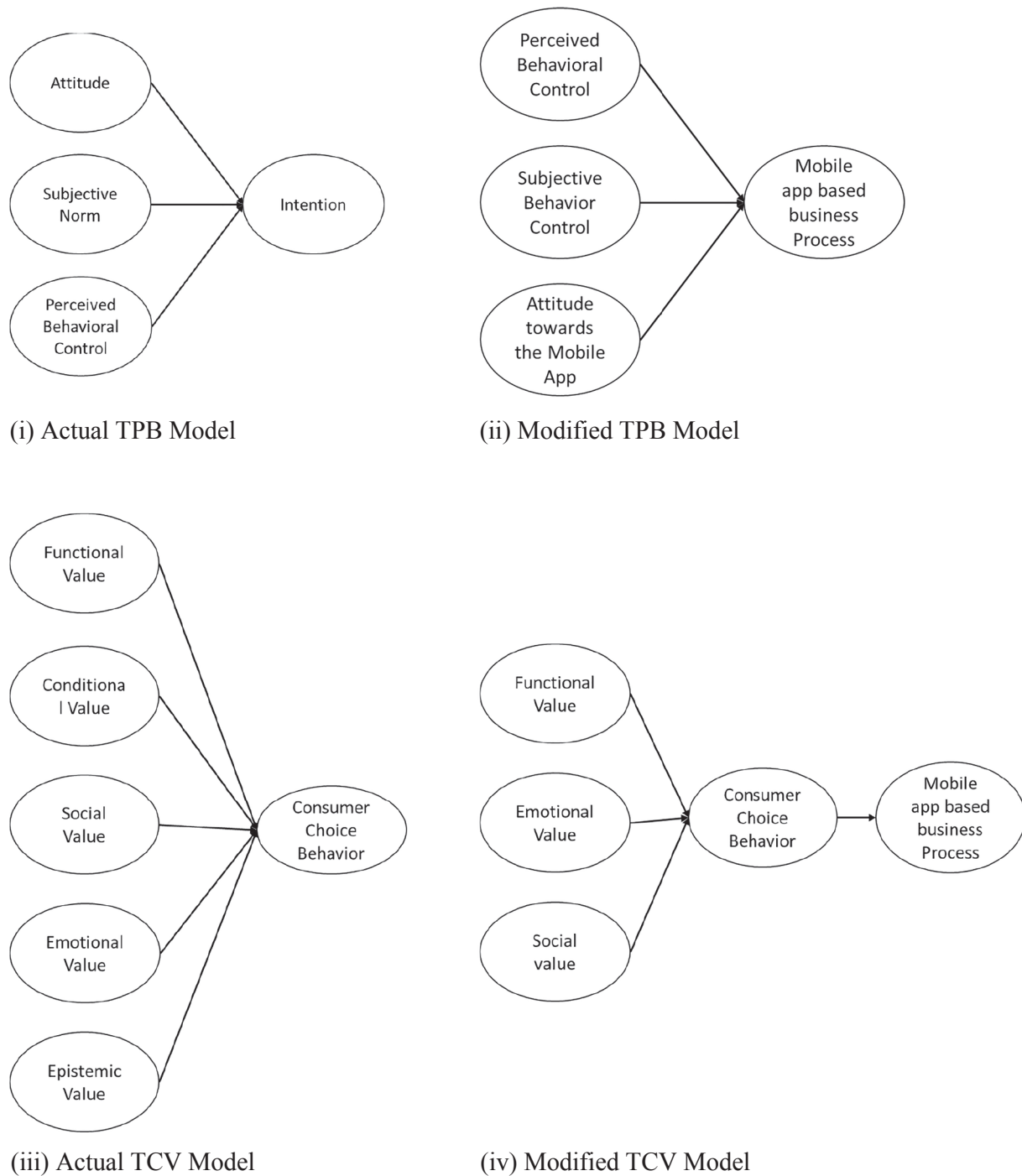


Fig. 2. Actual and modified models of TCV and TPB theories.

better understand SMEs.

Our model describes six main latent variables: Consumer Choice Behavior, Perceived Behavior Control, Subjective Behavior Control, Mobile App Attitude, Mobile-App-Based Business Processes, and SME Sustainability Performance (Table 2). The study claims that using such an inclusive model will turn the SMEs into a modern world economic order characterized by sustainable SMEs.

