

# Analysis of Engineering Students Acceptance and Usage of 5G Technology: A Case Study of Gannon University

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## Abstract

It has been around 20-25 years since the internet was first developed for public use, and since then the number of users has been increasing exponentially. In a recent report, there are around 313 million internet users, out of which 276.8 million are mobile internet users and internet penetration is 90.3% (Johnson, 2021). With the development of wireless telecommunication technology and mobile devices, use of the internet access has been increasing. From the first generation (1G) of cellular networks to the current 5th Generation (5G), there has been a huge improvement in the data rate, coverage, and security that made it possible to have the internet on mobile phones. The internet in mobile devices has existed since 2G and was used for checking emails and browsing the web (Yamauchi *et al.*, 2005). It is important that users should accept new technology. In this study, acceptance, and usage of the 5G technology that was investigated in a survey of students from the engineering discipline of Gannon University. This work describes the usage of a statistical technique called the technology acceptance model to determine the engineering students perception of the degree to which the 5G technology is accepted and useful. It aims to answer the research questions of whether perceived usefulness and perceived ease of use affect the actual usage of 5G technology among engineering students, as they tend to bend towards new technology because of the high involvement of technology in engineering studies. This work aims to answer, to what extent perceived usefulness and perceived ease of use determine the usage of 5G technology among the selected group of participants.

**Keywords:** 5G Technology, technology acceptance model, perceived usefulness, perceived ease of use, actual usage

## 1. Introduction

5G is the 5th generation of communication technology and is being rolled out in the US. 5G promises broadband with extremely fast internet access over wireless and it is 20 times faster than the current 4G technology promising gigabit high-speed internet. 5G technologies are going to have a meaningful impact on industries like education, agriculture, health care, military, entertainment, etc. It operates in a 2-frequency range, one below the 6GHz and another above the 24GHz band. 5G is often referred to as 5G NR where NR stands for New Radio. Both 4G LTE and 5G use orthogonal frequency-division multiplexing (OFDM). 5G aims to solve the shortcomings of the previous generation. Here in the survey of the 5G network, Panwar *et al.* (Panwar *et al.*, 2016) mentioned issues that were being addressed in the 5G technologies, which were present in the previous generation. In 4G, there is currently no support for the burst data send that is necessary for the health monitoring devices that send data to the server. Base stations are not utilized properly, interference in uplink and downlink. So, these limitations were addressed in the 5G network along with a few additional features that are not mentioned here. 5G is often considered more than just the next generation of communication since it involves many different entities. Bertenyi (Bertenyi, 2021) mentions the timeline of the 5G evolution. Industrial IoT, device evolution, vertical industries, network deployment, and automation are the keys to 5G evolution.

The introduction section also includes the problem definition and research questions. The overview, advantages, disadvantages, research gap, acceptance models, related work, and acceptance and use in education, employees, and students of 5G technology are all covered in Section 2 of the paper. Section 3 on research methodology discusses the methodology and techniques of the study conducted in this paper. In Section 4 the analysis of the data we used for this study is discussed. Section 5 discusses the results, and Section 6 discusses the implications of the study. The paper then discusses the study's limitations and future work in Section 7, and Section 8.

### 1.1 Problem Definition

It is equally important for technology to be accepted by users, and there are some hurdles in that due to the misconception. Recently in 2020, there was a big conspiracy theory related to COVID -19 spread. Some researchers claimed that the COVID-19 outbreak was caused by cell phone towers installed near Wuhan in 2019. Other people stated that it was caused by the burning of 5G cell towers in England (Lin *et al.*, 2019). None of the above theories are related to what caused

the spread of COVID-19. Most users of 5G will be the current younger generation so it is important to investigate their views on current 5G technology. Therefore, this research will investigate to understand the perception of 5G technology by Gannon University engineering students.

### 1.2 Research Questions

The research questions that we are looking at as far as this research is concerned, are based on an analysis of engineering students acceptance and usage of 5G Technology with a case study at Gannon University.

