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Editorial

It is our pleasure to bring out the fourth volume of journal entitled INTELLIGENCE Journal of Multidisciplinary Research (IJMR) with ISSN 2822-1869 and eISSN 2822-1877. IJMR is fully-open access, blind peer review, and NepJOL indexed international journal published by Research Management Cell (RMC) of Pokhara Multiple Campus Pokhara. The journal provides a forum to publish research outcomes to national and international authors.

The objective of IJMR is to publish up-to-date, high quality, original research papers alongside relevant and insightful reviews from various areas of social sciences. This will, thus, be beneficial to the researchers who are pursuing their research work in various fields as well as practiceners for decision making in relevant areas of their work.

The journal received a total of eleven manuscripts for this issue, out of which three manu scripts were rejected after preliminary review, one more manuscripts were rejected after the peer review process, and finally seven papers were selected for the publication. A pool of experts in the relevant field reviewed the manuscripts. The peer reviewed issue comprises papers from diverse areas.

We took this opportunity to acknowledge the contribution of authors, support rendered by the independent expert reviewers, and language editor of the journal. We would also like to acknowledge the support of Advisory Board Members of the journal, Campus Management Com mittee, Campus Administration, and faculties and staffs of the campus. Our editorial team tried its best to make this issue free from errors at the most. Finally, we would like to express our grati tude to all of them and look to their unrelenting support in bring out Volume IV in scheduled time.

We welcome further suggestions from our readers to make the future issues as better.

Editor-in-Chief

About the Journal

INTELLIGENCE Journal of Multidisciplinary Research is a peer-reviewed open access journal published in March by the Research Management Cell (RMC), Pokhara Multiple Campus, Pokhara. It publishes only original research papers, which aim to promote research especially in the areas of social sciences. The journal is published annually and appears both in print and online. The journal is indexed in Nepal Journals Online (NepJOL).

Focus and Scope

The journal welcomes original research papers on topics related to business, management, education, tourism, environment, political and other social science areas.

Open Access Policy

This is an open-access journal and appears both in print and online. The research papers published in this journal can be viewed from different search engines including Google Scholar It is published in a manner to adhere with the registration requirements of Nepal Journals Online (NepJOL) providing easy and convenient access to the wider readers. The online version is available on the websites of Pokhara Multiple Campus (https://pmcpokhara.edu.np/) and NepJOL (http:// www.nepjol.info/index.php/ijmr/index).

Paper Processing Charges

We do not charge any for publishing articles in this journal.

Peer-Review Process

The journal employs a double-blind peer-review process. Two reviewers are assigned to each paper for review of the paper. Reviewed papers are sent to the authors for correction along with the peer-review form filled up by the reviewers. The process takes approximately two months to complete. The papers are divided into two parts -title page and manuscript. The title page included the manuscript title, authors names and their affiliations, address of the correspond ing author, including an e-mail address. This page is kept separate with the editorial, which is not sent to the reviewers with manuscript. In manuscripts, alpha-numeric codes were placed above the manuscript title and any identifying information in the anonymized manuscript is checked to ensure that there remains no identity of the authors. The whole process takes approximately two months to complete.

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Impact of Money Supply and Interest Rate on Stock Market Performance: Evidence from the Nepalese Capital Market

[1]Khem Raj Subedi

Abstract

This study examines the influence of money supply and interest rate including other macroeconomic variables on stock market performance in Nepal, using the data spanning from 1994 to 2023. The study employs the ARDL model of co-integration analysis to examine the long-run and short-run relationships between the NEPSE index and some selected macroeconomic variables, including broad money supply, interest rates, real GDP, and remittance inflow. The findings reveal unidirectional causality from broad money supply to NEPSE index, by-directional causality between real GDP and NEPSE index, and unidirectional causality between remittance flow and NEPSE index, but absence of causality between interest rate and NEPSE index. Moreover, the findings reveal that the money supply significantly and positively affects the NEPSE index, both in the long run and the short run, highlighting the importance of liquidity in stock market performance. But, interest rates show a marginally significant negative impact, indicating the dampening effect of higher borrowing costs on equity investments. The real GDP demonstrates a strong positive correlation with the NEPSE index, underscoring the critical role of economic growth in boosting corporate earnings and investor confidence. Conversely, remittance inflows exhibit no significant relationship with stock market performance, perhaps reflecting their predominant use in consumption and real estate. The negative and highly substantial error correction term confirms that deviations from the long-run equilibrium are corrected rapidly in the subsequent period. These findings provide valuable insights for policy-makers and stakeholders, emphasizing the role of macroeconomic stability in fostering sustainable growth in Nepal's stock market.

Keywords
Money supply
NEPSE index
Macroeconomic variables
ARDL model

MONEY IS REGARDED as the center of macroeconomics and understanding the effect of the money supply is critical for macro-economc theory (John & Ezeabasili, 2020; Palley, 2015). The impact

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of money supply on stock prices and stock indices is a significant area of research, revealing complex relationships influenced by various macroeconomic factors (Erdugan, 2012). In other words, the stock price is the outcome of the overall macroeconomic performance of a national economy including money supply (Bhattacharjee & Das, 2021; Muchir, 2012). In this context, the relationship between money supply and stock market performance is essentially a reflection of capital market and money market (Wang, 2016). The relationship between money supply and stock prices has long been a focal point of economic and financial research, as it encapsulates the intricate interplay between monetary policy and capital markets (Sirucek, 2013). Money supply, typically represented by broad money, serves as a key indicator of liquidity in an economy, influencing interest rates, inflation, and investment behavior (Lacey, 2021; Bhattacharjee & Das, 2021; Devkota & Dhungana, 2019). Stock prices, on the other hand, reflect investor sentiment, corporate performance, and broader economic dynamics.

Theories suggest that changes in money supply can significantly impact stock market performance, both directly and indirectly, through various transmission channels (Gunardi & Disman, 2023). In this context, understanding this nexus is critical for policymakers, investors, and economists, as it provides insights into how monetary interventions affect asset markets and economic stability. This paper examines the dynamic relationship between money supply and stock market performance, with a focus on short-run and long-run interactions in varying economic contexts. Globally, there are extensive studies on the impact of money supply on stock indices, but limited research exists exploring these dynamics in emerging economies, especially in the context of Nepal. To have better understanding of the effect of money supply and stock market performance in the Nepalese context, it is essential to investigate empirically. Moreover, this study examines the mechanisms through which money supply affects stock prices and indices, supported by empirical evidence from various contexts. Therefore, the pertinent research questions are proposed as follows: How does money supply influence stock market performance in Nepal? What is the role of other macroeconomic variables, such as interest rates, constant GDP, and remittance inflow, in shaping stock market dynamics? Is there evidence of speculative stock bubbles resulting from changes in the money supply in Nepal? In this regard, the objectives of the paper are to examine the impact of money supply on stock market performance in Nepal, including the role of other macroeconomic variables such as interest rates, constant GDP, and remittance inflow, and provide suggestions to policymakers and stakeholders for policy implications.

Review of Literature

Theoretical Perspectives

Stock market performance is crucial for economic prosperity, capital formation, and sustainable economic growth as it facilitates resource flow, investment opportunities, pooling funds, sharing risk, and wealth transfer between savers and users (Subedi, 2023). The relationship between money supply and the stock market composite index is a well-researched area in economics and finance around the globe, where several theories provide frameworks to understand this relationship.

The Quantity theory of money as the equation MV=PQ, suggests that an increase in the money supply leads to inflation if the output (Q) remains constant. It means as the money

supply increases, the liquidity improves, which in turn leads to encouraging more investments in the stock market and raises stock values. Conversely, if inflation increases as a result of excessive money in circulation, stock values may suffer as actual returns on investments decline (Fisher, 2006). Efficient Market Hypothesis (EMH) asserts that stock prices reflect all available information, including monetary policy signals (Fama, 1970). Therefore, the changes in money supply are incorporated into stock prices as investors adjust their expectations about future earnings and inflation. Therefore, money supply changes can have immediate effects on composite stock indices, depending on the degree of market efficiency.

Lucas (1972) developed the Rational Expectations Hypothesis and postulated that investors incorporate changes in money supply into their expectations about future economic conditions thereby influencing stock prices. It asserts that anticipated increases in money supply may already be reflected in stock prices, where unexpected changes can create volatility. Therefore, stock markets respond to the unanticipated component of money supply changes. Modigliani and Cohn (1979) argue that money supply increases can raise inflation expectations. Essentially, if inflation rises, it reduces the present value of future cash flows from stocks, adversely affecting stock prices. Therefore, the effect of money supply on stocks prices depends on whether inflation expectations are stable or rising. Behavioral Finance theories argue that the sentiment of investors and psychological factors expand the effects of money supply changes on stock prices (Shiller, 1981). It is observed that during periods of increased money supply, euphoria prevails and may lead to the overvaluation of stocks. Therefore, the theory states that the increase in money supply cognitive biases and herd behavior influence stock indices.

Empirical Review

The nexus between money supply and the market stock performance is a widely studied and discussed matter in macroeconomics and financial economics to have a better understanding of this relationship. The summary is presented subsequently.

Table 1

Literature Review Matrix

Auther (s) Years	Methodology	Major Findings
Brahmasrene & Jiranyakul (2007)	Time Series Analysis	The study found a long-run positive relation between money supply and stock market index. Likewise, the Granger causality test indicated causality from money supply to stock market returns.
Sahu et al. (2011)	Time Series Analysis	The study found that money supply significantly influences share prices positively.
Albaity (2011)	Generalized Autoregressive Conditional Heteroscedasticity (GARCH)	The study found monetary policy variables significantly influencing the stock market indices. Similarly, interest rate and real GDP growth also significantly influence on stock index. The study provides an evidence of the potential connection between excess money supply and

Martin (2012)	Time Series Analysis	speculative stock behavior as increase in price.
Sirucek (2013)	Time Series Analysis	The study found the money supply as significant factor causing stock bubbles, meaning that impact of money supply on stock index increases over time.
Shrestha & Subedi, (2014)	Time Series Analysis	The study found positive correlation of NEPSE with broad money supply and inflation but negatively correlated with treasury bills rate. The study concludes that Nepalese investors seem to take equities as a hedge against inflation and consider stock as an alternative financial instrument.
Ahmad et al. (2015)	ARDL short-run and long-run test,	The study found a contrasting result as money supply has a significant negative influence on the stock market performance.
Olulu-Briggs & Ogbulu (2015)	Vector Error Correction Model (VECM)	The Granger Causality test demonstrate a Uni-directional causality from broad money supply to stock market performance. Overall, all the results obtained are in line with a priori expectation.
Taamouti (2015)	Nonparametric Granger causality in mean test	The Granger causality in mean test result showed that money supply has no impact on stock prices. By contrast, general Granger causality test and quantile regression-based test were used, the effect of money becomes apparent and statistically very significant.
Shawtari et al. (2016)	VECM	The study found the macroeconomic variables such as money supply, inflation, and exchange rate are co-integrated on the long run with stock market prices.
Wang (2016)	Time Series Analysis	The study found that stock prices and the money supply in China is stable cointegration relationship with ECT -0.036 and the stock prices from a non-equilibrium state will be back to equilibrium very slightly.
Ndlovu et al. (2018)	VECM	The study found positive effect money supply and negative effect of exchange rate on stock price.
Khan & Khan (2018)	ARDL	The findings suggested that the money supply, and interest rate have significant positive and exchange rate have significant but negative impact on prices of Karachi Stock Exchange in long term.
Devkota & Dhungana (2019)	ARDL model	The bound test result confirmed that there is a long-run relationship among the variables and macroeconomic variables have a notable impact on stock market. NEPSE is highly interested sensitive while the gold price has insignificant impact on the

		stock market.
Al-Kandari & Abul (2019)	VECM	The study found a long-run unidirectional relationship from Kuwaiti Stock Exchange Index to the broad money supply, interest rate and exchange rate.
John & Ezeabasili (2020).	Time Series Analysis	The study revealed the existence of a long-run relationship between money supply and stock market performance in Nigeria, South Africa and Ghana. The study concluded that it is stock market performance that influences money supply more, rather than money supply affecting stock market performance in Nigeria, South Africa and Ghana.
Bhattacharjee & Das (2021)	VECM	The study found that money supply has an immediate positive effect on both Indian stock market index and stock market capitalization.
Lacey (2021)	An information Entropy Statistical	The study found positive relation between broad money supply and growth rate in stock index.
Gunardi & Disman (2023)	Methodology Associative descriptive approach	The study showed that both the money supply and interest rates have an influence on stock prices in Indonesia. But, the research in Malaysia shows that only interest rates have an influence on stock prices.
Synek & Veselá (2024)	Time Series Analysis	The study found the long-term dependence of stock indices on the broad money supply.

In summary, these studies have provided valuable insights into the short-term and long-term interactions between money supply, along other macroeconomic variables on stock market indicexisting studies mentioned above predominantly focused on the developed economy context, with limited attention to a unique economic structure of Nepal. Similarly, most studies report a positive correlation between the money supply and stock prices or stock indices, contrasting evidence on causality and the role of macroeconomic variables indicates the need for a localized investigation. In conclusion, this review identifies gaps in understanding the money supply dynamics in emerging economies like Nepal, highlighting the need for further investigation into the impact of changes in money supply on stock market performance and stability, thereby setting the stage for further research in Nepal.

Methodology

Research Design

This study has adopted a quantitative research design to analyze the relationship between money supply, interest rates, and stock market performance in the Nepalese contest. The research uses time-series analysis using econometric techniques to capture the dynamic interactions among the variables included in the model over time. Similarly, the study is explanatory in nature and employs statistical models to fulfill the objectives of the research.

Variables, Data, and Their Sources

This study used secondary annual data on some selected macroeconomic variables of Nepal viz., broad money supply(M2), interest rate, GDP at a constant price, remittance inflow in Nepal and Nepal Stock Exchange (NEPSE) index from 1994 to 2023. They are presented below:

Table 1

Variables, Data and Their Sources

Variables	Nature	Definition	Sources
NEPSE	Dependent Variable	Stock Market Performance	Nepal Rastra Bank
M2	Independent Variable	Broad Money Supply	Nepal Rastra Bank
IR	Independent Variable	Interest Rate	Nepal Rastra Bank
RGDP	Control Variable	GDP at Constant Price	Nepal Rastra Bank
RMT	Control Variable	Annual Remittance Inflow of Nepal	Nepal Rastra Bank

Analysis Tools and Techniques

The data analysis process involves descriptive statistics, stationarity tests, granger causality tests, ARDL methods of co-integration. Similarly, diagnostic tests like RESET test, Breusch-Godfrey Serial Correlation LM Test, Normality test, Heteroscedasticity test, stability test are done and they are subsequently discussed hereunder. The computer software EVIEWs 10 was used for data analysis.

Specification of the Empirical Model

To fulfill the objectives of the study, the researcher has developed an empirical model for testing the hypothesis in functional form as follows:

$$NEPSE_t = f(M2t , IRt , RGDPt , RMTt) \quad ...(1)$$

In equation (1) above, NEPSEt, M2t, IRt, RGDPt, RMTt denote the Nepal Stock Exchange, broad money supply, GDP at constant price and annual remittance inflow in Nepal for the time 't' respectively. The model given in equation (1) can be transformed into a logarithmic econometric model as follows.

$$\ln NEPSE_t = \alpha + \ln\beta 1T(M2t) + \ln\beta 2(IRt) + \ln\beta 3(RGDP)t + \ln\beta 4(RMT)t + et \quad \ldots(2)$$

In equation (2) above symbols α denotes intercept, and β i implies slopes parameters to be estimated, ln stands for natural logarithm, remaining acronyms are as defined above in equation (1). Likewise, α and β are parameters to be estimated.

ARDL Model

The general form of an ARDL (p, q) model is:

$$Y = \alpha + \sigma_{i\ 1}\beta Y_{-i} + \sigma_{j\ 0}\gamma X_{-j} + \varepsilon \quad ...(3)$$

In the above equation (3), Y_t is the outcome variable, X_(t-j) denotes explanatory, α_i and β _j are coefficients, p and q are the lag orders, and ε_t is the error term.

The ARDL model is estimated based on the number of lags suggested by the information

criteria suggested in the lag length selection criteria. Generally, Akaike Information Criterion (AIC), Hannan-Quinn Criterion (HQC) or the Schwartz Bayesian Criteria (SBC) can be used in order to choose the optimal lag.

F- bound test is essential for examining long-run relationship of the variables included in the model. Hence, to test if the variables have a long-run relationship, the F-test was performed based on the following Pesaran, Shin and Smith (2001) generalized form of applied ARDL model. Therefore, model for F- bound test is given below:

$$\ln(NEPSE)t=\beta_0+\beta_1 \ln(NEPSE)_{t-1}+\beta_2 \ln(M_2)_{t-1}+\beta_3 \ln(IR)_{t-1}+\beta_4\ln(RGDP)_{t-1}+\beta_5\ln(RMT)_{t-1}+$$

$$\sigma\ \gamma\ \Delta ln\ \text{NEPSE})_{t-i}+\sigma\ \delta\ \Delta ln\ M\ )_{t-j}+\sigma\ \eta_k \quad \text{IR})_{t-k}+\sigma\ \theta\ \Delta ln\ \text{RGDP})_{t-l}+\sigma\ \mu\ \ \Delta ln\ \text{RMT})_{t-m}$$

$$+\varepsilon_t \qquad \ldots(4)$$

In equation (4), β0 , β1, β2 … β5 are coefficients to be estimated and subscript t-1 implies lagged value, Δ represents the first difference of the variables. Similarly, γi, δj, λk, θl, μm are the short-run dynamics (coefficients of the first differenced variables). Others are described as follows:

lnNEPSEt = The natural log of the Nepal Stock Exchange index.
lnM2t-1 = The natural log of money supply at time t-1.
lnIRt-1 = The natural log of interest rates at time t-1.
lnRGDPt-1 = The natural log of real GDP at time t-1.
lnRMTt-1 = The natural log of remittance inflow at time t-1.
εt = Error term.

The ARDL model for estimating long-run coefficient can be specified as follows:

$$\ln(NEPSE)t=\beta0+\beta1\ \ln(M2)t+\beta2\ \ln(IR)+\beta3\ln(RGDP)t+\beta4\ln(RMT)t+\ \varepsilon t \quad \ldots(5)$$

Moreover, the ECM in the ARDL approach to co-integration, the lagged error correction term is generated out of the long-run coefficients to replace a linear combination of the lagged variables, and the model is re-estimated at the optimum lags selected by using model selection criterion (Bahamani & Ardalani, 2006). The ECM for estimating short-run coefficient and error correction term is presented as follows:

$$\Delta\ln(NEPSE)t=\propto+\delta_j\ \Delta\ln(M2)t\text{-}j+\lambda_k\ \Delta\ln(IR)t\text{-}k+\theta_l\Delta\ln(RGDP)t\text{-}l+\mu_m\Delta\ln(RMT)t\text{-}m+$$

$$\gamma ECTt-1+\varepsilon t \qquad \ldots(6)$$

In equation (6), $\propto$, δ_j, λ_k, θ_l, μ_m, and γ are coefficients to be estimated. Others are described hereunder.

ΔlnNEPSEt = Lagged change in the natural log of the Nepal Stock Exchange index.
ΔlnM2 t-j = Lagged change in the natural log of money supply at time t-j.
ΔlnIRt-k = Lagged change in the natural log of interest rates at time t-k.
ΔlnRGDPt-l = Lagged change in the natural log of real GDP at time t-l.
ΔlnRMTt-m = Lagged change in the natural log of remittance inflow at time t-m.
ECTt−1 =Error correction term lagged by one period.
εt = Error term.

Finally, the ARDL model tries to find the best linear unbiased estimator (BLUE) and thereby diagnostic tests need to be conducted. In this, regard, the researcher has also gone

through such tests. Therefore, diagnostic test, such as Ramsey Regression Equation Specification Error Test (RESET) test, is a general specification test for the linear regression model, LM Test for Serial Correlation, Test for Heteroscedasticity, J-B test for the normality of the residuals and CUSUM and CUSUMSQ test for the stability are conducted and reported.

Results and Discussion

The estimated results presented in Tables 2 to Table 9 present results of data analysis. The analysis results are given and discussed subsequently.

Descriptive Statistics

Table 2 shows descriptive statistics for included variables for the analysis from 1994 to 2023. The acronym lnNEPSE denotes NEPSE index in log form. Its mean and median are 6.4959, and 6.5278 respectively, indicating slight symmetry. Likewise, the skewness is 0.094 (near 0, suggesting symmetry), kurtosis is1.745 (below 3, implying a flat distribution), and Jarque-Bera (JB) Probability is 0.4326, indicating the data follows a normal distribution. Another, acronyms lnM2 denotes Money Supply in log form. Its mean and median are 11.44612 and 11.43098, suggesting symmetry. The skewness is 0.0768 (near 0, indicating symmetry). The kurtosis is 1.62399 (less than 3, flat distribution) and JB Probability is 0.3684, supporting normality. Another acronym lnIR denotes interest Rate in log form. Its mean and median are 0.7067 and 1.0919 in which mean is less than median, indicating potential left skewness. Another parameter, skewness is -0.6987 (negative, suggesting left-skewed distribution). Likewise, kurtosis is 2.5390 (below 3, moderately flat). Finally, JB Probability: 0.3237, indicating approximate normality. The acronym lnRGDP denotes Real GDP in log form. Its mean and median are 11.5852, and 12.0028, here mean is less than median, suggesting slight left skewness. The skewness for this is −0.1851 (near 0, weakly left-skewed). The kurtosis is 1.1759 (far below 3, flat distribution). JB Probability is 0.1646, borderline normality. Finally, the acronym lnRMT denotes remittance in log form. Its mean and median are 10.1604 and 10.490, here mean is less than median, indicating potential left skewness. The skewness, kurtosis and JB Probability are -0.5734(moderate left skewness), 2.2507(below 3, flat distribution), and 0.3763 (moderate left skewness) respectively.

Table 2

Descriptive Statistics

Parameters	lnNEPSE	lnM2	lnIR	lnRGDP	lnRMT
Mean	6.4959	11.4461	0.7067	11.5852	10.1604
Median	6.5278	11.4310	1.0919	12.0028	10.4900
Maximum	7.9667	13.3262	2.1066	12.4604	11.7122
Minimum	5.3223	9.6343	-1.8326	10.6109	7.1438
Std. Dev.	0.8044	1.2036	1.0415	0.7671	1.2866
Skewness	0.0944	0.0770	-0.6987	-0.1851	-0.5734
Kurtosis	1.7457	1.6240	2.5390	1.1759	2.2507
Jarque-Bera	1.6758	1.9970	2.2557	3.6088	1.9549
Probability	0.4326	0.3684	0.3237	0.1646	0.3763

Note. This table demonstrates the descriptive statistic result as for the variables computed by the author based on the data of respective variables from 1994-2023.
The descriptive statistics shows that most variables exhibit approximate normality, with some left-skewed or flat distributions.

Unit Root Test Result

Augmented Dicky Fuller (ADF) test result and Phillip-Perron (PP) test result is summarized subsequently. The ADF test evaluates the stationarity of variables by testing for unit roots at levels and at the first differences. The Table 3 results show that lnNEPSEt and ln IRt are stationary at levels I(0) and I(1) both. But, lnM2t, lnRGDPt, and lnRMTt are stationary only after the first difference I(1) and non-stationary at levels. These results clearly indicate that the variables are integrated at level, I(0) and after first difference I(1). Similarly, Phillip-Perron test result also shows a variable interest rate which is stationary at level I(0) and after first difference I(1) both. Reaming other variables are stationary only after first difference I(1)(Table 3). These results are crucial for selecting the ARDL model as an appropriate econometric approach for co-integration analysis and examining the relationships among these variables.

Table 3
Summary of Unit Root Test Result

ADF Test Results					
	At Level		At First Difference		Order of
Variables	t-Statistic	Prob.	t-Statistic	Prob.	Integration
lnNEPSE	-4.664**	0.005	-4.530**	0.002	I(0) and I(1)
lnM2	-2.076	0.536	-3.516**	0.015	I(1)
lnRGDP	-1.973	0.591	-5.224***	0.000	I(1)
lnIR	-4.013**	0.022	-8.501***	0.000	I(0) and I(1)
lnRMT	-1.023	0.925	-5.763***	0.000	I(1)
PP Test Results					
	At Level		At First Difference		Order of
Variables	t-Statistic	Prob.	t-Statistic	Prob.	Integration
lnNEPSE	-0.243	0.922	-7.320***	0.000	I(1)
lnM2	0.179	0.966	-3.496**	0.016	I(1)
lnRGDP	-0.548	0.867	-5.224***	0.000	I(1)
lnIR	-4.117**	0.004	-10.593***	0.000	I(0) and I(1)
lnRMT	-2.478	0.131	-5.737***	0.000	I(1)

Note. This table demonstrates the Augmented Dickey Fuller test result as computed by the author based on the data of respective variables from 1994-2023. The symbol ** and *** implies statistical significance at 5 percent and 1 percent respectively.