### 3.1. Consumer Choice Behavior (CCB)

Consumer Choice Behavior (CCB) value is the utility that traders perceive to derive from a product or service offering; it covers functional

impairment, emotional and social reciprocity, and social competence. Since before the publication of Schumpeter’s Theory of Economic Development (Elliott, 1983), it has been widely acknowledged that the emergence of new industries poses a challenge in terms of understanding and predicting consumer behavior. Based on the TCV, this study determines which factors influence consumer choice behavior regarding SMEs’ sustainability performance through mobile-app-based businesses in India (Kaur et al., 2020). Consumer behavior analysis examines consumer practice issues, such as how people pick, use and dispose of goods to fulfill their requirements. Koch and Mkhitarayan (2015) examine consumer behaviors in the Chinese automotive industry based on an overview of related local brands. Park and Cho (2012) confirm the

**Table 2**  
Development of constructs with items, sources and year.

Constructs	Items	Sources and year
1. CCB (Consumer Choice Behavior)	Functional	(Sheth et al., 1991)
	Emotional	(Kaur, Dhir, Rajala, & Dwivedi, 2018)
2. PBC (Perceived Behavior Control)	Social	(Peng et al., 2020)
	Facility	(Aitken, Watkins, Williams, & Kean, 2020)
	Knowledge	(van Twillert, Kreijns, Vermeulen, & Evers, 2020)
3. SBC (Subjective Behavior Control)	Speed	(Sun et al., 2020)
	Opinion	(Kaushik et al., 2018)
	Influence	(Ho et al., 2017)
	Other Users (Colleague, superior, Subordinates etc.)	(Grimes & Marquardson, 2019)
4. ATM (Attitude towards the Mobile App)	Nice Idea	(Shan et al., 2020)
	Positive feelings	(Cheung & To, 2017)
5. MAP (Mobile App-Based Business Process)	Like	(Dastjerdi & Kaplan, 2019)
	Timely	(Samoggia & Riedel, 2020)
6. SSP (SME Sustainability Performance)	Economic	(Libaque-Sáenz et al., 2020)
	Faster	(Price et al., 2020)
	Global Reach	(Falahat, Ramayah, Soto-Acosta, & Lee, 2020)
6. SSP (SME Sustainability Performance)	Productivity	(Owoseni & Twinomurini, 2018)
	Cost	(Ulas, 2019)
	Market Share	(Ballestar et al., 2020)
	Relationship Management	(Arif Anjum, 2018)

beneficial association between dedication to the online world of social networks and community-based behavioral knowledge. A business process centered on a mobile app that evaluates the relative value of various product attributes (functional, emotional, and social) influences CCB (Sung, 2021). This study examines which factors influence CCB concerning SMEs' sustainability performance via mobile-app-based businesses in India, based on the TCV (Owoseni & Twinomurini, 2018).

This study provides new theoretical insights into SMEs' sustainability performance through consumer choice behavior supported by empirical evidence. Product characteristics must appeal to the consumer on functional, emotional, and social levels in order for a new product to be introduced successfully. Consumers evaluate products with their unique choice and attention criteria, including perceptions about the products and its characteristics, such as how the product sounds, looks, and feels. Therefore, marketers aim to elicit emotions and a wide range of appeal drivers in order to persuade customers to buy their product. In doing so, many SMEs arrange seminars and personal contacts for promotional communication, which are difficult to arrange in a pandemic situation. Hence, during COVID-19, a mobile app can represent SME products through emotional development and social learning, focusing on the products' subjective and specialized features. As such, the mobile app significantly positively influences consumers' behavior and their buying decisions about SMEs' products and services. Therefore, the following hypothesis is suggested.

H1: Consumer Choice Behavior positively influences Mobile-App-Based Business Process

### 3.2. Perceived Behavior Control (PBC)

PBC specifically affects intentions, alongside perceptions and norms, and significantly affects behavior (Ajzen, 1991). Perceived behavioral control is defined as a person's belief in their ability to perform a behavior and control it (Sembada & Koay, 2019). Fig. 1 depicts the conceptual Mobile-App-Based Business Model for SMEs, as transformed for this study. Control beliefs may either enable SMEs to perform a specific behavior (e.g. SMEs have access to necessary mobile

applications), or impede SMEs (facility, knowledge, and speed) from performing the behavior (e.g. SMEs are not skilled to do this), thus determining PBC (Talwar, Talwar, Kaur, Tripathy, & Dhir, 2021). The resilience of the control belief is incremented by perceived power that can help the SMEs influence the PBC (e.g., access to the appropriate mobile applications would increase the performance of the SMEs). PBC (Hsu & Lin, 2016) is a combination of assumed influence, referred to as people's perceptions of the degree to which they have control over executing a given action. Empowering customers by raising their understanding of behavioral regulation has been crucial in closing this discrepancy between buyers' optimistic expectations towards sustainability and their actual purchasing behavior (Thøgersen, 2005). Sultan, Tarafder, Pearson, and Henryks (2019) examine the effectiveness or moderating impact of perceived connectivity, happiness, belief in intention-behavior, and PBC-behavior differences in the TPB model (Balushi, Locke, & Boulanouar, 2018). Facility, knowledge, and speed have been linked to PBC, as all concepts refer to the individual's perceived ability to perform a behavior towards MAP. Accordingly, we proposed the following hypothesis:

