

Acceleration of Digital Payment Adoption during COVID-19 Pandemic: A Case Study of Nepal

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Abstract

Since the starting of the coronavirus, the world has faced bigger challenge in terms of health and economy. As World Health Organization urged all governments across the world to limit the public gathering and make less physical contact, many governments followed it with implementing nationwide lockdown. Those governments also urged to use digital payment as access to banks was not possible. This has led in acceleration of digital payment users across the globe. This research finds the various factors that motivated the acceleration in digital payment adoption during pandemic in Nepal. The study has to find the actual reason for the shifting and acceleration on adoption of digital payment. survey among various sample population from various part of the country This research has used various statistical tools including but not limited Standard Deviation, Mean, Median, Mode, various bar and graphs. The study has used Technology Acceptance Model Framework for the whole research and later the framework is validated by analyzing the finding from collected data of the research. The study has also covered the role of government as well as discuss the future prospects for the digital payments after the pandemic ends in Nepal and provided recommendations and space for future works in the similar field of study.

Keywords: Corona Virus, Digital Payment, Banking Institutions, Monetary Policy, Perceived Risk, Descriptive Statistics, Technology Acceptance Model

1 INTRODUCTION

The emerge and spread of 2019 novel coronavirus (2019-nCoV), also known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a new string of coronavirus outbreak started in Wuhan, China, in December 2019, has disrupted the daily lives of billions of people (World Health Organization, 2020). As the virus started spreading in the following weeks across the world, the Chinese public health authority as well as scientific communities around the globe studied the virus and provided the gene sequence of the virus to the world. The virus is highly airborne and transferrable from person to person via physical contacts affecting every aspect of life worldwide.

The awareness about digital payment in Nepal was less before COVID-19. People ignored the importance of digital payment solutions because exchanging banknotes is handy. However, with the life-threatening infection looming over their heads, the government and various organizations started rampantly promoting digital payment. This awareness drive encouraged more people start using online or digital payments in at fast pace.

Although the main reason in the increment of digital transaction is fear of the virus, other reasons like educated or aware family members persuading other members to use digital payment accelerated the entire process. Banks and financial institutions made access to digital payment convenient. Opening a bank account and creating an e-banking service was made available, along with registering for various mobile wallet services and virtual form submissions. Many retailers and online food delivery service made digital payment mandatory, either via mobile wallet, online banking, and contactless transfer, to help accelerate the digital payment system (Widayat, 2020).

1.1 Brief background

Since the start of the pandemic, millions of people have lost the lives and hundreds of thousands of people are being infected every day. According to the Ministry of Health and Population, Nepal, the daily number of new cases of COVID-19 is close to 2000 (Ministry of Health and Population, 2020). The pandemic impacted the people and how they do daily transactions; hence, the research gap is seen.

As World Health Organization (WHO) confirmed that the novel coronavirus could transmit via

physical contact, including physical objects, paper notes were the first to be suspected of carrying and spreading the virus among the mass. Various governments around the world raised awareness through public notice to discourage the use of banknotes. China was the first to act and pull back all the cash from the market to issue new and disinfected notes to the bank (Taylor, 2020).

This information made Nepalese people forced in using less banknotes during the pandemic. Buyers, as well as sellers, started preferring digital payment over the exchange of banknotes. Shops and stores that didn't have digital payment for the customers started adding digital payment equipment.

1.2 Ethical issues, challenges

As ethics and confidentiality are integral part of any research, this research values both. The collected data and identity of all respondents are kept confidential and will not be shared with any third party.

1.3 Problem Statement

As the research starts with the problem to be solved, it is a very important part of the study to define the problem statement (Baldwin, 2018). Here are the problems or issues that need proper research to understand the situation of digital payment acceleration.

Here are the issues that needs proper research to understand the situation

- The COVID-19 made a significant impact on people's perspective on using banknotes. Research on peoples' current perception about letting go of paper notes over digital payment and the possibility of its use in the future would be beneficial (Raphael Auer, 2020).
- A surge in digital payment was seen during the pandemic in Nepal. It also saw an increase in new digital payment users during the pandemic. A detailed study is needed to assess the motivational factor for signing up for digital payment services.
- Most data shows that digital payment remains saturated, mostly in Nepal's urban areas, as cities have the greatest number of digital payment users. There is a research gap finding the reason to have fewer users from rural areas of Nepal.
- To find the factors resulting in the issues mentioned above, detailed research through questionnaires must be carried out.

1.4 Research Questions

The study will aim to answer the following questions during research:

- What is the perception of cash among people in Nepal?
- What factors forced people to shift from Cash Payment to digital payment for retail shopping during CoVid-19?
- What will be the main challenging factors impacting prospects of digital payments in Nepal post-CoVid-19?

1.5 Objectives

The objectives of this study are as follow:

- To find the general perception of the public about Cash Payments during COVID-19 Pandemic.
- To explore the reason for shifting from offline Cash payments to digital payments during the CoVid-19 pandemic.
- To determine the future prospects of digital payment in day-to-day transactions post Covid-19 in Nepal.