Lag length Selection

In time series analysis, the optimal lag selection is very crucial and quite sensitive in the case of time series analysis. The VAR Lag Order Selection Criteria are given in Table 4. The study uses criteria like LR, FPE, AIC, SC, and HQ to identify the optimal lag length for a

model. The majority of the criteria have been recommended for Lag 1, as it captures model dynamics effectively and maintains accuracy. In other words, this lag length allows for a comprehensive model improving forecast with accuracy and robustness.

Table 4

Selection of Optimum lag

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-69.6404	NA	0.0003	6.2200	6.4654	6.2851
1	37.7375	161.0670*	3.81e-07*	-0.6448*	0.8277*	-0.2541*

Note. This table demonstrates the test result as computed by the author based on the data of respective variables from 1994-2023.

F-Bound testing

The ARDL bounds test is a statistical method used to determine the long-run relationship among variables included in the model. Evidently, the F-statistic value is 5.063 and it is above the upper bound at all levels of significance (1 %, 5 %, and 10 %). Since 5.063 > 4.37 (the highest critical value for I(1) bond at 1 percent, we can reject the null hypothesis at the 1 percent level and conclude that there exists a statistically significant long-run relationship between the outcome variable and the predictors included in the ARDL model(Table 5).

Table 5

F-Bound Test Result

Null Hypothesis: There is no long-run relationship		
Test Statistics	Values	K(Explanatory Variables
F-Statistics	5.063	4
Critical Value Bonds		
Level of significance	I(0) Bonds	I(1) Bonds
10 percent	2.2	3.09
5 percent	2.56	3.49
1 percent	3.29	4.37

Note. This Table shows the F-bound test for co-integration results as computed by the author based on the data used for the variables spanning from 1994-2023.

Granger Causality Test Result

The Granger causality test is a statistical hypothesis test used to determine whether one-time series data can predict other data belonging to certain variables included in the time series model. It was developed by Granger (1969) and evaluates the causal relationship between two variables in the sense of temporal precedence. Therefore, the result of Granger causality is summarized as follows:

Table 6

Granger Causality Test Result

Null Hypothesis	F-Statistic	P-Value	Decision	Interpretation
Broad money supply does not Granger-cause NEPSE Index	5.81348	0.0090	Reject (at 1% level)	Broad money supply Granger-causes NEPSE Index.
NEPSE Index does not Granger-cause broad money supply	0.06150	0.9405	Fail to reject	NEPSE Index does not Granger-cause broad money supply.
Interest rate does not Granger-cause NEPSE Index	1.16312	0.3349	Fail to reject	Interest rate does not Granger-cause NEPSE Index.
NEPSE Index does not Granger-cause interest rate	0.22746	0.7988	Fail to reject	NEPSE Index does not Granger-cause Interest rate.
Real GDP does not Granger-cause NEPSE Index	4.02875	0.0316	Reject (at 5% level)	Real GDP Granger-causes NEPSE index.
NEPSE Index does not Granger-cause real GDP	2.96630	0.0714	Reject (at 10% level)	Weak evidence of NEPSE Index Granger-causing real GDP.
Remittance flow does not Granger-cause NEPSE Index	3.84697	0.0362	Reject (at 5% level)	Remittance flow Granger-cause NEPSE index.
NEPSE Index does not Granger-cause remittance flow	1.2367	0.3089	Fail to reject	NEPSE Index does not Granger-cause remittance flow.

Note. This Table shows the Granger causality test result as computed by the author based on the data used for the variables spanning from 1994-2023.

In summary, broad Money Supply Granger-causes the NEPSE index, indicating that liquidity significantly impacts stock market performance. Likewise, real GDP Granger-causes the NEPSE index. But, there is weak evidence that the NEPSE index may also Granger-cause GDP. Interest Rate and Remittance Inflows show no Granger causality with the NEPSE index in either direction.

Estimated Long Run Coefficients

Table 7 below shows the estimated long-run coefficients of the ARDL model and provides valuable insights into the relationships between the outcome variable NEPSE index and the independent and control variables included in the model.

Table 7

Estimated Long Run Coefficients using the ARDL Approach

Dependent Variables: NEPSE			
Selected Model: ARDL (1,1,1,0,1)			
Variables	Coefficient(Standard error)	t-Statistic	P. Value
lnM2	1.287***(0.364)	3.539	0.003
ln IR	-0.242*(0.135)	-1.797	0.093
lnRGDP	1.387***(0.419)	3.307	0.005
lnRMT	0.170(0.381)	0.446	0.662
C	5.783**(2.232)	2.591	0.021

Note. This table demonstrates estimated long-run coefficients using the ARDL approach as computed by the author based on the data used for the variables and the symbols *** ' ** and *indicate the significance of coefficients at 1 percent 5 percent and 10 percent level.

Table 7 result reveals that the coefficient of broad money supply (M2) is 1.287 (P<0.01). It implies a 1 percent increase in broad money supply is associated with a 1.287 percent increase in the NEPSE index in the long run. It indicates that increased money supply may enhance liquidity in the economy, encouraging investment in the stock market and driving up NEPSE index. Similarly, the coefficient of interest rate(IR) is -0.242 (P<0.10) indicating a 1 percent increase in interest rates leads to a 0.242 percent decrease in the NEPSE index in the long run. This can be inferred as higher interest rates increase the cost of borrowing and reduce corporate profits, making equities less attractive relative to other fixed-income securities. The coefficient of real GDP is 1.387 (P<0.01). This implies a 1 percent increase in real GDP causes an increase in NEPSE index by 1.387 percent in the long run. Its economic interpretation can be higher GDP growth reflects improved economic activity, boosting corporate earnings and investor confidence, which positively impacts stock prices. Moreover, the coefficient of remittance Inflows 0.170 (not significant, P=0.662). The coefficient is positive but statistically insignificant, indicating no clear long-run relationship between remittance inflows in Nepal and the NEPSE index. It can be inferred that remittance is predominant used in consumption or real estate investment but not invested stocks. The estimated coefficient for constant is 5.783 (P <0.05). This reflects the inherent factors influencing the NEPSE index that are yet to include as the explanatory variables.

Estimated Short-Run Coefficients

The ECM term, also known as the error correction term ECT (-1), is a key component in the Error Correction Model (ECM) estimated output. Moreover, the highly significant error correction term (ECT) indicates that the long-run equilibrium is corrected very quickly, reflecting a strong and stable long-run relationship among the variables included.

Table 8

Error Correction Model

Dependent Variables: NEPSE			
Selected Model: ARDL (1,1,1,0,1)			
Variable	Coefficient (Standard error)	t-Statistic	P-Value
ΔlnM2	0.842**(0.314)	2.683	0.018
ΔlnIR	-0.198(0.121)	-1.636	0.112
ΔlnRGDP	0.954***(0.312)	3.059	0.007
ΔlnRMT	0.051(0.158)	0.322	0.750
ECT(-1)	-0.653***(0.147)	-4.443	0.001

Note. This table demonstrates estimated short-run coefficients using the ECM approach as computed by the author based on the data for the variable spanning 1994-2023 of Nepal and the symbols *** ' ** and *indicate the significance of coefficients at 1 percent 5 percent and 10 percent level.

Table 8 shows the error correction term (ECT) coefficient value as -0.653 suggesting a rapid adjustment process in response to shocks, indicating that deviations from the long-run equilibrium are quickly corrected back. Essentially, the short-run dynamics reveal that the ECT is negative and highly significant (-0.653, P<0.01), indicating that approximately 65 percent of deviations from the long-run equilibrium are corrected in the subsequent period. In other words, any short-term fluctuations in economic growth caused by any changes the money supply, interest rate, real GDP growth, and remittance inflow will not persist, as the model tends to correct the disequilibrium rapidly. Moreover, in short, only the variables broad money supply(M2), and real GDP(RGDP) are statistically significant. But, interest rate (IR), and remittance inflow (RMT) are not significant. Furthermore, the values of R-squared and Adjusted R-squared are 0.697 and 0.652, implying that the model explains about 69.7 percent of the variation in NEPSE index, with an adjusted value of 65.2 percent, indicating robustness of the model. Moreover, Durbin-Watson Statistic value is 2.42 which is close to 2, reflecting no serious autocorrelation issues in the residuals of the estimated model.

Diagnostic Test of the ARDL Model

Table 9 demonstrates diagnostic test result such as the RESET (Regression Specification Error Test) is used to check for specification errors in a regression model, the Breusch-Godfrey serial correlation LM Test is used to detect the serial correlation (autocorrelation) in the residuals of a regression, the Breusch-Pagan-Godfrey test is used to detect heteroskedasticity in the residuals of a regression model and Jacque-Berra Test for normality test result.

Table 9

RESET Test Result

RESET Test Result			
	Value	df	Probability
t-statistic	1.401521	35	0.1699
F-statistic	1.964261	(1, 35)	0.1699
Breusch-Godfrey serial correlation LM Test result			
	Value	df	Probability
F-statistic	1.4406	Prob. F(2,13)	0.2722
Obs*R-squared4.3541	Prob.	Chi-Square(2)	0.1134
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
	Value	df	Probability
F-statistic	1.2071	Prob. F(8,15)	0.3581
Obs*R-squared	9.3999	Prob. Chi-Square(8)	0.3097
Normality Test Result			
Jarque-Bera statistic	0.6667	p-value	0.7165

Note. This table demonstrates diagnostic test result as computed by the author based on the data for the variable spanning 1994 -2024 of Nepal.

In the Regression Specification Error Test (RESET) result, the t-statistic value is 0.9641 with a p-value of 0.3513 which is greater than the common significance levels (0.01, 0.05, 0.10). In this case, the p-value of 0.3513 is greater than 0.05. Hence, there is no evidence of the omitted variables and wrong functional form (Table 9). Regarding, the serial correlation

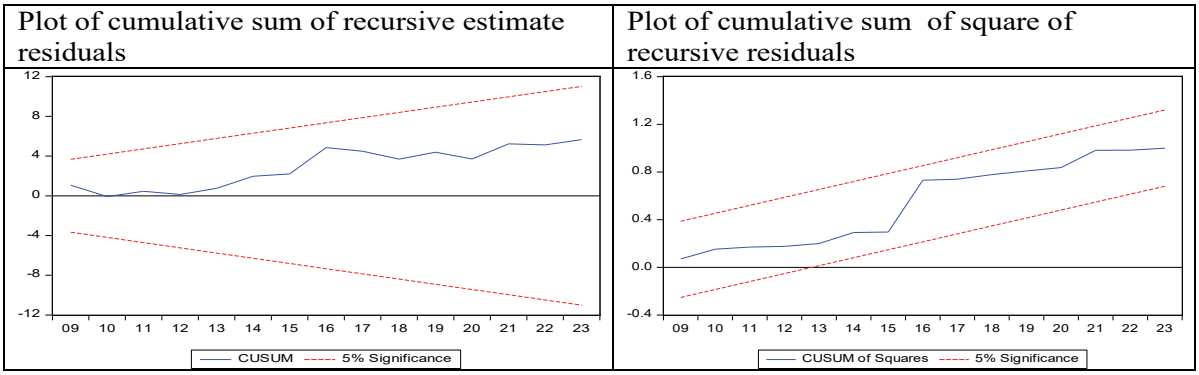
LM test, the F-statistic value is 1.4406 with a p-value (Prob. F) of 0.2722. Here, the p-value of 0.2722 is much greater than 0.05. This suggests that there is no significant evidence of serial correlation in the residuals. Similarly, regarding the heteroscedasticity test, the F-statistic value is 1.2071 with a p-value (Prob. F) of 0.3581. Here, the p-value of 0.0.3581 is much greater than 0.05. Hence, the Breusch-Pagan-Godfrey test results suggest that there is no significant evidence of heteroskedasticity in the residuals. This indicates that the variance of the residuals is constant across observations, meaning the model does not suffer from the heteroskedasticity issues based on this test (Table 9). Finally, the Jarque-Bera statistic is 0.6667 with a p-value of 0.7165. Evidently, the p-value greater than 0.05 indicates that the residuals are normally distributed. Therefore, we can conclude that the residuals of the ARDL model are approximately normally distributed based on this test (Table 9).

Stability Test Result

The plot of cumulative sum of recursive estimate residuals line remains within the 5 percent significance level critical bounds throughout the sample period from 1994 to 2023. This indicates that there are no significant deviations in the cumulative sum of the residuals that would suggest instability. Similarly, the cumulative sum of the squares line also remains within the 5 percent significance level critical bounds throughout the sample period. This indicates that there are no significant deviations in the cumulative sum of the squared residuals that would suggest instability in the variance of the residuals. Therefore, we can conclude that the variance of the residuals is stable over the period from 1994 to 2023 and there is no evidence of changes in volatility or variance instability in the ARDL model (Figure 1).

Figure 1

CUSUM Sum and SUSUM Sum of Square Recursive Residuals



Discussion

The findings revealed unidirectional causality from broad money supply to NEPSE index, this result is aligned with the studies such as Brahmasrene and Jiranyakul (2007), Olulu-Briggs and Ogbulu (2015), but contrasting with the findings of Taamouti (2015) as it could not find any causality between them. Conversely, the studies such as Al-Kandari and Abul (2019), John & Ezeabasili (2020) found causality from the stock index to money supply. Likewise, the current study found by-directional causality between real GDP and NEPSE index and unidirectional causality from remittance flow to NEPSE index, but the absence of

causality between interest rate and NEPSE index. The estimated long-run coefficients (Table 7) provide critical insights into the factors influencing the NEPSE index. Moreover, broad money supply exhibits a long-run and positive and highly significant relationship with the NEPSE index, with a coefficient of 1.287 (P<0.01). This suggests that a 1 percent increase in the money supply leads to a 1.287 percent rise in the NEPSE index, this is likely due to enhanced liquidity in the economy, which fosters investment in the capital market. The result is aligned with the findings of John & Ezeabasili (2020). But, this result contrasts with Ahmad et al. (2015), which showed negative effect on the same. The interest rate (IR) is negatively related to the NEPSE index, with a coefficient of -0.242 (P<0.10). This indicates that a 1 percent rise in interest rates reduces the NEPSE index by 0.242 percent. It may suggest that higher interest rates increase borrowing costs and reduce corporate profitability, making equities less attractive relative to fixed-income securities. Both of these results align with previous studies such as Ndlovu et al. (2018), Khan & Khan (2018), Shawtari et al. (2016), Shrestha & Subedi, (2014) and Sahu et al. (2011). But, this result contrasts with the study of Ahmad et al. (2015), which could not find a statistically significant effect of interest rates on a stock market index.

Moreover, real GDP positively impacts the NEPSE index, with a significant coefficient of 1.387 (P<0.01). This implies that a 1 percent increase in GDP boosts the NEPSE index by 1.387 percent. It is so because economic growth enhances corporate earnings and investor confidence, leading to increased stock prices. The finding, as positive but statistically insignificant coefficient of remittance inflow, is 0.170 (P=0.662), and it indicates no clear long-run relationship with the NEPSE index. This suggests that remittances inflow amount in Nepal have been predominantly used for consumption or real estate investment rather than stock market investment, as the study found by Subedi (2016), the substantial proportion of remittance amount is used for land purchases and real estate. The error correction model (Table 8) demonstrates the short-run dynamics. Similarly, the result reveals that broad money supply and real GDP have positive and significant effects on the NEPSE index in the short-run. The error correction term is negative and highly significant with coefficient value as −0.653 (P<0.01), indicating that 65.3 percent of deviations from the long-run equilibrium are corrected within one period, reflecting a stable and rapid adjustment process. These results highlight the critical roles of liquidity, economic growth, and interest rates in shaping Nepal's stock market dynamics while underscoring the limited influence of remittances in this context.

Conclusion and Policy Implications

This study explored the influence of money supply and other macroeconomic variables on stock market performance in Nepal, with a focus on understanding their roles in shaping market dynamics. The findings indicate that the money supply has a significant positive impact on the NEPSE index, both in the long run and short run. But, the interest rate has a negative and significant impact in the long-run but it is insignificant in the short-run. This underscores the role of increased liquidity in driving stock market performance, as higher money supply facilitates investment in financial markets. The adjustment process to long-run equilibrium was stable and rapid, with deviations corrected by 65.3 percent in each period. Moreover, real GDP plays a crucial role in driving stock market performance, with a positive

and significant relationship in both the short and long run. This finding reflects the close association between economic growth, corporate earnings, and investor confidence. Remittance inflows, however, show no significant long-run relationship with the NEPSE index. Perhaps, it suggests that remittances are predominantly directed toward consumption or real estate rather than stock market investments. Overall, this study highlights the importance of macroeconomic stability, particularly in managing money supply and interest rates, to foster sustainable growth in Nepal's stock market. It also provides critical insights for policymakers, investors, and stakeholders on the interplay between economic factors and stock market dynamics.

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Understanding Buying Behavior among the Smartphone Users in Nepal

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Abstract

Smartphones have seamlessly integrated into daily life for the people of Nepal, making their importance undeniable. However, the country's reliance on imports for smartphone consumption underscores the need to understand user preferences better. This paper investigates the buying behavior of smartphone users in Nepal, based on a sample of 235 randomly selected individuals from Banepa Municipality. Utilizing a five-point Likert scale, we collected valuable insights from the participants. The results reveal that user behavior is significantly influenced by reviews and recommendations, along with the specific features of smartphones. Conversely, product, price, place (distribution), and promotion attributes appear to have little effect on purchase decisions. Ultimately, when it comes to smartphones, features are paramount. Therefore, effective marketing strategies should emphasize key aspects such as speed, performance, battery life, camera capabilities, aesthetic design, and exchange options to attract Nepalese users.

SMARTPHONE CONSUMPTION IN Nepal has seen significant growth over the past decade, driven by increasing internet penetration, the availability of affordable smartphones, and the rise of digital services. With the expansion of 4G networks and more affordable data plans, internet usage has surged, making smartphones a necessity for staying connected. The data from the Department of Customs of Nepal shows that more than 990 thousand sets of smartphones are seen imported from different nations during the first five months of fiscal year

Keywords

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Communication is a crucial aspect of corporate life, with cell phones becoming a reliable and effective means of communication (Uddin et al., 2014). Smartphones are a rapidly growing form of communication, offering instant connections and information access (Chan, 2015). Mobile culture is influenced by three key trends: communication services like voice, text, and pictures, wireless internet services like browsing, corporate access, and email, and various media services like movies, games, and music (Hansen, 2003). Smartphones provide numerous benefits to society, such as immediate calls, SMS, work scheduling, GPS, internet access, entertainment, application downloads, data storage, and even legal assistance (Ling et al., 2001). Most people worldwide have widely adopted smartphones, making them indispensable to their everyday lives. Joshi and Mathur (2023) revealed that product features, affordability, brand reputation, convenience, and trust all influence the smartphone industry. Vishesh et al. (2018) indicated that speed and performance, brand and advertising, and finally recommendations and reviews had the greatest beneficial effects on determining the buying behavior of smartphones.

In context to Nepal, Humagai (2022) revealed that variables like, promotional campaign, price, after-sales service, mobile attributes, brand name, family and friend influenced influence on the buying behavior of smart phones among the Nepalese consumers. Similarly, the paper also found no significant relationship between gender, occupation, income level, and marital status, but a significant relationship between education level and age for mobile purchase decisions. Similarly, Tiwari (2024) on consumer buying smartphones in Butwal City, the study found a positive correlation between formativeness, creditability, entertainment, and incentives in advertising, that increased purchase intention, while credible advertisements and entertaining ones led to increased intention. More research is needed on the factors influencing smartphone purchasing decisions in Nepal. Hence, this study tries to find out the factors affecting consumer buying behavior for smart phones in Nepal.

Review of Literature

Theoretical Review

Buying Behavior

Marketing identifies and satisfies the needs of target customers. Marketers must understand how customers select, buy, use and dispose of products. They must know the behavior of their customers.

Human behavior is a very complex process. No two customers always behave in the same way. Marketers must understand why customers behave as they do. Buyer behavior influences customer's willingness to buy. Buyer behavior is concerned with the activities of customers. It involves decisions by buyers. They can be consumers or organizations (Agrawal, 2016).

Consumer Buying Behavior

A marketer is always interested in knowing how consumers respond to various marketing stimuli-products, price, place and promotion and another stimulus, i.e. buyer's environment-

economic, technological, political and cultural. The marketer studies the relationship between marketing stimuli and consumer response. These stimuli pass through the buyer's box which produces the buyers' responses.

Consumer buying behavior refers to the decision-making processes and actions of consumers when they purchase goods or services. Understanding this behavior is essential for businesses to align their products, marketing strategies, and customer engagement effectively. The buyer is considered a black box, because his mind cannot be imagined, as to his buying decision. The buying decision depends on his attitude, preferences, findings, etc. (Pillai et al., 2012). Modern consumer behavior is shaped by several key trends, with digital influence playing a pivotal role. Wahdiniawati et al. (2024) found that perceived usefulness, particularly timesaving, significantly influences both interest and trust. Trust mediates the relationship between perceived usefulness and interest, highlighting the complexity of factors influencing online shopping behavior. The study suggests enhancing perceived usefulness and trust through improved service quality, customer engagement, and transparency in return policies. Additionally, sustainability has become a major driver of consumer preferences. At the same time, Baviskar et al. (2024) examined consumer behavior toward sustainable product choices, focusing on visual trends and environmental impact awareness. Despite a preference for sustainable products, non-reusable plastics remain popular. The findings highlighted the need for education and practical measures to promote sustainable choices. Casaca and Miguel (2024) revealed that personalization is transforming modern marketing strategies, enhancing customer satisfaction, engagement, retention, and trust, thereby reshaping business connections with customers.

Empirical Review

Boby Joseph and Khannal (2011) studied Nepali teenagers' buying behavior towards mobile phones, comparing urban, semirural, and rural areas. The study concluded that factors such as brand choice, information source, decision-making factors, financial sources, and product satisfaction levels influenced the buying behavior of smartphones.

Mini (2019) revealed that changing consumer buying preferences and resulting changes in smartphone behavior are influencing middle-aged consumers' preference for internet browsing as the most popular feature in smartphones, with advertisements playing a significant role in this decision.

Maliha et al. (2020) found that regulatory focus influences consumer behavior in purchasing smartphones, controlling perception, rationale, and lifestyle. Quality of a product is the most important factor, followed by price, brand and product uniqueness, camera function, and operating system. Sales promotions are less important for those interested in trying different brands of mobile devices.

Fulzele and Chirde (2022) revealed that some people are influenced to buy smartphones from the advice of their relatives or friends or by seeing many offers/discounts and least people are influenced by advertisements.

Rai et al. (2023) conducted a study on smartphone purchasing behavior, focusing on device qualities, social factors, pricing, and brand image. The results showed that product

pricing, social variables, and brand image significantly influence consumer behavior, while product attributes did not significantly impact consumer behavior. The study highlights the importance of understanding these factors in smartphone purchasing decisions.

Boutaleb (2024) in his study on smartphone buying in Arar province, Saudi Arabia, found that personal, external, and gender characteristics account for 41.7 percent of the variance in purchasing decisions. These variables, along with gender, significantly influence smartphone purchasing behavior. Personal characteristics have a stronger influence on the decision to buy a smartphone.

Methodology

The paper concerns the consumer buying behavior for smartphones. Hence, the paper has taken opinions from the potential consumers of smartphones. To obtain the research objectives, the paper follows a descriptive as well as a casual comparative research design. About 15,000 people own a smartphone at Banepa Municipality as per the Central Bureau of Statistics (CBS) as of the year end of 2021. Among them 235 smartphone users and consumers were selected randomly from Banepa Municipality as a sample for the paper. A convenience sampling technique is followed in the paper. The required data for the paper was collected through field visit. Potential respondents were reached to get their opinions.