*RQ1:* Does perceived usefulness and perceived ease of use affect the actual usage of 5G technology among engineering students?

*RQ2:* To what extent do perceived usefulness and perceived ease of use determine the actual usage of 5G technology among engineering students?

## 2. Literature Review

This study aims at investigating the perception of the 5G technology since it is already being used in various parts of the US as well as around the world. This literature study further aims towards investigating the previous researchers perceptions and their future estimates, as well as studies related to the 5G perception of people from a different location.

### 2.1 Overview of 5G Technology

Panwar *et al.* (Panwar *et al.*, 2016) surveyed the 5G network back in 2015, and the increase in data, device, and data transfer would lead to the development of the 5G. The author estimated that by the end of 2020 there will be 50 million devices that will be utilizing the network services. However, there had not been any data available that could be used to verify the estimates. Some of the statistics and reports showed 21 billion connected devices in 2020 while some estimated it to increase by 50 billion marks by the year 2030. The latest report, which was comparing the 50 states of the USA, shows that New York is the state with the highest download speed through the 5G was 114 Mbps (Rizzato, 2021). This showed that there is still a need for improvement in the 5G to meet the expected criteria.

### 2.2 Advantages of 5G Technology

Since 5G has already been around, the open signal created the user experience report in June 2020, which Verizon found to be providing an average download speed of around 494.7 Mbps, and other companies provided in a range of 50-60 Mbps (Fogg, 2020). One of the main advantages observed by the numerous amounts of research is the latency of the network is very low as a camper to the current 4G network technology, which is improving the customer's gaming experiences.

### 2.3 Disadvantages of 5G Technology

In the 5G technology, the bandwidth of the network frequency is higher than the 4G network due to the network range being reduced, and the capital cost of implementing the network tower also increases making the technology costly. 5G network is also utilizing the millimeter-wave and radio access that operates at high frequency. The operation of these devices needs more processing power, so the mobile device needs more battery backup for the operation. 5G network is commenting the remote connectivity, but when users are trying to connect from remote places there is limited access given to them because it is only for telecommunication and basic internet surfing.

### 2.4 Acceptance and Use of 5G Technology in Education

In a study by Xue and Mao (Xue & Mao, 2021), the authors investigated the impact of the 5G technology on education. Due to the rapid spread of COVID-19, all colleges and schools were shut down temporarily as the countries-imposed lockdowns. It was clear that internet service was going to play a major role here, and many found out that the existing 4G network was not sufficient for this approach. Many students faced an issue while streaming the live class due to the low internet connectivity. As mentioned by Xue and Mao, with the help of 5G many limitations in current online learning can be overcome. 5G is capable of streaming 4K/8K which means students facing issues in the live stream can be avoided, which in turn causes the delay in class since the teacher has to explain the same thing multiple times if the network issues had been there. As discussed earlier, the higher throughput of data applications, such as Augmented reality (AR) /virtual reality (VR) is seamless and makes online learning more interactive, and avoids students from losing interest.

### 2.5 Acceptance and Use of 5G Technology by Employees

In a study conducted by Fahn and Yan (Fahn and Yan *et al.*, 2021), the author investigated the impact of 5G on the macro economy. Where the authors expected productivity to increase by 80-90% with the aid of 5G technology. It is estimated that employment was going to be affected the most as 5G provides means of remote work. Furthermore, from the recent development in VR technology, now there is software that enables people to be virtually present at the office or in project meetings. For instance, a tool that was developed by Facebook called Metaverse that allows users to connect virtually

(Chan & Lee, 2021).

### 2.6 Acceptance and Use of 5G Technology by Students

One of the key motivations for developing the 5G is to improve the students experience in the field of education and the novel methodology for educating the kids. Due to the COVID-19 pandemic, most students and researchers must study remotely, which gives a good trial and new experience to the students using the digital way of learning. The various educators and content developers work together to give the student the best way of learning in a more fun and practical way. By using the 5G technology AR/VR technology and other visualization techniques become more feasible due to the connectivity of the 5G (Xue & Mao, 2021).

