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Analyzing the impact of modern support services leveraged with digital technologies on customer experience: Implications for business sustainability in telecommunication sectors of PNG

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Abstract

In today's competitive environment, providing exceptional customer experience is highly pivotal for business sustainability including telecom sectors. This study conducted among the customers of telecommunication sectors in Papua New Guinea examined the impact of modern support services augmented with digital technologies on customer satisfaction and their retention. It addressed various critical parameters including customer awareness of digital support services, challenges encountered in both conventional and digital support channels, perceived effectiveness and the influence of digital literacy. The questionnaire was framed to test the effectiveness of the digital technologies on customer experience and the data were collected based on a convenient sampling distribution. The samples of 100 respondents were analyzed in SPSS using the Independent t-test, chi-square test and frequency distribution tools. The finding revealed that both traditional and modern digital support services had positively impacted customer retention paving the way for business sustainability. Also, the study outcome highlighted that 64% of customers have adequate awareness about digital support services. Another interesting finding showed that there was no significant association between digital literacy and the use of digital support services. Further, the research identified long waiting hours and difficulty in reaching the customer representative as the predominant challenges in the traditional support system. On the other hand, a limited range of support services and lack of personalization were the major challenges of digital support services. Even though the expression of retention rate was higher in digital support services, the perceived effectiveness was still high in the traditional support system. This study could be extended to additional insights having analyzing customer experience in using digital support tools in the context of age, gender, province and a few other attributes. However, the potential findings derived in this study will highly contribute PNG telecommunication sectors to sustain their business by knowing their customer expectations and developing strategic plans for their retention. This study recommends that service providers to take necessary steps to increase awareness and training to use digital support systems and also suggest providing toll free customer care facilities.

Keywords: Customer experience, digital support services, customer retention, Papua New Guinea, telecom sector, digital literacy, business sustainability

I) Introduction

In today's digital era, the telecommunications sector plays a vital role in national economic development. The telecommunication services are becoming a critical component for the growth of other segments such as banks, education, travel and tourism. Papua New Guinea (PNG), with its rugged terrains and mountainous landscapes, faces significant challenges in delivering teleservices to remote and isolated communities, making provision both difficult and costly. However, the PNG telecommunication network has made a significant growth in the past decade and has also transformed digitally. Digicel, BMobile and Vodafone are the service providers in the country. According to Papua New Guinea's National Statistical Office (NSO) 2024 report, the population census is 10.18 million. Among these, 5.03 million people have cellular mobile connections, according to Data Reportal's digital-2025 study. PNG Telecom sector News 2025 highlights that there is sustainability issues such land disputes and infrastructure costs while reporting notable increases in broadband and mobile coverage (4.4 million subscribers, 90% 4G coverage).

This expanding subscriber base emphasizes how crucial it is to provide reliable customer support services that can meet the various demands and expectations of a diversified customers. Telecommunications core services typically include Voice calls, data, and internet connectivity by managing network switching, routing, and signal transmission across devices and locations. Customer support services facilitate and enhance the delivery of core services (Vargo & Lusch, 2004). To ensure business sustainability, service providers in the telecommunications industry are concentrating on strengthening their relationships with clients by improving both the quality of their services and the viability of their customer support services. Customer support services facilitate and enhance the delivery of core services. (Roos & Edvardsson, 2008). To maximize the efficiency of their customer support services, telecom industries have started deploying digital support system in addition to traditional support services.

In today's digital era, the role of customer service support extends beyond simple trouble resolution. Customer experience depends on aspects of customer awareness, challenges encountered while using support services, digital literacy's influence on accessing these services, and perceived effectiveness in addressing customer needs. The goal of this research is to study the above aspects in the context of telecom users in PNG. Further, it also finds the influence of modern digital support services and traditional support services on customer retention rates in these industries. According to Cheong et al. (2025), the digital divide and algorithmic bias are obstacles that Papua New Guinea's developing tech society must overcome. They propose Open-Source Software (OSS) as a way to promote equitable ICT use. This coincides with the need for inclusive digital initiatives in customer support services within PNG's telecom sector.