The paper has used the questionnaire used in the paper of Vishesh et al. (2018). The constructs used in the paper of Vishesh et al. (2018) have been followed to develop the questionnaire for the study. A five-points Likert scale is used to measure the buying behavior of the Nepalese smartphones' consumers in Nepal. A scale of '1' to '5' was used to measure the buying behavior of smartphone users where '1' is indicated for 'least important' and '5' for 'most important' Correlation coefficient is a statistical measure that describes the strength and direction of a relationship between two variables.

The paper has adopted Cronbach's alpha to determine the reliability of the instrument used for the survey. Hence, the following outcome was seen after the reliability test:

Table 1

Reliability Result

Constructs	Initial Items	Items Dropped	Alpha Value
Reviews and Recommendations	4	2	0.342
Marketing Attributes+	18	10	0.732
Features*	16	12	0.778
Buyer's Behavior	6	4	0.546

Note. *Features include features 1: Speed and Performance, Features 2: Battery, Features 3: Camera, Features 4: Design and Color, and Features 5: Exchange Possibility. +A new construct, namely, marketing attributes is developed to enhance the reliability by adjoining price advantage, physical dimension, brand and advertisement, and finally availability.

Table 1 shows the construct 'reviews and recommendations;' and is seen as unacceptable, the alpha values are seen quite below the threshold of 0.7.

Results and Discussion

This section covers the analysis of the data collected from the respondents and a discussion of the results.

Respondents' Profile

The table below illustrates the summary of the respondents' profile:

Table 2

Respondents' Profile

Sex	Responses	Age Group	Responses	Education	Responses	Occupation	Responses
Male	117 (50.0)	Below 20	9 (3.8)	Illiterate	19 (8.0)	Self-employed	52 (22.0)
Female	118 (50.0)	21-30	99 (42.1)	SEE	19 (8.0)	Teacher	9 (4.0)
		31-40	80 (34.0)	SLC	61 (26.0)	Students	103 (44.0)
		41 and above	47 (20.0)	Bachelor	71 (30.0)	Business	19 (8.0)
				Master	61 (26.0)	Housewife	5 (2.0)
				PhD	4 (2.0)	Government Job	14 (6.0)
						Intern	14 (6.0)
						Agriculture	5 (2.0)
						Army	5 (2.0)
						Unemployed	5 (2.0)
						Retired	5 (2.0)
Total							235

Note. Field Survey, 2024.

An equal number of both genders are seen within respondents. The predominance of younger age groups and students suggests a study that may cater to or reflect the preferences of a younger demographics. The majority have formal education beyond secondary school, which may influence their perspectives and preferences. A mix of occupational backgrounds provides a broad understanding of societal perspectives, but the study is dominated by students and self-employed individuals.

Opinions on Reviews and Recommendations

The table below illustrates the opinion on the reviews and recommendations while buying smartphones:

Table 3

Opinions on Reviews and Recommendations

Items	Mean	Std. Deviation	Skewness
The recommendations of my friends/relatives for any phone makes me favorably disposed towards buying that phone.	3.91	0.98	-0.51
The review ratings given for any phone model affect my purchase decision.	3.72	1.04	-0.21
Overall Average	3.82		

Note. Field Survey, 2024.

Table 3 shows that consumers generally agree the recommendations from their social circle significantly in their buying decisions. Review ratings also play an important role in purchase decisions, though slightly less than personal recommendations. The overall mean of 3.82 suggests that both personal recommendations and review ratings are influential factors, with recommendations carrying slightly more weight. Both opinions are negatively skewed.

Opinions on Marketing Attributes

The table below illustrates the opinion on the marketing attributes, i.e. price advantage, physical dimension, brand and advertisement, and availability while buying smartphones:

Table 4

Opinions on Marketing Attributes

Items	Mean	Std. Deviation	Skewness
Price Advantages			
Free Internet data bundled with a new phone purchase will influence my buying decision favorably towards that phone.	3.45	0.94	+0.28
While choosing to buy on a phone, the availability of a flexible price plan (interest free EMIs etc.) affects my choice.	3.00	0.90	+0.68
Average Price Advantages (A)	3.22		
Physical Dimension			
The thickness of the phone doesn't matter to me when making a buying decision.	3.55	1.11	-0.03
I would prefer to buy a large-screen phone, where I can see the pictures and videos clearly.	3.47	1.10	+0.04
Average for Physical Dimension (B)	3.51		
Brand and Advertisement			
The popularity of the brand is an important factor for me when deciding to purchase a mobile phone.	3.79	1.04	-0.44
More often I see the Ads of a particular brand/phone, more favorably I am predisposed towards that brand/phone.	3.61	1.01	-0.11
Average for Brand and Advertisement (C)	3.70		
Availability			
I would prefer to buy a phone from a store that sells multiple brands so that I can make a choice between them (Multi Brand Outlets: MBO).	3.86	0.99	-0.20
If a particular brand's service center is close to me, it influences my buying decision favorably towards that phone.	3.86	1.06	-0.34
Average for Availability (D)	3.86		
Overall Average (A+B+C+D/4)	3.57		

Note. Field Survey, 2024.

Table 4 shows that an overall average of 3.57 points for marketing factors indicate a moderate level of agreement across all factors, with availability having the highest impact and price advantages the lowest. Price advantages moderately influence purchasing decisions, with slightly more importance given to flexible payment plans. Physical dimensions like screen size and thickness are relatively important, but opinions are diverse. The popularity of the brand and advertisement frequency significantly affect consumer behavior, with branding being slightly more influential. Availability factors, such as multi-brand outlets and proximity of service centers, are the most influential in purchasing decisions. In general, respondents value convenience (availability) and brand reputation over price considerations. Preferences are diverse, particularly regarding physical dimensions, which may depend on individual user needs. Advertisement effectiveness and brand popularity are critical for influencing consumer attitudes but rank slightly below availability.

Opinions on Features

The opinions on features are summated opinions on speed, battery, camera performance, design and color, and finally exchange possibilities. The table below illustrates the opinions on features on smartphones:

Table 5

Opinions on Features

Items	Mean	Std. Deviation	Skewness
I would prefer a phone, which gets me better pictures clicked.	3.90	1.04	-0.30
I would prefer a phone that will not hang while performing multiple operations.	3.85	1.04	-0.37
Fast battery charging capability in a phone influences my buying decision towards that phone.	3.77	1.07	-0.24
Availability of an attractive exchange offer for my old phone while purchasing a new mobile phone influences my buying decision favorably towards that phone.	3.53	1.06	0.01
Overall Average	3.76		

Note. Field Survey, 2024.

Table 5 indicates a strong agreement that consumers prioritize a phone with better picture quality. Consumers strongly value a phone's ability to handle multiple operations without lagging. The fast charging capability is an important factor, though slightly less than picture quality or multitasking. A moderate preference for exchange offers, making it the least influential among these factors. The overall mean of 3.76 indicates that technical features (picture quality, multitasking, fast charging) significantly influence purchase decisions, while promotional aspects like exchange offers are somewhat less impactful. One of the opinions, skewness is 0.01, being close to zero, shows a symmetrical distribution of responses.

Opinions on Buyer's Behavior

The table below illustrates opinions on the buyer's behavior of smartphones among Nepalese customers:

Table 6

Opinions on Buyer's Behavior

Items	Mean	Std. Deviation	Skewness
I got better convenience value.	3.91	1.06	-0.42
I achieved emotional value.	3.52	1.08	0.08
Overall Average		3.71	

Note. Field Survey, 2024.

Table 6 shows a strong agreement that consumers feel they derive convenience value from their purchasing decisions. Similarly, another opinion indicates a moderate level of agreement that purchases provide emotional value, though it is less influential compared to convenience. The overall mean of 3.71 suggests that convenience value plays a stronger role than emotional value in influencing consumer behavior. One of the skewness values, i.e. 0.08, reflects a nearly symmetrical distribution of responses.

The matrix below illustrates the correlation coefficients among the selected variables for the paper.

Table 7

Correlation Matrix

Constructs	Review and Recommendations	Features	Marketing Attributes	Buyer's Behavior
Review and Recommendations	1			
Features	+0.515**			
	(0.000)	1		
Marketing Attributes	+0.366**	+0.465**		
	(0.000)	(0.000)	1	
Buyer's Behavior	+0.432**	+0.491**	+0.123	
	(0.000)	(0.000)	(0.060)	1

Note. ** Correlation is significant at the 0.01 level.

Table 7 represents the correlation matrix for constructs related to buyer's behavior, review and recommendations, features, and marketing attributes.

'Review and recommendations' are seen having a positive correlation with features (+0.515**) and marketing factors (+0.366**). A moderate positive relationship with buyer's behavior (+0.432**), indicating that reviews and recommendations significantly influence buyer's decisions.

Features: have a strong positive correlation with 'review and recommendations' (+0.515**) and buyer's behavior (+0.491**). A moderate positive relationship with marketing attributes (+0.465**), suggesting that features of a product are influenced by marketing strategies.

Marketing attributes have a significant correlation with features (+0.465**) and 'review and recommendations' (+0.366**). There is a weak and non-significant correlation with buyer's behavior (+0.123, p = 0.060), indicating that while marketing factors are important, their direct

impact on buyer behavior might be less pronounced.

Buyer's behavior has the strongest correlation with features (+0.491**) and 'review and recommendations '(+0.432**). Similarly, there is a weak correlation with marketing attributes (+0.123, p = 0.060), showing that buyers prioritize product features and reviews over marketing efforts.

Features and 'reviews and recommendations' are the most critical factors influencing buyer behavior. Marketing attributes have limited direct influence on buyer behavior but are moderately connected to features and reviews, indirectly affecting decision-making. Strategies focusing on improving product features and leveraging positive reviews and recommendations may yield better consumer responses than purely increasing marketing efforts.

Summary of Regression Analysis

As Table 1 shows low reliability for the 'reviews and recommendations' factors, the respective variable is dropped from further analysis. The summary of the regression results has been illustrated below:

Table 8

Summary of Regression Analysis

Model		Beta	T-statistics	p-value	VIF
(Constant)		2.426	5.916	0.000	
Marketing Attributes		-0.267	-2.090	0.038	1.275
Features		+0.596	8.637	0.000	1.275
R-Square	0.255				
F-Statistics	39.65				
	(0.000)				
DW Statistics	1.863				

Note. Predictors: Marketing attributes, features; Dependent variable: Buyer's behavior.

R-Square (0.255) indicates that 25.5% of the variance in smartphone buying behavior is explained by the independent variables. Similarly, adjusted R-Square (0.248) showing a slightly lower but still meaningful explanatory power. F-Statistics (39.65, p < 0.001) indicates that the overall model is statistically significant.

The coefficient (-0.267) suggests that an increase in marketing attributes decreases the dependent variable by 0.267 units, holding other variables constant. The T-statistics (-2.090) indicates the significance of this variable, with a p-value of 0.038 (<0.05), confirming that the effect is statistically significant. Similarly, the coefficient (+0.596) indicates that an increase in features improves the dependent variable by 0.596 units. The T-statistics (8.637) and P-value (0.000) show strong statistical significance.

All VIF values are below 10, suggesting no multicollinearity issues among the independent variables. Durbin-Watson Statistics (1.863), i.e. close to 2, indicating no significant autocorrelation in the residuals.

Discussion

Boby Joseph S.J. and Khannal (2011) factors such as brand choice, information source, decision-making factors, financial sources, and product satisfaction levels influenced the buying behavior of smartphones, while this paper found that physical dimensions, reviews, and recommendations followed by features of the smartphones determined the buying behavior among Nepalese customers. Nepalese smartphone customers are seen as more concerned about features but no concern towards the advertisement of smartphones, which shows one the contradictors to Maliha et al. (2020) and Fulzele and Chirde's (2022) findings, where the researchers stated quality of a product is the most important factor, followed by price, brand and product uniqueness, camera function, and operating system. Rai et al. (2023) concluded that product attributes did not significantly impact consumer behavior in smartphone purchasing decisions, while the current study did not ignore the various features of smartphones.

Conclusion and Implications

The analysis provides key insights into the factors influencing smartphone buying behavior among consumers, highlighting the relative importance of various factors and their interactions with buyer behavior. The study reveals that functional and technical attributes like picture quality, multitasking capability, and fast charging significantly predict consumer behavior, while social circle recommendations and review ratings significantly influence buyer behavior, emphasizing the importance of trust and peer validation.

While moderately correlated with buyer behavior, availability shows an insignificant negative impact on the regression model. This suggests that while consumers prefer convenience and access, these factors are secondary to functional attributes and reviews.

Factors like phone thickness and screen size have a weak positive correlation and an insignificant impact indicating that they are not primary drivers. The paper determined that market attributes do not significantly influence the purchasing decisions of smartphone users in Nepal. Instead, what truly matters to these consumers is the quality and features of the smartphones themselves. While there may be concerns about the reliability of the paper’s reviews and recommendations. It is important to recognize that these factors can still sway consumer behavior in the smartphone market in Nepal.

Smartphone manufacturers who intend to sell in the Nepalese market should prioritize enhancing technical features, as these significantly influence consumer decisions. Leveraging social proof through reviews and recommendations is essential. Investments in influencer marketing or testimonials could amplify consumer trust and appeal. A balanced approach to pricing is necessary, focusing on value rather than competing solely on cost. Ensuring availability in multi-brand outlets and accessible service centers remains important, albeit less critical than core product features.

This study concludes that consumers are more influenced by functionality and social validation than by traditional branding or pricing strategies, which should guide manufacturers and retailers in aligning their offerings with buyer preferences.

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Utilization of QR Codes on Trust and Security in Nepalese Context

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Abstract

This study aims to analyze the use of QR codes for trust and security in the Nepalese context. Koshi, Madhesh, Bagmati, Gandaki, Lumbini, Karnali, and Sudurpaschim are among the seven province clusters into which the study's population is divided using the cluster sampling probability sample technique. A standardized questionnaire was utilized in physical and online surveys to collect data from 208 respondents. The study's findings indicated that employing QR codes made participants feel completely trusted and safe. The study notes that despite the progress, there are still enduring security and trust issues that could prevent QR codes from being widely used if they are not addressed. They feel better at ease utilizing technology in various sectors, such as banking, education, marketing, travel and tourism, hotel and dining, and health. This also helps explain the differences in the monthly percentage of mobile payments made using QR codes by province, gender, age, job, and educational attainment. The study will concentrate on preserving security, building trust, and enhancing user education in several areas before the widespread adoption of QR code services for long-term use.

Keywords
QR code
Effectiveness
Customer Satisfaction
Security and
Trust

QR CODE FOR commercial transactions are becoming increasingly common in the market, and many organizations use them (Demir et al., 2015; Dhamala, 2024). As the usage of QR payments has grown recently in Nepalese economic practice, Nepal Rastra Bank is getting ready to standardize and streamline the process. As more transactions are being made utilizing QR codes, NRB has announced that it will allocate its

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resources and staff to preserve greater regularity and order (NRB, 2023).

A QR code is a two-dimensional or matrix bar code that can hold data and is made to be readable by tablets, laptops, and smartphones (Hossain et al., 2018; Ifada & Abidin, 2023; Liébana-Cabanillas et al., 2015). Quick Response (QR) means that the contents of the code should be decoded rapidly. The code is composed of square-shaped black modules set on a white backdrop. Text, a URL, or other data may constitute the encoded information. In 1994, the Toyota subsidiary Denso Wave invented QR codes, which were first applied to inventory management in the auto parts industry (Amarullah et al., 2021; Demir et al., 2015; Eren, 2024; Maharjan et al., 2024; Suo, 2022). One- or two-dimensional QR codes are commonly used because of their low cost and small size (Karniawati et al., 2021).

Globally, QR codes are becoming increasingly popular. These days, many people read QR codes using smartphones with built-in cameras (Luitel, 2023; Mookerjee et al., 2022). QR codes are employed in supermarkets, hotels, restaurants, educational institutions, the financial and health sectors, insurance, travel and tours, entertainment, and more. Small supermarkets, pharmacies, meat markets, stationery stores, and snack shops also use them (Kim & Yoon, 2014; Ozkaya et al., 2015). They are currently used in various areas throughout Nepalese society (Luitel, 2023; Maharjan et al., 2024).

In Nepal, QR codes are extensively utilized in metropolitan regions and big cities. In the context of Nepal, the COVID-19 epidemic has expanded the digital realm. Online learning (Sah, 2021b, 2024), online banking (Gautam & Sah, 2023), internet banking (Sah, 2023), online shopping (Sah, 2021a), mobile banking (Sah & Gautam, 2025), acceptance of QR code payments (Maharjan et al., 2024), and the majority of digital transactions in Nepal.

The intention to use a QR code is greatly influenced by security and enabling factors (Luitel, 2023). This realization is crucial for all parties involved in the mobile payment and online banking system ecosystem since it emphasizes how important it is to put trust-building and security maintenance first in order to promote the broad adoption of QR code technology for payments (Gautam & Sah, 2023; Sehat et al. 2024). Security and trust (TR) has been shown to be a crucial component of digital media and new technologies since it significantly influences people's views, acceptance, and intent to utilize the digital banking system.

This pioneering technology improves the shopping experience by enabling customers to easily and conveniently make payments by only scanning the QR code (Eren, 2024; Shin et al., 2012). The adoption of QR codes affected the utilization of QR codes. So, the research problems are as follows:

RQ1: What is the status of the QR code utilization in the Nepalese context?

RQ2: Which factors influence the adoption of QR codes for utilization?

According to the study problems the research aims are mentioned as follows:

RO1: To explore the status of the QR code utilization in the Nepalese context.

RO2: To examine the influencing factors of the adoption of QR codes for utilization.

Review of Literature

This section examines the usage and application of QR codes through several literature assessments conducted in various nations.

Table 1

Review of Emperical Works

Studies	Countries	Objectives	Methodology	Findings
Kim & Yoon, (2014)	Korea	Aimed to compare differences in the perceptions of QR code attributes between shopping tasks for apparel and general merchandise at the QR code virtual stores.	A total of 122 usable responses were obtained from smartphone users	The findings indicated that, in the context of smart shopping, there were notable distinctions between clothing and general products in terms of three QR code technology factors: location-based information, ubiquity, and wireless infrastructure.
Ozkaya et al., (2015)	USA	Aims to present findings regarding college students' knowledge of and usage of QR codes.	Data was collected from 174 respondents with an electronic survey conducted at a large university in the western United States.	The results show a substantial relationship between QR code usage rate and purpose of use.
Liébana-Cabanillas et al. (2015)	Spain	Examined how well-liked Quick Response (QR) code mobile payment methods are among users, taking into account how many people use mobile devices	After thoroughly analyzing the scientific literature, a behavioral model explaining the intention to use a QR code for mobile payment was developed.	The findings demonstrate that the intention to utilize this technology in the future is determined by attitude, innovation, and subjective traditions.

Amarullah et al., (2021)	Indonesia	Investigated the elements that affect consumers' inclinations to adopt QR code-based mobile payments.	The data were supplied by 120 Jabodetabek customers who use mobile payments with QR codes.	The findings indicated that while hedonic motivation and company expectations have no bearing on customers' intent to utilize QR code-based payments, performance expectations, habits, and beliefs appear to be important determinants.
Suebtimrat & Vonguai (2021)	Thailand	Explored the elements that influence users' behavioural intentions towards QR code payment.	Data were gathered from 1,800 people in Bangkok were given a self-administered questionnaire.	The results showed that opinions about QR code payments are influenced by compatibility.
Zhong & Moon, (2022)	China	Studied how Chinese customers used mobile QR-Code and facial recognition technology during the COVID-19 outbreak.	Data were obtained from 457 responses to an online questionnaire.	The study found that three factors significantly influenced customers' intention to use QR Code payment: attitude stated usefulness, and ease of use.
Nepali & Tamang, (2022)	Nepal	Aimed to provide a broad awareness of new trends and technological	The literature on new library developments was gathered from connected online articles and projects.	The analysis revealed several additional trends and technologies that have surfaced in libraries but aren't utilized.

Hewawasam et al., (2022)	Sri Lanka	Examined consumer acceptance of mobile payment solutions incorporating Quick Response (QR) codes.	Information gathered from 457 responses to an online survey.	The study discovered that Ease of Use, reported Usefulness, and Attitude all substantially impacted users' desire to use QR Code payment.
Sehat et al., (2024)	Malaysia	Investigated the deliberate use of QR code applications.	The research included a random sample of 215 respondents.	The results showed that the behavioral intention to use QR code applications was positively and significantly correlated with performance expectancy, effort expectancy, hedonic motivation, habit, and trust.
Luitel, (2023)	Nepal	Examined the variables that influence users' intentions to use QR technology.	Examined service security, perceived utility, perceived ease of use, personal innovativeness, and facilitating conditions.	The research explained the various innovations and techniques that were emerging in libraries.
Eren, (2024)	Thailand	Explored the elements that influence Thai commercial bank users' behavioral intentions toward	Both qualitative and quantitative research methodologies were used.	The findings revealed that compatibility has an impact on attitudes regarding QR code payment.

Maharjan et al., (2024)	Nepal	Examined the opinions of Kathmandu Valley customers on QR payments.	The study used an explanatory research approach	E-sewa, Fone Pay, and Connect IPS are well-liked options for chores including bill payment and money transfers.
Sah & Gautam (2025)	Nepal	Investigated how consumers' opinions about the usefulness of mobile banking apps impact their behavioral intention to utilize services.	Surveys on the TAM model and structural equation modeling were conducted with a sample of 415 commercial bank customers who used mobile applications.	The strong positive correlation between behavioral intention to use, perceived utility, and ease of use is mediated by attitudes about mobile banking.

This section contains the majority of studies from both domestic and foreign contexts. Since QR code technology is new, not much research has been done on it. Early studies on QR codes focused on using the technology in various contexts. However, many studies avoid employing QR codes in Nepal's provincial context. Thus, the goal of this study was to look into how QR codes are used in different provinces in Nepal.

Methodology

The research was based on a descriptive research design. A structured questionnaire was used to gather data from QR code users, who were frequently considered a sample for the study. The questionnaire was based on the users' demographic profiles and also considered questions about using QR services.

A structured questionnaire utilized for survey research was used to gather data from the 208 respondents using purposive sample procedures (Cooper & Schindler, 2014; Greener, 2008). The study's population is split into seven province clusters using the cluster sampling probability sample technique: Koshi, Madhesh, Bagmati, Gandaki, Lumbini, Karnali, and Sudurpaschim.
The structured questionnaires were prepared to obtain demographic information regarding gender, age, occupation, education, province, areas, and purpose of using the QR code. It also focused on gathering information about QR code usage per month. Data were driven into SPSS software for analysis. Frequency and cross-tabulation were used to analyze the data. Bar diagrams and pie charts presented demographic information and summarized the results with several references on national and international context in the discussion section.

Results and Discussion

Respondents Status

The demographic statuses of the respondents were discussed in terms of sex, age group, provincial areas, professional status, and academic level. Most respondents were male, 58.2%, and the remaining were females. According to age group, most respondents were 20 to 24 at 52.7%, 25 to 29 at 12.7%, and 30 to 34 with 11.8% of Bagmati at 49.1%, Madhesh with 19.1%, and 10.9% of Gandaki and remaining from other provinces.

Most respondents were bachelor's degree holders, with 69.7%, and master's degree holders, with 14.9%. It also shows that 8.7% of the total respondents were higher secondary level, and 2.4% were PhD. Degree and MPhil Degree educated. The majority of respondents were students, followed by employees; 10.1% were self-employed, 5.8% were housekeepers, 3.4% were retired, and 2.4% were jobless.

QR Code Using Status

The following analysis illustrates the areas where QR is most commonly used, and the consumers' perceptions of security and trust in QR services to comprehend usage trends.