### 2.7 Research Gap

Here, this study aims towards an analysis of a small group of people from the education sector. Since there had not been any study conducted that targets such a specific audience when the 5G technology acceptance is considered. There had been little to no studies conducted after the 5G had been rolled out. For example, one of the recent studies regarding the 5G acceptance is examined. The acceptance in the medical field and university among the students respectively (Al-Marroof *et al.*, 2021; Martin *et al.*, 2021). The latter one closely relates to the study presented here, however, as mentioned the study is conducted in a gulf country. This means the study presented here targets a completely different demographic based on geolocation.

### 2.8 Theoretical Models Used for Acceptance of 5G Technology

As mentioned earlier, the Technology Acceptance Model is used for acceptance of the 5G technology, which uses perceived ease-of-use and perceived usefulness to assess the acceptance. However, there are other models as well that can be used, based on the type of information required. The theory of reasoned action (TRA) seeks to explain the link that exists between attitudes and actions in human activity. It is mostly used to forecast how people will behave based on their prior opinions and behavioral intentions. An individual's choice to participate in a certain activity is dependent on the consequences that the individual anticipates would arise from doing the behavior. In a study by Chan and Lee, apart from those 2 measures, other measures are also considered to get more insights. Perceived compatibility is used to indicate whether the new technology is fit for day-to-day use. The use of 5G CAV for their daily commute is considered with this parameter (Chan & Lee, 2021). A social influence is a measure to see if the user's intention is driven by the influence of other family members or friends due to the community. Similarly in other studies, additional factors like perceived enjoyment are considered to get additional insights (Han & Zhang, 2020). In Martin *et al.* (Martin *et al.*, 2021), the TAM model is used in addition to other measures such as trust, personal innovativeness, perceived impact on health/ environment, perceived level of information, etc. Apart from the derived version of TAM, flow theory is used (Akbari *et al.*, 2020). Flow theory is mostly used in online applications to understand behavior and customer experience. To measure the flow, enjoyment and concentration are quantified. How much a customer enjoys using the service or application and how concentrated the customers are while using the service and application. In a study by Akbari *et al.*, the measure of flow, the author used concentration only rather than taking enjoyment since the authors also targeted the use of 5G by the students. Apart from the TAM model and flow theory in the study by Akbari *et al.*, trust is also considered. Trust is considered as ones belief about how the technology works. Also, unlike other studies where they directly consider user intention, trust and confidence are between the perceived ease-of-use and perceived usefulness (Akbari *et al.*, 2020).

### 2.9 Technology Acceptance Model (TAM)

The technology acceptance model is widely used to measure the adoption of technology in the information system field (He *et al.*, 2018). The technology acceptance model is an information system theory in which users can come to accept the technology and use the technology. There are two main constructs in the technology acceptance model (TAM) i.e., perceived usefulness and perceived ease of use. These constructs determine the users acceptance of new technology. This research study is based on the perspective of the technology acceptance model to investigate the perception of 5G technology by Gannon University engineering students (Li *et al.*, 2009). Perceived usefulness (PU) means the perception of users where they can believe that using new technology can improve their performance in their work. Perceived ease of use (PEOU) means the users judgment of whether the technology is easy to learn and easy to use. Using the perceived ease-of-use, it identifies at what stages people are feeling it is difficult to use, and those stages can be improved.

### 2.10 Research Hypothesis

The following are the hypotheses of statistical tests that will be performed. These hypotheses are considered from the previous study, which had been done recently where authors considered the use of 5G in the gulf area (Al-Marroof *et al.*, 2021).

- H1: Perceived ease of use positively affects the actual usage of 5G technology.

- H2: Perceived usefulness positively affects the actual usage of 5G technology.