1.6 Scope and significance of research

This research's scope is limited to data provided by the digital payment services active within Nepal. Moreover, this research covers payment systems like Mobile wallets, POS card payment, Contactless, and QR code payment. The sample size for this research is 300, and the demographic group is categorized into four different age groups.

- 18-23 (Gen-Z -who rampantly use technology)
- 24-35 (Millennials -Use technology based on their preference)
- 36-42 (Post-Millennials -Aware about technology but hardly use it)

- 43-50 (Middle-age -Seldom use technology)

This research will find the factors behind the transformation from 'fiat currency' to digital payment in Nepal during the COVID-19 pandemic. Here is the list of areas that will have an impact and benefits from this study.

- This is the first yet comprehensive research on digital payment adoption in Nepal.
- This research can help banks and financial institutions rollout decisions on future digital payment products.
- This research may help policymakers find the perception of general people on banknotes and digital payment.
- This research will help mobile wallet service providers find the factors behind the increased number of users during this pandemic.

1.7 Limitations of the study

The conducted study has some delimitation in the scope while performing the research (Dimitrios Theofanidis, 2018). Here is the list of delimitations of this research.

- This study only covers Nepal in terms of geography.
- This research only looks into mobile wallets, QR code payments, POS card payments and contactless card payments for digital payment.
- The age coverage is limited to the 16 to 76 years age group.

2 LITERATURE REVIEW

The history of electronic payment goes back to the 1870s, when Western Union started the payment with Electronic Fund Transfer (EFT) in 1871. The development was gradual but comparatively slow from 1871 to the 1960s. From telegraph being used for money transfer by Federal Reserve of America in 1910 to the establishment of first independent credit card company, Diner's Club International in 1950s, the growth of such cashless payment has been witnessed. Since then, the ideas of sending money either to people or pay for goods and services have evolved in many ways. However, only from the 1970s, electronic payment used computers to enhance the security of transactions. Services like Automated Clearing House (ACH) were the first digital-based services rendered by the government USA. With the development of the world wide web for military purposes and later being used by ordinary people, various development was seen on digital payment services (Francis-Poulin, 2019).

The modernization of banking (Rani and Kautish, 2018) by Nabil bank in the 1990s with credit card services followed by Himalayan Bank providing ATM services and domestic credit cards in 1995 revolutionized the Industry. The first bank to provide e-banking service was Kumari Bank in 2002 and Laxmi Bank introduced SMS banking in 2004. In the initial days, the purpose of such digital payments was to check transactions and statements (Esewa, 2020).

As per the report by Nepal Rastra Bank, the central bank of Nepal, 60.9% of Nepal's population has a bank account. With exponential growth seen in digital banking and payments, the reasons are various in the context of Nepal. With smartphones being affordable, growth and penetration of the internet even in the rural part of Nepal, cost-effectiveness of digital banking and anytime anywhere banking services have fueled the growth in Nepal (Sherpa, 2015).

3 RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

Every research or study initially starts with the design of the research and methodology. To elaborate, research is an extensive study and search for systematic and scientific information on a specific area or topic. Research is also considered investigation and is accepted all over the world. To conduct such research, a given framework of methodology should be defined before starting it. A methodology is activity of how research should be undertaken, including the ideas, knowledge, and ability and theoretical assumptions on which whole research is based and implemented for the method (Kothari, 2004).

3.2 Research Strategy

A survey will be used for the research strategy as the survey is perceived as authoritative and allows to collect of quantitative data that can be analyzed easily. The main feature of the survey is it gives the researcher independence.

3.3 Research Method

With COVID-19 infection spreading rapidly daily, the adoption of preventive measures is a must to halt the spread of the virus. Along with different forms of physical contact, exchanging banknotes remains one of the biggest threats to people's health. Almost every country is trying its best to stop the spread by making its civilians aware of the possible agents that could spread the virus. And, efforts have been made to transfer the banknote economy to the digital economy, which this pandemic has helped to accelerate (Sarah Dodds, 2020).

Nepal Rastra Bank is working continuously to convert the local economy to digital for years. However, the process has been comparatively slower because people are reluctant to change their habits. After the spread of the virus, the people of Nepal became aware of the virus-transmission through a banknote, which helped change their habit from paying cash to digital payment systems within a short period of time.

This research will be exploratory in nature as the project aims to answer all the issues as mentioned earlier. Primary data with a sample size of approximately 300 will be used and analyzed while using the ontological philosophy's subjective approach for an integral part. The study aims to find the factors accelerating digital banking adoption in Nepal during the COVID outbreak.

3.4 Research Approach

This research will have a deductive approach as the quantitative data will be collected and analyzed to prove the hypothesis generated at the start of the research. As we are aware of the situation, the acceleration of adoption of digital payments during COVID-19, but we are not sure what factors caused this to happen. We will be going from known to unknown and find the reason and prove the hypothesis created. The best approach would be the deductive approach for this research.