Figure 1

Percentage of Area Using QR Code

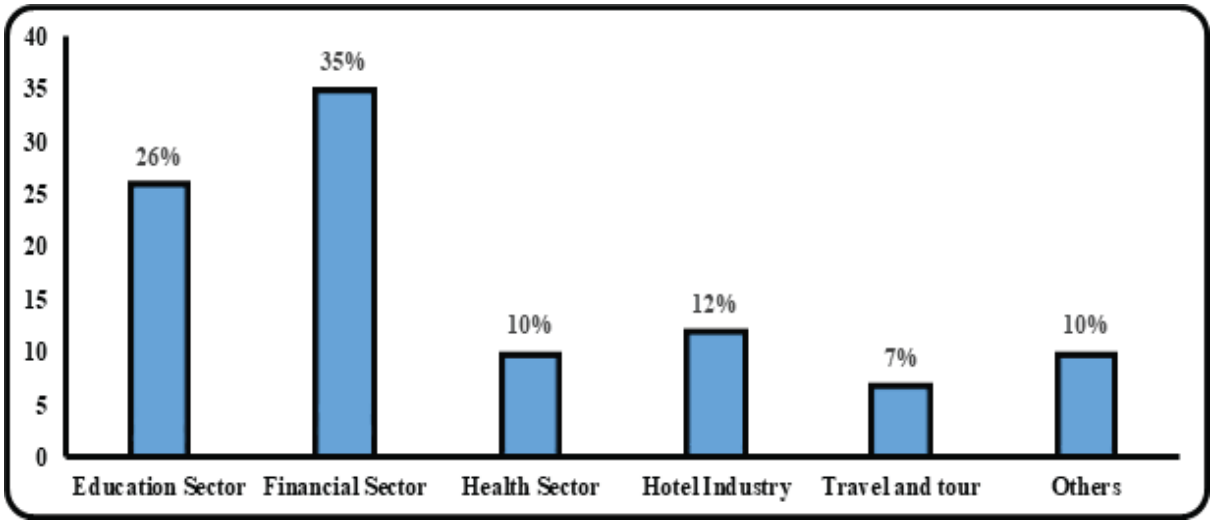

Figure 1 shows that most of the respondents 35% used QR codes in financial sectors, 26% in education areas, 12% in the hotel industry, and 10% in health and other sectors such as travel and tour, shopping, marketing, tracking, and so on. Thus, the research on QR codes revealed that most of Nepalese people utilized QR codes for financial areas for financial transactions.

Figure 2

Percentage of Security of Using QR Code

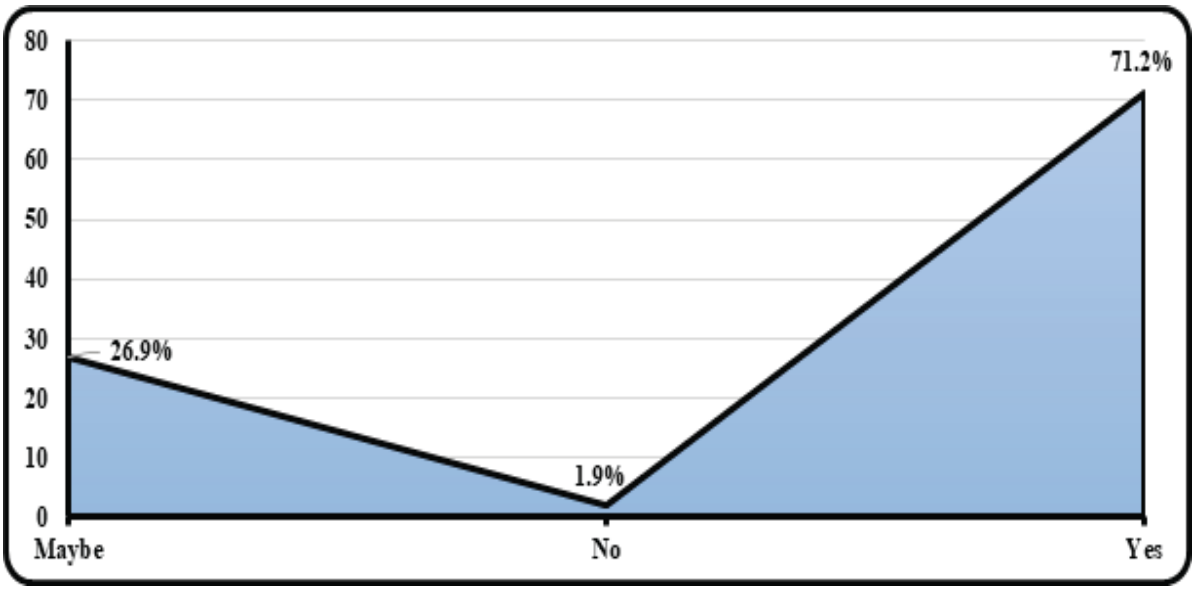

Figure 2 indicates that 71.2% of respondents believed QR codes to be secure, 1.9% felt insecure, and 26.9% were unsure whether to utilize secure or insecure codes.

Figure 3

Percentage of Trustworthiness of Using QR Code

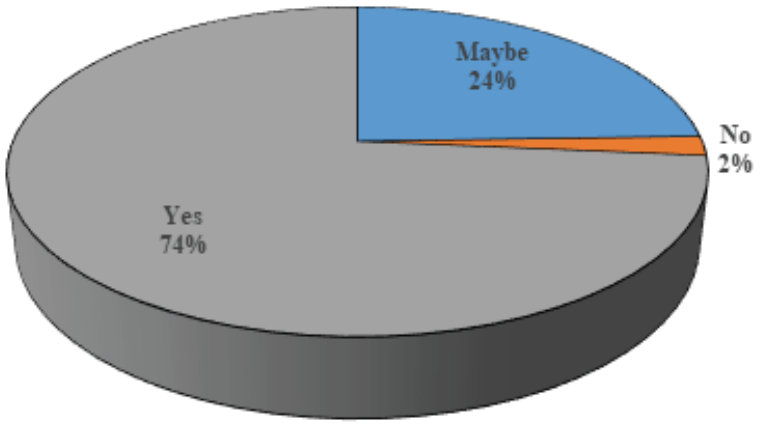

Figure 3 shows that 74% of participants fully trusted QR codes, while 2% did not. 24%, however, were not clear if they should be trusted or mistrusted when using QR codes.
Cross-tabulation analysis was then performed according to monthly QR Code usage, and demo-

graphic status such as gender, age, occupation, province, and education.

Cross-Tabulation Analysis

Cross tabulation is a quantitative research technique used to examine the relationship between two or more variables. Furthermore, this study used chi-square tests to investigate differences in the distribution of categorical responses between groups (Black, 2010). The chi-square test was used to identify whether gender, age, province, education, and job status affected the monthly frequency of using QR code mobile payments. In the table below, several updated UTAUT viewpoint variables are descriptively analyzed.

Table 1

Cross-tabulation between Gender and QR Code Usage Per Month

Gender		Frequency of QR code payment usage per month				
		Less than 10 times	10-20 times	21-40 times	More than 40 times	Total
Female	Count	11	55	16	5	87
	% within	12.60%	63.20%	18.40%	5.70%	100.00%
Male	Count	39	40	13	29	121
	% within	32.20%	33.10%	10.70%	24.00%	100.00%
Total	Count	50	95	29	34	208
	% within	24.00%	45.70%	13.90%	16.30%	100.00%

Pearson Chi-square value 30.559, P = 0.000

The majority of people use quick response (QR) codes for mobile payments 10–20 times a month, as shown in Table 1. This also explains the 10–20 times per month that both men and women use QR code mobile payments.

In contrast, 18.40% of women use it 10–20 times per month, while 24% of men use it more than 40 times. Thus, men and women alike showed interest in utilizing the QR code service. P = 0.000, the Pearson Chi-square value of 30.559, was below the significance level of 0.01 (1%).

Therefore, there was a significant correlation between monthly QR code mobile payment usage and gender. This indicated some variation in the monthly proportion of mobile payments using QR codes by gender.

Table 2 shows that 10 to 20 times a month, most age groups use quick response (QR) codes to conduct mobile payments. People of all ages utilize QR code mobile payments 10–20 times a month, which is also explained by this. But 22% of people in the 20–24 age group and 21.4% of people in the 25–29 age group use it more than 40 times a month, compared to 34.6% of people in the 30–34 age group, 44.4% of people in the 45–50 age group, and 33.3% of those over 50 who use it less than ten times.

Table 2

Cross-tabulation between Age and QR Code Usage Per Month

Age Group		Frequency of QR code mobile payment usage per month				
		Less than 10 times	10-20 times	21-40 times	More than 40 times	Total
20-24	Count	28	52	16	27	123
	% within	22.80%	42.30%	13.00%	22.00%	100.00%
25-29	Count	1	9	1	3	14
	% within	7.10%	64.30%	7.10%	21.40%	100.00%
30-34	Count	9	12	3	2	26
	% within	34.60%	46.20%	11.50%	7.70%	100.00%
35-39	Count	4	9	0	1	14
	% within	28.60%	64.30%	0.00%	7.10%	100.00%
40-44	Count	0	4	6	0	10
	% within	0.00%	40.00%	60.00%	0.00%	100.00%
45-50	Count	4	3	1	1	9
	% within	44.40%	33.30%	11.10%	11.10%	100.00%
Above 50	Count	4	6	2	0	12
	% within	33.30%	50.00%	16.70%	0.00%	100.00%
Total	Count	50	95	29	34	208
	% within	24.00%	45.70%	13.90%	16.30%	100.00%

Note. Pearson Chi-square value 36.505, P = 0.006

Table 2 shows that 10 to 20 times a month, most age groups use quick response (QR) codes to conduct mobile payments. People of all ages utilize QR code mobile payments 10–20 times a month, which is also explained by this. But 22% of people in the 20–24 age group and 21.4% of people in the 25–29 age group use it more than 40 times a month, compared to 34.6% of people in the 30–34 age group, 44.4% of people in the 45–50 age group, and 33.3% of those over 50 who use it less than ten times.

The result was a desire to use the QR code service across all age groups. The chi-squared Pearson value of 36.505, P = 0.006, fell below the 0.05 (5%) significance level. The monthly utilization of QR code mobile payments was thus significantly correlated with age group. This indicated some variance in the proportion of each age group using QR codes for mobile payments each month.

Table 3 shows that, with the exception of Karnali and Sudurpaschim, most people in all provinces use quick response (QR) codes to make mobile payments 10–20 times a month. This also explains why 50% of Karnali residents and 75% of Sudurpaschim use it more than 40 times a month, compared to 45.70% of Koshi residents, 52.80% of Madhesh residents, 76.90% of Gandaki residents, and 64.30% of Lumbini Province residents. Accordingly, all provinces' respondents said they would like to employ the QR code service.

Table 3

Cross-tabulation between Provinces and QR Code Usage Per Month

Province		Frequency of QR code payment usage per month.				Total
		Less than 10 times	10-20 times	21-40 times	More than 40 times	
Koshi	Count	12	16	3	4	35
	% within	34.30%	45.70%	8.60%	11.40%	100.00%
Madhesh	Count	12	19	2	3	36
	% within	33.30%	52.80%	5.60%	8.30%	100.00%
Bagmati	Count	23	41	16	16	96
	% within	24.00%	42.70%	16.70%	16.70%	100.00%
Gandaki	Count	0	10	2	1	13
	% within	0.00%	76.90%	15.40%	7.70%	100.00%
Lumbini	Count	3	9	2	0	14
	% within	21.40%	64.30%	14.30%	0.00%	100.00%
Karnali	Count	0	0	1	1	2
	% within	0.00%	0.00%	50.00%	50.00%	100.00%
Sudurrrpaschim	Count	0	0	3	9	12
	% within	0.00%	0.00%	25.00%	75.00%	100.00%
Total	Count	50	95	29	34	208
	% within	24.00%	45.70%	13.90%	16.30%	100.00%

Note. Pearson Chi-square value 57.624, P = 0.000

The chi-squared Pearson value of 57.624, P = 0.000, was below the 1% cutoff of 0.01. Therefore, there was a high correlation between the province and the monthly use of mobile QR code payments. The percentage of monthly mobile payments using QR codes therefore differed from province to province.

Table 4 shows that with the exception of SLC/SEE, most people at all educational levels use rapid response (QR) codes between 10 and 20 times a month, which also explains why 100% of SLC/SEE-educated people use the QR code service less than ten times a month. The Pearson Chi-square score was 27.714 (P = 0.023), which was below the 5% threshold. There was a strong correlation between educational status and monthly QR code mobile payment usage, meaning

that the percentage of monthly QR code mobile payment usage varied by education level.

Table 4

Cross-tabulation between Education and QR Code Usage Per Month

Education Status		Frequency of QR code mobile payment usage per month				Total
		Less than 10 times	10-20 times	21-40 times	More than 40 times	
SLC/SEE	Count	5	0	0	0	5
	% within	100.00%	0.00%	0.00%	0.00%	100.00%
Intermediate/+2	Count	4	12	1	1	18
	% within	22.20%	66.70%	5.60%	5.60%	100.00%
Bachelor Degree	Count	30	63	23	29	145
	% within	20.70%	43.40%	15.90%	20.00%	100.00%
Master Degree	Count	8	14	5	4	31
	% within	25.80%	45.20%	16.10%	12.90%	100.00%
MPhil Degree	Count	1	4	0	0	5
	% within	20.00%	80.00%	0.00%	0.00%	100.00%
PhD Degree	Count	2	2	0	0	4
	% within	50.00%	50.00%	0.00%	0.00%	100.00%
Total	Count	50	95	29	34	208
	% within	24.00%	45.70%	13.90%	16.30%	100.00%

Note. Pearson Chi-square value 27.714, P = 0.023

Table 4 shows that with the exception of SLC/SEE, most people at all educational levels use rapid response (QR) codes between 10 and 20 times a month, which also explains why 100% of SLC/SEE-educated people use the QR code service less than ten times a month. The Pearson Chi-square score was 27.714 (P = 0.023), which was below the 5% threshold. There was a strong correlation between educational status and monthly QR code mobile payment usage, meaning that the percentage of monthly QR code mobile payment usage varied by education level.

Table 5 shows that except for self-employed and retired individuals, most people across all job levels use quick response (QR) codes to make 10 to 20 mobile payments each month. This also explains why 57.10% of independent contractors and 42.90% of retirees use it less frequently than ten times a month. Respondents from various educational backgrounds thus wished to utilize the QR code service.

Table 5

Cross-tabulation between Employment and QR Code Usage Per Month

Employment Status		Frequency of QR code mobile payment usage per month				Total
		Less than 10 times	10-20 times	21-40 times	More than 40 times	
Employee	Count	8	23	8	6	45
	% within	17.80%	51.10%	17.80%	13.30%	100.00%
Homemaker	Count	2	6	3	1	12
	% within	16.70%	50.00%	25.00%	8.30%	100.00%
Retired	Count	3	2	2	0	7
	% within	42.90%	28.60%	28.60%	0.00%	100.00%
Self-Employed	Count	12	7	1	1	21
	% within	57.10%	33.30%	4.80%	4.80%	100.00%
Student	Count	24	53	15	26	118
	% within	20.30%	44.90%	12.70%	22.00%	100.00%
Unemployed	Count	1	4	0	0	5
	% within	20.00%	80.00%	0.00%	0.00%	100.00%
Total	Count	50	95	29	34	208
	% within	24.00%	45.70%	13.90%	16.30%	100.00%

Note. Pearson Chi-square value 26.548, P = 0.033

The Pearson Chi-square value was below the 5% cutoff at 26.548 (P = 0.033). Monthly utilization of mobile payments using QR codes was strongly correlated with educational status. Accordingly, the percentage of monthly mobile payments using QR codes varied by educational attainment.

Discussion

The importance of security and trust has been highlighted by the study on the adoption of QR code applications. The majority of respondents utilized QR codes in the banking sector, followed by the education sector, the hotel business, the health sector, and other industries like marketing, tracking, travel and tour, and shopping (Kim & Yoon, 2014; Ozkaya et al., 2015). According to this research work the proportion of monthly mobile payments made via QR codes varied somewhat by gender and age. Therefore, each province had a different percentage of monthly mobile payments made with QR codes. The use of QR codes for mobile payments each month was highly associated with educational attainment (Luitel, 2023; Mookerjee et al., 2022). The report also indicated that most respondents viewed QR codes to be secure and trusted (Gautam & Sah, 2023; Luitel, 2023).

Conclusion

The report offers a thorough grasp of how QR codes are being adopted and used in various regions for various purposes in the Nepalese context. The study concludes that the majority of Nepalese consumers use QR codes for financial transactions. The study's participants reported feeling secure when using QR codes. Although there have been improvements, the study also finds enduring security and trust issues that could prevent QR codes from being widely used if left unchecked. They are more comfortable using it in a variety of industries, including banking, education, travel and tourism, marketing, hotels and restaurants, and health. The Pearson Chi-square and cross-tabulation also stated that there was a significant correlation between the monthly use of QR code mobile payments and gender, age, occupation, province, and education. This indicated some variation in the monthly proportion of mobile payments using QR codes by province, gender, age, occupation, and level of education.

The study comes to the conclusion that although QR codes have the potential to completely transform payment systems in developing nations, it will take focused efforts to maintain security, foster trust, and improve user education in several areas before they can be widely adopted and grow sustainably. So, the study is intriguing since it concentrates on a developing country and provides valuable perspectives for similar economies directing the transition to digital payment methods.

Limitations and Future Implications

The sample size for this study was small, and it only represents a portion of Nepal's population. The results show the realities of growing markets with a young population and a relatively sensitive QR code, even though they might not apply to Nepali people. Thus, a larger sample size for this research could be more broadly applicable to the investigation of QR codes in Nepal.

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Factors Influencing the Adoption of Nepal Financial Reporting Standards in Nepal

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Abstract

This study investigates factors influencing the adoption of Nepal Financial Reporting Standards (NFRS) from the perspective of accountants and auditors in various sectors such as manufacturing, banking, services, and audit firms within Kathmandu Valley. By using a descriptive and causal-comparative research design, this study aims to evaluate the impact of government policy, company size, international environment, education level and initial cost of adoption on NFRS. A structured questionnaire utilizing a five-point Likert scale was used to gather primary data from a purposively selected sample of 400 respondents. Statistical analyses, including descriptive statistics, correlation, and multivariate regression analyses were conducted using Microsoft Excel and SPSS.

The findings reveal that government policy, company size, education level, and the initial cost of adoption have a significant positive influence on the adoption of NFRS. Although the international environment also showed a positive correlation, this was not statistically significant. The study concludes that enhancing these four factors is crucial for promoting NFRS adoption in Nepal, recommending improvements in government policies, and education, and reducing adoption costs. Additionally, larger firms are encouraged to lead in NFRS implementation, fostering better financial reporting practices nationwide. The study's implications are valuable for policymakers, educators, and accounting professionals in Nepal.

A COLLECTIVE OF professional accountancy organizations in the South Synthesis, Characterization, and Structural

Keywords
NFRS adoption
Government policy
Company size
Education level
Financial reporting

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Elucidation of a Novel (E)-1-(1-Phenyl-1H-pyrazol-4-yl)-N-(1-(p-tolyl)-1H-pyrazol-5-yl) methanimine: A Comprehensive Spectroscopic StudyAsian Association for Regional Cooperation area (SAARC), aims to enhance, uphold, and advance the accountancy field within the region (Ali et al., 2019). It is anticipated that financial reporting practices should see enhancements following the implementation of the complete set of International Financial Reporting Standards by the year 2021 in the area. Al-Nasrawi and Thabit (2020) indicate that local environmental factors can influence a country's decision to adopt the most suitable IAS/IFRS implementation approach. The statistical analysis findings demonstrate a strong consensus among participants regarding the impact of local environmental factors on IAS/IFRS adoption. Nguyen et al. (2021) observed that the adoption of International Financial Reporting Standards (IFRS) has profoundly changed accounting practices by highlighting the importance of adaptive structuration theory, wherein the perceived constraints of the system and IT support are vital for the successful utilization of accounting information systems and the overall effectiveness of accounting processes. Hung (2022) emphasizes the significance of uniform terminology in the business industry by adopting International Accounting Standards (IAS/IFRS). These standards aim to enhance transparency, clarity, and comparability in global financial reporting, which assists analysts, managers, and investors in making informed decisions. Despite the challenges, the continuing conversation about adopting IAS/IFRS raises inquiries about what motivates or hinders companies in various nations from embracing these standards.

Nepalese accounting system has evolved significantly over time and has been shaped by various political regimes and crises. The autocratic Rana rule proved a substantial obstacle to developing a transparent and efficient accounting and regulatory framework. The Nepal Financial Reporting Standards (NFRS) were established by the Nepal Accounting Standards Board (NASB). Under the guidance of the Institute of Chartered Accountants of Nepal (ICAN), alignment with International Financial Reporting Standards is ensured. Since 2007, public sector accounting standards have also been developed based on the International Public Sector Accounting Standards (IPSAS). Adopting IFRS involves collaborating with the International Accounting Standards Board (IASB) to formulate compatible standards, which may result in specific variances. Establishing the Accounting Standards Board in 2003 has significantly enhanced the local accounting framework, ensuring consistency and reliability in financial reporting practices.

The Nepal Accounting Standards Board (NASB) develops accounting standards for private and public sectors. NASB adheres to IPSAS to enhance the quality of financial reporting. Introduced in 2013 and implemented by the ICAN, the Nepal Financial Reporting Standards are designed to align with international practices. U.S. Generally Accepted Accounting Principles (GAAP) and International Financial Reporting Standards are key frameworks for accounting practices and financial reporting. These guidelines promote transparency and improve access to investment opportunities. Moreover, McEnroe & Sullivan (2011) found that many stakeholders, including individual investors and small businesses, resist transitioning from local accounting standards to IFRS, perceiving no clear benefits. Challenges such as funding, governance, and consistent application of IFRS further complicate the adoption Synthesis, Characterization, and Structural Elucidation of a Novel (E)-1-(1-Phenyl-1H-pyra-

zol-4-yl)-N-(1-(p-tolyl)-1H-pyrazol-5-yl)methanimine: A Comprehensive Spectroscopic Studyprocess, especially in jurisdictions with weak institutional frameworks.

Karn (2024) observed that the cultural perspectives on accounting and financial reporting in Nepal hinder the swift adoption of the NFRS. There is frequently a hesitation to change because of entrenched practices and misunderstanding of the advantages of embracing international standards. In order to ease the acceptance of NFRS, significant reforms are required in the regulatory framework, educational institutions, and professional training programs.

Nepal is working to improve the credibility of its financial reporting by tackling the challenges related to implementing NFRS. This study aims to assist in exploring factors that may affect the adoption of NFRS. To do so, this study uses the adoption of NFRS as a dependent variable and examines the influence of several independent variables such as government policy, company size, international environment, educational level and initial cost. An effective government policy can provide a robust legal framework and resources to facilitate the adoption of NFRS. Larger companies have greater resources to tackle any challenges during NFRS implementation. Interconnected global markets facilitate more international trade requiring participating companies to adopt similar standards. Qualified financial professionals understand the complexities related to NFRS implementation. And low initial cost to implement NFRS speeds up the adoption. Thus, this study hypothesizes that independent variables have a positive relationship with the adoption of NFRS.

Review of Literature

Conceptual Review

Pacter (2015) describes an accounting standard as a collection of regulations, guidelines, and principles that are widely acknowledged and established by a recognized accounting organization or a governmental entity, which clarifies how to recognize, process, and disclose financial transactions to supply financial information necessary for crafting financial statements and annual reports.

Nepal's financial reporting framework, guided by the Nepal Chartered Accountants Act of 1997 and developed by the Accounting Standards Board (ASB), aligns the Nepal Accounting Standards (NASs) with International Financial Reporting Standards (IFRSs) while adapting them to the local context. The ICAN monitors compliance among its members, ensuring the quality and consistency of financial reporting in the country. Since its establishment in 2003, Nepal Accounting Standards Board (NASB) has developed the Nepal Accounting Standards (NAS), many of which align with equivalent IFRS. These standards became effective for financial statements issued on or after July 17, 2008. In 2013, the ASB introduced the NFRS, a comprehensive framework based on IFRS, except IAS 29.

NAS 1, which outlines the presentation of financial statements, requires entities to declare compliance with NFRS instead of IFRS. This highlights a distinctive feature of the Nepalese accounting framework. In September 2013, ICAN issued a notification detailing the transition dates for various entities while encouraging them to adopt the new standards early.

The transition to NFRS began in 2014-2015, initially focusing on multinational and state-owned manufacturing companies. By 2016-2017, the regulations expanded to include financial institutions, insurance companies and corporations with borrowings over Rs. 500 million and qualifying small and medium-sized enterprises (SMEs). All entities were required to implement NFRS 9 regarding financial instruments starting July 16, 2015, to align Nepal's financial reporting with international standards. This structured and phased approach to implementing NFRS aims to improve the transparency, consistency, and comparability of financial statements across Nepal. By providing more accurate and internationally comparable financial information, investors, regulators, and other stakeholders benefit. Thabit and Abbas (2017) indicate that IAS/IFRS comprises a collection of widely acknowledged accounting principles that organizations utilize to create their financial statements and reports. These significant financial information sources are released annually and assist stakeholders in comprehending the company's financial performance and effectively overseeing its resources.