II) Literature Review

Digital technologies are widely adopted by businesses to support customers and build sustainable relationships. Roos and Edvardsson (2008) argued that telecommunication sectors could increase their sustainability and competitive advantage by offering fast and a wide range of customer support services with the help of digital tools. In this context, Hossain (2017) recommended telecom industries build long-term relationships with customers to be successful in competitive

markets. The customers who are satisfied with the support services are likely to be loyal customers and they continue with the service provider. Customer satisfaction is one of the key elements deriving the customer decision to continue with the operators (Zhou,2011). Similarly, to his argument, Hossain (2017) also emphasize that the customer satisfaction is a vital factor towards customer retention in mobile segments.

Telecommunication providers their customers using different channels of support services. They use customer care centers, call centers, webchat, email communications to provide required services to their customers. Customers expect fast and reliable services to fix their issues and any interruption in availing their service might cause customers to move to other networks. Kim et al. (2004) studied the effects of customer satisfaction and switching barrier on customer loyalty in Korean mobile telecommunication services. They derived the conclusion that wide range of customer support systems, quick response in addressing queries, easy steps in registering complaints and queries, and friendly support while receiving customer complaints had a positive relationship with customer loyalty and they helped to keep customers from switching to other competitors in the market.

Quality and reliability of the service could be enhanced by using modern digital support tools. Sinha et al. (2020) found that customer service factors such as call quality, billing, and overall support positively influenced customer loyalty. Their study also concluded that young digital citizens play a vital role in changing the trend by adapting to new digital solutions provided by telecommunications companies. Use of digital technologies like Artificial Intelligence in providing customer support services has significantly raised customer experience in both the services offered at the time of sales and after-sales (Abu Dagar & Smoudy, 2019). Alawadhi et al. (2021) found that digitalization of customer service in the telecom sector boosted customer experience and satisfaction, regardless of age. They recommend that the industries increase the use of digital technologies to increase effective service leading to increase in repurchase and retention chances. In the same year, research by Gelbrich et al., (2021) proved that emotional touch in customer services by the digital assistants had increased the satisfaction level of customers and the services with emotional support had increased their persistence too. Their study recommended that business entities add a human touch in their digital support facilities to raise their business outcomes.

Rajkhowa and Das (2020) pointed out that the telecommunication network companies are experiencing difficulty in understanding the real expectations of customers. If they could provide the expected customer service, they have high chance of retaining existing customers and add new customers to their network and use of digital tools like AI algorithms to understand their personalized expectations could be of use in this context.

Research has been conducted to study the impact of digital support services on customer satisfaction with industries like telecommunications, travel, restaurants, hospitals, banking sectors and insurance companies in countries like Nigeria, India, Cameroon, Palestine, UAE, etc. There are very few studies done in the context of Papua New Guinea, and specifically, studies about customer support services using digital technologies in telecommunication services have yet to be conducted. Hence, this research to find the influence of modern digital support services on customer satisfaction and their implications in retaining customers for sustainable business will provide valid insights to the telecom service providers to improve their customers satisfaction and retain them for their sustainable growth.

III) Research Aim and Objectives

The research aims to examine the impact of current digital support services on customer experiences in the telecom sectors of Papua New Guinea. The following objectives are set for the current study.

- Assess the customers' awareness about modern digital support services in telecommunication sectors of PNG
- Identify the challenges encountered by the customers while using modern digital support services and conventional support services
- Examine the impact of digital literacy on the use of modern digital support services
- Evaluate the perceived effectiveness of customer support by analyzing their experiences with modern digital support and conventional support services in resolving issues.
- To find the influence of modern digital support services and conventional support services on the customer retention rate in the telecommunication sector of PNG

IV) Research Methodology

A) Sampling and data collection:

This study used quantitative method to collect the data and used statistical tools to measure variables, analyze and test hypothesis. The primary data required for the above objectives were collected using questionnaires. The questionnaire was designed to collect information about customers' awareness of digital support services, their difficulties utilising them, their level of digital literacy, how effective they thought the services were, and how the support services affected their decision to stick with the network operator.

