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Determinants of adoption of latest version smartphones: Theory and evidence

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ABSTRACT

Technology has revolutionized the way we all use smartphones and has paved the way for devices with multiple functions like smart appliances, smartphones, smartwatches, and many more gadgets resulting from such a revolution. The in-built operating system (platform) on which these devices/ systems function is most vital. Many people use operating system (OS) based smartphones; the most popular is Android. The Android version keeps changing with the advancement in the OS platform and as per the changing needs of consumers. Consumers want to upgrade their mobile or buy the latest version of Android phones if given an opportunity. This paper seeks to examine the factors influencing consumers to buy the newest/latest version of Android-based smartphones. The proposed model amalgamates factors from the Unified Theory of Acceptance and Use of Technology (UTAUT), Diffusion of Innovation (DoI), and extended Technology Acceptance Model (TAM) theories. The study investigated ten factors by collecting data through a field survey (questionnaire) from 362 participants. Confirmatory Factor Analysis (CFA) was applied, showing that all ten factors were responsible for positive intention towards the latest Android versions. Path analysis results showed that performance expectancy, compatibility, price value, effort expectancy, and observability have a crucial role in consumers' intention to adopt upgraded (latest) versions of Android smartphones.

1. Introduction

The introduction of Operating Systems (OSes) in mobile phones has revolutionized the world in bringing smart technologies into a single device, also known as 'smartphone'. Many people use operating system (OS) based smartphones; the most popular is Google's Android, having its global market share of 74% (Statista, 2020). The Android version keeps changing with the advancement in the OS platform and as per the changing needs of consumers and technological upgrades. Consumers want to upgrade their mobile or buy the latest version of Android phones if given an opportunity. Moreover, it irritates them to use an old version of OS in their mobile when an upgraded (latest) version is available, with lots of new features like - all new look (great aesthetics), better security, performance enhancements, to name a few.

The wide acceptance of the latest technology in mobile phones and frequent innovations in the field has led to an exponential growth in the smartphone market, particularly its users and applications (Kasilingam and Krishna, 2021; Mehra et al., 2020). Users nowadays create new mobile data service applications on Google's Android and Apple's iOS, the two most dominant mobile phone platforms also known as mobile operating systems (MOS) (Ye and Kankanhalli, 2018). Mobile operating systems (MOS) is an apt area of research, especially in the context of India, one of the fastest-growing emerging markets with an estimated size of 748 million smartphones (Statista, May 2021), out of which 95% are Android-OS based smartphones (Statista, June 2021), and a forecast of 1.2 billion smartphone connections by 2025 (Statista, May 2021). Few studies are available on behavior related to MOS (Casalo et al., 2010; Z. Yuan et al., 2016), but no specific study could be found in literature especially on the adoption of their latest versions; to analyze the behavioral intention of users/consumers towards buying of new (latest) OS version enabled smartphone either of Google Android or Apple IOS, as these are the two most commonly used operating systems in smartphones in recent times. This makes our study unique as it attempts to fill the gap.

Further, the differences are present in various generations in their adoption patterns. Every generation has its apprehensions before

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adoption. For instance, Gen Y (Millennials/ born between 1981 and 1996) and Gen Z (post Millennials/ born between 1997 and 2010) (Dimock, 2019) are far more acclimatized with the adoption of new technologies and at a faster rate in comparison to their earlier generations (Freestone and Mitchell, 2004). These two comprise the largest pool of smartphone users as they are technology enthusiasts, and mobile technologies are particularly important to them (Eastman et al., 2014). Since childhood, they have been using cell phones and related mobile technology devices heavily for various purposes (McMahon and Pospisil, 2005). Gen Y and Gen Z want to experience flawless technology (i.e., without glitches such as bugs, security issues, slow speed, low battery (power) issues, etc.) in their daily use of gadgets/devices like smartphones. Many studies have talked about multi-generational products but at times they engender backward compatibility (Hann et al., 2014). Although, the latest version of MOS can significantly enhance the performance of a smartphone. The critical variable here is 'behavioral intention' for using and adopting the latest version of Android; behavioral intention influences all other constructs of users' behavior. In the IT/IS research field, popular models have been used, like UTAUT by Venkatesh et al. (2003), DoI theory by Rogers (1995), and TAM by Davis et al. (1989), wherein behavioral intention predicts the technology acceptance and adoption. UTAUT theory focuses on the behavior in using technology and has four components that predict the behavioral intention: performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC). The DoI theory coined by Rogers (1962) describes five factors of adopting innovations (Rogers, 1995): *Relative advantage, Compatibility, Observability, Complexity* and *Trialability*. TAM (Davis, 1989; Davis et al., 1989) was an adaptation of TRA (Theory of Reasoned Action proposed by Hills et al., 1977) for modeling acceptance of ISs by users. TAM included perceived usefulness (PU) and perceived ease of use (PEOU/EOU) related to computer acceptance. Hence, these three models are present in this study, and a new integrated model is developed for a better theoretical underpinning in the context. The specific objectives of this study are:(i) understand the behavioral intention for the adoption of an upgraded (latest) Android OS version by smartphone users, and (ii) conceptualize an integrated model that could identify the hypothesized relationships.

Smart products have received increasing attention in recent years (Julsrud and Krogstad, 2020; Raff et al., 2020). For example, smartphones have become a necessary product for voice calls, text messages, reminders, etc. It serves numerous purposes such as video calling, recording High Definition (HD) videos, large screens (casting on a Smart TV), HD camera for shooting the picture and watching the HD videos, GPS navigation, playing games, and many applications that make day-to-day life easier (Vaterlaus et al., 2020). Other professional work-related services, such as using MS office and social media, etc., for official purposes have done wonders. This is possible only through a smartphone that runs on an operating system like Google Android, Apple IOS, and Windows OS platforms, the three most popular operating systems for smartphones. These OS (Operating Systems) have versions (updates) for increased efficiency, like bug fixing, reducing power consumption, performance tweaks, adding new features, etc. However, the updated version OSes, for example, Android 11 (launched in Sept. 2020) were first launched only in the premium models of flagship phones like Google - Nexus, Samsung Galaxy S-series, etc., and then after some time (few months) in medium-range models. This time lag irritates the users (especially young consumers) of previous OS version enabled smartphones, and consequently, they get motivated to buy/ adopt the latest version enabled smartphone. Therefore, this study attempts to analyze the consumers' behavioral intention who had a feeling of deprivation in using an old Android OS version phone. Thus, vital research questions highlighted are: (i) What are the main factors of 'behavioral intention' that could be analyzed for users using the latest Android OS version-enabled smartphone? (ii) How far does behavioral intention influence the use and adoption of such updated smartphones by the 'young consumers'?

The proposed integrated model is tested using quantitative-based research approach; thus, we elaborate, analyze, and interpret the behavioral intention of smartphone consumers to use/adapt the latest version of Android OS.

2. Conceptual framework and theoretical background

This section is devoted to reviewing the literature and presenting conceptual frameworks related to our study.

2.1. Conceptual frameworks

This section presents smartphone generations, the importance of updating a mobile OS, various Android versions, and why people buy the latest version of Android-enabled smartphones.

2.1.1. Smartphone generations

In 2007, with the release of the iPhone 1 (First generation), the smartphone era began; and before this, no one had imagined the technological convergence that would occur through this wonderful device called the 'Smartphone.' The world has changed significantly with the advent of the inbuilt mobile operating system (OS) in smartphones, smartwatches, tablets, and other similar gadgets. Several companies are landing up with the creative and revamped edition of smartphones with various manufacturers and handsets like Apple, Android, HTC, Nokia, etc., with specific models and versions, for instance: RAM (1GB RAM, 2GB RAM), Processors (1.5 GigaHertz Quad-Core Processor, 1.7 GigaHertz Octa-Core Processor), OS (Jelly Bean, Ice Cream Sandwich, KitKat, Android One), Camera (5MP, 8MP, 13MP), etc. Selecting among various alternated (upgraded) devices produce a challenge in the case of the smartphone in today's scenario as there is nothing like the "one size fits all" concept with smartphones. A new OS (Operating System) version is essential as it makes the device simple to use, free from security holes, and allows a lot more flexibility. Hence, whether it is Android OS or iOS (the two most popular OS options in the world), the latest version has become an acute need. Since 2011, the best-selling OS on smartphones in the world is Android, and as of September 2020, it has captured 74.43% market share compared to 24.99% of iOS (Statcounter, 2020). Therefore, Android phones were chosen as the base for this study.

2.1.2. Importance of updating a mobile OS

OS version updates are vital for the mobile systems' stability and safety, as they include patches for security holes and functionality enhancements (Suau, 2020). A mobile system should be a vibrant ecosystem that can benefit the phone users through timely plugging of loopholes as and when they are found, eventually making it more secure and more usable (Xing et al., 2014). Major smartphone system/software developers and vendors leverage convenient updating mechanisms (such as OS version updates) on phones to enhance existing protection and push out fixes. Such updates are becoming increasingly frequent, with an average of 3.4 months per release of an upgrade for all 19 Android major updates; with every single release of a mobile OS version, a considerable number of apps are being added and replaced by many different options. Application usability and its adoption by users is also a critical reason for upgrading the OS version apart from the bug fixing (security) and performance enhancements.

2.1.3. Advantages of buying the latest version android-enabled smartphone

When purchasing a smartphone, getting the latest OS version is one of the critical deciding factors. Phones with the latest OS are likely to be supported for longer than those with an older version. Every smartphone manufacturer usually supports their devices by releasing software patches and bug fixes; in most cases, this generally continues for a maximum of two years. Older OS version-enabled devices will have lesser chances of receiving updates, security patches, and fixes from the official source.