H2: Perceived Behavior Control positively influences Mobile-App-Based Business Process

### 3.3. Subjective Behavior Control (SBC)

Subjective behavior control is derived from subjective norms. The psychological influence refers to a perceived social obligation to perform or not perform an action. In short, the more favorable the behavioral attitude and the subjective norm, and the more significant the assumed behavioral influence, the greater the individual's intention to execute the action. The discrepancy between the initial TPB and the modified TPB is that the human subjective norm influences the action. Hsu (2012) examines that the subjective norm does not affect attitudes.

Kaushik, Jain, and Kumar Singh (2018) provide an overview of websites' social presences and subjective norms for disclosing particular privacy issues on the websites. Ho, Ocasio-Velázquez, and Booth (2017) examine the causal impact of perceived vulnerability and subjective norms on users' confidence in cloud technologies. Grimes and Marquardson (2019) develop models that include subjective norms, assuming that consumers will reciprocate the assumed indifference of the device builder that produced a poor-quality system with their indifferent behavior, including failure to conform with the best practices of protection, and vice versa (Ozarslan & Eren, 2015). We focus on opinion, influence, and other subjective behavioral regulation users as proximal cognitive antecedents of goal-directed action against the Mobile App-Based Business Process. We, therefore, suggest the following hypothesis:

H3: Subjective Behavior Control positively influences Mobile-App-Based Business Process

### 3.4. Attitude Towards the Mobile App (ATM)

Attitude refers to a positive or negative opinion about a particular behavior (Fishbein & Ajzen, 1975). Much recent research looked at people's mindset towards using websites or smartphones (Sun et al., 2020). Hsu (2012) study of the structural equation modeling showed attitude has a significant impact on intention. Cheung and To (2017) suggested that users' trust levels impaired their trust in in-app ads, which impacted their attitudes towards in-app advertisements and their desire to view in-app advertising. Dastjerdi and Kaplan (2019) study indicated that enhancing travel quality, relaxation, social networking, and encouraging eco-sustainable travel are essential factors for using new smartphone apps. SMEs argue that positive feelings are critical in mobile app research because this decision is a key indicator of successful app usage (Wang, Pauleen, & Zhang, 2016). We also found that a three-

item measure of attitude toward mobile apps (nice idea, positive feeling, and like) positively impacts the MAP (Gomeseria, 2019). Users are more likely to visit an app multiple times and longer periods if they have a positive attitude. Bellman, Potter, Treleaven-Hassard, Robinson, and Varan (2011) came to the same conclusion, claiming that successful apps can boost positive attitudes and, as a result, purchase intent. Customers' attitudes improve when they use a well-designed mobile app (Vahdat et al., 2020), which increases their desire to buy more products or services.

Furthermore, nice ideas, optimistic thoughts, and attitudes towards the mobile app affected the MAP positively. Thus, we conclude that Attitude towards the Mobile App is advantageous for Mobile App-Based Business Process. Our hypothesis was as follows:

H4: Attitude Towards the Mobile App positively influences Mobile App-Based Business Process.

### 3.5. Mobile-App-Based Business Process (MAP)

In this study, we will concentrate on mobile app entry, which connects the pre-launch and launch stages of the MAP (Olaleye, Ukpabi, Karjaluo, & Rizomyliotis, 2019; Talwar et al., 2021), reflecting the transformation from conventional SMEs to sustainable SMEs. Mobile apps are described as end-user software applications developed for a mobile operating system that expands the handset's functionality by allowing users to perform specific activities, such as searching for information and social interaction. Tectonic trends in digitalization through mobile applications and consumer interaction via diverse social media networks have created convincing channels for SMEs to deliver an efficient business model due to improved and simpler user/customer data collection and enhanced productivity in customer support, virtual collaboration, and electronic payment.

