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## Developing ICT adoption model based on the perceived awareness and perceived usefulness of technology among telecom users

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**Abstract:** Current study aims to develop an ICT adoption model based on the perceived awareness, perceived usefulness and intention to use ICT. Researcher has measured the opinions of the telecom users towards ICT using a well-structured questionnaire, distributed to 1080 telecom users equally from rural and urban areas of the North and Central India. It was found from the study that the ICT is useful for acquiring information, entertainment, safety and security, maintaining e-repository, managing digital money & payments and for skill or knowledge enhancement. ICT adoption model developed in the study suggests that perceived awareness and perceived usefulness both are significant predictors of the intention to use ICT. Further, the model shows that the area and generation gap both are significant predictors of the ICT adoption. The study is limited to telecom users only and geographical area of the survey is limited to North and Central India.

**Keywords:** information and communication technology; perceived awareness; perceived usefulness; generation gap; residential area; information; digital money and payments; telecom users; mobile value added services; North India; Central India; internet; technology adoption model; knowledge and skills; e-repository; entertainment.

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## 1 Introduction

Using mobile phones for voice calls has become a *passé* in the recent years. Mobile phones have transcended the stereotypical use of phones as singularly a medium of voice communication. It has metamorphosed into smart phones with features like; large screen, inbuilt camera, easy accessibility while being supported by advanced operating systems, and fed by internet. Today's web technology has spread widely-expanded communication via video calls, recreation through movies and games, financial management by accessing bank accounts and paying bills, and other spheres like knowledge sharing, information dissemination, business and transport, dating and match making- the list goes on. In short, it has percolated in every nook and corner of our daily needs and seems to be here to stay. People are using digital technology to increase their live experiences (Deloitte, 2018). The Indian telecom industry has witnessed a drastic shift from being a voice centric market to data centric market, as phones become tools for accessing Internet as much as regular communication (KMPG, 2017). This infinite support and dependence on Mobile Value – added Services (MVAS) has contributed significantly in making Indian telecom sector to be the second largest in the world, with a subscriber base of 1168.89 million, as on June 2018 as reported by Telecom Regulatory Authority of India- TRAI (Economic Times, 2018), and the third largest internet user population with 481 million telecom subscribers, as on December 2017 (Agarwal, 2018).

There are varied communication systems used in India such as; telephone, internet, satellite, television, radio and mobile phones. India has the second largest network of telecommunication in the world, on the basis of total number of telephone users. According to the TRAI report published in May, 2018, total number of telephone users in India was 1153.51 million, out of which 1131.01 million were mobile users and 22.51 million were fixed line users (TRAI Report, 2018). Mobile users thronged the market of total telephone subscriptions. Value added services in the mobile phones have made them not only a medium of communication but also a channel for exchange of information and innovative services. Thus, mobile value added services have lent the enviable tag of a 'smart' phone over the plain phones of yesteryears. A dynamic combination of ICT tools and internet, smart phones extend flexibility and mobility to their users. In the mobile users' segment, India and China face cutthroat competition in becoming the biggest smart phone market in the world. Total number of mobile users is bound to grow as the world is expected to reach an astounding figure of 5 billion mobile subscribers by 2025, with India leading the way among fastest growing countries (GSMA Report, 2018). However, there exists huge disparity in tele-density of urban and rural areas. An official statistics release by Telecom Regulatory Authority of India states that tele-density in urban area was 156.49% and that of rural area was only 57.18% in May 2018 (TRAI, 2018). The number of mobile users is also less in rural areas. This stark imbalance makes rural market a place of opportunity.

Indian telecom market can be categorised in three segments namely; mobile (wireless), fixed line and internet services. Mobile services facilitate communication through airwaves; transmission in fixed line is through landlines, microwave, or a combination of landlines and satellite link ups. In India, telecommunication sector is largely supported by the domestic satellite system namely; INSAT, which is the largest domestic satellite system globally. Internet Service Providers (ISP) provides broadband internet connections. Total numbers of internet users in the world are expected to increase from over 3 billion in 2017 to 5 billion in 2025 (GSM Report, 2018). ISP comes