According to the research question and hypothesis, ease of use is considered how natural and easy it is to use the new technology. Similarly, perceived usefulness is a degree of measure that indicates that a person believes that technology is useful (He *et al.*, 2018). So, with these hypotheses and research questions, one can find out that people found it useful and easy to use. Questionnaires are prepared to find out the reasoning about the perceived ease of use and with usefulness, one can assess that 5G is helping as compared to the other mode of connectivity.

2.11 Related Work

In this study, the target group is students from Gannon University. Similar work is presented in studies by Al-Maroof *et al.* (Al-Maroof *et al.*, 2021) and Shah *et al.* (Shah *et al.*, 2021), which have considered students from gulf countries, China, and Iran, respectively. All studies have considered the technology acceptance model with additional factors. In a study by Akbari *et al.* (Akbari *et al.*, 2020), a total of 518 students from Iran and the USA were selected for the study and considered a trust, concentration, and mediators. These studies have investigated different demographics for acceptance of 5G in a different setting but considered the students at the university. In this study, engineering students at Gannon University are considered, so this study will add another different demographic to this research area. In the study, a structural equation model is used for finding the relationship between the factors and the intention to use 5G. In this study, only TAM is considered and seeks the existence of a linear relationship, hence correlation analysis is carried out for validating the research hypothesis.

3. Research Methodology

3.1 Data Collection

This survey consists of 13 questionnaires. Out of this nine were for the evaluation of the TAM model and the mentioned hypothesis. The data collected consisted of 196 entries. First, based on the descriptive analysis of the data, the demographics of the data were examined. Demographic data consists of the gender, major, graduate, or undergraduate students, and age group. This data was collected from the students of the engineering discipline of Gannon University. As mentioned earlier, survey questions were divided into demographic and behavioral questionnaires. Some of these questionnaires were considered the global rating form of data collection. The selection of SurveyMonkey for data collection, made it easy to set up questionnaires as per the requirements. SurveyMonkey itself provides several descriptive statistics as the data starts to collect. With this tool, one can create a questionnaire and can generate a link that can be shared among the participants, and for participants, this provides an easy-to-understand web user interface (UI). So that the respondent does not find it difficult to respond.

3.2 Student Personal Information/ Demographic Data

Based on information on gender, age, major, and education level, characteristics of respondents are identified and will give an idea about what type of population this analysis is valid. Since this study was conducted on the students at Gannon University, many respondents also gave an idea about the perception of people from different fields.

Table 1. Frequencies for gender

Frequencies for What is your gender?				
What is your gender?	Frequency	Percent	Valid Percent	Cumulative Percent
Female	51	30.723	30.723	30.723
Male	115	69.277	69.277	100.000
Missing	0	0.000		
Total	166	100.000		

Table 2. Frequencies for age range

Frequencies for Please select your age range.				
Please select your age range.	Frequency	Percent	Valid Percent	Cumulative Percent
18-24	115	69.277	69.277	69.277
25-34	45	27.108	27.108	96.386
35-44	5	3.012	3.012	99.398
65+	1	0.602	0.602	100.000
Missing	0	0.000		
Total	166	100.000		

This age group shows that participants of the survey were from the targeted population. As the survey was conducted on the students at Gannon University, there were 45 respondents who are from the 25-34 age group as well, which indicates that the respondents may be postgraduates as well. This is supported by the frequency table of the highest education level.

Table 3. Frequencies for the highest level of education

Frequencies for What is your highest level of education?				
What is your highest level of education?	Frequency	Percent	Valid Percent	Cumulative Percent
Graduate	83	50.000	50.000	50.000
Undergraduate	83	50.000	50.000	100.000
Missing	0	0.000		
Total	166	100.000		
Missing	0	0.000		
Total	166	100.000		

### 3.3 Student Behavioural Information

In behavioral information, TAM was used to evaluate the acceptance of the 5G technology in which 2 measures perceived ease-of-use and perceived usefulness are required. The actual use is considered here for the acceptance of the 5G technology. So, each of the three measures has three questionnaires in this analysis. Since students were being targeted for the use of 5G, the questionnaires were designed to identify how easy it was to use 5G in their routine work for perceived ease of use. For the perceived usefulness variable, quantify the usefulness of the 5G, it was compared with the existing 4G technology. Since 5G is currently being rolled out but is not yet available in all regions, these questionnaires are created as if asking for their future intention about the 5G technology for actual usage variable. The questionnaire response consisted of 5 levels starting from strongly disagree to strongly agree.