A good mobile-app-driven business method focuses on a more creative and competitive strategic business ideology that can support and direct SME businesses in an innovative, profitable, and sustainable manner (Gomeseria, 2019). Users' intention to use mobile apps for market purposes is affected by their understanding of data control and information (Libaque-Sáenz, Wong, Chang, & Bravo, 2020). (Price et al., 2020) assess the viability and efficacy of a new, constructive-theoretical mobile app designed to encourage self-control and healthy eating. Two pilot programs were launched to test the smartphone-app-aided RANAS solution's potential to change recycling behavior (Shan, Ang, & Yang, 2020). Because of the advancement of emerging technology (Islam, 2017; McGuire & Islam, 2015), mobile applications in SME businesses could strengthen these systems. After evaluating things such as timely, economical, faster, and global reach, they discovered that these metrics are positively associated with mobile app use and affect SMEs' sustainability performance. Accordingly, we proposed the following hypothesis:

H5: Mobile-App-Based Business Process has a positive influence on SME Sustainability Performance

### 3.6. SME Sustainability Performance (SSP)

Sustainability is considered to be a multi-faceted phenomenon targeted at consumer, social and environmental well-being. This research is at the core of this sustainability and smartphone app phenomenon. We present a conceptual model and related literature, including the SME literature on mobile app elements and the evolving mobile app business model for SMEs' sustainability. The productivity, cost, market share, and relationship management aspects of SMEs are heavily emphasized in the SMEs Sustainability Framework (Denicolai, Zucchella, & Magnani, 2021). SMEs' operational and financial aspects are critical targets for producing goods or services and generating revenue (Lee, Che-Ha, & Syed Alwi, 2021). However, the nature of SMEs' contribution to

sustainability performance tends to conflict with their social and environmental performance and market efficiency. Productivity, cost, market share, and relationship management are important factors in SMEs' long-term success (Ballestar, Díaz-Chao, Sainz, & Torrent-Sellens, 2020). As a result of the preceding argument, an innovative SME sustainability performance framework is required to help SMEs measure and evaluate their sustainability.

Sustainable corporate activities of SMEs boost the credibility of the company in the eyes of its stakeholders. High-level sustainability focus will boost SMEs' efficiency because it aligns the company with its stakeholders' sustainability priorities (Kautonen et al., 2020). The factors influencing SMEs' environmental, social and financial performance in Asia's manufacturing sector have been established (de Sousa, Jabbour, Ndubisi, & Seles, 2020). The presented initiative's primary aim is to assist SMEs in applying sustainability measuring metrics (productivity, cost, market share, relationship management) in a way that does not jeopardize their ability to compete effectively in the market. The mobile app-based paradigm is now positioned to propel SMEs toward long-term sustainability (Khaskheli et al., 2017). Finally, our linear regression included a variety of variables, including productivity, cost, and market share, and relationship management as performance metrics that could affect the sustainability appraisal of the SMEs.

## 4. Research method

The study uses a two-step methodology. First, confirmatory factor analysis (CFA) was conducted to assess the steps' reliability and validity. Second, a structural model and path analysis were developed to test the hypotheses. The use of SEM as a data processing tool is justified because the research investigates hypotheses based on a solid theoretical context. The collected data often satisfy the multivariate criteria for an analysis to support SEM's suitability, which means that the collected data are usually normally distributed and do not have multicollinearity problems. Common method bias (CMB) may be a problem, owing to the self-reported quality of results. This was checked using a Harman one-factor test (Kaur et al., 2020).

To examine our study model, we surveyed SME business professionals who had carried out mobile-app-based businesses. Specifically, we searched for pre-existing SMEs and start-ups who used a smartphone app to launch products or concepts. The survey instrument was pre-tested with various SME stakeholders who were smartphone app users to ensure transparency and comprehensiveness of the item scales. The survey contained a research statement and confidentiality agreement. We specified that the sample required working professionals in SME businesses that were explicitly active in the mobile-app-based business.

### 4.1. Data collection

In selecting 439 SMEs from 3 Industrial Development Corporations (IDCs) in India, non-probability convenience sampling was used. Questionnaires have been administered to the marketers and/or stakeholders of the SMEs chosen. The study used a five-point Likert-scale survey analysis (1 = strongly disagreed; 5 = strongly agreed) to analyze the proposed constructs' essential metrics. We have identified three key items for CCB, PBC, SBC, and ATM; and four key items for MAP and SSP from the literature review. With the feedback obtained from the online questionnaire and email, we verified the IP addresses and time stamps for each reply, confirming that surveys were sent at various times and from different machines. This strict purge shortened the survey for review from 439 initial responses to the final sample N = 343. Table 3 contains the demographic information of the survey used for research.