It becomes essential to buy the latest OS version-based mobile when it comes to Android-based phones, especially after a lapse of some time. Hence, for using an Android OS-based smartphone, the latest version has become a need to the extent that people look for its newest release and search for a flagship phone that can offer it. Most high-end flagship phones like Google Pixel (2 / 2 XL / 3 / 3 XL …. total 11 models), Samsung Galaxy (S10 / S10 Plus / S10e…. total 11 models), Samsung Galaxy Note (5 models), One Plus (3 models), Sony Experia (3 models), etc. are compatible (updated) with full Android 11 features. While a few mid-range flagship phones like Samsung Galaxy (A32 & A51…only two models), Xiaomi (5 models), Nokia (3 models), etc. will be made compatible (incoming times) with 'Go edition' of Android 11 - a light-weight version of the OS (www.techradar.com). People who wish to use the latest features and updates of OS will have no other option but to buy one of these Android 11 enabled phone models. Youngsters (Gen Y and Gen Z) are generally more aware of the latest technological advancements (including upgradations) and are more concerned with and inclined towards the 'use of technology' and, therefore, would not mind spending on an expensive flagship (high-end or mid-range) phone which is enabled with the latest version of Android. Our study becomes more relevant in this context, and it has been set as a premise for this study.

2.2. Theoretical background

This section presents the most relevant theoretical frameworks/models on the use and acceptance of technology and will help develop an understanding of why consumers accept and adopt a new/innovative technology. The two vital elements of use/non-use of technology are: first, an individual should have a deep 'intention to use' a particular technology; and second, the state of the technology should be on a level such that a user can get acclimatized with it effortlessly (Barnard et al. (2013). The first element leads to various models of technology acceptance. While 'intention to use' studies focus on users' perceptions and attitudes towards the usability of the technological design of the technology, the second element is a more recent concept called the 'user experience,' which encompasses usability (Barnard et al., 2013). Hence, more than the user's willingness to use technology that might have been designed well, giving them an 'experience' (Ye et al., 2020) that can go beyond pure functionality and thereby stimulating an emotional response from them becomes essential.

2.2.1. Intention to use technology (Before acceptance)

The UTAUT, initially propounded by Venkatesh et al. (2003), amalgamates various previously established technology acceptance models (Barnard et al., 2013). This model was based on the 'Theory of Planned Behavior' (TPB) which explains that the behavioral intention precedes a specific behavior while using/accepting (the use of) a technology (Ajzen, 1991). Perception, norms, and attitudes of control over the behavior delineate the intention to behave. UTAUT theory focuses on the behavior in using technology and has four components that predict the behavioral intention: performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC). Venkatesh et al. (2003), explained the prediction of the user's behavioral intention through these components: PE is the "perception of the potential user about the utility of the system or technology in use, in what way and how it can help them achieve what they wish to [do] by using it." For instance, what does a user think about while using an online payment system and digital wallet platform like Google Pay: how can it help him transfer money to his family/friend in no time? EE is "the level of easiness related while using any system" which means the effort needed by the user ("whether it is simple or not") to be able to use a technological system. SI relates to "how individuals change their behavior to meet the demands of a social environment". Moreover, it is the user's perception about what 'significant others' (close individuals in their social setting) would think if they start to use a technological system (e.g., a colleague/friend may believe that it will be great for him to use Google Pay for making a quick transaction). Finally, according to them, FC is "a condition wherein one feels that there is a strong technical and organizational infrastructure that will help to use the system in a better manner" (e.g., conditions to use Google Pay).

Three components from the original UTAUT model were used for this study: performance expectancy (PerExp), effort expectancy (EffExp), and social influence (SocInf). In the current study, a situation is presented in which a user of Android is to consider the perceived usefulness of its latest OS version (i.e., performance expectancy), whether they may be influenced by their social settings (i.e., social influence), and the level of effort needed to use this latest Android version (i.e., effort expectancy). Facilitating conditions are not considered as they will not be directly applicable in buying a new OS version phone since the developer provides the technical and organizational infrastructure to the mobile manufacturer.

2.2.2. Adoption of technology (After acceptance)

Renaud and van Biljon (2008) studied older people's understanding of their acceptance and adoption of mobile technologies. They made a clear distinction between *acceptance* (an attitude to use technology) and *adoption* (the stage of 'mental acceptance' of technology by embracing and using it entirely by either an individual or an organization). Acceptance is the precondition for adoption (Barnard et al., 2013). Adoption means a relatively stable change in one's behavior in using technology. Innovation in technology impacts its adoption; that is, the adoption rate becomes faster with innovation/upgrades. The DoI theory coined by Rogers (1962) describes five factors of the adoption of innovations (Rogers, 1995): *Relative advantage* (level to which the technological innovation is perceived as a better substitute than the existing technology *Compatibility* (amount of consistency of potential users' needs, their previous experiences along with existing values), *Observability* (the extent of visibility of using innovation and its results), *Complexity* (the level of difficulty/simplicity in using and understanding the technology), *Trialability* (the degree of experimenting with the new product/service on a limited basis). These five factors influence the rate of diffusion. The DoI theory of Rogers (1995) has been studied extensively to adopt innovation and innovative products in the market in various fields ranging from agriculture to IT/IS innovations (Mehra et al., 2020). In IT/IS research, DoI is the most profoundly used theoretical model to describe the adoption of new technologies by users (Dwivedi et al., 2017). The current research selected the DoI model for the distinct reason that it belongs to IT/IS research and selected two of its factors/dimensions only: *Compatibility* and *Observability*. The reason for omitting other constructs is based on some facts relating to the subject of study. Talking about the Android technology, it is an inbuilt OS on which every smartphone runs, and no other technology can substitute it; therefore, the relative advantage, which means a benefit provided by the innovation compared to other available technologies, would not be applicable.

Similarly, being expensive, trialability (i.e., "a trial" for buying a smartphone) makes this factor impossible. However, the construct 'complexity,' which means ease or simplicity of using technology, is quite similar to EE of the UTAUT model (described above) and PEOU of the TAM model (described below), which could well be applicable here. Thus, EE is selected from the UTAUT model. Another theoretical model proposed initially by Davis (1989) is the TAM. TAM model is one of the most extensively used models and contributes to the literature related to IT/IS (Luarn and Lin, 2005). TAM (Davis, 1989; Davis et al., 1989) was an adaptation of TRA (Theory of Reasoned Action proposed by Hills et al., 1977) for modeling acceptance of ISs by users. TRA aims to provide a theoretically and parsimoniously acceptable model for explaining the factors leading to computer acceptance for end-users through a wide range of computing technologies (Dwivedi et al., 2017). TAM postulates *perceived usefulness* (PU) and *perceived ease of use* (PEOU/EOU), the two dimensions as specific beliefs that are of crucial significance for behaviors related to computer acceptance (Dwivedi et al., 2017). PU, one

of the vital components in the original TAM, is the individual's trust for enhancing his/her work-related productivity by using a particular IS and that it will be beneficial in a given organizational context (Pantano and Priporas, 2016). PEOU, another vital component of TAM, is the perceived degree of a person to assess the easiness (or effortlessness) in using technology. Various literature used the TAM to explain a potential user's behavioral intention (BI) in accepting to use an innovative/new technological product/service (Venkatesh et al., 2012). BI determines user behavior to a great extent (Jayasingh and Eze, 2009). Studies present in the literature used various extended TAM models. For instance, TAM 2, etc., included constructs like *subjective norms* (adapted from TPB/TRA), *image* (Moore and Benbasat, 1991; Rogers, 1995), *result demonstrability* (Moore and Benbasat, 1991; Rogers, 1995), *perceived credibility* (Wang et al., 2003), *job relevance* (Venkatesh and Davis, 2000), and *perceived enjoyment* (Höflich and Rössler, 2001; Nysveen et al., 2005). For this research, we have used perceived enjoyment, perceived ease of use, perceived usefulness, and behavioral intention constructs from the extended TAM. Davis et al. (1992), who first developed *perceived enjoyment*, described it as the 'level a user senses/feels that using a particular product/service is pleasant, enjoyable, or playful'. In the IT/IS services context, an individual uses a technology associated with a certain reward like excitement and recreation while using it (Nysveen et al., 2005). Whether it is the inclusion of a new app, latest features, etc., *perceived enjoyment* as a construct becomes an important determinant that needs to be studied. According to Wu and Wang (2005), PU in the TAM model concurs with the *relative advantage* construct in DoI. Similarly, according to Rogers (2003), PEOU in the TAM model resembles the *complexity* construct in the DoI, and also EE in UTAUT (Venkatesh et al., 2012). Also, *perceived enjoyment* (originally drawn from TAM 3) has been used extensively in studies on smartphone adoption (Chtourou and Souiden, 2010). As studied by Davis et al. (1992), *perceived enjoyment* significantly affects the intended use of new technology. Thus, as found in the literature, these similarities and resemblances in the models makes it imperative to propose a comprehensive model that could integrate the three models to better understand concepts and their validity.