out with new technologies from time to time that enhance user experience. Graduating in the past from 2G to 3G, market is now flooded with 4G technology with 5G soon in tow. According to *Accelerating Growth and Doing Business* (2017), a report published by Deloitte, 4 mobile subscribers out of 20 have a 4G enabled smart phone and 11 people use 3G enabled devices. Emerging technologies like 5G, M2M and evolution of Information and Communication Technology (ICT) have augmented the popularity and usages of smart phones. However, constant change in technologies also poses a threat to existing business models and there is an effort by businesses to modify the technological advances to their advantage. Various theories talk about these adoption processes and Technology Acceptance Model (TAM) is one of them. Introduced by Fred Davis in 1986, TAM consisted of and tested two specific beliefs namely; Perceived Usefulness (PU) and Perceived Ease of Use (PEU). Former is defined as the probable user's subjective likelihood that using a certain system will improve his / her action and the later refers to the degree to which the probable user expects the target system to be effortless (Lai, 2017). These two beliefs of TAM will be tested in this working paper.

Information and Communication Technology (ICT), another technological evolution, is an amalgamation of all those technologies that supports different forms of human communication, communication between human and electronic systems, and among electronic systems. ICT sector in India traces its history to the initial period of pre 1990's i.e. pre liberalisation era when it was in a primitive stage. With the advent of many private and Global players the ICT sector in India has seen a meteoric rise both in terms of tools and services. Export Processing Zones Authority (2005) has highlighted ICT as the world's fastest growing economic activity as it provides opportunities across transcending borders, cultures and new channels for service delivery. The information society provides foundation for social interaction, economic, political engagement and business operations. ICT plays an important role in socio-economic development of the nation (Lewis, 2012). There are many challenges, which are encountered by effective execution of ICT sector in economic development like business-friendly government, access to technology infrastructure and attracting high-tech industry (Export Processing Zones Authority, 2005). Hence, in view of the rapid development in technology and the contribution it makes to overall economy of the country, it will be worthy effort to analyse the various stages of the developments which have taken place in recent past. ICT has been one of the fastest growing sectors in India with its contribution to GDP increasing year on year. Its contribution to government coffers is next only to inputs through income tax collection. Not only that but it is also one of the significant contributors to FDI in India. An extensive information communication and technology infrastructure across the country has played an important role in this growth; in fact, all the components of ICT such as Consumer and Industrial electronics, computers etc. have registered a ballistic growth in last decade. In 2017, India's approximate revenue from ICT sector was USD 164.3 Billion, and expected to reach USD 225 billion by 2025 (Economic Times, 2017) due to rapidly growing internet penetration in the country.

Having enumerated the benefits, there is a further need to develop a proper policy framework, and an ecosystem which can furnish growth of the various areas of mobile value added services such as; technology platforms, content development and content accretion. Official releases by TRAI (2018) on telecom penetration in India revealed wider and deeper penetration in urban areas than rural areas. Telecom services in the urban areas have reached their full potential delivering satisfactory result, whereas rural areas have significant scope of penetration. There is also dire need to educate villagers

about the multi functionality of mobile phones, making them explore beyond voice calls to utilise smart phones for education, entertainment, news and other internet based services. Telecom services providers need to raise awareness among villagers that the use of a phone is beneficial for their financial and business interest also, they can get information related to weather forecasting, commodity prices, banking services and employment opportunities. Report of TRAI (2011) highlighted the problems faced by telecom companies in providing services to the rural areas. Some of the contemporary problems were; power supply, acquisition of land, low average revenue per year, affordability of services, high operational and maintenance cost, low literacy level and availability of infrastructure. Since then, the telecom sector has seen sharp rise in the number of subscribers, revenues of service providers, and network coverage as per TRAI Recommendations Report (2018). Thus, while this scenario has seen robust improvement in the past seven years, many issues still remain hurdles to be crossed. Telecom companies struggle to grow in rural areas due to low internet penetration, illiteracy due to low enrolment or high dropout rates, infrastructural deficiencies and lack of encouraging attitudes from the public (Madangopal and Madangopal, 2018). These bottlenecks faced by telecom sector motivated the researcher to conduct a study for comparing the awareness and usefulness of ICT among telecom users from rural and urban areas and to develop an ICT adoption model for telecom users. The paper is divided in two parts. First part reviews existing literature to come up with relevant secondary research questions followed by findings and their implications in the second part.