The questions were generated on Google forms, and answers were directly entered via email and various WhatsApp groups. It took three months for the data collection exercise to be completed, and 349 SMEs got input. Six respondents opted out of the study voluntarily, limiting



**Table 3**  
Demographic details of the respondents.

Attribute	Alternatives	Cumulative Frequency	Percent (%)
Gender	Male	193	56.27
	Female	150	43.73
Educational status	School Level	121	35.28
	Graduate	151	44.02
	Professionals	71	20.70
Respondent Age	20 years or under	27	7.87
	21–30 years	87	25.36
	31–40 years	167	48.69
	41 and above	62	18.08
SME's Age	5 years or less	147	42.86
	6–10 years	138	40.23
	More than 10 years	58	16.91
Volume of Employees	1–20 employees	169	49.27
	21–50 employees	102	29.74
	More than 50 employees	72	20.99
Responsibility at the company	SME Owner/CEO	14	4.08
	SME Marketer	197	57.43
	Other Employee	132	38.49

the sample size to 343.

#### 4.2. Demographics

The respondents were 43.73 percent female and 56.27 percent male. 35.28 percent, 44.02 percent, and 20.70 percent, respectively had the highest school, college, and professional credentials (Table 3). Of the SMEs under review, 49.27 percent had less than 20 workers, 29.74 percent had between 21 and 50 employees, and 20.99 percent had more than 50 employees. A total of 04.08 percent of the respondents were SME owners/CEOs, 57.43 percent were marketers, and 38.49 percent were SME owners/CEOs. To sum up, the demographics revealed a heterogeneous sample. In addition, involvement in the study was strictly voluntary, confidential, and anonymous. The study participants were free to leave the study at any point in time. Table 3 offers a description of the demographic data.

### 5. Results

The key objective of this paper was to evaluate the effects of mobile apps for business applications for SMEs during COVID-19. We assessed

**Table 4**  
Results of the statistical measures.

Items	Skewness	Kurtosis	Factor Loading	Constructs	α*	AVE	CR	MSV	ASV
Functional	-2.487	6.35	0.719	Consumer Choice Behavior (CCB)	0.846	0.516	0.516	0.510	0.340
Emotional	-2.35	5.414	0.839						
Social	-2.378	5.847	0.865	Perceived Behavior Control (PBC)	0.815	0.611	0.825	0.543	0.324
Facility	-1.853	3.313	0.687						
Knowledge	-2.363	6.01	0.838						
Speed	-2.027	4.358	0.812	Subjective Behavior Control (SBC)	0.865	0.685	0.867	0.570	0.339
Opinion	-1.796	3.135	0.784						
Influence	-2.035	3.848	0.859						
Other Users	-1.905	3.449	0.837						
Nice Idea	-2.129	4.339	0.649	Attitude towards the Mobile App (ATM)	0.790	0.568	0.796	0.231	0.115
Positive feelings	-2.024	4.292	0.793						
Like	-1.975	3.744	0.807	Mobile-App-Based Business Process (MAP)	0.871	0.630	0.872	0.590	0.378
Timely	-2.055	4.312	0.811						
Economic	-1.567	2.654	0.785						
Faster	-1.615	2.375	0.776	SMEs Sustainability Performance (SSP)	0.875	0.639	0.876	0.598	0.348
Global Reach	-1.257	0.925	0.764						
Productivity	-2.04	4.476	0.737						
Cost	-2.091	4.453	0.810						
Market Share	-1.804	2.723	0.795						
Relationship Management	-1.787	2.906	0.851						

α\* = Cronbach's Coefficient α.

Consumer Choice Behavior (CCB), Perceived Behavior Control (PBC), Subjective Behavior Control (SBC), Attitude towards the Mobile App (ATM), Mobile-App-Based Business Process (MAP) and SME Sustainability Performance (SSP). To do so, a hypothetical model was empirically tested using data from 343 SME mobile app users who were CEO/owners, administrators, or creators of different SMEs. The findings of this analysis provide in-depth insights into the effect of CCB, PBC, SBC, and ATM on MAP, which further affects the efficiency of SSP.

The Kaiser-Meyer-Olkin (KMO) test measure was administered on the survey for factor analysis (Kaiser & Cerny, 1979) and for sampling adequacy for each variable in the model. Bartlett's test of sphericity showed the suitability of performing factor analysis in our data set (Cooper, Schindler, & Sun, 2006). It was concluded that all distributions were aligned to the normal distribution as per Skewness and Kurtosis values for normality (Table 4). The KMO of 0.93 was described by the thresholds defined by Kaiser and Cerny (1979) as "adequate". In addition, the significance of the Bartlett's sphericity test was lower than 0.05, suggesting the variables were statistically significant and related to each other. The survey data could therefore be a model for SEM.