Empirical Review

Shima and Yang (2012) examined the data from 73 countries from 2000 to 2007, categorizing them into three categories: disallowed, allowed or required, and mandatory for adopting IAS/IFRS. Their quantitative study indicated that apart from tax and inflation that negatively impacted adoption, other factors such as political and economic ties, reliance on foreign debt, and legal systems positively affected the implementation of IAS/IFRS. This demonstrates that accounting practices are influenced by diverse national contexts, with the choice of accounting standards arising from the interaction of micro-environmental and macro-environmental factors. Odia and Ogiedu (2013) identified public awareness, legal and regulatory support, and lack of resources such as knowledge and staff training as challenges to adopting IFRS. Poudel et al. (2014) examined the challenges faced by Nepal in adopting IFRS. The study emphasizes that external influences from donor organizations, including the Asian Development Bank and the International Monetary Fund, frequently precede local requirements. Notable barriers to implementing IFRS within Nepal's accounting framework include a shortage of qualified accountants and the prevalent corruption and fraud issues, which significantly impede progress.

Thabit and Al-Nasrawi (2016) defined accounting standards as business rules that guide accountants to explain problems and identify probable solutions based on accounting theory. Al-Nasrawi and Thabit (2020) employed a 28-item questionnaire to examine the impact of environmental factors adopting the International Accounting System (IAS) and IFRS in Iraq. The study found that local contextual elements significantly shaped the implementation of IAS/IFRS methods. TA et al. (2021) analyzed factors influencing the adoption of IFRS among companies listed on the Ho Chi Minh Stock Exchange in Vietnam. They found that audit quality, firm size, foreign investment, financial institution category and return on equity positively impacted adoption, while total debt-to-equity ratio had a negative effect. The authors recommended that Vietnamese regulators focus on the positive factors to enhance IFRS implementation and offered guidance for other countries in similar adoption stages. Gonçalves et al. (2022) studied the implementation of IFRS for SMEs in Brazil by surveying 426 accountants and firms. They identified inconsistencies and misunderstandings as significant barriers to implementation but noted that better information could alleviate these issues.

The researchers recommended enhancing educational programs to boost accountants' confidence in adopting IFRS for SMEs, contributing to the discussion on the standard's effectiveness. Hung (2022) identified key factors affecting global IFRS adoption, including organizational traits, regulatory conditions, and economic contexts. The study calls for more research on underexplored factors in IFRS implementation and emphasizes the significance of standardized financial reporting for improving transparency and comparability in financial statements globally. Susilowati and Sugiri (2022) explored how institutional factors, such as national accounting standards and corporate governance, affect accounting information quality in Asian countries after adopting IFRS. Their research significantly influenced earnings management practices, though the effects on accruals quality and value relevance varied. Le et al. (2022) conducted a study on integrating IFRS in accounting and auditing programs in Vietnam, surveying 208 lecturers from 30 institutions using PLS-SEM software. The research highlighted eight key factors impacting IFRS implementation, particularly the critical role of training programs and teaching methods while revealing that institutions' financial capability does not significantly influence this process.

Nguyen et al. (2023) surveyed 350 enterprises to identify factors influencing the voluntary adoption of IFRS. Key motivations for adoption included regulatory compliance, accountant qualifications, and perceived IFRS benefits, while challenges involved tax pressures and psychological barriers. These insights are significant for policymakers and business leaders as Vietnam targets full IFRS adoption by 2025. Vidanage et al. (2023) studied the challenges professional accountants face in Sri Lanka regarding IFRS adoption and how these challenges vary based on demographic factors like gender, experience, and education. The research used a quantitative method with a Likert scale questionnaire, surveying 200 accountants. The study identified significant obstacles to IFRS implementation and offered insights for policymakers to help address these barriers.

Alessa (2024) studied the impact of IPSAS on resource allocation efficiency in developing countries using an econometric model across 64 nations from 2005 to 2021. The findings revealed a positive correlation between IPSAS adoption and improved resource allocation efficiency, particularly in countries with lower bureaucratic quality. The research highlights IPSAS as a key tool for enhancing resource optimization and attracting international investors like the World Bank. Tran and Tran (2024) found that factors such as steady growth, economic scale, financial capacity, and positive managerial perceptions significantly influence the adoption of IFRS. The study emphasizes the necessity of a proactive managerial approach, along with strategies to improve financial resources and expand business scales and stresses the role of management agencies in raising awareness and providing policy support for smoother IFRS implementation. Moloi and Obeid (2024) investigated South African accountants' perceptions regarding the factors affecting the adoption of artificial intelligence (AI) in financial reporting, utilizing the diffusion of innovation theory, the technology-organization-environment (TOE) framework, and institutional theory. A quantitative survey of accountants from South Africa's four IFAC-recognized bodies revealed that accountants believe organizational, technological, and environmental factors all play significant roles in AI adoption. The research highlights the complexity of AI integration in the accounting profession within South Africa.

Alkhuzaie et al. (2024) studied the voluntary adoption of accounting standards by 100 SMEs in Jordan. They found that adopting these standards improves organizational structure and enhances the credibility of financial reporting. However, external demand for quality financial information did not significantly impact adoption rates, possibly due to the absence of government mandates. Benhayoun and Zejjari (2024) explored the adoption of IFRS among SMEs in Morocco, focusing on a sample of twelve accounting professionals to uncover key influences on this process. Their findings emphasize the significance of both firm-specific and individual factors and the impact of implementation methods and industry sectors on SMEs' readiness to adopt IFRS. Ajiboye (2024) examined the effects of adopting IPSAS on Nigeria's quality of public sector accounting information. The study involved 110 accountants and found that IPSAS implementation significantly improves financial accuracy, reliability, transparency, and disclosure. It also recommends that the government provide IPSAS training and create a monitoring team to ensure compliance. Zahid and Simga-Mugan (2024) investigated the effects of adopting IFRS on capital market integration and information asymmetry. Their findings showed that IFRS adoption did not significantly enhance market integration, indicating that standardizing accounting practices alone cannot address more profound barriers to financial transparency. The research suggests that additional measures are necessary to improve capital market integration. Tlemsani et al. (2024) investigated the impact of adopting IFRS on the classification of assets and liabilities in publicly traded companies in Saudi Arabia, pointing out significant distinctions from GAAP. The research emphasizes the necessity for an enhanced understanding of IFRS within the Saudi industry to support a seamless transition to the updated standards.

Research Gap

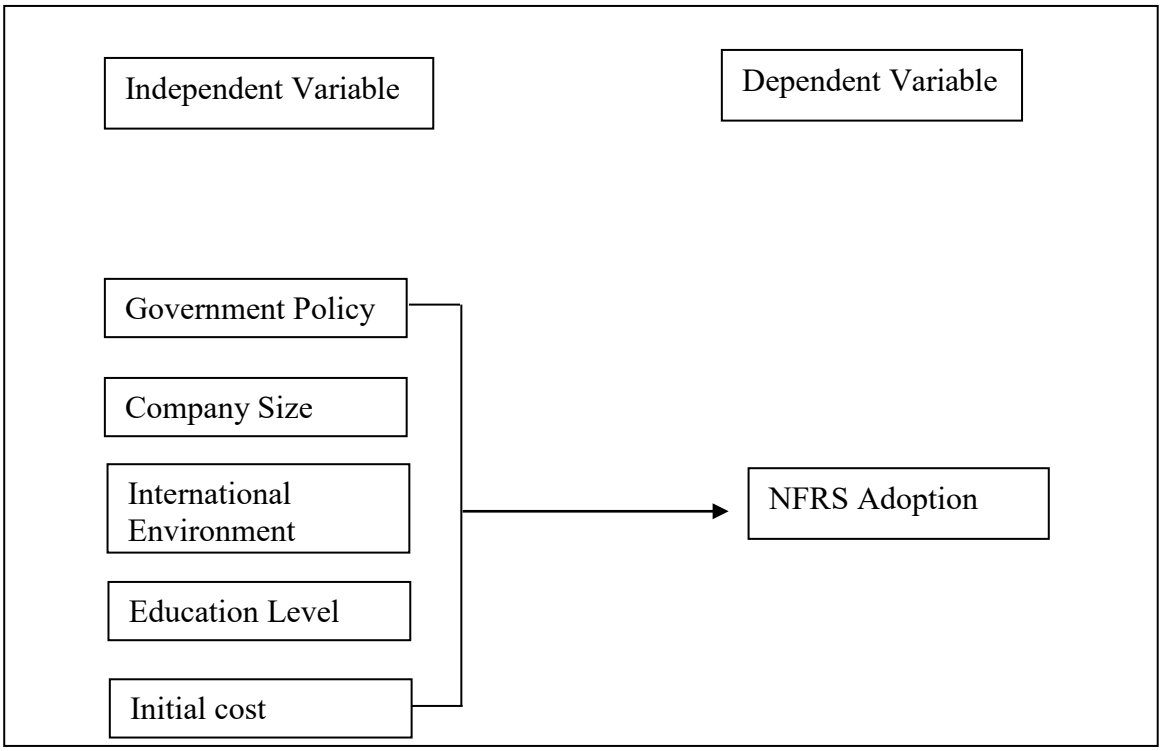
The interest in adopting IFRS, IPSAS, and NFRS is increasing. Nevertheless, there is a notable lack of thorough studies evaluating their long-term effects on organizational performance across different sectors. Most current research focuses on the factors influencing adoption instead of the stakeholders' views during the implementation phase, especially in emerging economies. In Nepal, the utilization of NFRS highlights this research gap, as few studies consider the country's distinct financial, regulatory, and cultural circumstances despite the abundant global research on IFRS adoption.

Research Framework

A research framework identifies the independent and dependent variables, illustrating how the independent variables influence the dependent variable. It incorporates government policy, company size, international environment, education level, and initial cost of adoption as independent variables, while the adoption of NFRS is considered the dependent variable. This framework aims to analyze how these factors collectively and individually affect the adoption of NFRS in Nepal.

Figure 1

Conceptual Foundation



Definition of Variables

Adoption of NFRS

Adoption of NFRS refers to the process through which organizations implement and adhere to the NFRS, which aims to enhance the quality and transparency of financial reporting. This adoption is crucial for aligning financial statements with international practices and ensuring that financial information is useful for stakeholders.

Government policy. Government Policy encompasses regulations, guidelines, and incentives established by the government to promote the adoption of financial reporting standards. A supportive government policy can facilitate the transition to NFRS by providing the necessary legal framework and resources.

Company size. Company Size refers to the scale and complexity of an organization, often measured by factors such as revenue, number of employees, or total assets. Larger companies may have more resources and capabilities to adopt NFRS compared to smaller firms.

International environment. International Environment includes the global economic conditions and international accounting practices that influence local financial reporting standards. The interconnectedness of global markets can drive organizations to adopt NFRS to

enhance comparability and transparency in financial reporting.

Education level. Education Level pertains to the qualifications and training of accountants and financial professionals within an organization. A higher education level is often associated with a better understanding of complex financial reporting standards, including NFRS.

Initial cost of adoption. Initial Cost of Adoption refers to the expenses incurred by organizations during the transition to NFRS, including training, system upgrades, and compliance-related costs. High initial costs can be a barrier to adoption, particularly for smaller firms with limited resources.

Research Hypothesis

Following research hypotheses are tested in this study:

H1: There is a significant positive relationship between government policy and NFRS adoption.

H2: There is a significant positive relationship between company size and NFRS adoption.

H3: There is a significant positive relationship between the international environment and NFRS adoption.

H4: There is a significant positive relationship between education level and NFRS adoption.

H5: There is a significant positive relationship between low initial cost of adoption and NFRS adoption.

Methodology

This study employs descriptive and inferential research designs to examine accountants' and auditors' perceptions of adopting NFRS in Nepal. It evaluates the impact of various factors, including government policy, company size, the international environment, educational attainment, and initial costs of adopting NFRS. The sample comprises 400 respondents from Kathmandu Valley, selected through purposive judgmental sampling. Data collection was conducted using a structured questionnaire employing a five-point Likert scale. Subsequent analysis utilized Microsoft Excel and SPSS, incorporating descriptive statistics, correlation analyses, and a multivariate regression model. The following model is estimated.

$$AND = \beta 0 + \beta 1*GVP + \beta 2*IEN + \beta 3*EDU + \beta 4*CSZ + \beta 5*ICA + ei$$

Where, AND =Adoption of NFRS, GVP=Government Policy, IEN=International Environment, EDU=Education Level, CSZ=Company Size, ICA=Initial Cost of Adoption, β0= intercept (constant) term and ei= error term

Results and Discussion

Demographic Profile of Respondents

The analysis focused on the demographic characteristics of respondents, specifically their gender, age group, educational attainment, years of professional experience, type of

organization, job designation, and level of awareness regarding NFRS.

Table 1

Demographic Profile

Demographic Profile		Frequency	Percent
Gender	Male	256	64
	Female	144	36
Age Group (years)	Below25	157	39.25
	25–35	127	31.75
	36–45	77	19.25
	Above 45	39	9.75
Education Level	Bachelor's Degree or below	114	28.5
	Master's Degree	173	43.25
	Professional Certification	113	28.25
Years of Experience	Less than 5years	59	14.75
	5–10	244	61
	More than 10	97	24.25
Type of Organization	Small and Medium Enterprises	82	20.5
	Large Companies	278	69.5
	Multinational Companies	40	10
Designation	Accountant	129	32.25
	Manager	158	39.5
	Auditor	113	28.25
Awareness of NFRS	Aware	379	94.75
	Not Aware	21	5.25

Table 1 provides a detailed demographic summary of the 400 survey participants, with 256 (64%) identifying as male and 144 (36%) as female. Age-wise, 39.25% of respondents were under 25, 31.75% were between 25 and 35, 19.25% were 36 to 45 and 9.75% were over 45 years old. In terms of education, 28.5% had a Bachelor's degree or lower, 43.25% held a Master's degree, while 28.25% possessed professional certifications. Experience levels varied, with 14.75% having less than five years, 61% between five and ten years, and 24.25% with more than ten years in their fields. Out of 400 respondents, 39.5% were managers, 32.25% were accountants, and 28.25% were auditors. Lastly, a significant majority, 94.75%, were aware of the Nepal Financial Reporting Standard (NFRS), leaving only 5.25% unaware of it.

Reliability Test

Table 2

Reliability Test

Code	Variables	Cronbach's Alpha	N of Items
GVP	Government Policy	0.705	6
IEN	International Environment	0.790	6
EDU	Education Level	0.776	6
CSZ	Company Size	0.575	6
ICA	Initial Cost of Adoption	0.724	6
AND	Adoption of NFRS	0.817	6
Overall Reliability		0.917	36

Table 2 presents the reliability test results for the data collected in this study. The Cronbach's alpha values for the variables are as follows: government policy (0.705), international environment (0.790), education level (0.776), initial cost of adoption (0.724), and adoption of NFRS (0.817) all exceed the acceptable threshold of 0.70, indicating that the data for these variables is reliable. However, Cronbach's alpha for company size (0.575) is below 0.70, suggesting that the data for this variable is not considered reliable. The overall reliability for all 36 items is 0.917.

Descriptive Statistics

Descriptive statistics were used to analyze how factors like government policy, international environment, education level, company size, and initial cost influence the adoption of NFRS.

Table 3

Summary of the Variables

Statements	Mean	S.D.
Government Policy on Adoption of NFRS	3.706	0.706
Political instability in Nepal hinders the adoption of NFRS.	3.593	1.168
Inconsistent government policies delay the adoption of NFRS in Nepal.	3.613	1.12
Weak regulatory oversight by government bodies affects NFRS adoption in Nepal.	3.633	1.14
The lack of government-provided incentives discourages companies from adopting NFRS.	3.755	1.006
The absence of a national-level strategy for NFRS implementation leads to non-adoption in Nepal.	3.733	1.024
Legal complexities in Nepal negatively influence NFRS adoption.	3.913	1.038
International Environment on Adoption of NFRS	3.851	0.703
Lack of international collaboration influences the adoption of NFRS in Nepal.	3.72	1.077
Weak external influence (e.g., from development partners) affects the adoption of NFRS.	4.005	0.955
Lack of global alignment in reporting practices influences NFRS adoption in Nepal.	3.988	0.962
Nepal's limited integration into international markets hinders NFRS adoption.	3.805	1.061
Weak participation in global accounting networks delays NFRS implementation in Nepal.	3.838	0.956
Inadequate guidance from international agencies on NFRS requirements poses challenges.	3.753	1.014
Education Level on Adoption of NFRS	3.782	0.704
Weak accounting education in Nepal is a barrier to adopting NFRS.	3.848	1.001
The lack of NFRS-specific training programs affects adoption in Nepal.	3.758	1.059
Limited resources on NFRS in accounting textbooks hinder its adoption in Nepal.	3.715	1.126
The shortage of qualified accounting professionals impacts the adoption of NFRS.	3.918	0.942
Weak English language proficiency among accountants affects understanding of NFRS standards.	3.758	1.006
Low awareness of NFRS among stakeholders in Nepal Limits its implementation.	3.698	1.004
Company Size on Adoption of NFRS	3.889	0.564
Lack of international operations among companies affects NFRS adoption in Nepal.	3.753	1.002
Limited financial resources in smaller firms negatively impact NFRS adoption.	3.948	0.994
Small firms in Nepal cannot implement NFRS effectively.	3.758	1.035
The lower profitability of small companies impacts their attitude toward adopting NFRS.	4.003	0.938
Large companies in Nepal are better equipped to handle NFRS adoption challenges.	3.885	1.086
The operational size of the company significantly influences Its ability to adopt NFRS	3.988	0.919

Initial Cost on Adoption of NFRS	3.86	0.631
The initial cost of training personnel affects NFRS adoption in Nepal.	3.743	1.009
The initial cost of upgrading IT systems for NFRS implementation is challenging in Nepal.	3.9	0.907
High initial consulting costs discourage firms from adopting NFRS.	3.97	0.909
The cost of double reporting for compliance with NFRS is a significant challenge in Nepal.	3.995	0.835
Small firms struggle to bear the costs of NFRS-related audits.	3.763	1.144
The high cost of hiring external consultants affects NFRS adoption.	3.793	1.006
Adoption of NFRS	3.934	0.716
NFRS adoption enhances their liability of financial statements.	3.938	0.996
Adopting NFRS improves transparency in Nepalese firms' financial reporting.	3.875	1.092
NFRS provides valuable information for effective decision-making.	3.988	0.924
The fair value measurement under NFRS improves the quality of financial information.	3.94	0.977
The adoption of NFRS aligns Nepalese firms with international accounting standards.	3.97	0.981
Adoption of NFRS leads to increased comparability of financial statements.	3.893	0.976

Note. Opinion Survey, 2024

Table 3 presents the descriptive statistics regarding accountants' perceptions of adopting NFRS. Accountants display a slightly optimistic view of government policy, with a mean score of 3.706. They also have a positive perception of the international environment, with a mean score of 3.851, although responses in this area are more consistent. Additionally, they view the education level positively (3.782) and acknowledge the influence of company size as significant (3.889), with responses showing less variability. The initial cost of adoption is considered moderately significant, with a mean score of 3.860. Overall, the perception of NFRS adoption is notably positive, with a mean score of 3.934, although this area shows higher response variability.

The study's findings are important as they highlight significant obstacles to the adoption of NFRS in Nepal. Among these barriers, legal complexities received the highest average score of 3.913, while political instability, which is a lesser concern, scored 3.593. These areas are central to the discussion. Accountants perceive weak external influence from development partners as a significant obstacle (mean score of 4.005), while inadequate guidance from international agencies is a lesser issue (mean score of 3.753).

The study highlights the shortage of qualified accounting professionals as a key barrier (mean score of 3.918), a pressing issue that contrasts with the more varied perceptions of limited resources in accounting textbooks (mean score of 3.715). Reduced profitability in small companies also impacts their willingness to adopt NFRS (mean score of 4.003), but there are mixed views on the influence of international operations (mean score of 3.753).

The substantial costs associated with dual reporting for compliance present a considerable challenge, evidenced by a mean score of 3.995. Additionally, smaller enterprises encounter more pronounced difficulties concerning the expenses related to NFRS audits, with a mean score of 3.763. While respondents concur that NFRS offers valuable insights for decision-making, reflected in a mean score of 3.988, there is a divergence of opinions regarding its effectiveness in enhancing transparency within financial reporting, as indicated by a mean score of 3.875.

Correlation Analysis

In this section, correlation analysis has been used to analyze the relationship between government policy, company size, international environment, education level, initial cost of adoption, and adoption of NFRS in Nepal.

Table 4

Pearson Correlation Matrix

Variables	GVP	IEN	EDU	CSZ	ICA	ADN
GVP	1					
IEN	.645**	1				
EDU	.466**	.712**	1			
CSZ	.310**	.306**	.272**	1		
ICA	.456**	.544**	.600**	.335**	1	
AND	.482**	.550**	.557**	.499**	.620**	1

Note. This table includes the correlation coefficients between various factors. *, **, and *** represent significance at 10, 5, and 1 percent level (2-tailed).

Government policy (GVP) exhibits a moderate positive correlation of 0.482 with NFRS adoption. This suggests that enhancements in policy are likely to facilitate increased adoption of NFRS. A stronger correlation of 0.550 is identified between the international environment and ADN, indicating that favorable global conditions significantly influence the likelihood of NFRS adoption. The education level (EDU) also demonstrates a strong correlation of 0.557, illustrating that higher educational attainment, particularly in accounting, fosters NFRS adoption. Furthermore, company size (CSZ) plays a role in this process, with a moderate correlation of 0.499 indicating that larger organizations are more inclined to adopt NFRS. The initial cost of adoption (ICA) is notably impactful, evidenced by a strong positive correlation of 0.620, which underscores the substantial influence of upfront expenses on the decision to adopt NFRS. All examined factors positively contribute to NFRS adoption, highlighting their critical importance in this context.

Regression Analysis

Multivariate regression analysis has been used to analyze the impact of government policy, company size, international environment, education level, and initial cost of adoption NFRS in Nepal.

The regression analysis on adopting NFRS indicates a strong positive correlation between various predictor variables with an R-value of 0.735. This suggests that as these predictor variables increase, the likelihood of adopting NFRS also rises. Notably, the R-squared value of 0.540 implies that these variables account for approximately 54% of the variation in NFRS adoption, which includes government policy, company size, international

environment, education level, and initial cost of adoption. The adjusted R-squared value of 0.534 confirms the model's robustness when considering multiple predictors.

Table 5

Results of Regression Analysis

Variables	Coefficients	Std. Error	t-Stat	p-value	Tolerance	VIF
Intercept	0.309	0.205	1.508	0.132		
GVP	0.103	0.046	2.262	0.024	0.558	1.792
IEN	0.105	0.058	1.844	0.066	0.363	2.753
EDU	0.164	0.053	3.134	0.002	0.427	2.342
CSZ	0.283	0.047	7.634	0.000	0.852	1.173
ICA	0.323	0.051	7.178	0.000	0.576	1.735
f = 92.533		Sign(F)=0.00	R = 0.735			
R^2 =0.540		Adj. R^2 =0.534				

Note. Opinion Survey, 2024

The model demonstrates statistical significance, highlighted by an F-value of 92.533 and a p-value of 0.000, well below the 0.05 threshold. This points to a strong correlation between the predictor variables and NFRS adoption. Hence, improving factors such as government policies and company education could enhance the adoption rates among businesses in Nepal. The collinearity statistics provide information about multicollinearity. The tolerance values and variance inflation factor (VIF) assess the extent to which one predictor can be predicted from the others. All tolerance values are well above 0.1 and have VIF scores below 10, indicating no severe multicollinearity issues.