3.5 Data collection method and tools for data collection

The data sampling helps to ensure the integrity of collected data making it represent all classes and randomizing the result. In this research, all generations of people from the age of 16 years are included in the survey. To make it wider, respondents from all geographical regions (rural to urban) are covered.

As the data collection was done within a short period of time, only respondents eager to participate could take part, limiting it to fewer than expected. In some questions, options may not have explicitly represented the respondents. Some respondents were less educated, so they asked others to take part on their behalf. Following assumptions are made for data collection

- The participants are randomly selected to take part in this research.
- The respondents are of age from 16 years and above and are from rural to an urban area of Nepal.
- The respondents have started using digital payment either before the pandemic or during the pandemic.

3.6 Sample Selection

The questionnaire will be forwarded to more than 550 people. The expected sample size for this study will be between 250-350 respondents. The respondents will be selected randomly in terms of geographical as well as age factors.

3.7 Reliability and Validity

In this study, online survey forms have been used as the data collection method. It is known to us that the e-commerce has flourished in the world mostly in developing countries, however, in countries like Nepal, it is still developing and people still prefer traditional type of shopping and e-commerce is in developing phase. Thus, the online forms were distributed to the normal people mostly above age 20 who are working and can buy using e-commerce. The respondents are

supposed to be aware of e-commerce security hence, respondents who are bit knowledgeable about online shopping and can give their own opinions have been chosen.

3.8 Analysis Plan

As stated, the survey will gather data related to the factors affecting the acceleration of the payment, which author believes quantitative method would be suitable. The collected data will be analyzed with tools and theories available for research.

4 DATA ANALYSIS AND FINDINGS OF RESEARCH

4.1 Reliability test analysis (Cronbach's Alpha Reliability Test)

A reliability test is a necessary step while validating the data collected from the survey. Testing helps to assess the consistency of the responses mostly collected in the form of Likert questions (Elsayed, 2012). For this research, various variables were processed in IBM SPSS for reliability test. The Cronbach's Alpha value was 0.822, which is higher than 0.7, the minimum acceptable requirement. So, the items taken into consideration for this research are reliable and will be taken to find the results.

Figure 1: Cronbach's Alpha Test

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.811	.822	14

COVID-19 is a very new virus, resulting in a pandemic within a few months of starting. The impact of the pandemic has mostly on the health and economy of the entire people of the world. As the world lost trillions of dollars as the economy was shut down, the silver lining effect of this pandemic was seen on the digital economy and information technology.

The primary focus of this research was to find the various factors that enabled the acceleration of digital payment adoption during the COVID-19 pandemic. The study was focused on Nepal. As the research is concluded, we found that the risk of transmission of coronavirus by cash has exponentially raised the digital payment users after the pandemic was declared by WHO.

The sample size for the survey was 302 people, and we validated the results by applying various statistical tools like IBM SPSS and Microsoft Excel. Among the most important findings of this research, the shift from cash to digital payment within a short period of time is recorded. The number of people preferring cash payment was 177, which declined during the pandemic dragging it to just 86 people. The number of digital payment users also seemed hiked during the pandemic in Nepal. From 125 people using digital payment, 216 people started using digital payment since the start of COVID-19 in Nepal among the 302 respondents.

5 Discussion

5.1 Summary

The data collection period for this research was carried between 2nd Feb 2021 to 20 Feb 2021. In total, 550 people were invited to take part in the survey via email, social network, instant messenger. Out of them, 302 people responded to the survey. As we have concluded the data analysis for this research, various output and results are seen. Some results were anticipated, where some results are very drastic in terms of expectation. We will discuss the result of the finding and try to align with the research objectives and research questions. Here is the list of objectives of this

research: To find the general perception of the public about Cash Payments during COVID-19 Pandemic. To explore the reason for shifting from offline Cash payments to digital payments during the CoVid-19 pandemic. To determine the future prospects of digital payment in day-to-day transactions post Covid-19 in Nepal.

This research is aligned with most of the research mentioned in the literature review. Most of the research mentioned the people shifting from cash to digital payment, which was also found in this study. The notable thing is that most papers mentioned the fear of people about COVID, which we also found from the questionnaire that people indeed fear that coronavirus can be transmitted via cash. Few papers also mentioned the government initiatives to promote digital payment during the pandemic, which this research also examines that the government of Nepal is too promoting via the survey conducted. However, paying government fees and taxes digitally has started after the pandemic in Nepal.

5.2 Research questions and findings of the survey

According to the results obtained from the survey and statistical analysis, the related answers/findings to the research questions are discussed below:

Research Question 1 What is the perception of cash among people in Nepal?