The following statistical measures were used to ensure convergent validity. Three related statistical tests were used to determine discriminant validity: i) The average variance extracted (AVE) values of the research constructs were more significant than their respective average shared variance (ASV) and maximum shared variance (MSV) values; ii) The correlation between the two constructs was less than 0.80, and iii) A research construct's correlation value was less than the square root of its AVE value. Finally, the composite reliabilities were in the range of 0.52–0.88. This increased the survey instrument's trustworthiness (see Table 4).

#### 5.1. Common method variance

The Herman single factor test was used to test for common method variance (CMV), revealing that less than the 50 percent threshold was explained by the single factor. Thus, no common factor emerged (Podsakoff, MacKenzie, & Podsakoff, 2012).

#### 5.2. Multicollinearity

The variance inflation factor (VIF) was analyzed to search for possible multicollinearity. The absence of multicollinearity is indicated by a VIF value below or equal to 5. On all other factors, we downplayed the behavioral intent of the mobile app business process. The all-

constructs VIF value was less than 5, suggesting that our model does not show multicollinearity (Kock & Lynn, 2012).

### 5.3. Measurement model

To examine the validity and reliability of the measures model, we carried out a CFA. Satisfactory goodness-of-fit indices ( $\chi^2/df = 2.183$ , CFI = 0.955, NFI = 0.920, TLI = 0.945, RMSEA = 0.059) were shown in the results. The reliability of the item was also confirmed, as all factor loadings were above 0.70 (Table 4), except for two items whose loads were within the 0.65 range and within the acceptable 0.50 cut-off (Hair, Black, Babin, & Anderson, 2016). The preferred convergent validity metrics, composite reliability (CR) score greater than 0.7, and average variance extracted (AVE) greater than 0.5 were also endorsed by the model. Besides, the correlation between the constructs studied was lower than the recommended threshold value of 0.80, which further confirmed the validity of discriminants.

### 5.4. Structural model

Analysis of the structural model returned satisfactory model fit indices ( $\chi^2/df = 2.227$ , CFI = 0.952, NFI = 0.917, TLI = 0.943, RMSEA = 0.06), confirming goodness-of-fit quality. Table 5 summarizes the testing hypotheses supported by H1, H2, H3, H4, and H5; that is, CCB ( $\beta = 0.32$ ,  $p < .001$ ), PBC ( $\beta = 0.34$ ,  $p < .001$ ), SBC ( $\beta = 0.32$ ,  $p < .001$ ), ATM ( $\beta = 0.14$ ,  $p < .001$ ), SBC ( $\beta = 0.32$ ,  $p < .001$ ), and MAP ( $\beta = 0.83$ ,  $p < .001$ ) were positively associated with the SME Sustainability Performance (SSP). With 159 degrees of freedom and a p-value of 0.000, the Chi-square ( $\chi^2$ ) of the structural model was 354.039. This implied that the structural model was satisfactorily suited to the data. In order to draw conclusions about the research hypotheses, the structural model (Fig. 3) can therefore be used with confidence. Note that when the p-value is smaller than 0.05, a study is significant.

## 6. Discussions and implications

Mobile-app-based purchasing is becoming increasingly popular. The popularity of app-based purchasing has piqued SMEs' interest in this area. As a result, the Theory of Consumption Values (TCV) and the Theory of Planned Behavior (TPB) were used to investigate the links between consumer choice behavior, perception, performance expectancy, perceived behavior control, and mobile-app-based purchasing. Our research incorporates the CCB from TCV, and the PBC, SBC, and ATM from TPB perspectives, for Mobile-App-Based Business Processes (MAP) in SMEs. The results of the original TCV model indicate that, while the constructs of CCB were substantially linked to MAP, the model did not match the aggregated data satisfactorily. As a result, the original TCV model cannot completely describe the causes of MAP. The findings are consistent with those of a previous TCV framework review (Kaur et al., 2020; Talwar, Talwar, et al., 2020, Talwar, Dhir, Kaur, et al., 2020, Talwar, Dhir, Khalil, et al., 2020; Thongmak, 2020). However, in the extended TPB model, the results show that the three constructs PBC, SBC, and ATM, were significant MAP predictors. Our study demonstrates the importance of MAP in SMEs' long-term sustainability.