3. The integrated model

Many theoretical models have been used extensively in the literature, such as the TAM (Davis et al., 1989), TPB (Ajzen, 1991), DoI (Rogers, 2003), and UTAUT (Venkatesh et al., 2003; 2012). Models like TAM and UTAUT were initially proposed in organizational contexts and later for consumers' contexts (Venkatesh et al., 2012). Undoubtedly, there is a substantial difference present in the organizational and customer contexts, such as the factors that attribute to the formation of the user's intention and behavior in using technology. Hence, selecting a theoretical model that is more in the individual consumers' context (Venkatesh et al., 2012). Such a concept must explain and cover factors of new technology using intentions like the latest Android OS version and its adoption. The current study is based on selected variables/constructs from the DoI, TAM, and UTAUT models; these are interconnected models being validated, extended, and elaborated from time to time. There are several variables used in the TAM and validated differently by various researchers: Venkatesh and Davis (2000) introduced the extended version of TAM as TAM 2, and Lee et al. (2012) integrated all the variables and proposed a model establishing a relationship with external variables and TAM variables. Many other researchers used their version of extended TAM by including one or more variables/models other than the original TAM (e.g., Aboelmaged, 2010; Aggelidis and Chatzoglou, 2009; Gefen et al., 2003; Horst et al., 2007; Karavasilis et al., 2010; Lin and Nguyen, 2011; Hung et al., 2013; Alawan et al., 2016; George and Kumar, 2013; Riffai et al., 2012). Similarly, the outcomes of Rogers' work have been used extensively for research in IT/IS acceptance and adoption (Brancheau and Wetherbe, 1990; Cooper and Zmud, 1990; Huff and Munro, 1985; Kwon and Zmud, 1987). Likewise, the UTAUT model of Venkatesh et al. (2003) has been extended as UTAUT2 by Venkatesh et al. (2012) and used extensively by numerous researchers (e.g., Alalwan et al., 2014; Gu et al., 2009; Luo et al., 2010; Martins et al., 2014; Peñarroja et al., 2019; Riquelme and Rios, 2010; Weerakkody et al., 2013; Yu, 2012) to predict behavioral intention.

The current study is an amalgamated version of the UTAUT, the DoI, and the extended TAM models used to explain and understand the behavioral intention of young consumers towards the latest Android OS version. The integrated model used make it unique as it develops a new conceptual background in the given context. The literature is considered thoroughly for developing the conceptual framework and thereafter a model to be tested for this study.

The current paper amalgamates the three models as discussed. It includes the eight constructs; the summary (with operational definitions) of each is discussed in Table 1. The ten constructs i.e., *Performance expectancy, perceived enjoyment, compatibility, effort expectancy, social influence*, and *observability,* are present as independent variables; *perceived usefulness* and *perceived ease of use* are present as mediating variables. The *behavioral intention* and *adoption* construct are presented as the dependent variables.

3.1. Hypotheses development

Thorough past work is elaborated on the interconnection of various variables used in the integrated model, and thus hypotheses were put forward:

3.3.1. Performance expectancy

After trust, *performance expectancy* is the most significant influencer in making any technology accepted (Sharma et al., 2018). In UTAUT theory, *performance expectancy* is 'expected benefits' that a consumer expects to acquire through the product (Venkatesh et al., 2003). *Performance expectancy* plays a vital role in smartphones as it supports the relative advantages and lowered complexity as technological factors that lead to smartphone adoption among various professionals (Elogie et al., 2015). It can be bifurcated into *hedonic* and *utilitarian performance expectancy* (Yang and Forney, 2013), but the current study undertakes the performance expectancy based on the functions present in any smartphone. As and when the new version is released, the consumers would expect better performance tweaks, security patches, upgraded features, better power management, etc., that could significantly improve the phone's overall performance Thus, the features/benefits (*performance expectancy*) of the latest version of the Android smartphone could very well lead to its adoption. Performance expectancy is also present in literature, along with perceived usefulness. as an antecedent to e-adoption. However, no direct relationship is studied between the two, i.e., perceived expectancy and perceived usefulness (Habes et al., 2020; Riyadh et al., 2019). In many studies, performance expectancy is found to mediate the relationship of national culture and cultural dimensions with behavioral intention and adoption wherein perceived usefulness is considered a factor (Olasinaa and Mutula, 2015). In the case of mobile health, the direct relationship between performance expectancy and perceived usefulness is not studied (Asadi et al., 2020). However, it together has influenced behavioral conditions, although digital healthcare has several other indicators like procedure values, responsibility, privacy, autonomy, security, justice (Rezaei et al., 2021). It is must to note that at times the effect of performance expectancy is subject to change as per change in the country (Raten, 2014; Yip et al., 2021); both perceived usefulness, and performance expectancy are considered a functional benefit (Kaium et al., 2019). Looking at the rare literature where the effect of performance expectancy has directly affected perceived usefulness the following hypothesis is postulated:

H1a: Performance expectancy will positively influence the perceived usefulness of the latest Android OS version among young smartphone users.

Table 1
Summary of constructs (based on the Integrated DOI, UTAUT, and TAM models) used in the study.

Construct	Operational definition	Model name	Origin	Reference article
Performance expectancy (PerExp) Perceived enjoyment (PerEnj)	The degree of belief by users of the latest android version smartphone to get the expected benefits in terms of an enhanced performance while using their smartphone. The perception degree of a consumer to sense the latest android version smartphone as pleasant, enjoyable, and fun-oriented.	UTAUT Extended TAM	Venkatesh et al. (2003) Taylor and Todd (1995)	Yang and Forney (2013) Nysveen et al. (2005)
Compatibility (Comp)	The extent to which an innovation (latest version of Android) is compatible with the lifestyles of potential adopters.	DOI	Rogers (2003)	Gao et al. (2015a)
Price value (PriVal)	It is the consumers' perception about the effect of price value while looking for a purchase of a smartphone having the latest version of android in it.	Extended UTAUT and Extended TAM	Venkatesh et al. (2012)	(Alalwan et al., 2017)
Effort expectancy (EffExp)	The perception degree of ease is related to the use of the latest android version smartphone by the consumer.	UTAUT	Venkatesh et al. (2003)	Lee et al. (2012)
Social influence (SocInf)	The degree of perception of the user that an essential person near him suggests him to use/buy the latest version of the android phone.	UTAUT	Ajzen (1991); Venkatesh et al. (2003)	Lee et al. (2012); Lutfie and Hidayat (2017)
Observability (Observ) Perceived ease of use (PerEas) Perceived usefulness (PerUse) Behavioral intention (BehInt) Adoption (Adopt)	The degree to which the results of an innovation (latest version of Android) are visible to others. The degree to which it is easy to use the latest version of Android by the young consumer. The degree to which the latest version of Android is useful for doing particular activities by young consumers. The subjective probability that an Android phone user will buy a new phone having its latest version. The latest android version smartphone user subjective probability that he/she will continue using it.	DOI TAM TAM TAM DoI	Rogers (2003) Ajzen and Fishbein (1980) (Davis et al., 1989) (Hill et al., 1977) Rogers (2003)	Gao et al. (2015a) (Dasgupta et al., 2011) Horst et al. (2007) Mamman et al. (2016), (Alalwan et al., 2017)

Source. Synthesized by Author.

3.3.2. *Perceived enjoyment*

Perceived enjoyment is present in the context of software usage in smartphones in many studies (Verkasalo et al., 2010). *Perceived enjoyment*, according to Davis et al. (1992), is "the extent to which an individual believes that the activity of using a particular technology (system) would be an enjoyable/exciting/playful experience, apart from the usual performance outcomes occurring from system usage" (in Lee et al., 2012). Looking at the extremity of mobile phone usage, it is mandatory to note that youth surf mobile phones even while watching television and movies, etc. (Hinz et al., 2016). People do not use smartphones from nine to six or from morning to night; instead, they use them from the moment they open their eyes until they fall asleep (Lee et al., 2012). The young generation is smart enough to make personal choices for the technical use of smartphones. There are ample features in a mobile phone that are used in professional and personal life. Agrebi and Jallais (2015) verified that perceived enjoyment in the TAM model directly influences smartphone satisfaction and use intention.

Similarly, Verkasalo et al. (2010) found that, with the addition of enjoyment, the equation among users and non-users seems strong and positive. Even in the case of compulsive smartphone usage, *perceived enjoyment* directly affects intentions to use (Park and Lee, 2011). Kang et al. (2014) proved that, instead of word of mouth, in the case of smartphones, *perceived enjoyment* positively influences the intention to use. At times, it is reported that users interested in value-added functions have a high inclination towards *perceived enjoyment* (Chen et al., 2015). *Perceived enjoyment* affects hedonic and utilitarian application usage in a smartphone (Xiang et al., 2015) since the latest Android version comes up with some great improvements that could drive a user to have perceived enjoyment. Hence, the adoption of the latest Android version smartphone could be a result of the 'enjoyment' factor.

In contrast, perceived enjoyment is found to affect perceived usefulness and they jointly affect the behavioral intention in activities like video calling (Zhou and Feng, 2017;) and banking (Yoon et al., 2020). However, in the case of websites, perceived enjoyment demonstrates more about layout and color scheme (Oyibo and Vassileva, 2020). In software, different outcomes are present in literature, where perceived usefulness and perceived enjoyment are found affecting behavioral intention. Perceived usefulness is found more important than perceived enjoyment and equal depending on users' personality (Kumar, 2017). However, in the case of impulse buying, perceived usefulness affects perceived enjoyment (Zulfa, 2020). Similarly, perceived enjoyment and perceived usefulness have a positive influence users' disclosure of information when it comes to social networking sites (Mouakket and Sun,

2019). Studies have also confirmed the direct influence of perceived enjoyment on perceived usefulness (C.T. Chang et al., 2017; Elkaseh et al., 2015). Thus, the following hypothesis is postulated:

H1b: Perceived enjoyment will positively influence the perceived usefulness of the latest Android OS version among young smartphone users.