GVP shows a positive correlation with a beta coefficient of 0.103, a t-statistic of 2.262, and a p-value of 0.024. This indicates that stronger government policies are statistically significant and likely to facilitate NFRS adoption among firms. Therefore, bolstering these policies could foster a wider acceptance and implementation of NFRS. Regarding the international environment, the beta is 0.105, with a t-statistic of 1.844 and a p-value of 0.066. Although this positively affects NFRS adoption, the p-value exceeds the 0.05 threshold, suggesting that its impact is not statistically significant at the 5% level. Thus, while international factors might play a role, they do not serve as a primary catalyst for adopting NFRS in Nepalese firms. Education level, company size, and initial adoption costs are significant factors in NFRS adoption. EDU has a beta of 0.164, a t-statistic of 3.134, and a p-value of 0.002, indicating that higher educational attainment increases NFRS adoption likelihood. For CSZ, a beta of 0.283, a t-statistic of7.634 and a p-value of 0.000 reflect that larger companies are more inclined to adopt NFRS. Similarly, ICA shows a beta of 0.323,a t-statistic of 7.178 and a p-value of 0.000, indicating that initial adoption costs significantly affect the willingness to adopt NFRS. Tackling these cost barriers could promote broader adoption among smaller firms.

AND = 0.309 + β1 0.103 +β20.105 +β3 0.164 +β40.283 +β50.323 + 0.205

Table 6

Hypothesis Testing

S.N.	Hypothesis	Remarks
1	There is a significant positive relationship between government policy and the adoption of NFRS in Nepal.	Accept
2	There is a significant positive relationship between company size and the adoption of NFRS in Nepal.	Accept
3	There is a significant positive relationship between the international environment and the adoption of NFRS in Nepal.	Reject
4	There is a significant positive relationship between education level and the adoption of NFRS in Nepal.	Accept
5	There is a significant positive relationship between initial costs of adoption of NFRS in Nepal.	Accept

Conclusion

The study demonstrates that accountants in Nepal have a generally positive view of the factors influencing the adoption of NFRS. These factors include government policy, educational levels, company size, and initial adoption costs. Although there is general agreement on the positive effects of these factors, opinions among accountants vary moderately. This finding aligns with Tran and Tran's research on IFRS in Vietnam. However, it contrasts with Zahid and Simga-Mugan's suggestion that IFRS adoption had no significant effect. The research emphasizes the role of market integration and finds that, aside from the international environment, the highlighted factors significantly promote NFRS adoption in Nepal except international environment.

Theoretical Implications

- The study enhances the theoretical understanding of factors influencing the adoption of NFRS by integrating various theories, including Corporate Governance, Signal Theory, and Institutional Theory while emphasizing the significance of government policy, education, company size, and initial adoption costs.

- It expands Institutional Theory by illustrating how external factors and governmental influence drive regulatory adoption in developing countries like Nepal. It explores the role of Signal Theory in how governmental and market signals can impact the adoption of new standards.

- The research emphasizes the importance of political and institutional mandates in promoting the adoption of NFRS among Nepali companies. It expands on existing frameworks to explain the factors affecting regulatory adoption in developing contexts.

Practical Implications

- The practical implications of this study are significant for policy makers, accounting profes-

sionals, and firms involved in or planning to adopt NFRS in Nepal.

• The study highlights that factors such as government policy, company size, education level, international environment, and initial adoption costs heavily influence the adoption of NFRS.

• Policy makers should concentrate on strengthening the regulatory framework, providing targeted training, and encouraging smaller firms to lower initial adoption costs through incentives like tax breaks or subsidies for training programs.

• Clear and consistent government policies and regulations are necessary to encourage uniform adoption of NFRS across Nepal.

• For accounting professionals and firms, the study emphasizes the importance of enhancing education and training in financial reporting standards, as a higher level of education positively influences NFRS adoption.

• Larger companies have a higher likelihood of adopting NFRS, so firms should leverage their size to facilitate the adoption process.

• The study highlights the need for companies in Nepal to understand the international environment and align their practices with NFRS as the country integrates into global financial markets.

• A collaborative effort between government and private sectors is essential for effectively adopting NFRS in Nepal's financial ecosystem.

Scope for Further Research

i. Sector-Specific Analysis: Future research could focus on exploring the adoption of NFRS across various sectors beyond the manufacturing and banking industries. This includes assessing challenges and benefits specific to sectors like agriculture, tourism, and small businesses, which may have distinct financial reporting needs and capabilities.

ii. Impact of Technology: Investigating the role of emerging technologies, such as accounting software and digital platforms, in facilitating the implementation and compliance of NFRS can provide insights into how technological advancements can streamline reporting processes and improve transparency in financial statements.

iii. Training and Education Initiatives: Research aimed at understanding the knowledge gaps among accounting professionals and their perceptions of NFRS compared to IFRS could help in designing targeted educational programs. This would enhance competency of accountants in Nepal and support a smoother transition to adopting these standards.

Limitations of the Study

1. The study relies on primary data, which may limit the generalizability of the findings, as respondents' perspectives can change over time and vary across different contexts.
2. The research is limited by a small sample size, which may affect the robustness and reliability of the findings, ultimately reducing the study's representativeness of the larger population.

3. The study is focused on the Kathmandu Valley, which may not accurately reflect the views and adoption practices in other regions of Nepal, leading to potential regional bias.
4. The use of a quantitative and causal-comparative design may overlook valuable qualitative insights, missing complex factors affecting adoption decisions.

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Synthesis, Characterization, and Structural Elucidation of a Novel (E)-1-(1-Phenyl-1H-pyrazol-4-yl) -N-(1-(p-tolyl)-1H-pyrazol-5-yl)methanimine

[1] Kamal Raj Sapkota

Abstract

(E)-1-(1-Phenyl-1H-pyrazol-4-yl)-N-(1-(p-tolyl)-1H-pyrazol-5-yl)methanimine (PPM) was synthesized by reacting 1-phenyl-1H-pyrazole-4-carbaldehyde with 1-(p-tolyl)-1H-pyrazol-5-amine in methanol, achieving a 90% yield. The elemental analysis confirmed the molecular formula, $C_{17}H_{13}N_5$. Structural characterization was performed using NMR, IR, UV-Vis spectroscopy, and mass spectrometry. The 1H and 13C NMR spectra identified the imine, aromatic, and pyrazole groups, verifying the molecular structure. IR analysis showed characteristic bands for C=N, aromatic C=C, NH, and CH_3 groups, consistent with the compound's functional groups. UV-Vis spectroscopy revealed transitions at 415 nm and 325 nm, indicating an extended conjugated system. Mass spectrometry established the molecular ion at m/z 328 ([M+H]+) and identified fragmentation patterns consistent with the proposed structure. This comprehensive analysis demonstrates the successful synthesis and structural elucidation of PPM.

Keywords

Fragmentation
Methanimine
Methanol
Pyrazole

(E)-1-(1H-pyrazol-4-yl-1-phenyl) The compound -N-(1-(p-tolyl)-1H-pyrazol-5-yl)A Schiff base, methanimine (PPM) is generated from pyrazole, a class of heterocyclic chemicals that may find use in a number of disciplines, including material science, pharmaceutical chemistry, and coordination chemistry (Hassani et al., 2023; Moussa et al., 2024: Verma et al., 2023). Schiff bases have special electronic and structural characteristics due to the presence of an azomethine (-CH=N-) group (Katariya et al., 2022; Moussa et al., 2024). Due to their substantial pharmacological actions, such as antibacterial, anti-inflammatory, and anticancer qualities, pyrazole

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derivatives in particular have been the subject of much research (Karrouchi et al., 2018; Hassani et al., 2023; Moussa et al., 2024: Verma et al., 2023). Additionally, these substances are crucial ligands in the creation of coordination complexes, which are frequently used in sensing and catalysis applications. The five-membered heterocyclic chemical class known as pyrazoles is very important in organic synthesis. They have attracted a lot of attention because they are one of the azole family's most researched groupings. Over time, a variety of synthetic techniques and structural changes have been implemented. As a crucial component of a wide range of compounds, the pyrazole nucleus supports its numerous applications in a variety of fields, such as technology, medicine, and agriculture. This adaptability is particularly noticeable in the bioactive characteristics of derivatives of pyrazoles. They exhibit a wide range of therapeutic effects and are recognized for their potential as effective inhibitors of protein glycation. Pyrazoles are essential in the creation of innovative medical therapies and solutions because of their antibacterial, antifungal, anticancer, antidepressant, anti-inflammatory, anti-tuberculosis, antioxidant, and antiviral properties.

(E)-1-(1-phenyl-1H-pyrazol-4-yl)-N-(1-(p-tolyl)-1H-pyrazol-5-yl)methanimine (PPM) is conjugated with two pyrazole units, a phenyl group, and a p-tolyl substituent. Its chemical reactivity and possible biological activity are anticipated to be influenced by the improved conjugation and electronic interactions that such a structure offers (Silva et al., 2018; Ebenezer et al., 2022; Golovanov et al., 2021). Because they may form stable metal complexes, Schiff bases with this kind of structural complexity are frequently investigated as potential candidates for material and catalytic applications (Liu et al., 2018; Zhang et al., 2018; Cozzi, 2004). Furthermore, the electron-donating and withdrawing properties of the phenyl and p-tolyl groups may further boost its potential adaptability in numerous scientific disciplines (Raicopol et al., 2012; Wang et al., 2016; Khan et al., 2014).

To comprehend PPM's chemical and physical characteristics, its synthesis and characterisation are essential. To identify functional groups and guarantee the accuracy of the molecular structure, advanced characterisation techniques have been used. The molecular weight and fragmentation pattern are specified by mass spectrometry (MS), which also provides proof of the molecular formula. The purity of the produced product is guaranteed by elemental analysis (CHN), which verifies the proportion composition of carbon, hydrogen, and nitrogen. Characteristic functional groups, such as the azomethine (vC=N) stretching vibration at 1600 cm^{-1} (Pavia et al., 2015; Socrates, 2004), as well as vibrations belonging to aromatic and aliphatic functional groups, can be identified with the aid of infrared spectroscopy (IR).

The molecule's electronic transitions are investigated using ultraviolet-visible spectroscopy, or UV-Vis. π-π* and n-π* transitions are indicated by absorption maxima (λmax), which reveal information on the electronic characteristics of the conjugated system (Pavia et al., 2015; Pretsch et al., 2013). ^{1}H and ^{13}C nuclear magnetic resonance (NMR) spectroscopy provides comprehensive details about the chemical surroundings of carbon and hydrogen atoms. The presence of aromatic carbons and the azomethine carbon is confirmed by the ^{13}C NMR spectrum, although the ^{1}H NMR spectrum shows different signals for aromatic and azomethine protons.

These thorough analyses demonstrate the purity and structural integrity of (E)-1-(1-phe-

nyl-1H-pyrazol-4-yl)-N-(1-(p-tolyl)-1H-pyrazol-5-yl)methanimine, providing a strong basis for further research focused at examining its possible uses in a range of scientific domains. In addition to guaranteeing accurate characterisation, the combination of cutting-edge methodologies emphasizes the compound's suitability for additional material science and biological applications.

Methodology

Methods

A Perkin-Elmer FT-IR spectrometer was used to record the FT-IR spectrum of (E)-1-(1-phenyl-1H-pyrazol-4-yl)-N-(1-(p-tolyl)-1H-pyrazol-5-yl)methanimine (PPM) at 25 °C. This allowed for the identification of the molecule's vibrational modes and functional groups. A Bruker AVANCE-III spectrometer was used to perform 13C and 1H NMR spectroscopy in order to examine the structural features of the hydrogen and carbon atoms. Using a Perkin-Elmer Lambda 35 spectrometer, UV-Vis spectroscopy revealed details on the compound's electronic absorption characteristics over a wavelength range of 200 to 600 nm with a bandwidth of 1 nm. In order to ascertain the molecular ion and fragmentation pattern, the mass spectrometric analysis was conducted on a WATERS Q-ToF Premier Mass Spectrometer employing electrospray ionization (ESI-MS). Additionally, a Perkin-Elmer 2400 Series II CHNS/O Analyzer was used to evaluate the compound's elemental composition and ensure that it agreed with theoretical values.

Materials

Sigma-Aldrich provided all of the ingredients needed to synthesize (E)-1-(1-phenyl-1H-pyrazol-4-yl)-N-(1-(p-tolyl)-1H-pyrazol-5-yl)methanimine (PPM), which were employed straight into the process without any additional purification.

Results and Discussion

Synthesis of (E)-1-(1-phenyl-1H-pyrazol-4-yl)-N-(1-(p-tolyl)-1H-pyrazol-5-yl)methanimine (PPM)

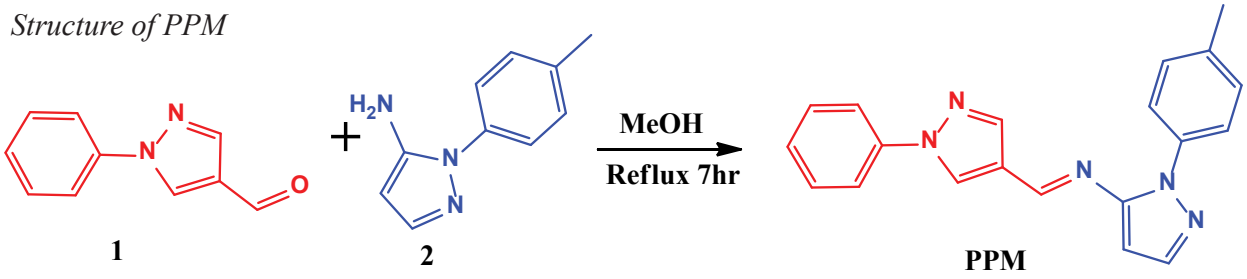
PPM was synthesized by reacting 1-phenyl-1H-pyrazole-4-carbaldehyde (1) with 1-(p-tolyl)-1H-pyrazol-5-amine (2), as shown in Scheme 1. First, 0.50 g (2.88 mmol) of 1-(p-tolyl)-1H-pyrazol-5-amine was dissolved in 20 mL of methanol. Then, 0.49 g (2.84 mmol) of 1-phenyl-1H-pyrazole-4-carbaldehyde was added to the solution. The reaction mixture has been refluxed for 7 hours, during which a light yellow solid precipitate formed, and the solution volume was reduced to 10 mL. The precipitate was filtered out and washed with 5 mL cold methanol and 10 mL hexane. The resulting red powder was recrystallized from methanol and thoroughly dried in a vacuum desiccator. With a 90% yield, 0.90 g of yellow solid was the end product, PPM. The aforementioned synthetic technique has previously been documented (Jamal et al., 2024; 2025).

The molecular formula of the compound (PPM) was found to be $C_{17}H_{13}N_5$. The calculated values of C, 73.37%; H, 5.23%; and N, 21.39%, as determined by elemental analysis, closely matched the values obtained experimentally, which were C, 73.14%; H, 5.09%; and N, 21.11%. These findings provide highly accurate confirmation of the compound's elemental composition.

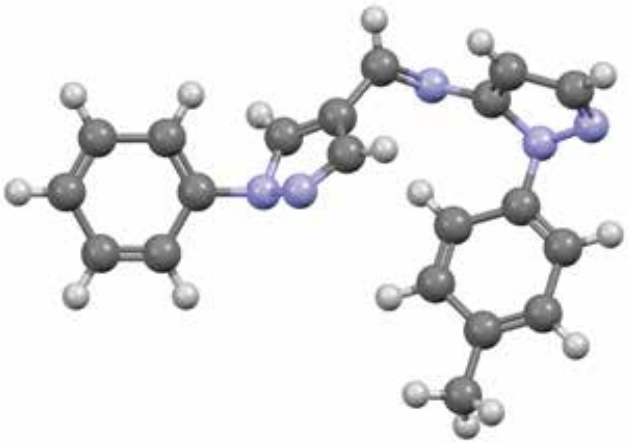
Additionally, Figure 1 illustrates the PPM structure.

Figure 1

Structure of PPM



Scheme1



NMR study

When (E)-1-(1-phenyl-1H-pyrazol-4-yl)-N-(1-(p-tolyl)-1H-pyrazol-5-yl)methanimine was recorded in DMSO-d_6, its 1H NMR spectrum (Figure 1.1) revealed a mix of broad and sharp signals that were in line with the predicted proton environments. The presence of the C=N bond was confirmed by assigning a singlet to the imine proton at δ 8.85 ppm. At δ 7.55–7.40 ppm, the phenyl group's aromatic protons appeared as a multiplet. This finding is in line with other research on Schiff bases and compounds containing imines, which found that the deshielding effect of the nearby nitrogen typically triggers the imine proton to emerge in the downfield region (Pretsch et al., 2013; Kaya et al., 2011: Jamal et al., 2025). Similar chemical changes for imine functionalities have been documented in a number of studies, supporting the structural characterisation of these molecules.

(Pretsch et al., 2013: Meyer et al., 2007; Pavia et al., 2015) The aromatic protons in the p-tolyl group showed a doublet at δ 7.38 ppm (J = 8.1 Hz), while the methyl group showed a singlet at δ 2.34 ppm (Pavia et al., 2015; Pretsch et al., 2013). The pyrazole ring protons were represented by the broad signals in the spectrum. The pyrazole ring's NH proton was identified as the source of a wide singlet at δ 10.12 ppm, indicating that it is exchangeable. Two more broad singlets, which correspond to aromatic CH protons inside the pyrazole rings, were detected at δ 8.43 and δ 8.15 ppm (Sharma, 2007; Pavia et al., 2015; Pretsch et al., 2013). The pres-

ence of its essential functional groups is highlighted by this 1H NMR investigation, which also validates the structural integrity of (E)-1-(1-phenyl-1H-pyrazol-4-yl)-N-(1-(p-tolyl)-1H-pyrazol-5-yl)methanimine. The suggested molecular structure (PPM) is in agreement with the distribution of chemical shifts.

(E)-1-(1-phenyl-1H-pyrazol-4-yl)-N-(1-(p-tolyl)-1H-pyrazol-5-yl)methanimine's 13C NMR spectrum (Figure 1.1), which was recorded in DMSO-d_6, showed multiple unique peaks that represented the various carbon environments inside the molecule. The imine carbon (C=N), which is typical of the compound's C=N group, was identified as the source of the peak at δ 146.0 ppm (Sharma, 2007; Pavia et al., 2015; Pretsch et al., 2013). Because of conjugation and electrical effects, imimine carbons usually occur in the 140–160 ppm range (Silverstein et al., 2014; Pretsch et al., 2013). Similar shifts around δ 145–155 ppm are reported in studies on pyrazole derivatives (Silverstein et al., 2014; Sharma, 2007; Pavia et al., 2015; Pretsch et al., 2013), which validate the compound's structural integrity and corroborate our assignment. Individual aromatic carbons in the benzene ring were represented by signals at δ 128.2 ppm and δ 130.0 ppm, whereas the aromatic carbons from the phenyl group were detected in the range of δ 125.4–130.0 ppm. The carbons in the pyrazole ring provided many signals. At δ 142 ppm, the pyrazole ring's imine carbon (C=N) was visible, which is in line with the carbon that is directly bonded to the nitrogen in the heterocyclic ring. The region of δ 120.0–140.0 ppm was found to contain the aromatic carbons of the pyrazole rings (Pavia et al., 2015; Pretsch et al., 2013). These chemical shift values align with previously reported NMR studies on pyrazole derivatives, where imine carbons typically resonate between δ 140–150 ppm due to their electron-deficient nature and conjugation effects (Silverstein et al., 2014; Pavia et al., 2015; Pretsch et al., 2013). Similarly, aromatic carbons in heterocyclic systems are commonly found in the range of δ 115–145 ppm, depending on substitution patterns and electronic interactions (Sharma, 2007; Silverstein et al., 2014). The observed shifts are characteristic of pyrazole-containing compounds and further confirm the structural integrity of the synthesized molecule (Nakamoto, 2009)

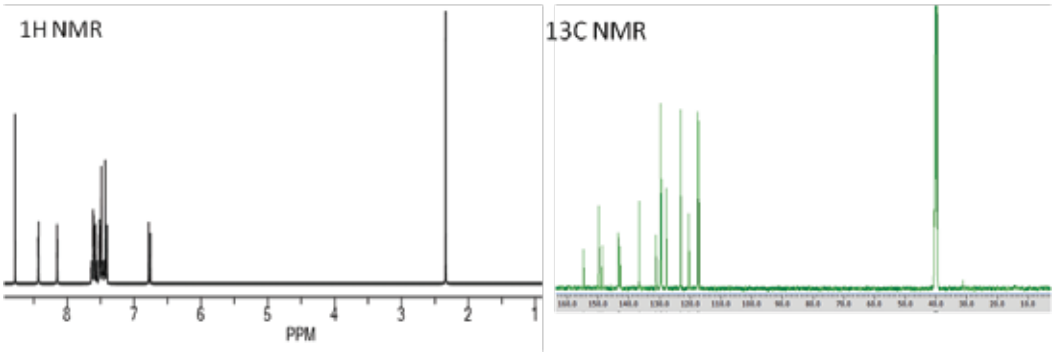
At δ 138.3 and δ 130.1 ppm, the pyrazole ring displayed distinctive carbon signals that corresponded to carbons situated next to the nitrogen atom in the heterocyclic ring. The carbon at position 1 of the pyrazole ring, next to the imine group, was identified as the source of the signal at δ 121.6 ppm. A methyl group connected to an aromatic ring is consistent with the methyl carbon signal that the p-tolyl group contributed at δ 21.3 ppm. In the δ 128.0–130.0 ppm region, additional aromatic carbon signals from the p-tolyl group were detected (Sharma, 2007; Pavia et al., 2015; Pretsch et al., 2013). All things considered, the carbon habitats in (E)-1-(1-phenyl-1H-pyrazol-4-yl)-N-(1-(p-tolyl)-1H-pyrazol-5-yl)methanimine are thoroughly and consistently analyzed by the 13C NMR spectra. The presence of the phenyl, pyrazole, and p-tolyl groups as well as the imine functionality are confirmed by the peak assignments, which are in good agreement with the predicted structure.

IR study

(E)-1-(1-phenyl-1H-pyrazol-4-yl)-N-(1-(p-tolyl)-1H-pyrazol-5-yl)methanimine's infrared (IR) spectra, which was recorded between 4000 and 450 cm^{-1}, showed a number of charac

Figure 1.1

1H and 13C NMR of PPM



teristic absorption bands that were suggestive of the molecule's functional groups and general structure. The imine (C=N) bond's stretching vibration was identified by a strong, crisp band at 1620 cm^{-1} (Sharma, 2007; Pavia et al., 2015; Socrates, 2004). This discovery is in line with observations in the literature, which state that the distinctive C=N bond causes imine stretching vibrations to generally occur in the 1600–1650 cm^{-1} range (Silverstein et al., 2014; Pretsch et al., 2013; Socrates, 2004). Similar absorption bands have been seen in this location in studies on Schiff bases and pyrazole derivatives, indicating that the imine functionality is present (Sharma, 2007; Pavia et al., 2015).

The presence of the C=N linkage in the chemical is confirmed by this absorption, which is typical of compounds with an imine group. According to the chemical structure, the band at 1620 cm^{-1} supports the synthesis of the imine group in the molecule, and the stretching frequency for C=N bonds is normally between 1600 and 1690 cm^{-1} (Pavia et al., 2015; Socrates, 2004). The aromatic rings' C=C stretching vibrations are responsible for the notable absorption band that was detected at 1602 cm^{-1} (Socrates, 2004). The phenyl and pyrazole rings' conjugated system gives rise to this band, suggesting that these aromatic components support the structure's overall conjugation. As is common for compounds with conjugated systems, the downshifted absorption of the C=C stretch is probably caused by the conjugation in the aromatic rings. The spectrum showed distinctive C-H stretching vibrations for the aromatic protons in the 3050–3000 cm^{-1} range, which are suggestive of the hydrogen atoms joined to carbon atoms in the aromatic rings (Pavia et al., 2015; Socrates, 2004). The presence of both the pyrazole and phenyl rings in the structure is supported by these absorptions. The stretching vibrational band of the C-H bonds in the benzene ring is the cause of the bands in this area, which are common for aromatic compounds.

As is common for compounds with NH groups, particularly in heterocyclic structures like pyrazoles, the NH stretching vibration was detected as a broad, weak band at 3230 cm^{-1} (Pavia et al., 2015; Socrates, 2004). This band's broadness indicates the existence of intermolecular interactions or hydrogen bonds with the solvent or other functional groups inside the mole-

cule. This discovery is consistent with earlier observations in the literature, which state that hydrogen bonding effects are responsible for the broadening of NH stretching vibrations in pyrazole and related heterocyclic compounds, which usually occur in the region of 3200–3400 cm^{-1} (Silverstein et al., 2014; Pretsch et al., 2013). Similar patterns have been seen in studies on Schiff bases and other nitrogen-containing heterocycles, supporting the idea that hydrogen bonds affect vibrational properties (Sharma, 2007; Nakamoto, 2009). According to numerous reports in vibrational spectroscopy research, the presence of hydrogen bonding can cause peak broadening and spectrum changes (Socrates, 2004). These results support the current study's assignment of the NH stretching band.