Few questions were made to find the perception of cash among the participants of the survey. It is notable that cash perception is different from what it used to be prior to the COVID-19 pandemic. According to the findings from the survey, people preferred digital payment compared to cash, and most of them use digital payments for daily retail shopping. As the data derived in the analysis part, 177 people preferred cash before the pandemic but since the pandemic started, only 86 people still use cash. The digital payment users increased from 125 to 216 in a similar way.

When asked about the cash being unsafe as it can transmit COVID-19 from one person to another, almost 57% said they believe cash could spread the virus. About 5% of people said cash is safe, where are 38% people were not sure if cash can transfer virus or not. The survey also had a question to find if the businesses or retails stores persuading buyers on digital payment and find the availability of digital payment options. As stated by the 171 participants, the stores accepted both cash and digital payment during the pandemic. Seventy-two respondents reported that businesses insisted on paying via digital payment, with 39 responding only digital payment option was available in the store they buy. Only 20 people said their retailers accepted only cash during the pandemic.

As discussed above, it is clear that cash is perceived as a risk for COVID-19 transmission among participants. The increased number of participants using digital payments against cash since the pandemic shows the shift in the paradigm of perception of cash from essential instrument to risky instrument that is prone to coronavirus. It satisfies the objective to find the general perception of people about cash during the pandemic.

Research Question 2 What factors forced people to shift from Cash Payment to digital payment for retail shopping during CoVid-19?

As we saw people shifting from cash to digital payments, even for small groceries, it is very important to find the underlying factors that forced the change. We made provided various options in the questionnaire to find the factors behind the shift.

When asked about the convenience of using digital payments, 33% of participants found it easy and 19% of people find them extremely easy to use digital payment. About 32% responded they are neutral and can't decide either it is easy or hard; only 16% people said they find it hard to use the digital payment to buy daily goods. When asked about digital payments helping to stop the spreading of COVID-19, 250 agreed that this payment method would help to stop the virus spread. Only 5 people said that digital payment does not help in stopping the spread.

During the pandemic, most of the open businesses used logbooks for contact tracing if any visitor has a virus. However, many retail stores that accepted mobile wallets and QR code payments used the payer details as contact tracing details. When asked about it, 62% of participants said such payment would be helpful in contact tracing as name and contact details are received by the store along with the date and time of the payment. However, 13% of people believed this method would

not be effective.

When asked about the government's initiative on using digital payments has helped, 68% of participants stated that such initiatives would help in making digital payment easy. Finally, we asked to compare cash vs. digital payment; 86% said digital payment is better than cash payment.

The discussion clearly depicts the primary factors that forced people to shift from cash payment to digital payments. The factors, according to the data analysis, are convenient to use, stopping the spread of the virus via cash, using it as a means of contact tracing during the pandemic, initiatives of the government and digital payment service providers and digital payment being a better option than cash. These factors are the answer to the research question and satisfy the objective to find the factors forcing people to shift to digital payment from cash during the pandemic in Nepal.

A similar study was conducted by Hendy Mustiko Aji in 2020, where the research was focused on finding the intention of people to use e-wallets during the pandemic in Malaysia and Indonesia. The research concluded that fear of coronavirus and government initiatives motivated people to use e-wallets during the pandemic in Malaysia and Indonesia.

Research Question 3 What will be the main challenging factors impacting future prospects of digital payments in Nepal post CoVid-19?

Every problem comes to an end. As the world is currently busy vaccinating against COVID-19, the normal life is slowly returning to its old form. When the vaccination is complete, there would be no risk of coronavirus transmission from person to person. In such a situation, government and digital payment services should be aware that gaining new users or current users abandoning digital payment would be normal. We asked some opened-ended questions about the future prospects of digital payment after the COVID-19 ends from a user perspective to our participants.

When asked about the continuity of digital payments in the future, even after the pandemic ends, 91% responded they would continue to use digital payments. We also brought the security features of digital payment as they are the most secured mean of payment and easily trackable and retrievable in case of theft of mobile cards happen. We asked if digital payment is safe compared to cash and 80% responded it being safe, a reason to keep using even after the pandemic ends.

We also included the promotional activities to gain new users and keep exiting one as a question. 84% of respondents believe such promotion will keep the existing users and bring new users into the digital platform instead of keep using cash for the transaction. Not to forget the government intervention on digital payment, as the government of Nepal has recently started collecting taxes and fines using digital payments. We asked if this step help in shaping the future of digital payment in Nepal, 75% of people believe this is a positive step by the government. And finally, we also asked if covering the population in the rural part of Nepal by expanding services there could increase the userbase in those areas. 77.5% of people believe providing services and support to rural areas of Nepal will help to bring more business as well as users to the digital economy of Nepal. Only about 4% believe this step will not help in shaping the future of digital payments in such part.

As discussed above, not providing services and supports to businesses and users in the rural area and keeping the existing users after the pandemic ends are challenging factors impacting the future prospect of digital payments in Nepal. Educating users about the benefits of digital payments and providing information about government fees and tax payments via digital payment could attract a new segment of the population that has not used digital payment even during this pandemic.