3.3.3. Compatibility

According to Rogers (2003), *compatibility* is the "extent to which the potential users regard an innovation to be consistent with needs, prior experiences, and existing values". *Compatibility* is the fitment of new technology with the prior experiences of people (Lee et al., 2011). However, smartphones need to be highly compatible in the present era as several apps and gadgets have become an inevitable part of users' lives and day-to-day working. It is compatibility that makes any smartphone more competitive and accepted among users. It is considered as one of the benefits of what is referred to as 'value for money.' Another dimension of *compatibility* can be an extending life cycle of the product. Hence, compatibility of the latest version of Android OS could become crucial for smartphone buyers as it brings new uses compared to the older versions (previous experiences). In literature, the direct relationship between compatibility and perceived usefulness is mentioned (Yoon et al., 2020) in sectors like banking and m-banking (Raza et al., 2017). Compatibility is also found to moderate the relationship between perceived usefulness and behavioral intention to use (Faqih, 2016) and also a direct influencer for attitude towards such behavior (Kanchanatanee et al., 2014). It is also found that compatibility and perceived usefulness improves adoption and performance (Lui et al., 2021). Hence, the following hypothesis is put forward:

H1c: Compatibility will positively influence the perceived usefulness of the latest android OS version among young smartphone users.

3.3.4. Price value

Literature supports the relationship between *price value* and *behavioral intention*. In an area like mHealth, price value affects the behavioral intention irrespective of country's level and is also a common determinant for distinguished cultures (Dwivedi et al., 2016). *Price value* has affected *behavior intention* in banking (Alalwan et al., 2017), mobile application (Özsungur, 2019), smartwatches and smart shoes (Sung and Sung, 2015), and smart farming (Kang et al., 2020). However, many studies contradict the findings, stating that there is no relationship between *price value* and *behavioral intention* (Macado, 2017). Application of *price value* in the UTAUT model is an extension initiated by Venkatesh et al. (2012). The *price value* is defined as "consumers' cognitive trade-off between the perceived benefits of the applications and the monetary cost for using them" (Venkatesh et al., 2012 p.161). However, *price value* quantifies the "cognitive difference between consumers' perceived benefits and the cost of technology use" (Dodds et al., 1991). Turner (1982) has connected the exchange with the benefits, wherein, irrespective of the nature of the product, the buyer must receive value for money he/she has exchanged to get a specific product. In this context, when a customer is paying money for the latest Android version smartphone, possibly even a flagship phone, a high level of expectation (*perceived usefulness*) is associated with this exchange in terms of benefits they may receive while using it. Android phone buyers, especially young adults, will be more stimulated to adopt the latest/new Android version phones and, at times, influenced by factors like adult education (Jafari-Sadeghi et al., 2021). Looking at other industries like tourism, where price value affects behavioral intention (Mohamad et al., 2021). App developers' current industry trends show shifting from paid downloads to free price value (Dinsmore et al., 2017). The price value is also found to moderate the relationship between satisfaction and continuance intention (Hidayat-ur-Rehman et al., 2020). Price in general also acts a big influence for users to make several decisions related to purchase intention and repurchase intention and affect the loyalty associated with any product or brand. There are few studies present in literature where price value is one of the formative elements for perceived ease of use, affecting intention to use (Hokroh and Green, 2019). Based on this, the following hypotheses are proposed:

H2a: Price value will positively influence the perceived usefulness of the latest Android OS version among young smartphone users.

H2b: Price value will significantly influence the intention of young smartphone users towards buying the latest Android OS version phone.

3.3.5. Effort expectancy

Effort expectancy, as described by Venkatesh et al. (2012), is "the extent of ease related with the use of a technology (system)." Leung et al. (2010) mentioned that using a smartphone may be an easy task for the millennials, although there are efforts needed to understand the various features and spend much time doing so in the appropriate manner. Therefore, Generation Y is more influenced by factors like convenience and features that need less effort to use (Lay-Yee et al., 2013). Older adults face more difficulty performing tasks with various applications and functions present in smartphones (Boontarig, 2012). In contrast, countries like Sweden and the United Kingdom have a high percentage of older adults using smartphones with ease compared to Southern European Countries (Berenguer et al., 2017). *Effort expectancy* is more associated with apps and features present in smartphones. Numerous researches are conducted wherein *effort expectancy* is more present in association with apps used by the smartphone user, whether those are travel apps (Gupta et al., 2018), flight booking apps (Jeon et al., 2019), diet apps (Okumus et al., 2018), etc. It must be noted that the expectancy for efforts increases when the user is new to the technology or low in their experience (Tarhini et al., 2016). Hence, for using/adopting the latest Android version smartphone, effort expectancy could be essential to consider. Considering the literature, effort expectancy has influenced behavior intention in activities related to the use of smartphones like m-payment (Hung et al., 2019), animation usage (Dajani et al., 2019), m-banking (Usman et al., 2020). It is also found in many studies that the relationship between effort expectancy and behavior intention is moderated by demographic variables like gender (Usman et al., 2020), religious beliefs (Warsame and Ireri, 2018), and mediated performance expectancy (Cao et al., 2019). Thus, to increase behavior intention or use behavior, it must increase effort expectancy (Usman et al., 2020). However, contrast studies do not confirm such affiliations (Andrianto, 2020; Özsungur, 2019). The above literature leads to the following hypothesis:

H3: Effort expectancy will positively influence the perceived ease of use of the latest Android OS version among young smartphone users.

3.3.6. Social influence

Considering the UTAUT theory, *social influence* is influenced by family, friends, workmates, or other individuals who are essential as per individual perception. Stanton et al. (1994) provide a new term (i.e., "social constituency") which means a group to which an individual belongs or desires to belong. Izquierdo-Yusta et al. (2015), Teo and Pok (2003), Yang et al. (2007), and Lutfie and Hidayat (2017) have mentioned *social influence* regarding the adoption of gadgets in the form of social reference groups. Teo and Pok (2003) have described *social influence* under the subjective norm category. According to Izquierdo-Yusta et al. (2015), the *social influence* of reference group members on consumers' beliefs refer to what these groups will think about their conduct. They also mentioned that subjective norms include both "normative as well as motivational beliefs." In the case of millennials, it is quite high compared to older adults (Mudondo, 2014), especially the influence of workmates, friends, college groups, and family and relatives. It must to note that it is not just the adoption of a smartphone when it comes to social influence. Instead, all other dimensions related are highly influenced by reference groups, be it one's mobile payment system or internet service provider selection (Gerpott, 2009). Lee (2014) found a robust normative peer influence among college students for smartphone adoption. It would not be wrong to mention that

smartphones tend to be extensions of individuals, so their adoption is also affected by the various groups to which an individual belongs (Yonkers, 2015). Therefore, social influence can be considered a vital factor in adopting the latest Android version-enabled smartphone by young consumers.. Literature has confirmed a direct effect of social influence over behavior intention. Thus, to increase behavior intention or use intention the degree of social influence must be increased (Usman et al., 2020). However, there are contrast studies also which do not confirm such affiliations (Andrianto, 2020). The relationship of social influence and behavior intention might get moderated by gender (Usman et al., 2020) or vice versa (Lestara Permana and Dewi, 2019). Social influence is the most vital variable influencing behavior intention compared to performance expectation, attitude, facilitating conditions, and cost (Asvial et al., 2021). Hence, the following hypothesis is put forward:

H4: Social influence will positively influence the intention of young consumers to buy the latest Android OS version smartphone.

3.3.7. Observability

As per Roger's DoI theory, *observability* is "the degree of visibility of results of any innovation to the public" (innovation including apparent changes and added visible features). *Observability* is an essential aspect of the adoption of mobile phones among older adults (Gao et al., 2015a), and among middle-aged adults (Gao et al., 2015b). It is important to note that age is a critical factor affecting *observability,* along with education and income, which significantly affect the adoption dimensions of smartphones (Ma et al., 2016). According to Choudrie et al. (2014), *observability* is "the extent to which the smartphones are visible to the silver surfers (internet population above 50 years of age)." Young generations can easily get fascinated with the idea of demonstrating to their friends'/peer groups the innovations like the latest Android version. Literature has confirmed the existence of observability as an antecedent of behavior intention (Farzandipour et al., 2019; Iskandar et al., 2020). However, observability is a prerequisite to the promotion of the latest technologies (Chen, 2019) it is also found to be indirectly influencing use intention via attitude and further leading to actual use (Jamshidi and Hussin, 2018) as well as adoption intention for industries working on e-contracts or smart contracts (Badi et al., 2020). Accordingly, the following hypothesis is postulated:

H5: Observability will positively influence the intention of young consumers to buy the latest Android OS version smartphone.

3.3.8. Perceived usefulness

As depicted by the original TAM, *perceived usefulness* is one of its major components (Dasgupta et al., 2011). If individuals believe that using the latest Android OS version will enhance their efficiency and productivity when using a smartphone, they will be more inclined to use it.

Many studies are conducted wherein the direct relationship between perceived usefulness, and behavioral intention is presented and confirmed (Hokroh and Green, 2019). In the activities like e-learning, e-banking perceived usefulness is one vital element affecting behavior intention (C.T. Chang et al., 2017) and attitude to use (Shafique and Khan, 2020). Being user-oriented, the TAM model has also included perceived usefulness which influences behavioral intention to use a system.