The questionnaire was shared among the telecommunication network customers selected based on convenient sampling strategy. Convenient sampling, in comparison to other methods, is flexible to collect data where there are more logistic constraints, time and cost. 100 users responded and the data were checked for reliability. The Cronbach's Alpha was 0.645(>0.5) indicating the acceptance in the reliability test.

Table 1: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.645	.683	58

B) Research Hypothesis

H0: Customers have adequate awareness of modern support systems enhanced with digital technologies.

H1: There is no significant association between digital literacy and the use of modern digital support systems
H2: Traditional support systems are perceived to be more effective than modern systems enhanced with digital technologies
H3: Customer retention is influenced by the services provided by both traditional and modern support systems

C) Data Analysis

Frequency analysis is used in this research to measure the awareness of the customers about the availability of digital channels in support services and to find the top challenges in using the support services rendered through both the traditional and modern support systems. The relationship between digital literacy abilities and the utilisation of digital support systems was investigated using chi square testing. Analysing using an independent test yields the perceived effectiveness. The frequency distribution values are also used to predict the effect of customer experience with these services on retention rate.

V) Results & Discussions

i) Assess the customers' awareness about modern digital support services in the telecommunication sectors of PNG

A simple Bar Diagram was used to show the respondents' awareness of modern digital support services in the telecommunications sector

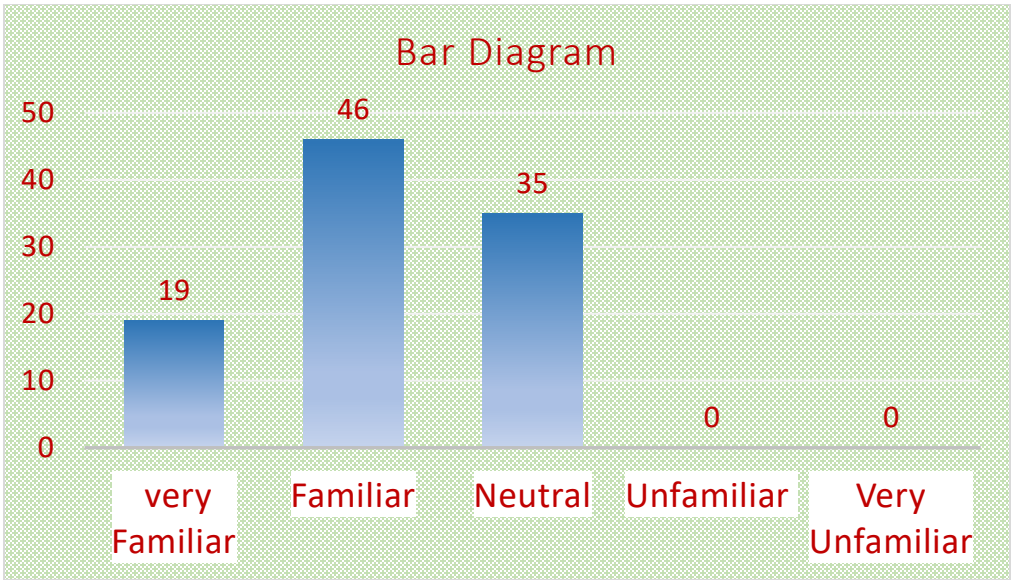

Figure 1: Bar Diagram for awareness about modern digital support services

The above bar diagram shows that 19% of the 100 respondents said they were extremely familiar with these services. The largest group, 46%, said they were familiar. 35% expressed neither familiarity nor unfamiliarity. None of the participants said they were unfamiliar or extremely unfamiliar with these services. 65% of respondents are at least familiar with digital support services, according to cumulative percentages, indicating a typically high degree of awareness

among participants. Overall, the data shows that most participants were somewhat familiar with contemporary digital assistance services.