5.3 Conceptual Framework

Every research is incomplete without a framework, either be a conceptual or theoretical one. When studied about the various available models and frameworks, as this study focuses on the acceptance of new technology by individuals and their behavior on acceptance of the technology, we concluded that "Technology Acceptance Model" (TAM) would be the best framework for the research (Jokonya, 2015). TAM framework is proposed on the data collected, reviewing the papers in literature review and mostly it is the study of the adoption of new technology during the pandemic in Nepal.

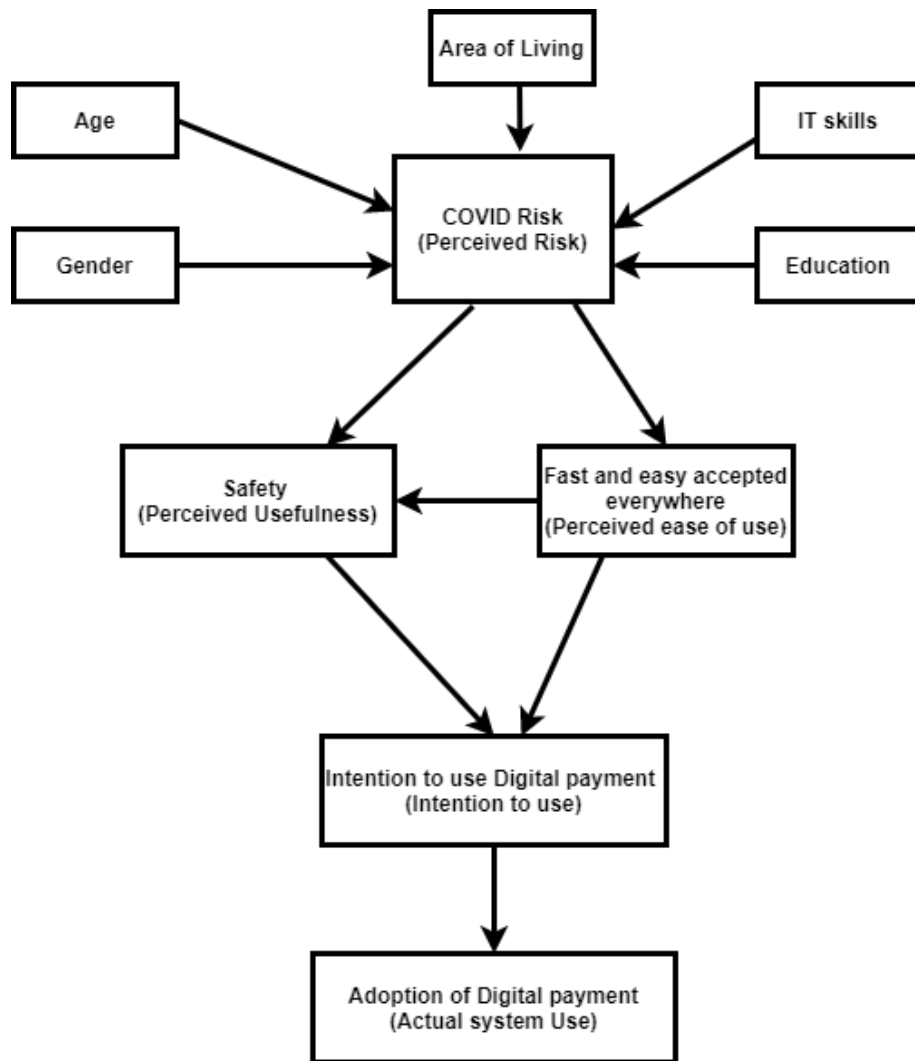


Figure 1: TAM Framework for adoption of digital payment in Nepal

5.4 Validation of the proposed framework

Independent Factors

These are the factors that mostly determine whether the TAM is accepted or not. Factors like education of the person, area of living, literacy of IT, gender, education level are prime determinants for the result.

Perceived Risk (Using Cash during pandemic)

As reported by various sources and directives of World Health Organization, cash payment is considered a risk during the pandemic as it can transmit the virus from one person to another (Taylor, 2020). In our research, using cash and getting infected with coronavirus is considered as a perceived risk. To validate it, 55% of the total respondent believed using cash during the pandemic is a risk.

Perceived Usefulness (Safety from virus)

Since the digital payment options mostly don't deal with physical contact to complete the purchase, even in retail stores, we considered the safety from the virus as the perceived usefulness of the digital payment. To validate, 82% of the total respondent said going digital and not using cash will help to stop in spreading of coronavirus during the pandemic. Hence, we can consider it as perceived usefulness.