Studies have also confirmed the role of demographics like age in affecting the equation between perceived usefulness and behavior intention (Salsabil and Sudyasjayanti, 2020). In industries like banking, it is perceived compatibility and mobility that influences the perceived usefulness, and then perceived usefulness affects behavior intention of services via mobiles (L Lin and Shiqian, 2018). Perceived usefulness and satisfaction together lead to behavior intention use (I.W.K. Wijaya et al., 2019). These arguments motivate us to develop the following hypothesis:

H6: Perceived usefulness will positively influence the intention of young consumers towards buying the latest Android OS version smartphone.

3.3.9. Behavioral intention

In predicting the adoption and actual usage of new systems, *behavioral intention* has been used most widely in the context of IT/IS literature (Venkatesh et al., 2012). *Behavioral intention* not only influences but also modifies usage and adoption of new technologies (Ajzen, 1991). Accordingly, in this study, the supposition that the actual adoption of the latest Android version phones could be broadly predicted by the young consumers' intention (willingness) to adopt new systems. Many smartphone adoptions have also established this relationship in studies such as Choudrie et al. (2014), Chun et al. (2012), Ha et al. (2015), and many others. There are some examples in literature where behavior intentions and adoption are associated with elements like sustainability (Al-Rahmi et al., 2019). Behavior intention is often found to act as a mediating variable where it mediates the relationship between the attitude of adoption and attitude-behavior (Yuan et al., 2019). Therefore, the higher the behavior intention, the higher the adoption among consumers (Madan and Yadav, 2018). Hence, the following hypothesis is proposed:

H7: Behavioral intention will positively influence the adoption of the latest Android OS version smartphone by young consumers

4. Methodology

Empirical data were tested for the current study to validate the hypothesized relationships and the proposed research model. In total, 362 responses from Android-based smartphone users were incorporated for the purpose of using the non-probability purposive sampling technique. Using the time frame and cost factors and smartphone being used commonly, non-probability sampling technique was used (Wisniowski et al., 2020). The respondents from two-tier cities of India (Indore, Gwalior, Bhopal) were part of the sample using a non-probability sampling method. However, due care was taken while choosing the respondents. Therefore, users of the age group of 18 to 45 comprising 'young consumers' (Gen Y and Gen Z) only were included (the reason for this selection is discussed in the above section) for better results. The proposed model was evaluated using CFA (Confirmatory Factor Analysis) to confirm the foremost factors associated with adoption, and then structural modeling was used to do the path analysis.

4.1. Instrument design and data collection

The instrument was designed by a thorough literature survey of the three theoretical models used in the study and the scales used in the prominent research related to these models. The instrument was finalized by adapting from the following: PerExp: Performance Expectancy (Boontarig et al., 2012; Venkatesh et al., 2003), PerEnj: Perceived Enjoyment (Moon and Kim, 2001; Nysveen et al., 2005), Comp: Compatibility (Putzer and Park, 2010; Brown et al., al.,2003), PerUse: Perceived Usefulness (Davis et al., 1989; Venkatesh et al., 2003), PriVal: Price Value (Cheong and Park, 2005), EffExp: Effort Expectancy (Boontarig et al., 2012; Venkatesh et al., 2003), SocInf: Social Influence (Walczuch, 2004; Boontarig et al., 2012), Observ: Observability (Moore and Benbasat (1991), BehInt: Behavioral Intention (Oh et al., 2009; Chao 2019) and Adopt: Adoption (Hsiao, 2013). The questionnaire was prepared on Google Forms and distributed through email and WhatsApp to more than 850 people from January 2020 till April 2020, who were followed up with afterward. The filled-in and usable questionnaires received back were 362, which were used for further analysis making a response rate of approximately 42.6% for the current study. A five-point Likert scale was adopted for the collection of data for this study, where strongly disagree to strongly agree (1 to 5) were the range anchors.

4.2. Data analysis tools

The measure is standardized through the computation of reliability, validity, and common method bias (CMB). Using the Confirmatory Factor Analysis (CFA), factors (constructs) were confirmed; and with the Structural Equation Modeling (SEM), the hypothesized model was established.

4.3. Sample descriptive

The final data collected was from 362 respondents from three cities of Madhya Pradesh, India, which comprised 213 male and 149 female respondents. The study included mainly three age groups: 18–25, 26–35, 36–45; 164 respondents between the ages of 18–25, 127 from the ages of 26–35, and 71 from the ages of 36–45, making 45.3%, 35.1%, and 19.6% of total respondents. From the age group of 18–25, 86 were males; from ages 26–35, there were 79 males, and from the age group of 35–45, there were 48 were males; the rest were females (see Table 2).

5. Results

5.1. Reliability

Reliability (Cronbach's alpha) is applied using SPSS, wherein the alpha values were as per threshold limits (0.7) as recommended by Nunnally (1978); it can also be up to 0.5 to 0.6 in case of few statements (Hair et al., 1992).

5.2. Discriminant validity

According to Venkatraman (1989), discriminant validity confirms of two measures for being highly correlated. AVEs (Average Variance Explained) are the estimate of extracted variations of the latent variable that measures the measurement error (Netemeyer et al., 1990). All AVEs (Average Variances Explained) values should be greater than the suggested threshold (minimum) value (i.e., 0.5) as recommended by Fornell and Larcker (1981), and all CRs (Composite Reliability) should be greater than the recommended threshold (minimum) value of 0.7 (Anderson and Gerbing, 1988; Fornell and Larcker, 1981). If values above this are attained, it will indicate that every construct is different from each other, and discriminant validity is confirmed with their underlying scales. Table 4 reflects excellent discriminant validity for the measurement model under consideration. The model findings, as depicted in Table 6, indicate a better fit to the data.

Table 4 shows that all the CR and AVE values attained in the statistical testing were above the minimum required criterion. All CR values were well above the minimum threshold criteria in the measurement model ranging from 0.805 to 0.884, and the AVEs ranged from 0.579 to 0.719.

5.3. Common method bias (CMB)

This research follows Harman's single factor and the ULMC (unmeasured latent method construct) for testing CMB (Podsakoff et al., 2003) for ten constructs (PerExp, PerEnj, Comp, PriVal, EffExp, SocInf, Observ, PerUse, BehInt, and Adopt) and the results stated that data was free from biases. CMB value using the SPSS version 25 software was 14.77%, which means the common method bias was well within the permissible limits of 50% (Harman, 1976).

Table 2
Sample descriptive.

Gender	Age 18–25	Age 26–35	36–45	Total
Male	86 (23.7%)	79(30%)	48(18.3%)	213 (58.8%)
Female	78 (21.5%)	48 (13.2%)	23 (6.3%)	149 (41.2%)
Total	164 (45.3%)	127 (35.1%)	71 (19.6%)	362 (100%)

Table 3
Reliability measures.

Factors	Cronbach's Alpha	No. of items
Performance expectancy (PerExp)	0.869	3
Perceived enjoyment (PerEnj)	0.767 (0.815)	4 (3)
Compatibility (Comp)	0.820 (0.843)	4 (3)
Price value (PriVal)	0.803	3
Effort expectancy (EffExp)	0.827	3
Social influence (SocInf)	0.805	3
Observability (Observ)	0.846	3
Perceived usefulness (PerUse)	0.834	3
Behavioral intention (BehInt)	0.830 (0.884)	4 (3)
Adoption (Adopt)	0.803	3

Note: Parenthesis values are improved values after the deletion of certain items. A Cronbach's alpha value greater than 0.7 (minimum threshold value) is acceptable, and it can be seen that all the factors had a high value (see Table 3).

5.4. Measurement model testing

CFA (Confirmatory Factor Analysis), an extension of exploratory factor analysis, is used in statistics, mathematics, and management. CFA is used to check whether measurements of a construct are compatible with an interpretation of the essence of the construct (or factor) by a researcher. Fig. 2 depicts the revised (final) measurement model.

To verify the fit indices, measures for a model fitness GoF (goodness of fit) indices (i.e., evaluation of CMIN/DF, GFI, AGFI, CFI, NFI, and RMSEA) were done. After the necessary filtration and reassessment, all values were found above their minimum threshold limit (Hair et al., 2006) to achieve an enhanced model fitness (Anderson and Gerbing, 1988; Byrne, 2010). Table 5 depicts all fit indices (after single revision) to be within their respective minimum criteria: CMIN/DF (1.263), GFI (0.923), RMSEA (0.027), RMR (0.011), NFI (0.912), CFI (0.980), and AGFI (0.901). The test of the measurement model as depicted in Fig. 2 confirms all the ten constructs (PerExp, PerEnj, Comp, PriVal, EffExp, SocInf, Observ, PerUse, BehIn, and Adopt) are the main factors of the study tested for the CFA model and are major constructs/factors of the study. To make the best fit of the CFA model, a few items were removed — PerEnj1 (0.369), Comp4 (0.539), and BehInt4 (0.459) — as they had regression weights below the minimum threshold criterion limit of 0.6.