## **2 Review of literature**

An extension of Information Technology, Information and Communication Technology (ICT) has been created to incorporate communication with technology. Although, the expression has been used by academic researchers since 1980s but ICT enjoyed popularity as a common parlance term in later years. The early stage of the evolution of wireless technology which was in 1980's was characterised by 1st generation (1G) network which was based on analogue techniques. This analogue system was based on circuit switching technology which offered only voice calls and data calls were not possible. Studies have supported the adoption of ICT in economic and social life and also endorsed its usefulness (Gatautis, 2006). Despite offering multifarious benefits to its users, the adoption level of ICT is found to be low among Indians. However, ICT penetration has increased and now is widely used in diverse sectors like business, SMEs, government departments, and education. ICT is an important tool for SMEs for boasting competitiveness in market. In order to gain competitive edge and formulate and develop global network, it is important for SMEs to adopt ICT (Selamat et al., 2011). Effectiveness of using ICT in Small and Medium Enterprises (SMEs) is supported and documented in studies. Selamat et al. (2011) have examined the association between ICT and productivity growth in SMEs. ICT has been regarded as an important tool enabling the SMEs for survival in the competitive environment. It has also been found that the decision to use the ICT tools in SMEs depends on the perceived usefulness, perceived ease of use, organisation readiness and competence and is said to be positively correlated with the intent to use ICT among SMEs (Selamat et al., 2011). Another study established the factors that affect ICT adoption among SMEs as mainly; trust, perceived usefulness, behavioural intention, actual system and the awareness level of SME's owners (Alzubi,

2017). Hassan and Ogundipe (2017) have investigated the adaptation and utilisation of ICT tools by Small and Medium Enterprises (SMEs). In business, adoption of ICT is determined by following determinants namely; employees' awareness, acquired knowledge on relevance of ICT, government support, and competitive pressure from other external parties (Hannatu and Adeyemi, 2016). The study draws attention towards poor funding, training, poor nurturing programs and weak financial strategies. It recommends the Government's involvement to ensure efforts steered towards the accomplishment of ICT adoption by SMEs. Besides, there must be adequate availability of infrastructural provisions, regulatory surveillance and proper training to be undertaken by owners and management for the survival of business organisations. Government departments have also employed ICT for reaping the advantages offered by ICT and this choice is based on factors namely; exchange of information, accessibility, cost effectiveness, educational tool and assistance in policy making. These factors positively influence the use of ICT in economics of climate change (Chiabai, 2009). Kassongo et al. (2018) argued that government policies must step up to bring effective implementation of ICT activities in poor communities, with the intervention of ICT helping the people in employment, communication, education and self-confidence.

There is wide spread popularity and benefit of ICT in education sector. ICTs can be used to maintain the learning environment by providing tools for discussion, deliberations, collaborative writing, problem-solving, and online support systems to develop students' growing understanding and cognitive growth (Alabi, 2016). Use of ICTs has positively impacted teaching, learning and research in the field of education. Age, teaching experience, teaching attitude, access to ICTs and teacher's awareness towards ICT magnificently influence the adoption of ICTs in the education sector (Alabi, 2016). Alharbi and Drew (2014) in their research work examined the Technology Acceptance Model to grasp the academic's behavioural intent to utilise Learning Management Systems. In the education sector, factors that directly influence implementation of ICT are namely; perceived ease of use, perceived usefulness, attitude towards usage, job relevance and prior experience of the academicians (Alharbi and Drew, 2014). Ahmad et al. (2012) have examined the Technology Acceptance Model to ascertain the adoption and usage of ICT in teaching and learning by faculties in higher education. At the university level, adoption of ICT by academicians is determined by elements that enjoy positive and significant relation among them namely; availability, perceived ease, intent to use. A positive and significant relation also exists between the determining elements and the adoption of ICT in universities. Research also established negative impact on ICT acceptance resulting from ICT anxiety (Ahmad et al., 2012). The research also highlights that technophobia is a major challenge encountered by academic staff. Similarly, Madangopal and Madangopal (2018) argue that effective implementation of ICT in education sector in rural areas would require attitudinal shift among teachers along with quality content and updated devices, language inclusivity in web resources and better infrastructures.