Perceived Ease of Use (easy to sign up and accepted everywhere)

To accept any new technology, the ease in using must be one of the factors to be accepted. In our research, we found almost every retail store accepted digital payment during the pandemic

(Viswanath Venkatesh, 1996). It is also notable that commercial banks of Nepal are allowed to open new accounts or add new services digitally during pandemics enabling ease of use (Shrestha, 2020). In accordance with the data collected from the survey, 52% of respondents said it was extremely easy to pay using digital payment and is accepted by almost every retail store in Nepal.

Intention to Use (Intention to use digital payment)

When considering the above factors, we can conclude that the intention to use digital payment is validated by the data collected in our research. Since the perceived risk of coronavirus is aligned with the perceived usefulness of using digital payment and ease of use of the digital payment, we can conclude that the intention to use the digital payment is validated.

(Actual System Use) Adoption of Digital Payment

The primary task of the Technology Acceptance Model (TAM) framework is to find if the proposed technology is accepted among people or not. In our case, we conducted all the surveys covering the independent variables. We also got the data on the actual use of digital payment. We found that people have shifted from cash to digital payment since the start of the pandemic.

6 Conclusion and Recommendation

6.1 Conclusion

Using the Technology Acceptance Model (TAM) framework for this study, we were able to find the actual factors and motivation for the shift in the adoption of digital payment. We were able to find the perceived risk of COVID along with other independent variables like demography and literacy, resulting in factors like perceived usefulness and ease of use of digital payment to accelerate the adoption of digital payment.

6.2 Recommendation

This research is able to determine the factors that helped to accelerate the adoption of digital payment in Nepal. It also provides an insight into the perception of cash among respondents. The research verifies the acceleration of digital payment adoption during pandemic and factors enabling it in the context of Nepal. This can contribute to those who want to get insight data, especially for digital payment service providers, to find the factors and validate them with their tools. As the research used the TAM framework and modified it to fit the requirement of the research, making it usable to various researchers and students for digital payment acceptance in the future.

6.3 Future work

This whole research was carried during the COVID-19 pandemic in Nepal. As the finding showed the increase in the number of users of digital payment because of various factors like COVID-19 risk, perceived usefulness and ease of use of the digital payment, the research gap is seen on the acceleration even after the pandemic ends. This research didn't cover the degree to which adoption is voluntary, as people may ditch digital payment and use cash again when there is no perceived risk of COVID. This leaves a research gap for such types of study in the future.

References

- Abrazhevich, D., 2001. Classification and Characteristics of Electronic Payment Systems. Munich, SpringerLink.
- Acharya, R., 2020. OnlineKhabar. [Online] Available at: <https://www.onlinekhabar.com/2020/07/879654> [Accessed 17 02 2021].
- Allam, Z., 2020. The Forceful Reevaluation of Cash-Based Transactions by COVID-19 and Its Opportunities to Transition to Cashless Systems in Digital Urban Networks. Surveying the Covid-19 Pandemic and its Implications, pp. 107-117.
- Baldwin, L., 2018. Beginning the Research Project. In: L. Baldwin, ed. Research Concepts for the Practitioner of Educational Leadership. Leiden: Brill, pp. 9-12.
- Bloomberg, 2021. More Than 245 Million Shots Given: Covid-19 Tracker. [Online] Available at: <https://www.bloomberg.com/graphics/covid-vaccine-tracker-global-distribution/> [Accessed 01 03 2021].
- Kautish, S. and Thapliyal, M.P., 2012. Concept of Decision Support Systems in relation with Knowledge Management– Fundamentals, theories, frameworks and practices. International Journal of Application or Innovation in Engineering & Management, 1(2), p.9.
- Kumar, A., Rajpurohit, V.S. and Kautish, S., 2020. A Study on Technology-LED Solutions for Fruit Grading to Address Post-Harvest Handling Issues of Horticultural Crops. In Modern Techniques for Agricultural Disease Management and Crop Yield Prediction (pp. 203-221). IGI Global.
- Niraula, P. and Kautish, S., 2019. Study of The Digital Transformation Adoption in The Insurance Sector of Nepal. LBEF Research Journal of Science, Technology and Management, 1(1), pp.43-60.
- Kaur, H. and Kautish, S., 2016. An Implementation of Wireless Sensor Network Using Voronoi _ PSO (Particle Swarm Optimization). International Journal for Research in Applied Science & Engineering Technology (IJRASET), 4, pp.361-368.
- Chen Wang, P. W. H. F. G. H. G. F. G., 2020. A novel coronavirus outbreak of global health concern. The Lancet, 395(10223), pp. 470-473.
- Davis, F. D. R. P. B. P. R. W., 1989. User acceptance of computer technology: A comparison of two theoretical models. Management Sci., 35(8), p. 982–1003.
- Dimitrios Theofanidis, A. F., 2018. LIMITATIONS AND DELIMITATIONS IN THE RESEARCH PROCESS. PERIOPERATIVE NURSING, 7(3), pp. 155-163.
- Dominic, u., 2019. 5 Turning Points in the History of E-Payments, Wollerau, Switzerland: SecurionPay.
- Elsayed, E. A., 2012. Overview of Reliability Testing. IEEE Transactions on Reliability, 61(2), pp. 282-291.
- Esewa, 2020. Digital Banking and Payment Trend in Nepal: Past, Present, and Future, Kathmandu: Esewa Pvt Ltd.
- Francis-Poulin, M., 2019. Electronic Payments: A Brief History, California: CSG Forte Payments, Inc.
- Jokonya, O., 2015. Validating Technology Acceptance Model (TAM) during IT Adoption in Organizations. Vancouver, IEEE.
- Kothari, C. R., 2004. Research Methodology: Methods and Techniques. 2nd ed. Mumbai: New Age.
- Luther, W. J., 2015. Bitcoin and the Future of Digital Payments. The Independent Review, 20(3), pp. 397-404.
- Mallapaty, S., 2021. What's the risk of dying from a fast-spreading COVID-19 variant?. Nature, pp. 191-192.
- Ministry of Health and Population, 2020. COVID-19 Dashboard,, Kathmandu: Government of Nepal.
- Ministry of Health and Population, G. o. N., 2020. COVID-19 Dashboard, Kathmandu: Government of Nepal.
- Pant, B., 2019. Financial Inclusion in Nepal: Policy Review and Prescriptions. NRB Economic Review, pp. 1-18.