5.5. Structural model

SEM estimation was done using the procedure of MLE (Maximum Likelihood Estimation) (Yang and Green, 2010). Fig. 3 depicts the revised (final) structural model. As illustrated in Table 5, the path analysis findings indicate that the GoF indices present a better match to the data.. Path analysis model exhibits all indices as per accepted criteria: CMIN/DF (1.311), GFI (0.913), RMSEA (0.029), RMR (0.019), NFI (0.901), CFI (0.974), and AGFI (0.897). The ratio of CMIN/DF (1.259) was also better after correction. The value of RMSEA was found to be lower than expected (threshold). Moreover, all the fit indexes were well above the threshold limits to make the path model correct. Overall, the data supported a total of six out of ten tested hypotheses. As depicted in Table 6, the results showed the following relationships: PerExp ($\beta = 0.123$, $P< 0.036$), PerEnj ($\beta = 0.042$, $P< 0.486$) did not have positive influence on PerUse; Comp ($\beta = 0.352$, $P< 0.001$) had positive and highly significant influence on PerUse; EffExp ($\beta = 0.284$, $P< 0.001$) had highly significant and positive influence on BehInt.; PriVal had significant and positive influence on both PerUse ($\beta = 0.137$, $P< 0.024$) and BehInt ($\beta = 0.159$, $P< 0.007$); SocInf ($\beta = -0.041$, $P< 0.475$) did not have influence on BehInt; Observ ($\beta = 0.209$, $P< 0.001$) had a highly significant and positive influence on BehInt. Similarly, PerUse ($\beta = 0.276$, $P< 0.001$) on BehInt and BehInt ($\beta = 0.405$, $P< 0.001$) on Adopt were strong predictors of young consumers' behavior towards using

Table 4
Discriminant validity.

	CR	AVE	Adopt	PerExp	PerEnj	Comp	EffExp	SocInf	Observ	BehInt	PriVal	PerUse
Adopt	0.863	0.677	0.823									
PerExp	0.870	0.691	−0.016	0.831								
PerEnj	0.818	0.601	−0.062	0.089	0.775							
Comp	0.845	0.648	0.070	−0.030	0.063	0.805						
EffExp	0.829	0.619	0.077	0.147	−0.016	0.048	0.787					
SocInf	0.849	0.653	0.065	0.034	0.024	0.095	0.073	0.808				
Observ	0.884	0.719	0.414	0.130	−0.029	0.148	0.326	0.271	0.848			
BehInt	0.805	0.579	0.032	0.014	−0.077	0.027	0.013	0.172	0.228	0.761		
PriVal	0.807	0.582	0.080	0.117	−0.064	−0.026	0.135	0.203	0.075	0.166	0.763	
PerUse	0.836	0.631	0.170	0.115	0.069	0.353	0.138	0.122	0.340	0.144	0.127	0.794

Note: All correlations were significant at $p < 0.05$. Diagonal elements are equal to the square roots of AVEs.

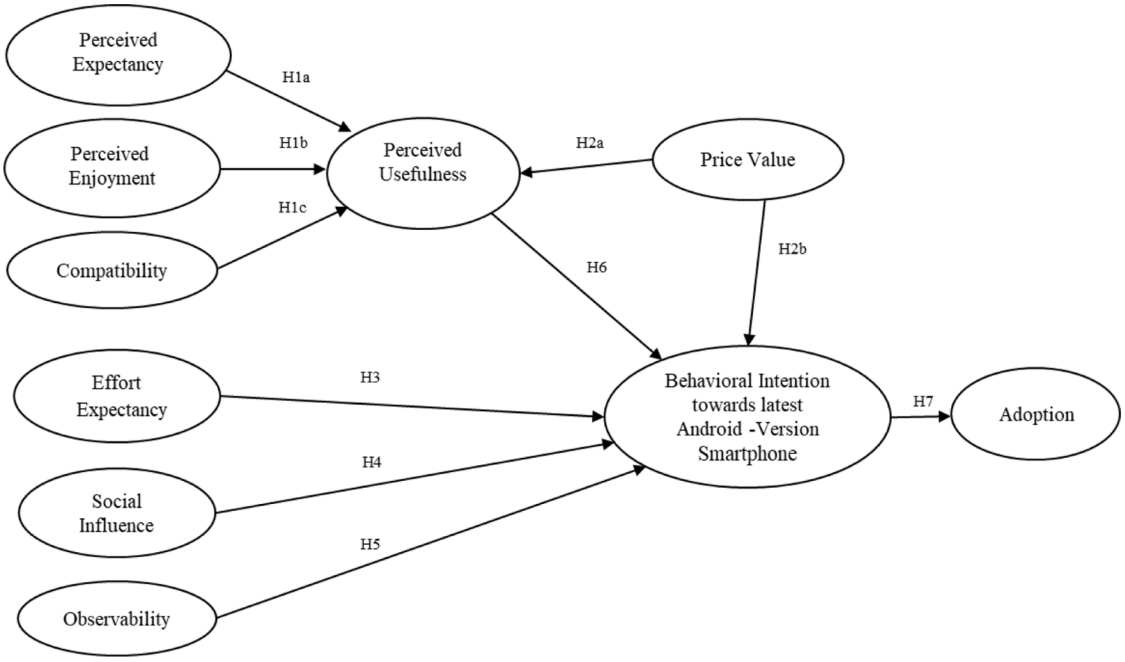


Fig. 1. The proposed model.

latest Android version smartphones. Hence, the results supported eight hypotheses: H1a, H1c, H2a, H2b, H3, H5, H6, and H7.

6. Discussion

As per the above presented statistical results, it is evident that the hypothesized model under examination in this study, in terms of its predictive power, has reached the acceptable level in all the exogenous variables except *perceived enjoyment* and *social influence*, with others being as follows: performance expectancy (12%), compatibility (35%), effort expectancy (16%), and all the endogenous variables, viz., price value (14%), observability (21%) and perceived usefulness (28%). In addition to this, the measurement model criterion (construct reliability, validity, and model fitness) was also met.

The first factor of PerUse (i.e., PerExp) had a significant and positive effect (indirect) on BehInt, which is consistent with the findings of a vast majority of research in IT/IS and banking services (Alalwan et al., 2014; Hoque and Sorwar, 2017; Martins et al., 2014; Riffai et al., 2012; Venkatesh et al., 2003; Yu, 2012; Zhou et al., 2010). Surprisingly, the second factor (i.e., PerEnj) was found to have an insignificant effect on users' intention to buy the latest Android version. This indicates that the young Indian smartphone users do not focus on the aspects related to enjoyment (fun, playfulness, etc.). This finding is inconsistent with the results of many studies pertaining to mobile services where fun and enjoyment were strong antecedents perceived in predicting the perceived intrinsic value of the users (Curran and Meuter, 2007; Park and Yang, 2006) probably because the young consumers in a developing country like India do not look for the fun and enjoyment at the cost of spending on a premium/ flagship smartphone immediately after the launch of latest OS version of Android. Rather they would wait for an auto software update to happen at a later time. The third factor of PerUse (i.e., Comp) was having a highly significant and positive effect on BehInt, which is consistent with the findings of Mehra et al. (2020) on mobile apps adoption and also the studies on smartphone adoption by Putzer and Park (2010) and Park and Chen (2007). Thus, the findings from previous studies indicates that the young consumers' lifestyle matches with technology up-gradation, like the latest Android version phones, and would suit its adoption. PriVal had a significant and positive effect on both PerUse and BehInt. SocInf is having a negative influence on BehInt. Generally, the posts and reviews of the friends, relatives, peers and others influence consumer decisions (Yadav et al., 2016), especially those who are part of any social network (Kim et al., 2016). However, young consumers looking for an updated version of Android OS might not get directly influenced to buy a new flagship smartphone possibly because of its high cost. Observ had a significant and positive effect on BehInt, which is consistent with the findings of Yang and Forney (2013), Zhou et al. (2010), and Yu (2012). This implies that the young consumers (such as students, job goers, and others) positively influence

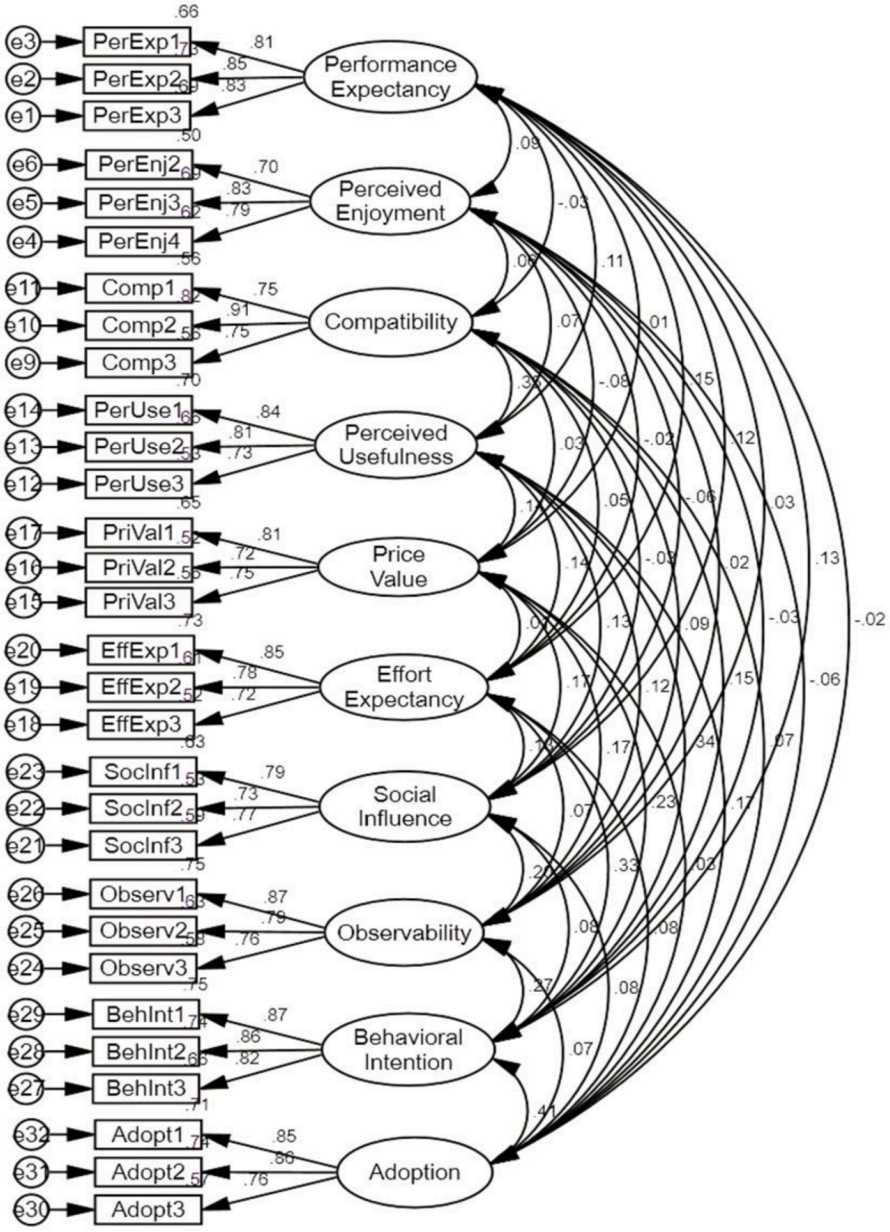


Fig. 2. Measurement model of CFA.