Akinde and Adetimirin (2017) in their study have analysed the use of ICT tools by the library educators and their perceived usefulness for teaching. ICT has enabled the easy and timely provision of many infrastructural resources and software as per the requirement. OAS (2018) presented that business of all sizes and sectors heavily depended on ICTs for innovation, output and development. Study showed that there is a significant relationship between library educators perceived usefulness of ICT for teaching whereas low level of usage for teaching LIS courses via ICT (Akinde and

Adetimirin, 2017). Performance expectation, facilitating conditions, disciplinary factors, institutional policies and availability of support influence the use of ICT (Muriithi et al., 2016). Facilitating conditions are significantly imperative than perceived usefulness and subjective norm in influencing use of technology among teachers (Liu et al., 2018). Research conducted to ascertain relationship between ICT adoption and the classroom experience showed that faculty-perceived usefulness and ease to use influence the ability to harness ICT tools to generate marvellous class-room experience (Salas, 2016). Tochukwu (2015) has analysed the synchronisation between ICT and education for overall development of students. Among the undergraduate students (across genders), adoption of ICT is dependent on awareness regarding the purpose of use, skill, possession and general usefulness of ICT tools (Tochukwu, 2015). Oye et al. (2017) examined the cognizance, adoption and acceptance of ICT tools in higher education institutions. ICT usefulness in higher education institutions revealed that there is a low level of awareness among teachers of HEIs. Performance expectancy is the most influential factor for the acceptance and utilisation of ICT programs (Oye et al., 2017). The study also highlights that lack of funds, less opportunities for training, lack of access to ICT facilities and lack of guidelines as well as government policies are the major challenges that affect adoption of the ICT tools.

Area of residence of users, whether rural or urban, also affects adoption of ICT. Tele-density and penetration of ICT is less in rural areas as opposed to urban areas. Nevertheless, studies that focused on rural population also revealed affinity of rural population to ICT. Sarban et al. (2015) have investigated the core factors that influence the utilisation of ICT among the villagers. ICT has better capacity and high potential for economic and social development in the rural areas. However, usability of ICT, according to ICT adoption model, is limited to people of certain age, educational qualification, and number of literate people in household. Knowledge of internet and computer working skills also affect the use of ICT services availed by the villagers (Heidari et al., 2015). Researcher in the present study, with the help of ICT adoption model, has shown that the area i.e. rural or urban is a significant predictor of ICT adoption.

Gender inequality prevails in usage of internet. A gender based study undertaken by Tochukwu and Hocanin (2017) to ascertain the levels of awareness regarding ICT tools among students and the factors affecting the utilisation as a part of their education revealed that females and young students have high level of awareness and indulgence with ICT tools for effective learning (Tochukwu and Hocanin, 2017). Boys, on the other hand, are more skilled and have a positive attitude to use ICT tools than girls. Comparative study between students and teachers present s students to be more ICT savvy (Madden et al., 2017) whereas; teachers are aware and willing to use ICT tools in integrated learning (Ghavifekr and Rosdy, 2015). Manyilizu and Gilbert (2015) documented the use and awareness of ICT between male and female teachers. Teachers in general, both male and females, experience some difficulties in harnessing the ICT tools for teaching. Nonetheless; male teachers reveal awareness and high usage of ICT tools in secondary schools (Manyilizu and Gilbert, 2015). The study also reveals that teachers who have dedicated more than 30 years to the education sector showed higher usage of ICT tools. Kwapong (2009) compared the knowledge and usage of ICT among male and female distant learners to establish a link between gender roles and the ICT sector. ICT is also used as a medium of imparting knowledge in distance learning mode but both male and female learners have moderate knowledge and usage of ICT facilities

to extract maximum learning from distance learning programs (Frimpong, 2009). Naciri (2016) has made comparative investigation of access and adaptability of plethora of ICT applications in higher education across both genders. It was found that male respondents have more confidence and positive perceptions in utilising the ICT tools than the female respondents due to disparity in education factor (Naciri, 2016). Girls feel less confident to use ICT tools whereas boys show greater experience and confidence. The main utility of ICT tools by girls is Social Networking (Report of Becta, 2008). Owusu-Ansah (2013) made a comparative analysis of usage of ICT applications among academics and came out with the result that males depict more usage of ICT in collaboration with other tertiary faculties for making learning, research and teaching swift and useful (Owusu-Ansah, 2013). Finding of this research also supports the difference in ICT adoption by males and females. Women were restricted to use internet technologies but post 1995 changes in society altered a woman's engagement with internet (Naciri, 2016). Seyfrin et al. (2018) and Herck and Fiscarelli (2018) have linked the influence of ICTs towards work as a way of advancement and empowerment of women, and bridging the prevailing gender gap in society. Similarly, ICT's growing impact has also been successful in improving education about the environment (Adu and Mireku, 2016). ICTs are the corner stone to the creation of emerging global knowledge-based economy and help in speeding the growth and sustainable development. Studies related to gender differences and ICT awareness and usefulness unveiled that ICT tools are extensively used by women in political, economic, health and education arenas to strengthen and mobilise for their empowerment (Ngwenyama and Bryson, 1999).