Because the NH proton is exchangeable, the NH stretching band in pyrazole derivatives is frequently widened by the creation of hydrogen bonds.
The stretching vibrational band of the C-H bond in the methyl group (CH_3) connected to the p-tolyl group is responsible for another noticeable absorption that was seen at 2925 cm^{-1} (Socrates, 2004). The existence of the methyl group in the structure is confirmed by this absorption, which is frequently seen in compounds with methyl substituents on aromatic rings. This result is in line with findings in the literature, which state that, depending on the molecular environment, the C-H stretching vibrations of methyl groups usually occur in the range of 2850 to 2950 cm^{-1} (Silverstein et al., 2014; Pavia et al., 2015). The attribution of this absorption band has been supported by studies on methyl-substituted aromatic compounds, which have shown comparable spectrum features (Sharma, 2007; Pretsch et al., 2013). This peak's existence further bolsters the structural soundness of

Other features were seen in the fingerprint region (below 1500 cm^{-1}). The presence of the pyrazole nitrogen attached to the aromatic ring is further supported by the observation of two absorptions: one at 1365 cm^{-1}, which corresponds to the C-H bending vibrations of the aromatic rings, and another at 1200 cm^{-1}, which is generally attributed to the C-N stretching vibrations in aromatic amines (Sharma, 2007; Socrates, 2004). These assignments are consistent with earlier observations in the literature, which show that C-H bending vibrations in aromatic systems often occur between 1300 and 1400 cm^{-1} and are impacted by conjugation effects and ring substitution (Sharma, 2007; Socrates, 2004; Silverstein et al., 2014; Pavia et al., 2015). According to several spectroscopic investigations, C-N stretching vibrations in aromatic amines are frequently seen between 1180 and 1250 cm^{-1} (Pretsch et al., 2013; Nakamoto, 2009). The spectrum assignments in the current work are further supported by the numerous reports of these bands' existence in heterocyclic compounds, especially pyrazole derivatives (Sharshira et al., 2012; Silverstein et al., 2014; Pavia et al., 2015).

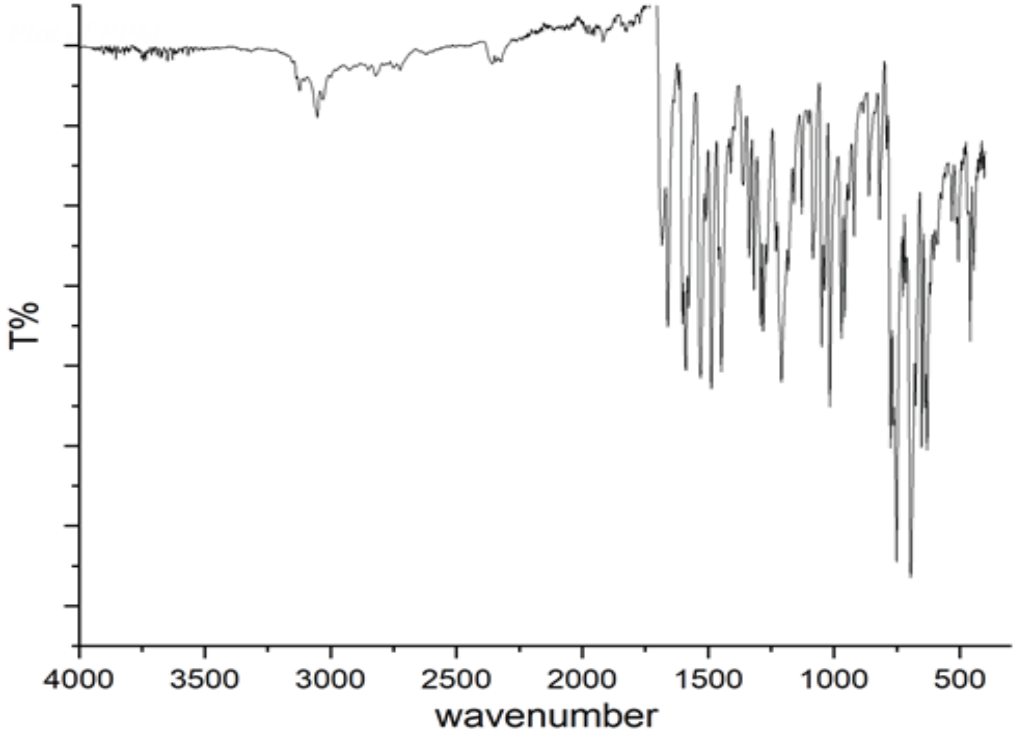
Additionally, the monosubstituted aromatic ring structure in the phenyl and p-tolyl groups is characterized by C-H out-of-plane bending vibrations, which are responsible for a number of weaker absorptions in the 700–800 cm^{-1} area. These bending modes, which are usually seen in the fingerprint region, offer more proof that the molecule is aromatic (Sharma, 2007; Pavia et al., 2015; Socrates, 2004).

The IR spectrum (Figure 2) of (E)-1-(1-phenyl-1H-pyrazol-4-yl)-N-(1-(p-tolyl)-1H-pyrazol-5-yl)methanimine shows absorption patterns that are consistent with the presence of methyl substituents, aromatic rings, NH groups, and imine groups. The distinctive absorption bands

show the functional groups involved and lend support to the suggested molecular structure. The thorough IR spectrum analysis validated the target molecule's effective synthesis and offered a useful insight of the compound's molecular shape.

Figure 2

IR



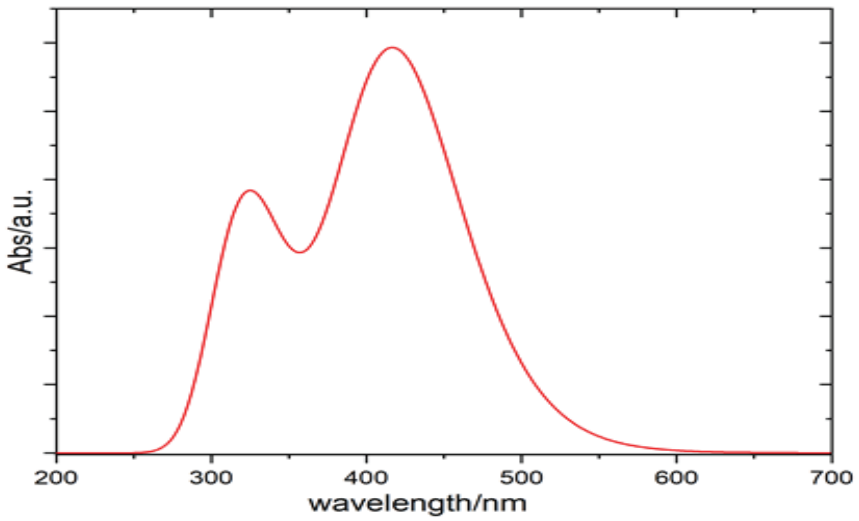
UV-Vis

Two noticeable absorption bands are visible in the UV-Vis spectrum (Figure 3) of (E)-1-(1-phenyl-1H-pyrazol-4-yl)-N-(1-(p-tolyl)-1H-pyrazol-5-yl)methanimine. These bands are suggestive of different electronic transitions that emphasize the compound's distinct electronic structure and conjugation. The sharp peak at 415 nm, which is indicative of a charge-transfer transition, is the first noteworthy feature (Sharma, 2007; Pavia et al., 2015; Pretsch et al., 2013). This peak indicates that the molecule experiences strong electrical interactions that are made possible by the imine group and the conjugation of the phenyl and pyrazole rings. By raising the electron density in the conjugated system, the p-tolyl substituent—which has an electron-donating methyl group—further improves the charge-transfer transition (Sharma, 2007; Pretsch et al., 2013). A greater overlap of electron densities between the donor and acceptor moieties is encouraged by the electron-donating development of the methyl group, which facilitates the transfer of charge (Sharma, 2007; Pavia et al., 2015). This transition, which is usually connected to π-π* or n-π* transitions, is thus seen in the lower-energy part of the spectrum. These transitions contribute to the overall electrical characteristics of the molecule by mediating the broad delocalization of π-electrons across the molecular framework (Pavia et al., 2015; Pretsch et al.,

2013). The molecule's strong charge-transfer interactions, which are frequently desired in materials meant for applications in fields including optoelectronics, organic photovoltaics, and photonic materials, are highlighted by the observed intense absorption at 415 nm. Its electrical features are facilitated by the charge-transfer transition's well-defined conjugated structure, which allows the electron density to move across the molecule effectively. A second absorption band, which corresponds to a π-π* transition mainly involving the aromatic and heteroaromatic rings, is seen at 325 nm in addition to the strong peak at 415 nm. While π-electrons are delocalized across the aromatic systems, this transition is localized within the phenyl and pyrazole rings. The π-π* transition is facilitated by the intrinsic electronic structure of these aromatic rings, as indicated by the moderate energy required for this transformation. The confined π-electron transitions, which are distinct from the charge-transfer transitions involving more extensive delocalization, are described by this band at 325 nm. The distinct electronic environments within the molecule are highlighted by the difference in the absorption wavelengths, which are 415 nm for the charge-transfer transition and 325 nm for the π-π* transition. While the absorption at 325 nm indicates the localized electronic transitions inside the aromatic rings, the strong interaction between the donor and acceptor moiety in the conjugated system is reflected by the high absorption at 415 nm (Sharma, 2007; Pavia et al., 2015; Pretsch et al., 2013). These findings show that the molecule's electrical transition behavior, electron density distribution, and conjugation all interact intricately. When combined, these spectrum features show the compound's distinct conjugated structure, which facilitates effective electronic transitions. The compound's electronic properties may be better understood thanks to the UV-Vis spectral features, which also point to the possibility of using it in applications that demand powerful charge-transfer capabilities. The observed UV-Vis behavior, which highlights the molecule's distinct electronic architecture and its promise for advanced materials applications in domains like photonics and organic electronics, is mostly determined by the interaction of aromaticity, conjugation, and the influence of substituent groups.

Figure 3

UV-Vis Plot of PPM



Mass Spectrometry (MS) Analysis

Using electrospray ionization (ESI) in positive ion mode, the mass spectrum of (E)-1-(1-phenyl-1H-pyrazol-4-yl)-N-(1-(p-tolyl)-1H-pyrazol-5-yl)methanimine was acquired. The molecular ion [M+H]+ was represented by a strong molecular ion peak in the spectra at m/z 328. The compound's molecular weight of 327 g/mol was verified by the high-resolution measurement, which was in line with the predicted value. The molecular ion's fragmentation produced a number of notable peaks, the base peak of which was seen at m/z 237 and indicated the removal of a p-tolyl group. At m/z 171, another important fragment ion was detected, which was explained by the pyrazole ring cleaving and losing a phenyl group. Other prominent fragment peaks were m/z 204 and m/z 176, which were compatible with normal pyrazole and imine fragmentations and were caused by subsequent rearrangements and losses of smaller neutral molecules. The mass spectrum confirmed the integrity of the produced molecule (PPM) and supported the molecular formula by offering additional proof of the compound's structure.

Conclusion

(E)-1-(1-phenyl-1H-pyrazol-4-yl)-N-(1-(p-tolyl)-1H-pyrazol-5-yl)methanimine (PPM) was successfully synthesized with a high yield of 90%, as evidenced by elemental analysis and its chemical formula $C_{17}H_{13}N_5$. The structure and characteristics of the chemical were confirmed by thorough characterization utilizing cutting-edge spectroscopic techniques. Chemical changes in the NMR measurements perfectly matched the suggested molecular structure, highlighting the presence of aromatic moieties and imine functionality. The methyl group, aromatic rings, and imine (C=N) bond were all confirmed by distinctive absorption bands in the infrared spectrum. The extended conjugated system was highlighted by the UV-Vis spectrum's $\pi \rightarrow \pi^*$ transitions (strong), and the structural integrity was supported by mass spectrometry's validation of the molecular weight and fragmentation pattern. Together, the data highlight PPM's effective synthesis and comprehensive structural elucidation, laying the groundwork for future research into its possible uses.

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Power Dynamics in manu: A New Historical Perspective

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Abstract

This study aims to examine how Manu legitimizes authority and social order and analyze how his stories shape cultural values and beliefs over time, functioning in literary texts and historical documents. Manu is a mythical figure in Hindu tradition. He has been studied as a lawgiver among Hindu believers. His laws are part of cultural practices and also there are some questions about his stories and doctrines. Based on the concepts set on mythical and cultural aspects of Manu tradition, this study examines the novel, Manu and Manu culture using the new historical perspective of power dynamics. This research further tries to see and reinterpret these narratives as cultural poetics, where myths shape societal norms and behaviors, rooted in historical circumstances. It implies the ideas of Manu culture and the novel Manu to examine how Manu codifies social norms and human cultural landscapes. However, interpretations vary with debates on their historical context and relevance regarding cultural hegemony and power dynamics. Implying the New Historicism, this research article concludes that Manu, in both myth and the novel, Manu, embodies a dynamic interplay of culture, power, and history, with its influence as a vehicle for societal norms and values. Amid the diverse arrays of cultural interpretations of Manu, this research is meaningful in reexamining Manu tradition and analysis of the novel Manu from the New Historical perspective.

Keywords

Cultural poetics
Manava Dharma
Manu law
mythical narratives
power dynamics

MANU, AN ANCIENT Indian mythological figure, has a mythical tradition in the chain of Hindu mythology. Manu, known as the progenitor of humanity, matches the myth of Adam in the Abrahamic religions in the case of producing the

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heritage of rules and regulations of humanity and human knowledge of social welfare among Hindu believers. Stories about the activities of Manu are found in Hindu scriptures, that show Manu not as a single person, but as a tradition, and therefore there was not a Manu, but there were several Manu/s.

Rich in legendary connections between ancient stories and present lifestyle, Hindu mythology provides the stories of deities and human beings among which Manu (the whole chain of Manu tradition as a single Manu) is believed to have been the first man created by the gods or the Supreme Being with exceptional ability to link Gods and Humans through the knowledge of humanity as a wise king and lawgiver who received the divine laws, known as dharma, directly from the gods. The Sanskrit term, 'Manava' (मानव) means 'of Manu' or 'children of Manu'. His role extends beyond being merely the first man; he is also the ancestor of all humans and the father of the human race. The myth of Manu serves as a foundation for Hindu cosmology.

Writing a novel entitled Manu based on the life and activities of Hindu mythical character/s, Manu, Devi Prasad Subedi has started a different discourse on the tradition of Manu as the initiator of education and social civilization on earth. The reference of Manu, Subedi has mentioned, comes from the Rigveda, "In the Rigveda there were references to Father Manu, implying that he was either a creator or a progenitor of the human race" (Williams, 2003, p. 210). The stories of Manu have come along later in Hindu scriptures and the Puranic stories, "Manu was known as the first human, father of the race, first to kindle the sacrificial fire, and creator of the social order" (p. 210). The story of Manu has historical value, "its application in modern times requires critical scrutiny, especially in relation to caste and gender issues" (Doniger & Smith p. 202). However, Manu's ideas have many criticisms on "the legal implications and restrictive stance on women's autonomy, particularly in sections where it prescribes patriarchal guardianship" (Olivelle, 2005, p. 124). Still, Manu principles are meaningful in shaping the moral fabric of ancient society.

This study examines how the novel, Manu has presented the events in the life of Manu; how this reference, not as a myth but as a mode of history is connected with present-day context and how the author has developed the events of Manu-history in the structure of the novel. The study uses the New Historicism as the theory of rereading Manu tradition in the novel to see how the power has determined not only the reality but also the mythical history. This article does not focus on 'reading myth', but it focuses on 'new-historical reading' of the text.

Review of Literature

Rooted in the Vedic tradition, Manu convention embodies a worldview that merges religious principles with practical governance. It has created a system where social roles, duties, and rights are defined. Doniger and Smith (2000) write, "Manu tradition tries to form a social order. Its historical context reveals a society striving for stability through a hierarchy that reinforced order but often entrenched systemic inequalities" (p. 45). Manu tradition begins the concept of dharma, a term that encompasses duty, law, and moral order. It emphasizes the importance of adhering to one's prescribed varna (caste) duties as a means to uphold

societal harmony through the Manusmriti, however, there is debate on whether Manusmriti is the real book authored by any one of the Manus in its long tradition. Patrick Olivelle (2005) highlights how the tradition of Manu combines metaphysical and practical dimensions, presenting "dharma as both an eternal truth and a context-dependent set of rules" (p. 22). The trend of Manu, as guided by Manusmriti, has, however, been criticized for its "rigid interpretation of caste and gender roles, which often served to legitimize Brahminical hegemony and patriarchal dominance" (Chakravarti, 1993, p. 104). Often it is identified as power hegemony. It has created positive and negative arguments.

Wendy Doniger and Brian K. Smith (2000) argue that Manu tradition reveals the tensions and contradictions within its hierarchical framework, where power is centralized but bound by ethical constraints (p.78). Manu's instructions for governance in Manusmriti reflect the philosophy of power. Kingship is described as divinely ordained. The monarch is someone who has to protect and enforce dharma. Yet, the king's authority is not absolute. It is circumscribed by the laws and ethical principles laid down in the text.

B. R. Ambedkar (1936) argues against Manu tradition and law. In his opinion, it is a tool of oppression that institutionalized systemic injustices (p. 25). It is necessary to debate its relevance, exploring how its philosophy has been selectively interpreted and adapted across different historical periods to serve varying political and social agendas (Smith 78). Therefore, it requires seeing Manu from diverse perspectives to authenticate its essence.

These studies on Manu and Manusmriti have shown Manu as an initiator of patriarchy, contradictions, hierarchy and injustice. Despite these extensive studies on the Manusmriti and its role in shaping ancient Indian society, there remains a significant gap in exploring the Manu tradition through a new historical perspective. Existing studies often focus on its prescriptive norms and hierarchical structures, yet they seldom contextualize how these principles were adapted, contested, or reinterpreted in different historical and regional contexts. Furthermore, the dynamic interplay between Manu's legal philosophy and the socio-political transformations across centuries has not been sufficiently examined. This research aims to address these gaps by analyzing the Manu tradition and the novel, Manu authored by Devi Prasad Subedi.

Objective and Significance of the Study

The objective of this study is to examine the Manu tradition and the Novel, Manu from the perspective of power dynamics. This study is meaningful in setting a connection between Manu tradition and the novel, Manu. It helps to reexamine the culture of Manu in modern principles of power dynamics.

Research Questions

1. Who is Manu- a man, a divine or just a myth?
2. How is Manu a vehicle of power in the Manu myth?
3. How does the author present the narratives of Manu to reflect upon the mode of power dynamics in the novel, Manu?

Methodology

This study is of a qualitative and archival nature. It implies the method of textual analysis based on secondary sources from the existing archives. It uses the theory of new historicism, especially the principles of power dynamics to interpret and analyze the Manu tradition and the novel, Manu.

Manu in Myth and Culture

Manu has a myth, and also has a religion and culture, as Devi Prasad Subedi (2022) has mentioned, "the story in the novel has combined the mythical character. The relational rope of the mythical and historical characters is more complicated than of the Puranas" (p. xii). Manu has a myth. He has a history too. Myth on him and religion link intricately with the common purpose of generating and maintaining cultural value. This culture has a history to tell. Manu history has stories to convey cultural beliefs, values, and moral codes. The history of Manu serves as a foundational narrative within religious traditions. This history explains the origin of the universe, the creation of humanity, and the workings of divine beings, however, "the law of Manu encompasses contradictions that may be ultimately insoluble" (Doniger, 1992, p. 25). Manu employs symbols and allegories to convey deeper spiritual truths and insights into long humanity, "the purpose of Manu was to establish humanity and human religion through the sages" (Subedi, 2022, p. 210). This purpose is often interpreted within religious contexts to provide guidance, inspire devotion, and foster a sense of community. It has deep-rooted impacts on the cultural pattern because the stories of Manu play a crucial role in transmitting cultural and religious beliefs across generations.

Manu tradition serves as a means of preserving and perpetuating religious teachings and practices. This tradition has come over the centuries through oral tradition, written texts, rituals, and ceremonies, "Manu gives a great deal of importance to customs which he considered essential for the maintenance of social life. These customs were based on the religious principles" (Sinha, 2017, p. 54). These customs and religious traditions incorporate mythological narratives into their understanding of sacred history as the interactions in the development of the faith "by making Takchyashila as the center of study, practice and documentation of human social rules and regulations" (Subedi, 2022, p. 206). Likewise, the story of Manu helps shape individual and collective identities within Hindu religious communities.

Revisiting and reinterpreting Manu related stories, symbols, and narratives unfolds new insights because "Manu changed the divine voices into human language and in the written form" (p. 262). This activity enhances the understanding of different perspectives and explores various layers of meaning within Manu myths. In Arthur Schopenhauer's views, "myths function as a vehicle that transports an esoteric system of values from the intellectually superior to the inferior" (Borchetia, 2023, p. 11). Stories of Manu, created once long back, have come down to human cultural practices and they undergo certain changes.

As powerful tools in shaping human lifestyles, myths often reflect the values, beliefs, and cultural practices of a society, "the work of myth is to explain, to reconcile, to guide action or to legitimate" (Cupitt, 1982, p. 29) the actions at present however they reflect the values of past of a particular geography, "in a myth we have definite locality" (Roheim, 1969,

p. 25). Rereading the Myth of Manu through literature helps individuals connect with the cultural heritage of the past and understand the historical context in which such myths originated and how they have affected life at present. Manu appears as the hero of civilization and culture and his laws have come in the form of stories and instructions. For example, "Vanaprasthi has to go to the forest taking his wife along or leaving his wife with the son, according to Swayambhuva Manu" (Subedi, 2022, p. 325). These instructions or stories contain elements of plot, character development, and narrative structure "in a myth the actors are mostly divine and sometimes human" (Roheim, 1969, p. 25), which makes it possible to reread them not just as the myths but as the forms of history and literature and this activity makes sense for further creation.

Manu embodies myth and culture. His myth and culture transfer to the publics for many generations, "Manu will establish and advocate humanity through education making Takshashila as the central place. Aaayurveda, Astrology and many other subjects will be taught there. Takshashila will be the place to expand humanity" (Subedi, 2022, p. 64). Through this mode, Manu continues to be relevant in contemporary society, however differently as the events and laws of Manu are not accepted as they are instructed. This transformation of humanity from ancient times as part of culture is a mode of history. This Manu history is the history of power and rereading it helps individuals draw parallels between the themes and motifs of the history/ stories to know better about current events and societal dynamics.

Manu: A Vehicle of Power

Mythical stories legitimize the authority of rulers, leaders, or institutions in the society through culture, "Myths could be used to validate otherwise inconsistent ritual practices or even conflicting political and property claims with the authority of law through divine sanction" (Dietrich, 1977, p. 66). Stories of Manu provide rules to strengthen the legitimacy of those in power. Manu tradition is the tradition of legitimization passing from one Manu to another. The myth of Manu is also a way to legitimize the authority in the mode of establishing social rules.

The laws of Manu refer to a significant Hindu mythological narrative centered around the legendary figure known as Manu "Primitive religion is the primitive counterpart to science because both are explanations of the physical world. The religious explanation is personalistic, the scientific one impersonal" (Segal, 2021, p. 11). Manu is understood as the progenitor of humanity in Hindu tradition and is associated with the concept of law and social order. There are different versions of the Manu myth found in various Hindu scriptures, with the Manusmriti (Laws of Manu) being a prominent text that outlines guidelines for righteous living.

Manu is not just a hero in Hindu practice; rather he is a power or the source of power. When the stories of the activities of Manu (Manu tradition) and the laws of Manu appear in the form of narrative, it carries the function of both the literary text and the history. Purânas narrate the stories of multiple Manus, a Manu, or first man, for each Manwantara. Manvantaras are approximately three hundred million years each, and the present one is the seventh Manvantara. The current Manu is Manu Vaivasvata. The six previous Manus were

Svayambhuva, Svarocisa, Auttami, Tamasa, Raivata, and Cakshusa. There will be seven more—Savarni, Daksasa- varni, Brahmasavarni, Dharmasavarni, Rudrasavarni, Raucya or Devasavarni, and Bhautya or Indrasavarni. (Williams, 2003, p. 210)

Manu has generated a level of cultural value among the Hindus in their lifestyle. Moreover, his actions and rules have been transformed as a source of literary creation in the later generations up to present. Many texts such as Devi Prasad Subedi's Manu have been written on the basis of the same myth and then the myth becomes literature. With its form of literature, as Brannigan says, "literary texts are vehicles of power" (Brannigan, 1998, p. 6), the myth of Manu has become a vehicle of power. Power in the creation and transformation of this myth has a complex and multifaceted aspect linking it with various historical and cultural contexts through texts, which in new historical perspective includes the history- text in history and history in text.