Table 2: Frequency of Preferred Modern Digital Support Tools

Modern Digital Support	**Number of respondents**
Social media	65
Mobile apps	63
Voice Assistants (e.g., Siri, Google Assistant)	44
Automated Phone Services	35
Chatbots on Websites	40

Table 2 above illustrates the frequency distribution of respondents' preferences for modern digital support tools in the telecommunications sector. 65% of the 100 participants responded, demonstrating that customers frequently use social media channels to obtain support. Additionally, 63% of participants preferred mobile app-based support, emphasising the necessity of mobile-friendly digital platforms. And 44% are interested in voice assistants (e.g., Siri, Google Assistant), 40% are aware of chatbots on websites, and 35% prefer Automated Phone Services, indicating that customers rely less on traditional automated systems.
Overall, these results show that customers prefer participatory and easily available digital platforms like social media and mobile apps. Many respondents chose various tools, demonstrating that an integrated strategy is required for effective modern digital support.

ii) Challenges in getting the support services

Descriptive statistics is used to study the basic characteristics of data and find insights of it. Here the challenges in availing the support services provided by the traditional support services and modern channels are studied through this tool. Given below is the table containing the common challenges and their associated frequency count, mean and variance values.

Table 3: Challenges encountered while using traditional Support Services

	N	Sum	Mean	Std. Deviation
Long Waiting Time	100	73	.73	.446
Difficulty to reach	100	52	.52	.502
Language Barrier	100	22	.22	.416
Limited Availability	100	49	.49	.502
Lack of Knowledge	100	35	.35	.479
Ineffective Person	100	29	.29	.456
No Challenges	100	11	.11	.314

Table 3 shows the challenges faced by customers while using traditional telecommunications support services. Overall, 73% of participants said that a long wait time for service is a big concern. This highlights a significant gap in the responsiveness of traditional support systems. The second most common challenge was difficulty in reaching customer support professionals, with 52%.

Followed by the other issues like limited availability of representatives with a mean of 0.49 and a lack of knowledge among personnel (mean = 0.35), implying inconsistencies in operational efficiency and staff competency. Language barriers (mean = 0.22) and ineffective personnel (mean = 0.29) were less frequently noted, but they nevertheless indicate areas for development. Only 11% of respondents reported no challenges, showing that the great majority have at least one challenge when using traditional support services. Overall, the data shows that customers are highly dissatisfied with different operational aspects of traditional support services.

Table 4: Challenges encountered while using digital Support Services

	N	Sum	Mean	Std. Deviation
Misunderstanding about the Queries	100	43	.43	.498
Providing inaccurate Information	100	26	.26	.441
Limited Range of services	100	49	.49	.502
Difficulty navigating the system	100	26	.26	.441
Lack of personalized assistance	100	45	.45	.500
No challenges	100	1	.01	.100

Table 4 provides the challenges experienced by customers when using modern digital support services. Among the 100 respondents, the most generally cited complaint is a Limited Range of Services, which has a mean score of 0.49, meaning that 49% of users believe that digital platforms do not cover all types of queries or support requests. This shows that, while digital solutions are useful, they may not completely replace human-assisted services for difficult problems. The next main issue is a lack of personalised assistance (mean = 0.45), with 45% of consumers believing that digital solutions do not give individualised support. This demonstrates a common weakness of automated systems like chatbots and self-service portals, which frequently provide generic responses.

Misunderstanding About Queries (mean = 0.43) is another big worry, with many users receiving wrong interpretations of their problems from digital systems. Challenges such as providing inaccurate information and navigating the system (both mean = 0.26) were less common, but they nevertheless signal usability and accuracy concerns. Only 1% of respondents reported no challenges, indicating that nearly all customers encountered some difficulty while using digital support services. Overall, while digital support systems improve efficiency, clients still face constraints in terms of accuracy, personalisation, and comprehensiveness.

iii) Impact of digital literacy skills on using the modern support services enhanced with digital technologies

Chi-square test is used here to find the association between two categorical variables – digital literacy skills and the use of digital support services. The output of the chi-square test has been given in the following table.