Rate of ICT adoption also varies because of generation gap. Bailey and Ngwenyama (2010) pointed to the generational gap as a hindrance in ICT adoption and usage. Ngwenyama and Bryson (2010) have explored the aspects pertaining to generational gap in the utilisation of ICTs through the analysis of social networks as the foundation of social identity and representation theory. Young tele-centre users are quick to adapt to new technology, develop learning and participation with ICT tools than older ones (Ngwenyama and Bryson, 1999). High intergenerational interaction results in benefits to widen community with the positive influence on social identities, high usage of technology and intergenerational knowledge transfer. Present study brings out the differences in generation gap between old and new generation.

### **3 Research gaps**

Research showed that majority of studies have been conducted on the education sector, and the ICT adoption model has been developed by researchers for the education sector, SMEs or businesses, but there is a lack of information on ICT adoption model for telecom users. A substantial increase in the number of telecom subscribers has turned them into an important user of the ICT tools or applications. Magpantay (2016) has illuminated the current status of ICT sector in context to Indian scenario. KPMG (2017) has documented the impact of inception of ICT on growth of telecom sector. India's telecom sector has witnessed a significant growth in the past two decades and has become home to world's second largest internet subscribers. Government must act positively to nurture the telecom industry in partnership with the various services providing entities to keep connecting billions, empowering citizens and raising the digital economy. Government must create a healthy economic environment in terms of ease of

doing business and financial stability. The study stresses on the need to ascertain digital divide, access utilisation of community internet and mobile phone application. Besides, it is also necessary to collect more ICT data in India pertaining to households, individuals and businesses in a comparable as well as comprehensive manner (Magpantay, 2016). Smart phones with big screens have replaced laptops or personal computers; hence it becomes imperative to study the perceived awareness and usefulness of ICT from the perspective of telecom users. There is need to invest more on research to make improvements in the present system so as to get the maximum benefits from the ICT industry to bridge the gender and rural-urban divides. Current study will bridge the gap found from review of literature and will attempt to develop ICT adoption model based on the perceived awareness and perceived usefulness of the ICT among telecom users.

#### **4 Research methodology**

*The objectives of the study are:*

- 1 To identify the factors of usefulness of ICT among telecom users.
- 2 To identify the gap between perceived awareness and perceived usefulness for the identified factors of ICT.
- 3 To develop an ICT adoption model for telecom users.
- 4 To measure the mediating effect of generation gap, area of residence and the gender on the relationship between perceived awareness, perceived usefulness and intention to use the ICT.

Current study is based on the primary data mainly collected from telecom users. As per the nature of study researcher has taken an equal percentage of telecom users from rural, and urban. Telecom users from household sector of North and Central India have been selected whereas telecom users from urban areas consists of students and faculties from various colleges and universities, and telecom users from rural areas were housewives and farmers. Total number of questionnaires distributed to respondents were 1080 equally in urban and rural areas, out of which only 645 were received which were completely filled up and after applying Mahalaonbis Distance test (Mahalanobis, 1936) for outliers only 604 were retained which were rounded off to 600 for final data analysis. The sample consists of (312) 53% male and (282) 47% female respondents and the variable generation gap has been shown by difference age group, respondents of the study have been selected from two age groups only is less than 25 years which represent the new generation and respondents from an age group of above 50 years representing old generation. Data has been collected through self-developed questionnaire, which consists total 45 items related to the applications of ICT for telecom users. The reliability of the questionnaire was found to be 0.872 using Cronbach Alpha, which is above 0.7 (Cronbach, 1951) and hence it was found to be reliable. Factor analysis used to determine the factors of usefulness of ICT, independent sample t-test was used for measuring the gap between perceived awareness and perceived usefulness score of telecom users for ICT, One-way Anova has been used to measure the impact of generation, area of residence and gender on the perceived usefulness of the factors of ICT and at last the regression analysis has been used to measure the mediating effect of the generation gap,



area of residence and the gender on the relationship between perceived awareness, perceived usefulness and intention to use the ICT. Researcher has used a scale of five points for measuring the opinion of the telecom users towards the usefulness of ICT (very useful, useful, neutral, less useful, not useful at all) and for measuring the awareness towards ICT (very high, high, moderate, less and very less). Intention to use the ICT has been measured using three statements on a scale of five points (very high, high, moderate, less and very less).