### 3.4 Validation of Instrument

It is necessary to have an idea about the validity of the measurement, i.e., whether data was collected properly or not. There is one measure that is quite often used while validating the data collected from the surveys is Cronbachs alpha. Cronbachs alpha is a measure of the consistency in the response. In this study, 9 questions are for the behavioral data. As discussed, these variables must be validated for consistency. Cronbach’s alpha tells whether every question is the same thing or not. Following is Cronbachs Alpha for each variable of Questions.

Table 4. Frequentist scale Reliability statistics for ease of use

Frequentist Scale Reliability Statistics for Ease of Use	
Estimate	Cronbach’s $\alpha$
Point estimate	0.869
95% CI lower bound	0.830
95% CI upper bound	0.900

Table 5. Frequentist scale Reliability statistics for usefulness

Frequentist Scale Reliability Statistics for Usefulness	
Estimate	Cronbach’s $\alpha$
Point estimate	0.877
95% CI lower bound	0.840
95% CI upper bound	0.906

Table 6. Frequentist scale Reliability statistics for “actual usage”

Frequentist Scale Reliability Statistics for “Actual Usage”	
Estimate	Cronbach’s $\alpha$
Point estimate	0.776
95% CI lower bound	0.710
95% CI upper bound	0.829

Cronbachs Alpha should be at least 0.7 for consistency. In this study, all Cronbachs alpha was more than 0.8 for each group. In table 6, the 95% Confidence Interval (CI), lower and upper bound shows that the possible range of actual

Cronbachs alpha if the selected sample size is larger or different than what it is currently and even the lower bound of Cronbachs alpha is greater than the 0.7 for each of the three cases.

**4. Data Analysis**

Table 7. Pearsons Correlations for PE

Pearson’s Correlations				
			Pearson’s r	p
PE	-	AU	0.579	<.001

Note. All tests are one-tailed, for a positive correlation

Table 8. Pearsons correlations for PU

Pearson’s Correlations				
			Pearson’s r	p
PU	-	AU	0.565	<.001

Note. All tests are one-tailed, for a positive correlation

Following are the scatter plots for PE, PU, and AU.

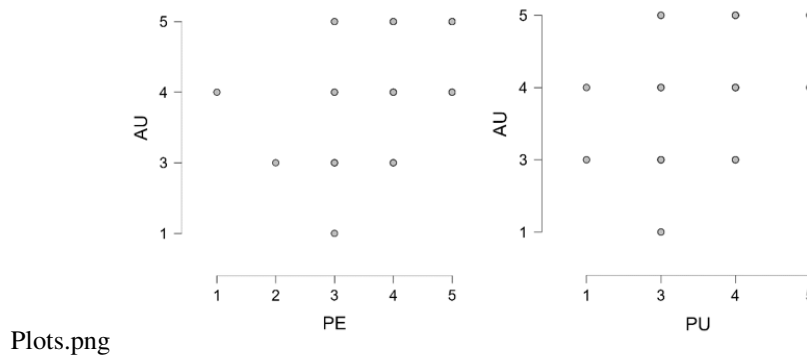


Figure 1. Scatter Plots

As seen from the above scatter plot, is that Actual use increased as the perceived usefulness and perceived ease of use increased. In this analysis, 5% of the significance level was considered for rejecting the null hypothesis, which indicates that there is no correlation or negative correlation with the pair of variables.