Table 5
The goodness of fit indices of measurement model (Final) and SEM (Revised) of adoption of latest android version.

	χ2	Df	Absolute fit measures χ2/df	GFI	RMSEA	RMR	Incremental fit measures NFI	CFI	Parsimony fit measure AGFI
Criteria			1<X2/df	≥0.90	≤0.08 <0.1 ≤ 0.08 <0.1		≥0.90	≥0.90	≥0.90
CFA	4545.623	360	1.263	.923	.027	0.011	.912	.980	.901
Structural model	513.831	392	1.311	.913	.029	0.019	.901	.974	.897

their peer group or friend using the latest Android version phones and would refer to them before adoption. EffExp was found to have a positive and significant effect, which is consistent with studies of Gao et al. (2015a), Gao et al. (2015b), and Choudrie et al. (2014) and explains that the ease associated with using the latest version Android smartphone for young users is an attraction to them which would mean that they believe that using it might not require too much efforts and it will be easy to use/adapt to it. Similarly, PerUse was proven to be a strong predictor of BehInt and BehInt as a vital predictor of Adopt.

Hence, the results of this study indicate that more than PerEnj (playfulness) and SocInf (family/social group affect), young consumers get motivated by PerExp (enhanced performance) of the smartphone device. Young consumers get benefitted from its improved efficiency in their day-to-day working in terms of performance tweaks, security patches, power saving, new features, innovative apps, APIs, etc.; Comp (related to lifestyle). Such features make it easy to match up with their lifestyle; and EffExp (ease of use), which makes it comfortable for them to operate the latest Android phone. Observ (visible to others) affects

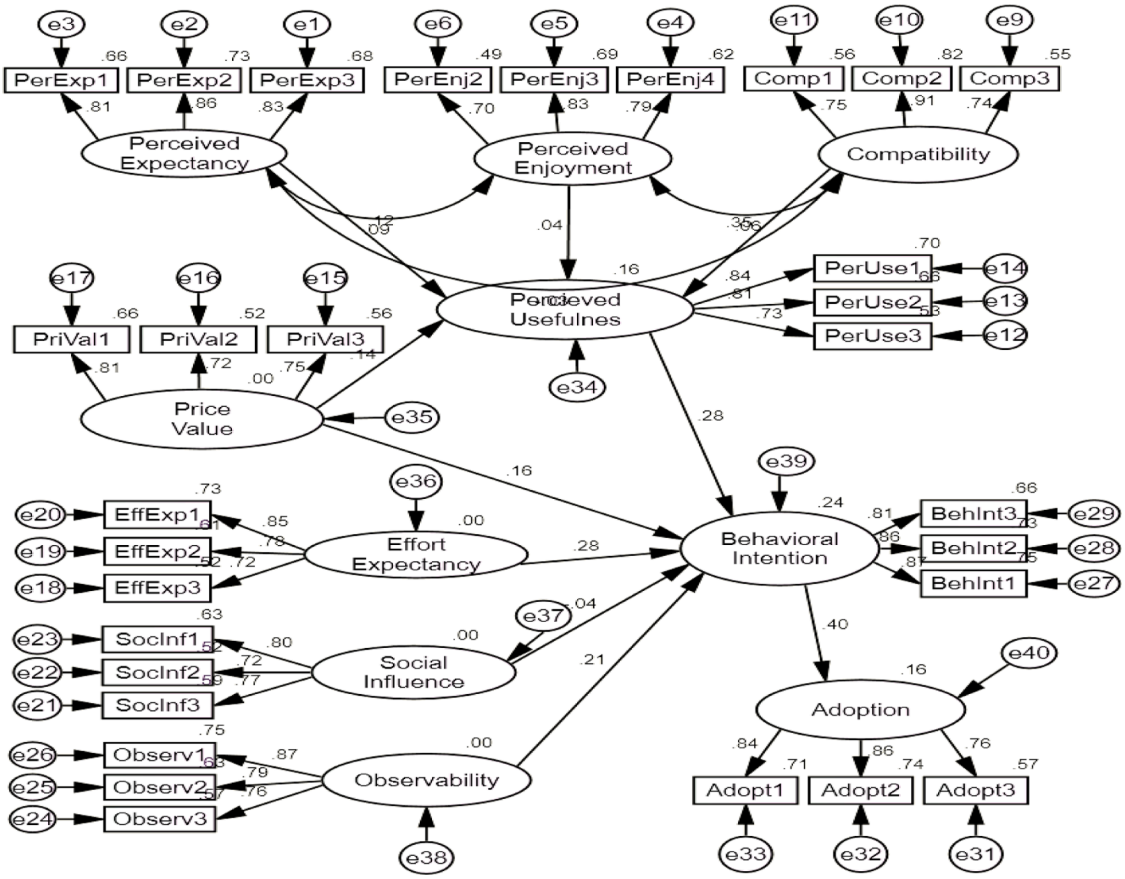


Fig. 3. Structural model path analysis.

Table 6
Results of hypotheses testing.

Construct	Hypothesis	Hypotheses Path (Positive)	Path Coefficients (β)	Supported
Performance expectancy	H1a	PerUse<–PerExp	0.123 (P<0.036)	Fully
	H1b	PerUse<–PerEnj	Not	
Perceived enjoyment			0.042 (P<0.486)	
Compatibility	H1c	PerUse<–Comp	0.352 (P<0.001)	Fully
Price value	H2a	PerUse<–PriVal	Fully	
			0.137 (P<0.024)	
	H2b	BehInt<–PriVal	0.159 (P<0.007)	Fully
Effort expectancy	H3	BehInt<-EffExp	Fully	
Social influence	H4	BehInt<–SocInf	0.284 (P<0.001)	Not
Observability	H5	BehInt<–Observ	−0.041 (P<0.475)	Fully
Perceived usefulness	H6	BehInt<–PerUse	Fully	
Behavioral intention	H7	Adopt<–BehInt	0.209 (P<0.001)	Fully
			0.276 (P<0.001)	
			0.405 (P<0.001)	

BehInt for the latest Android phones, probably because youngsters are generally being driven by their social settings (peer group, friends, colleagues, etc.). Surprisingly, PerEnj did not come out as an important factor for the young consumers: this implies that they could not relate it directly with the upgraded version of Android (i.e., how it could improvise playfulness through various small enhancements in the OS). This could be rectified in future studies by adding more specific items (related to tech interface, etc.) for the PerEnj construct.

6.1. Implications for practice

This study examines the prediction of the most crucial factors for user's intention of the latest version of Android phones and their subsequent adoption, thus making a substantial contribution to the existing theory about the area of technology acceptance in general and smartphone technologies adoption in particular. This study fills the gap, especially in young consumers' adoption of the latest (version) Android smartphones. Understanding the use/adoption and implications of the newest versions of Android (OS) through an integrated model that combines UTAUT, DoI, and extended TAM for the given context has probably been done for the first time. The uniqueness of this study is exhibited by the defining of the new causal paths in the proposed integrated model: PerExp–>PerUse–>BehInt, PerEnj–>PerUse–>BehInt and Comp–>PerUse–>BehInt, and PriVal–>PerUse–>BehInt; PerExp, PerEnj, and Comp (all three logically combined for the first time) as antecedents of PerUse in predicting the behavior intention and finally adoption. Plus, there is the PerVal construct having two directional new paths, directly and indirectly (through PerUse), to BehInt, thus extending the theory that has been proposed by Venkatesh et al. (2012) in UTAUT2. All these relationships except PerEnj–>PerUse–>BehInt, and SocInf->BehInt have been validated as per the model results. Hence, this study becomes a significant contributor by integrating and extending the three well-established theoretical models — UTAUT (Venkatesh et al., 2003; 2012), DoI (Rogers, 2003), and TAM (Davis et al., 1989) — in examining the latest version Android (new technologies) of smartphone adoption by young consumers (new context) in India (developing country).

From the researcher perspective, the current study has undertaken

constructs/variables named PerExp, PerEnj, and Comp as factors of PerUse; PriVal, EffExp, and Observ for identifying their influence over behavioral intentions; and, after that, adoption. PriVal was also found as an antecedent of PerUse. The study provides a standardized set of the instrument for these variables. The hypotheses were put forward after rigorous review on each variable with behavioral intention. Therefore, the study presents a verified and comprehensive list of references that can be utilized in future works and act as a good ground for literature. The study has provided a list of various technology adoption models and their extensions which are expected to enhance the understanding of the subject. Further, the study has identified a significant relationship between various constructs (including the new relationships added in this research), highlighting the gap and the underexplored areas in the field.