The study is aligned with the positive effects of mobile app-based

**Table 5**  
Structural model results.

Hypothesis	Structural Equations	Coefficients ( $\beta$ )	t-value	p-value	Result
H1	CCB → MAP	0.321	6.126	***	Supported
H2	PBC → MAP	0.337	5.800	***	Supported
H3	SBC → MAP	0.317	5.528	***	Supported
H4	ATM → MAP	0.144	3.335	***	Supported
H5	MAP → SSP	0.835	12.719	***	Supported

Notes: \*\*\* Significance level:  $p < 0.001$ .

business processes on the long-term viability of SMEs (Khaskheli et al., 2017; Swani, 2020). Our findings indicate that a positive attitude toward mobile app use is associated with higher use of mobile-app-based business processes. Our results also indicate that the positive impact of MAP on SMEs is due to the network effect, which broadens the research scope on SME sustainability. According to the literature, CCB, PBC, SBC, and ATM influence SMEs' decision-making and behavior, and SMEs need a powerful mobile-app-based business process network to succeed in the entrepreneurial process. Using instrumental variable analysis, we discovered that increased mobile app usage improves SMEs' long-term efficiency. This result is consistent with previous evidence that used TCV & TPB theories. Unlike previous studies that merely show an overlap between social media and mobile network associates, our instrumental variable research aids in determining the effect of a mobile-app-based business on SMEs' sustainability. This study contributes to future research on mobile app use in SMEs.

This research aimed to look into the reasons for people's continued involvement with MAP. This is crucial to comprehend because MAP has a severe issue with consumer retention. Furthermore, details are scarce in the prior literature regarding SMEs' attitudes toward MAP. The current research fills in the existing literature gaps by presenting CCB, PBC, SBC, and ATM information. Furthermore, the study considers various interventions derived from two widely accepted structures (TCV and TPB). Also, the study examines the performance of SMEs in terms of sustainability (SSP). The study has theoretical and practical impacts on the stability of mobile-app-based business processes and SMEs' sustainability performance. Service providers and SME marketers in confirming mobile-app-based business intentions for SMEs will benefit from manipulating TCV and TPB bases' parameters, as described in this study. The parameter estimates in Table 5 indicate that improved mobile-app-based businesses for SMEs' sustainability during COVID-19 are positively correlated with CCB, PBC, SBC, ATM & MAP. These findings support H1, H2, H3, H4, and H5.

### 6.1. Theoretical implications

This study makes four contributions to theory: i) Although TCV and TPB each independently have a significant amount of benefit in comprehending business processes focused on mobile applications, as demonstrated in this study, it is possible to grasp SME motives more thoroughly by studying their components together. We can assemble a more authentic picture of SMEs' intentions towards the business process focused on mobile apps by merging TCV and TPB; ii) In line with previous studies (Peng, Chen, & Hung, 2020), the findings of the analysis confirm that CCB has a clear positive impact on the MAP (H1); iii) The Mobile-App-Based Business Process (H2, H3, H4) is inspired by PBC, SBC and ATM, and assists in discovering new marketing strategies (Ballestar et al., 2020). iv) It can also be claimed that the Mobile App-Based Business Process will further boost SMEs' efficiency in sustainability (H5).

### 6.2. Social implications of SMEs

The social implications of the mobile app business model for SMEs should be considered to identify both future gains and unforeseen adverse effects of mobile apps. Despite the lack of studies on the social implications of the Mobile App-based business for SMEs, a growing body of empirical, socioeconomic, and economic research could lead us to believe that SMEs' acceptance of mobile apps would result in social change. Designing and deploying convincing interventions for inducing sustainable urban mobility habits has been a very involved research area in recent years, exploiting SMEs' widespread use of mobile applications in their everyday operations. SMEs need to consider whether to introduce, reverse, or restrict mobile apps as part of their social change. The Mobile App provides a decision-making platform for SMEs by providing foresight on the social implications of technological innovation.