## 5 Findings and conclusion

The value of KMO test (data adequacy test) was found to be 0.933, which is close to one and data was found to be adequate for applying factor analysis (Fabrigar et al., 1999). Similarly; the value of Bartlett's test (homogeneity of variance) was found to be significant as the value of chi square was 43862.78 at a p-value of 0-0.000, which shows that there is an unequal variance in the sample used for factor analysis (Fabrigar et al., 1999). Factor Analysis using PCA method, and Varimax rotation, six factors were extracted which represent the usefulness of the ICT for telecom users. Out of 54 statements, nine statements whose factor loadings was less than 0.45 (Child, 2006), were eliminated. Six factors which were extracted from the factor analysis were namely; information, knowledge & skills enhancement, time and cost saving, safety & security, entertainment, e-repository and digital money and payments. All these six factors contribute 87% of total variance in the variable 'perceived usefulness'. Highest contributing factor to perceived usefulness of ICT was found to be Information, followed by knowledge & skills enhancement while least contributing factor was found to be e-repository.

*Null Hypothesis: Perceived awareness towards ICT among telecom users is less than perceived usefulness.*

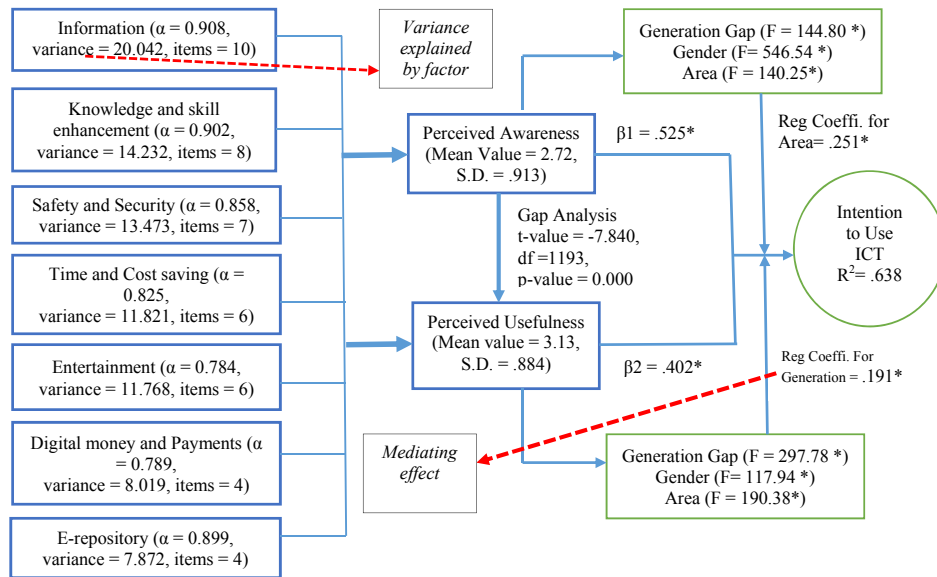
Mean value of perceived awareness (2.72) was found to be less than the mean value of perceived usefulness (3.13), which shows that the awareness level of telecom users is low towards the various applications of ICT while telecom users perceive the usefulness of ICT high. The gap between perceived awareness and perceived usefulness was found to be significant.

*Null Hypothesis: Generation gap, area of residence, and gender has no impact on perceived awareness and perceived usefulness of ICT among telecom users.*

Further, the area, gender and generation gap were found to have significant impact on the perceived awareness and perceived usefulness of telecom users towards ICT. Male users (mean value = 3.25) were found to be more aware than the female users (mean value = 2.93). Similarly; telecom users from rural area (mean value = 2.12) were found to be less aware about the ICT than urban telecom users (mean value = 3.89). New generation (mean value = 3.86) was found to be more aware towards the ICT than old generation (mean value = 2.58). While the perceived usefulness of the female users (mean value = 3.45) were found to be more than male users (mean value = 2.77); telecom users from urban area (mean value = 3.88) found ICT more useful than rural telecom users (mean value = 2.47). New generation (mean value = 4.15) found ICT more useful than old generation (mean value = 2.38). Hence, perceived awareness level and perceived

usefulness of ICT among telecom users were found to be significantly different due to difference in the gender, generation gap and area of residence. Figure 1 shows the ICT adoption model emerged during current study.