Table 5: Crosstabulation of Preferred Channel for customer support service and the levels of digital literacy

Preferred Channel for Customer Support Service	Level of Digital Literacy			Total
	Limited Skills	Proficient	Highly Proficient	
Digital Support Services	1	74	13	88
Traditional Support Services	0	6	1	7
No preference	0	4	1	5
Total	1	84	15	100

Table 3 results show a substantial correlation between the preferred channel for customer support services and digital literacy levels. 88% of all respondents, or customers with proficient (74%) and highly proficient (13%) digital literacy, strongly favor digital support services. Only a small percentage of expert or extremely proficient users have no choice (5%) or prefer traditional methods (7%). Digital solutions were also preferred by those with weak digital skills (only one responder), but the sample size is too small to identify a distinct trend.

Table 6: Chi-Square Tests table for Preferred channel and digital literacy levels

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.237[a]	4	.994
Likelihood Ratio	.349	4	.986
Linear-by-Linear Association	.148	1	.700
N of Valid Cases	100		

a. 6 cells (66.7%) have expected countless than 5. The minimum expected count is .05.

The above table 4 chi-Square test shows the value 0.237 with 4 degrees of freedom. That indicates no significant association between the preferred customer support channel and the levels of digital literacy. The significant value is 0.994, which is greater than the standard significance level 0.05, indicating that differences in digital literacy level do not significantly influence whether customers prefer digital, traditional or no preference support channels.

Furthermore, 6 out of 9 cells (66.7%) have anticipated counts less than 5, indicating that the Chi-square test's assumptions are broken, hence, the test results should be evaluated cautiously. The reliability of the Chi-square result deteriorates when many expected counts are low, and even if a relationship is present, the test may fail to identify it.

Although low predicted frequencies restrict the robustness of this conclusion, the statistical output indicates that there is no statistically significant correlation between the preferred customer assistance channel and digital literacy level.

iv) Perceived effectiveness of customer support based on their experiences with modern digital support and conventional support services in resolving various issues.

Table 7: Frequency Distribution of customer experience with Modern and Traditional Support Services.

	Modern support services	Percent	Traditional Support Services	Percent
Highly Dissatisfied	0	0	5	5.0
Dissatisfied	3	3.0	38	38.0
Neutral	27	27.0	57	57.9
Satisfied	53	53.0	0	0.0
Highly Satisfied	17	17.0	0	0.0
Total	100	100.0	100.0	100

The above frequency distribution table shows a clear difference in customer experience between modern support services and traditional support services.

For Modern support services, 70% of customers are either highly satisfied (17%) or satisfied (53%) with modern support services. And just 3% are not dissatisfied. Furthermore, none of them was highly dissatisfied. Most respondents expressed satisfaction, indicating that contemporary support systems provide a very pleasant customer experience.

Conversely, 38% of respondents are unsatisfied with traditional support services, and 5% are extremely dissatisfied. Most people (57.9%) are in neutral, neither satisfied nor unsatisfied. Additionally, no customer expressed satisfaction or high satisfaction. According to these statistics, the majority of customers are either unsatisfied or not interested in traditional support methods.

Table 8: Levene's Test for Equality of Variances for the rate of Satisfaction with Modern and traditional Support services.

The above table shows the significant level for traditional Support services is 0.590 is greater than 0.05 thus, there is a statistically significant difference in effectiveness. For "Satisfaction with Traditional Support Services," the t-test indicates a statistically significant difference. Customers, on average, rate traditional support services more satisfactorily than modern support services. On the other hand, for "Satisfaction with Modern Support Services," the t-test does not reveal a statistically significant difference. This means there is no strong evidence to suggest that satisfaction ratings for modern support services are different from traditional support services. Hence, the hypothesis H2 is accepted.