**4.1 Criteria for Rejecting the Null Hypothesis**

To reject the null hypothesis, a significance level is considered. Generally, a hypothesis is tested at 5% and 1% significance levels. Test statistics are calculated and based on the known distribution at a given significance, the critical value of test statistics needs to be found and then those two values need to be compared. In the t value-based test,  $t_c$  is found from known distribution at a given significance level. If  $t > t_c$  then there is sufficient evidence to reject the null hypothesis. When the p-value is considered in the analysis, it is directly compared with the significance level. I.e., if  $p = 0.01$  (i.e.,  $p = 1\%$ ) and significance level  $\alpha=0.05$  (i.e.,  $5\%$ ) so here if  $p < \alpha$  then we can say that null hypothesis is rejected.

**4.2 Hypothesis Test**

In this analysis, the p-value for each case is below 0.001. This is well below comparison to significance level 5% i.e., 0.05. This indicates that there is sufficient evidence to reject the null hypothesis and accept the alternate hypothesis. This test has been carried out in the JASP tool and this tool does not provide the t-statistics. So, it is calculated by taking a degree of freedom =  $n-2 = 165-2 = 163$  and using the procedure provided in the previous chapter.

For  $H_{A1}$ ,

$$t_{H1} = \frac{0.579}{\sqrt{\frac{1-0.579^2}{165-2}}} = 9.067$$

For  $H_{A2}$ ,

$$t_{H2} = \frac{0.565}{\sqrt{\frac{1-0.565^2}{165-2}}} = 8.743$$

Table 9. Results for rejecting the null hypothesis

Hypothesis	Pearsons Correlation	t-value	P	Level of significance	$p < \alpha$	Result
H1	0.579	9.067	0.001	0.005(5%)	0.001 < 0.005	Null hypothesis Rejected
H2	0.565	8.743	0.001	0.005(5%)	0.001 < 0.005	Null hypothesis Rejected

Table 9 shows the Pearsons Correlation, t-value, P-value, and level of significance calculated for each hypothesis.

So, this test concludes that both the alternate hypothesis is valid and accepted, which validates TAM on acceptance of the 5G technologies.

### 5. Discussion of Result

In this survey, graduate and undergraduate students at Gannon University were surveyed for technology acceptance of 5G. SurveyMonkey was used for collecting the survey response electronically. The motivation behind the consideration of technology acceptance of 5G is to see what factors affect the acceptance of 5G technology. 5G technology is very important in current times, as most work is now done through the internet. 5G provides stable and low latency connectivity to stay connected. Misconceptions regarding the 5G technology and several groups of people raised controversies about 5G. So, it is very important to investigate the acceptance of 5G technology. In demographic data, firstly gender, there were more male responders than female respondents. There were more people from the age group 18-24, and 25-34 which makes sense because the target respondents were undergraduate and graduate students. There is an equal distribution between the graduate and undergraduate students, and there were significantly more students from Electrical, Mechanical Engineering, and Computer and Information Science. Secondly, Cronbachs alpha was calculated for the set of questionnaires for these three groups: perceived ease of use, perceived usefulness, and actual use. The consistency of this measure in questionnaires. This Cronbachs alpha should be more than 0.7, if the Cronbachs Alpha is below the 0.7 range, then questions that are having inconsistent responses are removed from the analysis. In this analysis, when questions are grouped in three, Cronbachs alpha was above 0.8 and below 0.9 which is sufficiently larger than the threshold. This indicates that the responses and study are consistent. All these nine questions are converted to three variables, by the aggregating response to three questions in each of the three groups. Variables PE, PU, and AU are created that are respectively Perceived Ease of Use, Perceived Usefulness, and Actual Use. Thirdly, a person correlation analysis between the perceived ease of use and actual use, and between perceived usefulness and actual use was calculated for hypothesis testing. Pearson Correlation for pairs PE-AU and PU-AU was calculated, which was 0.579 and 0.565, respectively. In this analysis, the significance level is 5% which means  $\alpha=0.05$ . In Pearson Correlation analysis, using the p-value, the null hypothesis can be accepted and rejected. This means  $p < \alpha$ . The P-value test and the value of correlations show that Perceived ease of use and perceived usefulness positively affect the actual use of 5G technology. This concludes that the responders are finding 5G easy to use and useful.