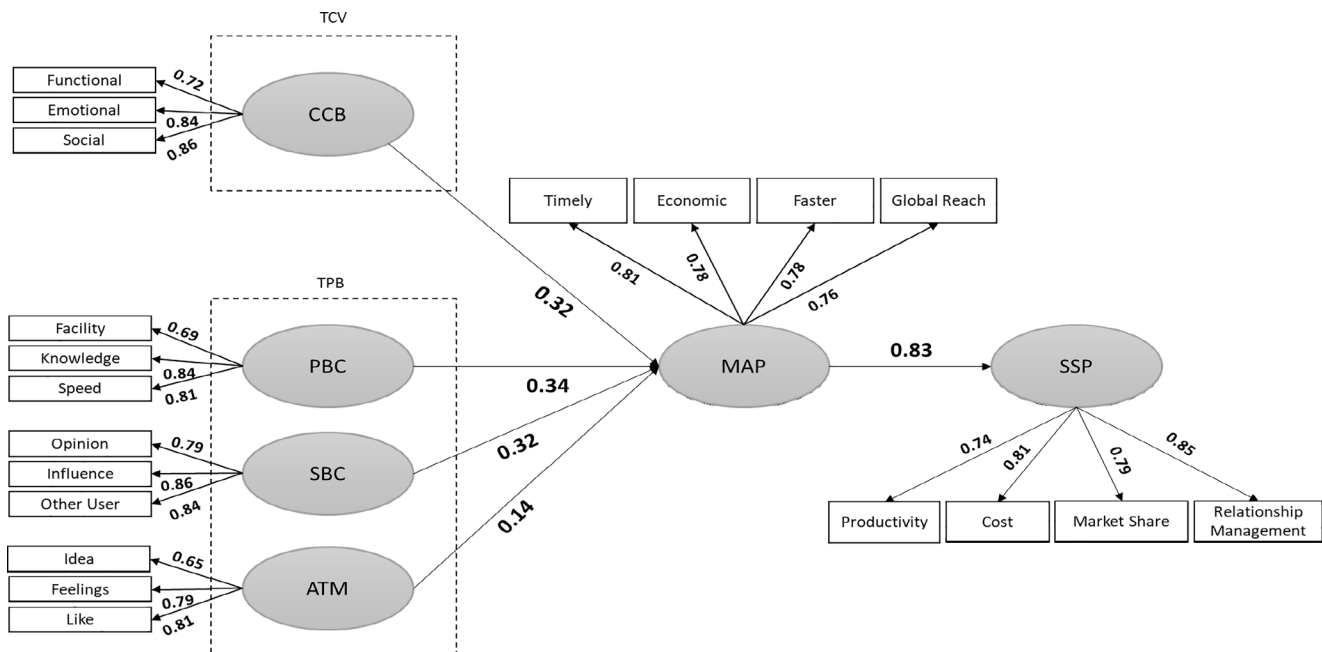


Fig. 3. Hypothesized structural equation model showing the relationships between constructs.

### 6.3. Managerial implications

This research has significant management implications for SMEs that have not built and deployed smartphone applications for SMEs, but intend to do so shortly. Furthermore, the research shows that PBC, personal attitude, top management encouragement, and competitive pressure strongly influence SME mobile-app-based business adoption intentions. The findings suggest that the intention to introduce smartphone applications for SMEs could be directly and implicitly affected. Personal attitude and PBC have indirect positive effects on the purpose of implementing smartphone applications for SMEs. Managers and software developers can successfully communicate the relative benefit of SME mobile apps by stressing how the apps can decrease running costs, boost market share and revenue, enhance the purchase process and user engagement, and/or deliver a new service.

## 7. Conclusion and future research direction

Based on the TCV and TPB models, this study explores the factors that may impact the creation and deployment of SME mobile apps in companies that have not yet adopted them. The type of mobile apps used by SMEs can help us understand the non-significant results of this analysis. For instance, business size and data intensity may be greater driving factors for SME apps than commercial apps. Since this research was performed in a developing country, the results do not reflect SMEs' mobile-app-based business models during COVID-19 in developed nations. Future research may build on this study and look at the best-in-class mobile app capabilities for SMEs to function efficiently. The study draws on the premise that it is necessary for SME managers to consider mobile apps' importance to the global economy, as the use of mobile apps has become common in raising awareness of both SMEs and their products or services.

Furthermore, it is important to explore further what variables might enable SME marketers to determine, select, plan, execute and use mobile apps. Future studies could extend the literature by concentrating on a) Successful UI/UX mobile app designs that improve customer engagement and hence play a crucial role in the performance of SMEs; b) The categories of SMEs that benefit most from the use of mobile apps; c) For embedding the mobile apps to upgrade the SMEs' strategy, a detailed SMEs sector-specific feature analysis is expected, a comprehensive SME

sector-specific cost/benefit study of the introduction of mobile apps into the service strategy; d) An international comparison of the effect of COVID-19 on the mobile-app-based business model for SMEs from the TCV and TPB perspective, assuming data sets from multiple countries are made available in the future. By supplying descriptive survey data from India, our study serves as a stepping stone.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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