V) Influence of modern digital support services and traditional support services on customer retention rate in the telecommunication sector of PNG

Table 9: Influence of Traditional and Modern Digital Support Services on Customer Retention.

Rate of Satisfaction		Levene's Test for Equality of Variances						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Traditional support services	Equal variances assumed	.292	.590	2.582	88	.011	.413	.160
	Equal variances not assumed			2.228	17.783	.039	.413	.185
Modern support services	Equal variances assumed	3.550	.063	-.561	88	.576	-.120	.214
	Equal variances not assumed			-.674	24.873	.506	-.120	.178

	Traditional	Digital
Not at all	7	2.0
Slightly	18	9
Moderately	60	54
Significantly	15	35
Total	100	100

75% of the customers had expressed that they are adequately influenced to retain in the network system because of the service support delivered through traditional support systems. Comparatively, it is 89% reported in the digital support systems. Hence both the support services had influenced customer retention paving way for business sustainability.

VI) Key Findings

Awareness: According to this report, 65% of respondents are aware of modern digital support services. Furthermore, the survey reveals that more than half of respondents use methods such as social media and mobile apps for customer support in telecommunications services.
Challenges: Customers suffer the most significant issues in traditional support services, such as long wait times and difficulty in contacting a person. The most significant problems for modern digital services are a limited range and a lack of personalised assistance.
Digital Literacy Impact: No significant relationship was observed between digital literacy levels and preferred support channel, but proficiency generally correlates with use of digital services.
Satisfaction: 70% of customers reported being satisfied or highly satisfied with modern support services, while traditional services had lower satisfaction levels.
Customer Retention: Both traditional and digital support positively influence retention. Digital services have a slightly stronger effect than traditional service. 89% of respondents accepted that, digital services have encouraged them to continue using the same telecommunication.

VII) Conclusion and Recommendations

In the era of industry 4.0, all business entities are building their strength by incorporating digital technologies in all their operations. Customer experience is one of the vital components for business success and it is enhanced by digital tools. This study examined the influence of modern support services leveraged with digital technologies on customer experience and its implications for business sustainability in the context of Papua New Guinea's telecommunication sectors. The results of the research outlined that there was an encouraging awareness among the customers about digital support channels. Challenges in availing the support services were also identified and addressing those challenges by telecom service providers might hold the customers for long time leading to business sustainability. It was reflected that traditional support system had more perceived effectiveness than modern support services even though 89% of customers had stated that they were influenced to stay because of digital support services. Lack of personalized assistance is one the main challenge cited for digital support services and adding emotional touch and personalization with the help of Artificial Algorithms will help network service providers to increase their customer experience.

This study could be further continued by analyzing the impact in the perspective of other attributes such as age, gender, province and locality. Stratified sampling could be used to collect data from different subpopulation for further study.

This study has several recommendations like:

Awareness and Training: Increase awareness programme and training with the Launch of targeted campaigns and workshops to educate customers on using digital support systems efficiently, especially in rural areas.
Expand the Digital Support Services: Expand or customize the range of services.
Feedback: Continuously collect feedback from the customer and implement it to assess customer satisfaction and identify the gaps.
Future Research: Increase the sample size and use probability stratified sampling to include demographic factors like age, gender, and province for deeper insights and better generalization.

VIII) Limitations of this study

The study has a few limitations, such as a small sample size of just 100 respondents compared to a population of over 5 million mobile users and the use of convenient sampling, which limits generalizability and may not reflect the total PNG telecom user base.
The study broadly covers that customers viewpoints, omitting telecom providers' operational limitations, and it does not include demographic analysis of age, gender, province, or socioeconomic characteristics.
Furthermore, perceived effectiveness is dependent on subjective satisfaction ratings without including concrete operational KPIs like response time or resolution rate, which limits the depth of performance evaluation.

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