#### 5.1 Answer the Research Questions

*RQ1:* Does perceived usefulness and perceived ease of use affect the actual usage of 5G technology among engineering students?

*Answer:* As discussed in the data analysis, it is concluded that perceived ease of use and usefulness positively affect the actual usage of 5G technology and positively correlate with actual usage. The correlation values of the pair PE-AU and PU-AU are 0.5 and 0.6 and the p-value was 0.001. So, there is sufficient statistical evidence that there is a correlation between the pairs and rejects the null hypothesis.

*RQ2:* To what extent do perceived usefulness and perceived ease of use determine the actual usage of 5G technology among engineering students?

*Answer:* In this analysis, the correlation value was more than 0.5 in both variables indicating the positive relationship between pairs PE-AU and PU and AU. In a comparison of the two variables of correlation value, the PE-AU pair was higher which means perceived ease of use has a higher impact on the actual usage of 5G technology as compared to the perceived usefulness. This indicates that if the 5G technology is easier to use then the acceptance of 5G technology among engineering students will be more.

## 6. The Implication of the Study

Based on the demographic data, most of the respondents are male, and as mentioned earlier the majority are from 3 branches of engineering which can be considered as the bias in this study. So, the result may vary if the distribution of respondents is different than the study presented here. Here it's necessary to talk about these 3 majors of engineering: Electrical Engineering, Mechanical Engineering, and Computer and Information Science. When looking at the group rating table, these 3 groups do not have the highest average rating but do consist of many responders. Out of these 3 groups of respondents, computer and information science has the highest average rating for perceived ease of use, then comes electrical engineering, and lastly mechanical engineering students. The same order is seen for the perceived usefulness. This indicates that people having relevant knowledge find it easy to use. However, conclusive findings require further analysis of the additional factors. In a study by Al-Marouf *et al.* (Al-Marouf *et al.*, 2021) and Chan and Lee (Chan & Lee, 2021), the impact of other factors apart from the perceived ease of use and perceived usefulness were considered. Moreover, from the education level graduate students have more average ratings for all 3 variables as compared to undergraduate students. These 2 observations indicate that there should be additional factors that are related to the knowledge level of the individual, i.e., how much an individual knows about the technology. The result had shown that there had been significant evidence that perceived ease of use and perceived usefulness positively affect the actual use of 5G. This finding corresponds with the previous studies (Akbari *et al.*, 2020), furthermore here in this study, found that perceived ease of use has more impact on the actual use of the technology.

## 7. Limitations

This study investigates TAM for 5G acceptance among the engineering students at Gannon University. This analysis considered only perceived ease-of-use and perceived usefulness to see the user's actual usage of 5G technology. Where in a previous study (Akbari *et al.*, 2020; Chan & Lee, 2021; Han & Zhang, 2020), additional factors like perceived enjoyment, perceived personal innovations, perceived skills readiness, etc. The sample size is smaller and is only focused on the engineering students at Gannon University. It is necessary to have diverse responders but this study did not have them. Moreover, since here students were considered for the survey, there was no such question that can help to answer low rating in the ease of use. Similarly for perceived usefulness, no such factor was considered. In addition to that, this study only considers the correlation between the pairs. Instead, linear regression or linear model would give a relationship. The study targeted only engineering students. To more generalize the results, the survey should be conducted on a more diverse demographic. Furthermore, the study had only considered the only 5G technology. There is no contrast represented with the other technology like 4G or broadband service.

## 8. Future Work

Future work of this study mainly consists of removing the limitation in the existing study to create more constructive findings related to the acceptance of the 5G. First, the study will be extended to the other stream of students. This will give more information regarding the perceived ease of use, along with additional factors such as personal knowledge of the technology working. It will give more information regarding the perceived usefulness, along with consideration of factors that inform about the personal belief about the technology. Additional factors for contrasting with other technology like 4G and broadband service will be considered.

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