- Prasain, K., 2019. Government to launch digital payment system by April-end. [Online] Available at: <https://kathmandupost.com/money/2019/03/07/government-to-launch-digital-payment-system-by-april-end> [Accessed 26 02 2021].
- Pushp P. Patil, Y. K. D. N. P. R., 2017. Digital Payments Adoption: An Analysis of Literature. Delhi, Springer, pp. 61-70.
- Raphael Auer, G. C. J. F., 2020. Covid-19, cash, and the future of payments, Basel, Switzerland: Bank for International Settlements.
- Sarah Dodds, A. C. H., 2020. Adapting research methodology during COVID-19: lessons for transformative service research. *Journal of Service Management*.
- Sherpa, P., 2015. Development and impact of mobile banking in Nepal, Turki: Turku University of Applied Sciences.
- Shrestha, A., 2020. Digital Payments in Nepal Soar As More People Stay Home on Virus Fears, Kathmandu: TechLekh.
- Shrestha, P. M., 2020. Banks digitise remittance processing after lockdown. [Online] Available at: <https://kathmandupost.com/money/2020/05/16/banks-digitise-remittance-processing-after-lockdown> [Accessed 21 02 2021].
- Srihari Kulkarni, A. S. T., 2017. Digital Payments: Challenges and Solutions. *IOSR Journal of Business and Management*, pp. 50-55.
- Taylor, C., 2020. China is sterilizing cash in an attempt to stop the coronavirus spreading, Singapore: CNBC Asia Pacific News.
- Viswanath Venkatesh, F. D. D., 1996. A Model of the Antecedents of Perceived Ease of Use: Development and Test. *Development and test. Decision sciences*, 27(3), pp. 451-481.
- Vivek Dubey, R. S. A. M., 2020. FinTech, RegTech and Contactless Payments Through the Lens of COVID 19 Times. *International Journal of Advanced Science and Technology*, 29(6), pp. 3727-3734.
- WHO, 2021. WHO Coronavirus Disease (COVID-19) Dashboard, Geneva: World Health Organization.
- World Bank Development Research Group, t. B. T. C. A. B. & M. G. F., 2014. The Opportunities of Digital Payments, Washington D.C.: World Bank.
- World Health Organization, 2020. Coronavirus. [Online] Available at: <https://www.who.int/health-topics/coronavirus> [Accessed 01 02 2021].
- Rahul De', N. P. A. P., 2020. Impact of digital surge during Covid-19 pandemic: A viewpoint on research and practice. *International Journal of Information Management*.
- Raphael Auer, G. C. J. F., 2020. Covid-19, cash, and the future of payments, Basel, Switzerland: Bank for International Settlements.
- Rakesh Kumar Verma, D. M. K. J., 2020. A Study on the Customer Satisfaction for E-banking Transaction during COVID-19. *Science, Technology and Development*, 9(7), pp. 21-42
- Hendy Mustiko Aji , Izra Berakon & Maizaitulaidawati Md Husin | (2020) COVID-19 and e-wallet usage intention: A multigroup analysis between Indonesia and Malaysia, *Cogent Business & Management*, 7:1
- V. Sornaganesh, Sudha Ganesh, M. Thangajesu Sathish (2020), Impact of Covid-19 Outbreak in Digital Payments, *INTERNATIONAL JOURNAL FOR INNOVATIVE RESEARCH IN MULTIDISCIPLINARY FIELD*, 6 (8)
- Nur Ani (2020) The Use of E-Payment During COVID-19 Outbreak, *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, 6 (4)
- Nirmala M, Parvathi S (2021), The impact of the pandemic on digital payments in India, *Journal of the Maharaja Sayajirao University of Baroda*
- Linn Kristensen, Mona Solvoll, (2019), Digital payments for a digital generation, *Nordic Journal of Media Studies* 1 (1)