**Figure 1** ICT adoption model



Note: \*Significant at 99% confidence level.

*Null hypothesis: There is no significant mediating effect of generation gap, area of residence and the gender on the relationship between perceived awareness, perceived usefulness and intention to use the ICT.*

$$\chi = \alpha + \beta_1.y_1 + \beta_2.y_2 + \beta_3.y_3 + \beta_4.y_4 + \beta_5.y_5 + \epsilon \tag{1}$$

( $\chi$  is dependent variable (Intention to use ICT),  $\alpha$  is constant term; Mediating variables ( $y_1$  (Gender),  $y_2$ (Generation Gap),  $y_3$  (Area), Independent variables ( $y_4$  (Perceived awareness), and  $y_5$  (perceived usefulness)), regression coefficients ( $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ ) and  $\epsilon$  is the standard error.

The results of multiple regressions show that intention to use ICT by telecom users was significantly affected by the perceived awareness and perceived usefulness of ICT. R square value was found to be 0.638, which shows that perceived awareness and perceived usefulness explains total 64% variance in the variable intention to use ICT, while 36% of the variation is caused due to other chance factors. Further, the regression coefficient showed that the perceived awareness (regression Coefficient = .525) of ICT contributes higher to the independent variable (intention to use ICT) than perceived usefulness (regression Coefficient = .402).

In order to measure the mediating effect, three variables were used as control variables in the regression model, and the change in R square (0.166 to 0.638) was found to be significant by adding control variables in the regression model. Hence, a significant regression model emerged after consideration of the mediating variables. Further, the results for the regression analysis to measure the meditating effect of the three variables

(gender, generation gap and area), shows that only two variables i.e. generation gap (R coeffi. = 0.191, p-value = 0.000) and area (R coeffi. = 0.251, p-value = 0.000) were found to be significant mediators which affect the relationship between perceived awareness, perceived usefulness and intention to use the ICT. Gender was found to be an insignificant mediating variable in the study (R coeffi. = 0.019, p-value = 0.091).

It can be concluded from the study that ICT is useful for acquiring information, providing entertainment, safety and security, maintenance of e-repository, tracking digital money and payments and skill and knowledge enhancement. ICT adoption model developed in the study suggest that perceived awareness and perceived usefulness are significant predictors of the intention to use ICT by telecom users. Awareness of ICT is not sufficient until the users do not find it useful, hence the behaviour of users depends on their awareness and benefits, they can receive by using ICT.

Telecom users are of the opinion that ICT is highly useful in acquiring information and less useful in e-repository. Research conducted by Tochukwu and Hocanin (2017) also found positive attitude for the usage of ICT tools in the learning process. Challenges to businesses in today's age can arise in the form of poor ICT infrastructure and lazy cybersecurity measures like protection of personal data (OAS, 2018). Business Sweden (2016) explored that mobile is the most utilised gadget to access internet, which people use to seek information of any kind that flood the search engines. Being abreast with happenings in the surroundings is the need of the hour. Knowledge and information develops competitive edge. Advent of smart phones has accredited students by promoting education through interactive mediums. YouTube and other digital content providers have also increased their education based content by 75% (Technology, Media and Telecommunications Predictions, 2018). The process of acquiring information has been simplified with the advent of smart phones and internet. Knowledge can easily be found at the touch of finger tips and is replacing cumbersome books and reducing the wait time for information to reach individuals.

Further, the model shows that the area, rural or urban, is a significant predictor of ICT adoption as there are various factors associated with the area such as lack of technological infrastructure, access to telecom services, and inability to afford the cost of data plans as most of the ICT based applications can be used only with internet. Telecom users from rural area are less aware about ICT and found ICT less useful than telecom users from urban areas. However, it has been highlighted by Sarban et al. (2015) that ICT has better capacity and high potential for economic and social development in the rural areas. Keeping this view in urban, it is of utmost importance to facilitate the villagers with adequate technological infrastructure and employment opportunity to increase their standard of living. According to the Report of Working Group on

Telecom Sector for 12<sup>th</sup> five-year Plan (2012–2017) right ICT policy would ensure effective role on the part of nation to accelerate inclusive economic growth by flexible and affordable telecom services in remote areas. People living in towns and cities have better exposure and accessibility to technology and its usage as compared to their counterparts in villages. To bridge this gap, 62,443 un-penetrated villages were declared to be provided with telephone facility supported by Government of India's Universal Service Obligation Fund (IBEF, 2017). Expansion in Indian villages will provide roadmap for the future expansion and unbridled growth of the telecom sector.