Managers can benefit from the study's findings, which revealed that *perceived usefulness, performance expectancy and compatibility; effort expectancy; and observability* are the primary and foremost factors that influence the behavioral intention for the adoption of the latest version of Android smartphones in emerging economies like India. The findings will guide the manufacturers and marketers to emphasize the perceived enjoyment while designing and promoting the Android OS-based devices in India; for example, merely changing the color combinations and patterns of display appeal may provide an esthetic value. However, the younger generation (e.g., school-going kids, college students) would be attracted towards more fun-oriented features. These may include features like whenever one opens the phonebook and goes to a particular contact and clicks his/her picture, a message could automatically be displayed using AI (for the recorded speech) in his/her voice, such as, "You last called me up on the fourteenth of February 2020, and we had a chat of about fifteen minutes." Similarly, there could be a voice note for mobile games one has played last, announcing how much time was spent playing and what were the results, the points earned, etc. Voice notes, suitable animations, attractive GIFs, and things like these could fetch real fun, playfulness, and entertainment for all users, particularly youngsters. Designers and promotors of Android OS-based devices should take care that social influence (effects of family, peer group, etc.) is created through promotional efforts like positive WOM (word of mouth), using IoT, and social media. In such products, the performance expectancy, effort expectancy, and enjoyment in each dimension should equally exist without any conciliation. This study showed that price value also has a role to play in the purchasing of the latest Android version phone as young Indian customers' intentions to buy a new phone, even if is a little expensive flagship one, may not be affected by its higher price value. Branded flagship phones and even mediocre-range phones could enhance the price value and convince their customers to buy the latest version phone and use this new technology that will provide them with better quality in terms of the user interface, security, appearance, cost, fun, and effort. This quality could make a value addition relative to the cost paid for an older Android version phone. In addition, using special price discounts on the latest Android version phones for a limited period could be another price value tactic that could be effective; this could enhance young customers' purchasing intention (Venkatesh et al., 2012; Wessels and Drennan, 2010) and motivate the potential adopters to become actual adopters of latest version Android smartphones. The service providers and developers should place particular emphasis on these when it comes to consumers' perception/focus on the latest Android OS version. Maybe in the future, the latest version of an OS like Android will become an important criterion for buying a new phone aside from the innovative features in the smartphone (brand) itself, such as performance enhancements and other protective features and upgradations, along with ease of use (interface) that could make the device more tech-friendly (adaptive) and socially desirable.

7. Recommendations

This study presents a relatively narrow perspective (context) by taking in only a few Madhya Pradesh (India) cities with a sample size of only 362 respondents. The researchers can attempt to take a more comprehensive sample from other states to have a deeper insight. A similar kind of study can be done on other indigenous gadgetry using the same variables. The current study incorporates non-probability purposive sampling to collect the data. However, methods like quota sampling are expected to generate biased free results as equal representation from all ages, incomes, and other social demographics will be there.

During the review, many variables came across. However, the study remains focused on the variables mentioned in the model. The researchers can attempt to incorporate another related variable also and can test a comprehensive model. Another research gap that persists is the cross-national comparisons, which is again a potential area of research. Another interesting submission is that, during the review phase, there are other variables like customer satisfaction (George and Kumar, 2013), and perceived service quality (Yang et al., 2005) which are affected by the seven identified constructs of the model which can be studied in the extended model in future studies. Demographic data was present but was left out to keep the study out of exaggeration and risk of losing focus. Fortunately, the absence of demographic analysis presents a certain gap that is an opportunity for future research works. Using a more comprehensive set of socio-demographic variables can be used to identify the variation across demographics. Cross-national studies for nations that are at different technology life cycle stages could also be done to identify the difference in the outcomes. Being a technology-based study, it has an automatic gap, as the new technologies will enter there will be a need for another study with the latest android version in the market. Emerging economies have different perceptions of products; therefore, the comparative perception can also be studied using some developed countries. At present, continent -based studies are gaining new heights, like South Asian, Europeans, etc. which can be an interesting contribution to the literature.

The sentiment analysis is another new trend in the research. Smartphones are always subject to the users' sentiments; therefore, qualitative data analysis can be conducted to identify the emotions and sentiments associated with smartphones by using software like NVIVO or MAXQDA. Qualitative analysis can also be done using Twitter or some hashtags mining which is much in trend.

There are few recommendations for the future proposed model: The current study has combined extended TAM, DoI, and UTAUT model with the selected elements of each one. A comprehensive model using all the elements can be incorporated in a single frame to evaluate their impact on behavioral intention and the extended element i.e., 'actual use' which is found missing in the present study. Further, in the current study, independent variable (subjective norms, job relevance, output quality, result demonstrability) from TAM2 are not considered, which certainly opens up new vistas for future research. There are rare studies wherein the amalgamation of TAM1, and TAM 2 models can be seen. Therefore such unique models can develop and enhance understandings in the field. TPB (theory of planned behavior is another area from a similar family which is not studied, hence few elements from TPB can also be used in future work in combination with TAM1, TAM2, or UTAUT.

8. Conclusion

The study examined factors affecting the behavioral intention and adoption of the upgraded version of Android in a smartphone. Users of Android (OS)-based smartphones like doctors, students, teachers, entrepreneurs, employees, etc., were the primary data sources; and by applying tests like reliability, validity, CFA, and SEM, the data was analyzed. The study has resulted in reliable and standardized measures of factors for adopting of an upgraded version of Android in smartphones. All the ten factors were found to be positive factors after applying CFA and were important for the adopting of the latest version of the Android OS platform. Performance Expectancy, Compatibility, and Effort Expectancy emerged as factors that indirectly affect the

Behavioral Intention of young smartphone users to adopt the latest version of the Android phone, while Price Value, Observability, and Perceived Usefulness play a critical role in their intention to adopt the upgraded version of Android smartphone. Henceforth, the model used in the study is approved, as evident from the results.

Author statement

We have NO conflict of interest. Our manuscript is neither submitted to another journal nor published in another journal.

Appendix

Measurement items

Construct	Items	Factor Loads
Performance	I feel that the latest version of the Android phone is useful.	PerExp1 0.811
expectancy	Using the latest version of the Android phone enables me to finish my tasks more quickly.	PerExp2 0.853
Perceived enjoyment	Using the latest version of the Android phone increases my efficiency.	PerExp3 0.829
Compatibility	I think that using the latest version of the Android phone is fun.*	PerEnj1
Perceived ease of use	I think that using the latest version of the Android phone is pleasant.	(0.369)
	I think that using the latest version of the Android phone is entertaining.	PerEnj2 0.704
	I think that using the latest version of the Android phone is exciting.	PerEnj3 0.828
	I believe that using the latest version of the Android phone is suitable for me.	PerEnj4 0.788
	I believe that using the latest version of the Android phone will fit my lifestyle.	Comp1 0.751
	I think that using the latest version Android phone fits well with the way I like to work.	Comp2 0.906
	Using the latest version of the Android phone fits the way I like to do things*	Comp3 0.747
	Using the latest version Android phone will enhance the productivity of my particular activities.	Comp4 (0.539)
	Using the latest version Android phone will enhance my effectiveness in particular activities.	PerUse1 0.837
	Overall, the latest version Android phone can be useful for my particular activities.	PerUse2 0.813
		PerUse3 0.729
Price value	I am willing to buy the latest version Android smartphone even if its price is high.	PriVal1 0.809
	I prefer to buy the latest version of the Android smartphone even if it is a little expensive flagship phone like Samsung Galaxy, etc.	PriVal2 0.722
	I think that paying a little extra price for the latest version Android smartphone is worth spending.	PriVal3 0.749
Effort expectancy	I believe that using the latest version of the Android phone is easy.	EffExp1 0.852
	Learning 'how to use' the latest version of the Android phone is easy for me.	EffExp2 0.782
	I think that not much effort will be required in using the latest version of the Android phone.	EffExp3 0.720
Social influence	People (like, my family/friends) who are important to me think that I should use the latest version of the Android phone.	SocInf1 0.792
	People who could influence my behavior think that I should use the latest version of the Android phone.	SocInf2 0.728
	People whose valuable opinions I consider, suggests me to use the latest version Android phone since they are already using it.	SocInf3 0.767
Observability	I have had enough opportunity to see the latest version of the Android phone being used.	Observ1 0.868
Behavioral intention	It is easy for me to observe others using the latest version of the Android phone.	Observ2 0.793
Adoption	People can tell me that they know more about the latest version of the Android phone since they are already using it.	Observ3 0.759
	I intend to use the latest version of the Android phone as much as possible.	BehInt1 0.868
	I intend to continue using new version of the Android phone in the future.	BehInt2 0.859
	I intend to upgrade my existing version and shift to the latest version of the Android phone available in the market.	BehInt3 0.815
	I intend to buy the latest version of the Smartphone in the future as a plenty of benefits/features are provided by them over the old version.*	BehInt4 (0.459)
	I use the latest version of the Android phone as it is available in the market.	Adopt1 0.845
	I would update the latest version of Android whenever I get a notification in my phone for software update.	Adopt2 0.862
	I will use latest version of Android smartphone in future.	Adopt3 0.758

Note:*Item factor loadings in parenthesis were dropped items from the study.

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