Jayati Ghosh, Jayati Ghosh, C. P. Chandrasekhar, (2017), The Growth of Digital Payments, Business Line

PRASANTH, S. and SUDHAMATHI, S., 2020. CUSTOMER PERCEPTION ON PAYMENT OF LOANS DURING COVID-19: EMPIRICAL STUDY ON INDIAN BANK. *International Journal of Disaster Recovery and Business Continuity* Vol.11, No. 3

Roggeveen, A.L. and Sethuraman, R., 2020. How the COVID-19 pandemic may change the world of Retailing. *Journal of Retailing*, 96(2), p.169.

YAKEAN, S., 2020. Advantages and Disadvantages of a Cashless System in Thailand during the COVID-19 Pandemic. *The Journal of Asian Finance, Economics, and Business*, 7(12), pp.385-388.

Kaur, R. and Kautish, S., 2019. Multimodal sentiment analysis: A survey and comparison. *International Journal of Service Science, Management, Engineering, and Technology (IJSSMET)*, 10(2), pp.38-58.

Kautish, S., 2021. *Computational Intelligence Techniques for Combating COVID-19*. Springer Nature.

Kautish, S., 2008. Online Banking: A Paradigm Shift. *E-Business*, ICFAI Publication, Hyderabad, 9(10), pp.54-59.

Kautish, S. and Thapliyal, M.P., 2013. Design of new architecture for model management systems using knowledge sharing concept. *International Journal of Computer Applications*, 62(11).

Li, Z., Fathima, G. and Kautish, S., Action classification and analysis during sports training session using fuzzy model and video surveillance. *Journal of Intelligent & Fuzzy Systems*, (Preprint), pp.1-13.

Rani, S. and Kautish, S., 2018, June. Association clustering and time series based data mining in continuous data for diabetes prediction. In 2018 second international conference on intelligent computing and control systems (ICICCS) (pp. 1209-1214). IEEE.

Rani, S. and Kautish, S., 2018. Application of data mining techniques for prediction of diabetes-A review. *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, 3(3), pp.1996-2004.

Reyana, A., Krishnaprasath, V.T., Kautish, S., Panigrahi, R. and Shaik, M., 2020. Decision-making on the existence of soft exudates in diabetic retinopathy. *International Journal of Computer Applications in Technology*, 64(4), pp.375-381.

Rani, S. and Kautish, S., 2018, June. Association clustering and time series based data mining in continuous data for diabetes prediction. In 2018 second international conference on intelligent computing and control systems (ICICCS) (pp. 1209-1214). IEEE.

Reyana, A. and Kautish, S., 2021. Corona virus-related Disease Pandemic: A Review on Machine Learning Approaches and Treatment Trials on Diagnosed Population for Future Clinical Decision Support. *Current Medical Imaging*.

Rudra, T., & Kautish, S. (2021). Impact of Covid-19 Infodemic on the Global Picture. *Computational Intelligence Techniques for Combating COVID-19*, 333.

Singh, C. and Kautish, S.K., Page Ranking Algorithms for Web Mining: A Review. *International Journal of Computer Applications*, 975, p.8887.

Reyana, A., Kautish, S. and Gupta, Y., 2021. Emergence of decision support systems in healthcare. In *Demystifying Big Data, Machine Learning, and Deep Learning for Healthcare Analytics* (pp. 109-128). Academic Press.

Wentao, C.H.U., Kuok-Tiung, L.E.E., Wei, L.U.O., Bhambri, P. and Kautish, S., 2021. Predicting the security threats of internet rumors and spread of false information based on sociological principle. *Computer Standards & Interfaces*, 73, p.103454.

Lyatuu, H.H., 2020. The contribution of e-payment system in revenue collection at local government authority.

Kaur, P. and Kautish, S., 2018. Opinion Mining from Tweets on Goods and Services Tax (GST) using Ensemble Learning Technique and Computational Linguistics.

Ashwini, K., 2020. The Journey of Digital Wallets. *CYBERNOMICS*, 2(4), pp.13-15.

Pandey, N. and Pal, A., 2020. Impact of digital surge during Covid-19 pandemic: A viewpoint on research and practice. *International Journal of Information Management*, 55, p.102171.

- Toh, Y.L. and Tran, T., 2020. How the COVID-19 Pandemic May Reshape the Digital Payments Landscape. *Payments System Research Briefing*, pp.1-10.
- Srivastava, R., Kautish, S. and Tiwari, R. eds., 2020. *Green Information and Communication Systems for a Sustainable Future*. CRC Press.
- Fu, J. and Mishra, M., 2020. *Fintech in the Time of COVID-19: Trust and Technological Adoption During Crises*. Swiss Finance Institute Research Paper, (20-38).