Study also revealed that gap in generation plays a significant role in adoption of ICT, its awareness and usefulness. Youth is more aware and found ICT more useful than older generation. Madden et al. (2005) made a comprehensive analysis of the problems, which

may arise with ICT based generation gap between students and their parents or teachers as the outcome of numerous perceptions of technologies. Students reflect higher degree of utilising ICT facilities than teachers. Students here are representative of present or younger generation. Easy adoption of technology is hindered by generation gap. The aging generation had negligible exposure to technology in the past and with growing age the learning capacity and resilience also reduces. Operating a smart phone or working on computer is cumbersome and difficult for them. These factors make them averse to technology. They are haunted by a sense of fear and insecurity of losing important information and their privacy to technology. Older generation prefers to resort to traditional mediums whereas the younger generation is more prone to experimentation and exploring newer avenues and technology. Ngwenyama and Byrson (2010) have explored the aspects pertaining to generational gap in the utilisation of ICTs through the analysis of social networks as the foundation of social identity and representation theory. The study finds that young tele-centre users are more comfortable, quick at learning and participation with the use of ICT tools than older ones. High intergenerational interaction results in benefits to entire community with the positive influence on social identities, high usage of technology and intergenerational knowledge transfer. Hence, generation gap was also found to be a significant mediating variable.

Males and females have different approach towards awareness and usefulness of ICT. Females are less aware about ICT than males but found ICT more useful than male users. Becta (2008) has explored the different patterns of usage of ICT tools between boys and girls with its impact on them across UK. The study reveals the variations and inconsistency in utilisation of the tools among boys and girls. Girls feel less confidence to use ICT tools. Boys show greater experience and confidence. The main utility of ICT tools by girls is social networking. It is imperative that tools to attract more female users should be developed with the aim to encourage trust and confidence and imbibe usefulness of ICT. Madden et al. (2005) in his found that boys are more skilled and have positive attitude to use ICT tools than girls. ICT strategies are also used to promote gender equality, ensuring education and opportunities for all women in ICT sector by creating an enabling environment, as well as promoting women's participation in economic segments of information society (EMG, 2002). Feminist principles are emerging as increasingly influential in techno- science, and in forming new patterns of behaviour in society (Seyfrin et al., 2018). Hence, this study adds to the existing literature of ICT usefulness while throwing substantial light on its exploration by telecom users. The study adds to ICT literature in two ways. First, it has shown benefits of adopting ICT for economic and social growth, removing generation gaps, gender disparity and creating rural – urban balance. Second, the study has shown substantial gap in perceived awareness and perceived usefulness in ICT adoption and has suggested an ICT adoption model based on the gap analysis. ICT adoption model, as proposed in the paper, will help in mitigating this gap between awareness and usefulness by creating more awareness through information sharing and developing user-friendly programs.

## **6 Limitations and future scope**

The present study is based on the telecom users but it could be extended to other sectors also, such as education sector, services or manufacturing sector. ICT adoption model does not include the personality traits of the users, which could be an important variable

in prediction of the intention to use the ICT. Further, the problems, issues or challenges related to the ICT can be incorporated to study the intention to use ICT more rigorously.

## 7 Managerial implications

This study about measuring perceived usefulness and perceived awareness of ICT adoption has shown significant positive outcome for most of the variables identified and examined. Each of the factors discussed above promise growth and development in socio economic parlance. Although, ICT is used extensively in education sector, its use can be enhanced for generating more discursive learning as well. Research conducted in this paper supported the use of information technology for gathering knowledge. Hence, telecom companies can focus on creating and sharing more information- oriented content through ICT. This will help businesses in gathering more number of users and viewers thereby, contributing to the profit margin. Government of India is also aiming to increase rural penetration for bridging the urban- rural divide. With about 70% of India's population living in rural areas, telecom subscribers should see this as a seamless opportunity and work towards maximising the profits from an untapped market full of probable users. Mobile value based services should aim at creating more female oriented programs to reap the benefits of this segment that largely relies on ICT for social networking. Creating interactive forums and empowerment modules will add more number of female subscribers. Initiatives taken by telecom players, is a step to strengthen government's plan towards creation of a "Digital India". Keeping this view in mind, proper steps should also be taken to inculcate habit of using e-repository to form a smarter, tech- savvy India.

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