Texts, the way the Laws of Manu does, are the tools to both practice of power and resistance of power, "literary texts become an important focus for contemporary attempts to resist power" (p. 6). No literature, in New Historicism, can be completely isolated from the power, "Power is everywhere; not because it embraces everything, but because it comes from everywhere" (Foucault, 1981, p. 93). Myth "can be a part of this process of renegotiating power relations and is in that respect somewhat similar to a political movement" (Brannigan, 1998, p. 196). The myth of Manu has the picture of Vedic society on how power exercise was the central concern in both heaven and earth. The myth of Manu as a mythical narrative provides an opportunity to read the ancient society in the form of a text further encouraging multiple interpretations, "It is always possible to read a literary or cultural text for its mythic interest" (Coupe, 2009, p. 13). It provides the history of the Arya civilization beginning from Kshir Sagar (Kshir Ocean) to Devalok (heaven) and to Bharatbarsha (Earth) along with the history of the tradition of Manu, fourteen Manus beginning from Swayambhuva.

The power of Manu is not the power of a ruler or a king, "Vivaswan was not a person at the level of the ruler, nor was he a singer poet of the Arya civilization" (Subedi, 2022, p. 2) but "he had an objective to improve the society through education" (p. 2). Manu, (a chain of Manu tradition in fourteen Manus) is an image of an educational power to enhance a civilization of knowledge with different schools of thought, "his Gurukul (school) was centered to produce human resource who could work for social reformation and generate moral and spiritual consciousness" (p. 2). He has given the rules for human beings, but he respects individual freedom "The freedom of the Manu-smriti from all sectarian influence is perfect. It nowhere teaches the performance of other rites than those prescribed in the Vedic writings, and it nowhere inculcates the exclusive worship of one of the deities of the Pauranik sects as we find it recommended" (Mullar, 1886, p. lv). Manu's strategy lies in his excellent handling of his issue as a powerful way of focusing on the social civilization and culture without properly emphasizing praying to any particular god/goddess. The power lies on his primary focus on virtuous conduct, self-improvement and happiness after death.

Manu's tradition existed among the ancient Aryas starting from Swayambhuva Manu and passing the tradition from one Manu to another as "'the repetition of power through different epistemés" (Hamilton, 1996, p. 162). His laws have remained as Smritis for a long

time. Sage Markandeya and his disciples incorporated those sutras into pictographs in the school of Acharya Vivaswan of Devloka and those Dharmasutras became famous as Manudharmasutra. Later Vaivaswat Manu led the work of summarizing and transcribing those Dharmasutras from pictorial script into Brahmi script for Aryavarta. The reference of Manu's best contribution to mankind is also connected with human civilization as a social civilization in the way a history does.

It is the history of Humanity to establish nonviolence and respect to human and nonhuman beings, "the main purpose of Manu was to establish humanitarianism (Manav dharma) on earth through his sons and heaven's sages" (Subedi, 2022, p. 210) which takes a form of history. This history talks about the linear pattern of Manus. This history itself is a text, a text of civilization. Manu, in the myth, is not a king but has a power not less than a king in Heaven and Earth, "The power to represent, and hence to dominate, is what is at issue" (Brannigan, 1998, p. 149) in all practices of Manu civilization. Manu has the power to preserve and sustain the power of King Indra in heaven and Manu has the power to establish kingdoms on earth, especially in the Bharatbarsha. And, therefore, Manu is the symbol of power "we are more readily equipped to recognize the interests and stakes of power when reading culture" (p. 8) and the myth of Manu whose power is "omnipresent and omnipotent force, the new god" (p. 50). The description of Manu in the myth shows him with the qualities of a man but in a border sense he is the symbol of knowledge and power. His power, as Foucault says, appears as the productive network:

What makes power hold good, what makes it accepted, is simply the fact that it doesn't only weigh on us as a force that says no, but that it traverses and produces things, it induces pleasure, forms knowledge, produces discourse. It needs to be considered as a productive network which runs throughout the whole social body. (Foucault, Power/Knowledge: Selected Interviews and Other Writings 1972-1977, 1980, p. 119)

Among fourteen Manus, each Manu has the power for an epoch known as Manwantar and "each period has its own specific and pervasive mode of power" (Brannigan, 1998, p. 63) and each of them tries to establish Manav Dharma on earth, "this must have been the old Manava Dharma-sutra" (Mullar, 1986, p. xxxvii) and transfer the knowledge of heaven to earth because "the ancient Manava Dharma-sutra was considered as the special property of the Manavas," (p. xl) as a power. Manu's purpose and nature of power remain the same but the form that it takes does not. Their attempts "are being reconstrued as historically determined and determining modes of cultural work" (Montrose, 1989, p. 15) however their works are all surrounded to establish and circulate power from one to another in chain.

Lessons of Manu focus on ending discrimination and establishing equality through behavior, "one becomes a god or a man or a monster not by any caste or cast but by the behavior" (Subedi, 2022, p. 192) as Greenblatt says it 'improvisation', which "is primarily the mode of behavior through which power adapts to the structures and roles of its other in order to accommodate and appropriate opposition" (Brannigan, 1998, p. 62). Improvisation is always the instrument of power, but it may not always be in the hands of repression or destruction. Lessons of Manu myth always talk about the constructive part of life, "the sacrifice (hawan) in Yagya is not the sacrifice (hawan) of any material things, animals and others,

but it must be the sacrifice of desire, jealousy, greed and anger" (Subedi, 2022, p. 192), and therefore "we should stop the tradition of sacrificing animals in Yagya and this will be the best way to maintain equality" (p.195). Manu, in the myth, is no when in the throne of the king in the heaven and earth, but as "power works through the medium of cultural forms (Brannigan, 1998, p. 69), Manu becomes a culture and he always deserves a power to settle every problem and conflicts with his holy desire to bring change through knowledge, "I would request to all sages to make the Vedic knowledge knowable and understandable to every common human being" (Subedi, 2022, p. 220), and then "all the sages of the Heaven agreed to transfer Vedic knowledge into simple form" (p. 220). Manu, in this regard is not a ruler, not a destructive or subversive symbol, but he is a creative symbol and the myth of depicting Manu as a creative symbol is itself a result of power because myth and power both appear virtually synonymous.

Manu, similar to a mythical hero, has a power to settle conflicts of social hierarchies and inequalities, who has contributed the discrimination of Devas and slaves in heaven, "Now the discrimination and slavery in heaven has been ended and my aim is to bring this message to earth and set social order without discrimination on earth" (p. 221). Myths can do nothing but produce and reproduce power as 'Invisible Bullet' in Greenblatt's terms and the myth of Manu, likewise, generates the image of Manu as an invisible bullet that functions secretly to establish power for many generations as lessons of Manu (Manusmriti) are studied even today however critics find contradictions in them. Manu exists both in literature and culture "endlessly reduplicative: endlessly re-presenting" (Ryan, 1998, p. 124) as the reduplication of power.

Manu's circular existence justifies "the restoration of cosmic order, exercising colossal martial prowess in doing so. These exploits are embedded in an intriguing frame narrative" (Balkaran, 2029, p. 01) when he developed the principles of Brahmasutra into the written form in Takshashila school (Subedi, 2022, p. iii). His stories "defined as a "traditional story" – that is, one that has been handed down for as long as anyone can remember" (Ellwood, 2008, p. 3) have highlighted the academic power Manu with somehow divinely endowed figure, "all humans are divinely endowed, whereas only very special beings can claim divinity. The same categories apply to Christianity" (Bassuk, 1987, p. 7). He steps on earth as "the first expression of a spiritual process of liberation which is effected in the progress from the magical-mythical world view to the truly religious view" (Bidney, 19069, p. 6), but he has never proposed religion as the prayer to any gods/goddesses, but the religion as the true humanity. Therefore, Manu is not a divine figure, but a figure of the far past history. His presence can't just be ignored as a factious mythical character. He is a symbol of power and the product of power.

Therefore, Manu stories have long-rooted practices where power and culture most visibly merge. Manu is an agent in constructing power and culture in real from generation to generation as an invisible bullet. His stories survive and power also survives as the belief, as the logic in literature and as culture. The myth of Manu therefore is the vehicle of power.

Manu and Cultural Poetics

Myths are powerful tools for social control, helping to shape norms, values, and behaviors within a society in the mode of cultural poetics. Myth creates poetics in culture, the narrative structure of society. Cultural poetics is defined as the "study of the collective making of distinct cultural practices and inquiry into the relations among these practices" (Greenblatt, Shakespearean Negotiations: The Circulation of Social Energy in Renaissance England, 1998, p. 5). Based on this theory of cultural poetics, Manu narratives are the embodiment of Manu cultural poetics with wider understanding of humanity, "Manu is the founder of rules, regulations and social system on earth" (Subedi, 2022, p. iii). Being the founder of all these systems, he stands as a power in the cultural poetics for many generations. One who is in power may use culture as a means to reinforce a particular social order, promoting unity and conformity among the population that process in another term is cultural poetics. In this sense, Manu stories have promoted Manu culture as a history and this cultural practice as a whole can be seen as a cultural poetics in New Historical perspective.

A poetics of culture looks at how or what causes culture to manifest in specific ways, "The cultural practice which the book identifies is the appropriation of symbolic power" (Brannigan, 1998, p. 87). Because poetics explores how culture materializes in particular forms. Manu narratives depict the historical events scrutinized as the ongoing exchange of meanings that influence cultural development and the mode of power, as Vaivashwat Manu opines, "Our purpose is to establish human dharma in the Bharatvarsha and ascertain civilized and cultured Arya societies through education at Takshashila" (Subedi, 2022, p. 260). Manu migrates from heaven to Bharatvarsha (earth) purposefully with a design of starting a new culture, "now the love marriage will be accepted both in the heaven and earth" (p. 260). His all decisions and activities are the result of cultural practice, "everything we do is interrelated to and within a network of practices embedded in our culture" (Bressler, 2003, p. 188), a historical demand and a predetermined cultural poetics.

Manu tradition comes along many generations in the form of a work of art, Manusmriti. The novel, Manu is a novel based on the same tradition in narration. Works of art always have something to say. They explore how that creation fits into the interconnected web of exchanges that shapes a society. Manu's activities, his laws and the narratives on Manu have interrelatedness of all human activities, not solely the activity of any one moment of past, but they have generated a discourse, "their doctrines go back to the first progenitor of men" (Mullar, 1986, p. xxxiv). The laws imparted by Manu are the same, but their cultural interpretations do not remain the same. They go on changing because understanding and interpretation of cultures and texts differs subjectively, "all history is subjective, written by people whose personal biases affect their interpretation of the past" (Bressler, 2003, p. 181). Those in power, in any mode of history or repeatedly, use myths to propagate specific ideologies, whether religious, political, or cultural. Laws of Manu are crafted purposefully or adapted to align with the ruling ideology and reinforce its principles, "they are the stories of the first human being credited with the responsibility of preserving and protecting life" (Subedi, 2022, pp. 336-337) during the difficulties as the great flood.

Manusmriti provides the lessons attributed to Manu as the formal properties of a

cultural system. It outlines principles for righteous living, social duties, and the caste system as a culture to Hindus, "culture as a self-contained sign system and which consider any notion of reality or history as an effect of this sign system and determined entirely by representations" (Brannigan, 1998, p. 93). The rules, as the "most important record of old Hindu Society" (Dowson, 2000, p. 209) set a change in human civilization as the earliest and most influential works on Hindu law and ethics. They emphasize the importance of dharma, "the racial difference has been ended and our second purpose is to start the action of establishing and developing human-religion" (Subedi, 2022, p. 236). This activity addresses various aspects of human conduct, including family life, social interactions, and religious practices. And, therefore, the myth of Manu is the poetics of cultural value that needs a "close reading to a self-contained cultural system relies upon the change in title and nothing more" (Brannigan, 1998, p. 93). Interpretations of the Manu myth and the rules of Manu vary, and discussions around these texts often involve debates about their historical context, cultural significance, and relevance. It continues to be a source of discussion and exploration within the broader context of Hindu mythology and philosophy.

The tradition of Manu has a rich history within Hinduism, primarily associated with the legendary figure, Manu, "the history of man, as described in the Vedic texts, began with Manu" (Subedi, 2022, p. iii). His "divine descent has occurred not once but many times" (Bassuk, 1987, p. 1). And, therefore, Manu is not only a person; he is a tradition; he is a power in cultural poetics. According to the theory of cultural poetics, "History can never provide us with the truth or give us a totally accurate picture of past events nor the worldview of a group of people" (Bressler, 2003, p. 181). History is one of many discourses, or ways of seeing and thinking about the world. This can contribute to cultural hegemony, where the beliefs and values of the powerful group become widely accepted as the norm. The history of Manu has followed the same path, Subedi admits, "the main subject of the novel is how Manu ended the discrimination between Aryas and Aryetar and hoe he established humanity on earth" (p. iv). His principles have codified the varna system, outlining the duties and responsibilities of different social classes. His codes have contributed to the creation of identity at its surface level, but they have established power and has helped to exercise power.

Therefore, the history of Manu is circular and serves as part of cultural poetics among his believers. His laws used to be understood as divine lessons in the past, but they are reinterpreted as the changing doctrines as per the geo-political context.

Conclusion

The mythical figure of Manu serves as a potent vehicle of authority and the establishment of social order within Hindu tradition. Devi Prasad Subedi has depicted a similar history of Manu in his novel, and he has humanized Manu. His image of Manu is not a divine. He is a human being and he has established a social life through the education in Takshashila. His stories provide a framework for the reinforcement of power structures, however he, in the novel, is not a king or a source of a direct power. He is the source of passing down education and social systems from one generation to the next. He is not in power seemingly, but he has exercised power excessively. He has the power to appoint the kings. His significance extends beyond mere mythological tales; he embodies the concept of law and social order in Hindu

tradition. The same appears in the novel, but in a slightly different mode. Manu is a hero figure both in the myth and in the novel. He represents power and authority. He appears at the perfect position of power dynamics. He uses power- the power of knowledge, education, civilization and civic norms both in the Manu tradition and the novel, Manu. Narratives of Manu function as both literary texts and historical documents.

The novel keeps Manu at the center to examine the intricate relationship between myth, culture, and power dynamics, which reflects the concept of cultural poetics. Myths, as powerful tools for social control, shape norms, values, and behaviors within society, and embodies the narrative structure of cultural expression. In a similar way, the life stories of Manu both in the heaven and the earth depict historical events and cultural practices. They illustrate the ongoing exchange of meanings that influence cultural development and power dynamics. Manu's migration from heaven to earth, as seen in the novel, signifies the intentional establishment of a new culture, with his actions and laws reflecting predetermined cultural poetics.

Hence, Manu's character and actions as pictured in the novel, Manu, show power dynamics rooted in divine authority and social order. As the first man and a lawgiver in Hindu tradition, Manu is seen as chosen by the gods to preserve life and guide humanity. His laws, especially documented by Manu in the school of Takshashila, create a strict social order, with men holding the most power. While Manu is respected for maintaining cosmic order, his legacy is also debated for reinforcing inequality in society.

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Community Adaptation to Climate Change: A Sociological Analysis of the Madi Region, Chitwan, Nepal

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Abstract

Climate change brought about significant disruptions to local weather patterns, impacting communities worldwide. In Nepal, the Madi community of Chitwan district experienced these changes acutely, facing challenges that threatened livelihoods, agricultural productivity, and community well-being. Understanding the local dimensions of weather patterns (changing climate) and identifying effective adaptation strategies were crucial for building resilience at the grassroots level. While there was rising recognition of the global implications of climate change, localized studies focusing on specific communities, such as the Madi community, remained limited.

This research aimed to explore the constraints faced by the Madi community in Chitwan district due to changing weather patterns, and to evaluate the effectiveness of local adaptation strategies in mitigating these impacts. To gain the objective this research adopted a participatory action research (PAR) approach, using case study, field observation, focus group discussions (FGDs) and KII, with members of the Madi community. Participants actively involved themselves in data collection and analysis, ensuring the research was grounded in their lived experiences and local knowledge. The study also included interviews with key informants from local agricultural and community organizations.The study identified weather-related several challenges, including unpredictable rainfall, increased temperatures, and flooding, all of which severely impacted local agriculture, food security, and overall livelihood. Local adaptation strategies, such as diversifying crop types, adjusting planting seasons, and developing water management techniques, were effective in reducing vulnerability. By drawing on indigenous knowledge and practices, the Madi community developed innovative solutions that enhanced resilience.

Keywords
Climate change
Community adaptation pattern
Indigenous knowledge
Livelihood
Resilience

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THE COPENHAGEN AGREEMENT, which was adopted at COP-15, presented opportunities for significant progress on the climate change agenda and the establishment of a strong foundation for climate change adaptation (CCA). However, the true measure of success in adaptation was ultimately determined by its impact at the local level (IFRC, May 2009). It was argued that the effectiveness of climate change adaptation strategies was demonstrated through the enhanced resilience of communities most vulnerable to climate change impacts, such as those in Madi village, Chitwan, Nepal. The involvement of local authorities and community-based organizations in developing adaptation strategies was considered crucial. Additionally, risk reduction and risk management were regarded as essential components of successful adaptation.

Climate change represents a global challenge that affectes the natural environment, economies, and societies. Environmental impacts include alterations to the global water cycle, rising temperatures, and intensification of extreme weather events. Specifically, increased rainfall and extreme precipitation lead to floods and landslides, potentially destroying homes and posing significant risks to communities. Economic consequences included reductions in agricultural output and threats to human life and property. The social effects involved forced shifts in lifestyles, which required adjustments in public policies and the development of environmental education programs (Hsieh & Lee, 2021). Similarly, Chongbang (2022) explained that community support practices could significantly contribute to adaptation efforts, but achieving meaningful progress required more comprehensive actions than those previously in place to effectively reduce vulnerability to future climate change. Vulnerability to climate change was not solely determined by the extent of the climate change itself but was also shaped by existing social and natural stresses, which underscored the importance of following a "nature-based pathway." Sustainable development played a crucial role in deteriorating vulnerability by enhancing adaptive capacity and bolstering resilience. However, shifting weather patterns hindered progress toward sustainable development by escalating exposure to adverse impacts or eroding the ability to adapt. Consequently, it became essential for the agendas of sustainable development, climate change adaptation (CCA), and disaster risk reduction (DRR) to converge. This integrated approach aimed to maximize on-the-ground impact, reduce vulnerabilities, and fortify resilience within communities.

Community adaptation to changing weather patterns was most effectively achieved by building local capacities to reduce vulnerabilities to hazards. Experience demonstrated that safety and resilience were enhanced when communities focused on understanding and addressing the vulnerabilities that drove risk, rather than just the hazards themselves. Without reducing these vulnerabilities, it was not possible to sustainably lower community exposure to natural hazards in a way that contributed to long-term resilience (Chongbang, 2023). Furthermore, communities had to recognize the broader risk context in which they operated. For instance, building bio-damps, rainwater harvesting systems, drip-irrigation, or reservoirs to enhance the adaptive capacity of one community could unintentionally increase risks for neighboring communities. These lessons emphasized the need for climate change adaptation to be proactive and resilience-focused, aligning with broader risk reduction strategies and being deeply embedded within sustainable development goals.

Community-based adaptation adopted the approach of viewing adaptation as a form of development. It recognized that adaptation was inherently local and place-based, addressing the context-specific nature of climate change vulnerability. This approach focused on local levels, where people experienced climate impacts, built adaptive capacity, and acted. It emphasized that adaptation strategies should be developed through participatory processes (FGD), involving local stakeholders as well as development and disaster risk-reduction practitioners, rather than relying solely on impact-based scientific data. Consequently, expertise in vulnerability reduction stemmed from local case studies and indigenous knowledge, providing locally appropriate solutions to climate variability and extremes. Effective adaptation involved addressing both immediate and long-term vulnerabilities related to climate change and development, ensuring that adaptation efforts were grounded in local realities and needs. Community adaptation to changing weather patterns was most effectively achieved through community-based adaptation (CBA), which Reid et al. (2009) defined as a "community-led process, based on communities' priorities, needs, knowledge, and capacities, which should empower people to plan for and cope with the impacts of climate change." CBA brought climate change issues back to the local level, where communities played a central role in addressing challenges. Through adaptation efforts, local communities could rebuild not only cultural structures and lifestyles but also foster greater stakeholder involvement. This broader engagement, including inputs from ecosystem services and consumer groups, strengthened the capacity for adaptation and empowerment. The more stakeholders were involved, the greater the potential for sustainable, locally driven solutions that built resilience and adaptive capacity.

Climate change posed significant challenges to communities worldwide, impacting local weather patterns and threatening livelihoods dependent on natural resources. In the Madi community of Chitwan district, Nepal, changing weather patterns led to increased variability in rainfall, temperature extremes, and unpredictable growing seasons. These changes had profound implications for agriculture, water availability, and socio-economic stability. This paper aimed to explore how local adaptation practices and livelihood strategies developed through participatory approaches in the changing context of climate.

Review of Literature

The literature review examined previous studies on climate change impacts and community-based adaptation strategies globally and within Nepal. It discussed the vulnerability of rural communities to changing weather patterns, emphasizing the importance of localized responses that integrated traditional knowledge with scientific innovations. Key concepts included resilience-building, adaptive capacity, and the role of participatory action research in empowering communities to address climate-related challenges effectively.

Climate change, characterized by long-lasting shifts in weather patterns from the tropics to the poles, represented a global threat with far-reaching impacts across multiple sectors. This conceptual study, by Abbass et al. (2022), focused on how climate variability undermined the sustainability of various sectors worldwide, with particular attention to the agricultural sector. The vulnerability of agriculture was a significant concern, as fluctuating and unpredictable weather patterns threatened food production and global food security. This situation was especially critical in countries where agriculture played a central role in the

economy and overall productivity. Beyond agriculture, climate change endangered biodiversity by altering optimal temperature ranges for various species, accelerating biodiversity loss, and reshaping ecosystems. The study also highlighted the increased risks of food and waterborne diseases, as well as vector-borne diseases, with the coronavirus pandemic serving as a recent example of how climate variability exacerbated health crises. Furthermore, climate change accelerated the issue of antimicrobial resistance, creating new challenges for human health by fostering the spread of resistant pathogenic infections.

Since the IPCC's Fourth Assessment Report (AR4), the understanding of climate change adaptation had evolved, with a growing demand for strategies to manage climate risks. Klein et al. (2014) discussed the opportunities, constraints, and limits to adaptation in their contribution to the Fifth Assessment Report, emphasizing enabling conditions that facilitated adaptation and its potential benefits. They highlighted both biophysical and socio-economic constraints that hindered effective adaptation, suggesting that, in some cases, these constraints limited adaptive capacity. The authors argued that adaptation limits required transformational approaches to change social, economic, or environmental systems. They presented a framework that defined key adaptation concepts such as vulnerability and adaptive capacity, aligning with AR4 definitions. This framework integrated insights from different sectors and regions, offering a comprehensive view of adaptation complexities across time frames. The chapter called for flexible adaptation strategies that addressed uncertainties in climate models and potential irreversible changes, underscoring the need for both immediate and long-term adaptation responses from various actors, including governments, communities, and organizations.

Good adaptation involved addressing both immediate and long-term vulnerabilities in terms of climate change and development. It was essential to understand how social and economic trends contributed to vulnerability before considering how to adapt to likely climate risks. Without recognizing these underlying factors, the effectiveness of adaptation efforts could be limited. Development goals also had to integrate climate projections to ensure resilience. Community-based adaptation played a crucial role in this process if it remained a community-driven initiative. By aligning with the implications of climate change, these interventions formed part of a broader climate change adaptation strategy. This approach allowed for addressing specific, long-term climate impacts at various scales, ensuring the needs and priorities of the local community were incorporated into both immediate and future adaptation efforts (Ayers & Forsyth, 2009).

The growing application of an approach to adaptation was community-based adaptation. Community-based adaptation operated at the local level in communities vulnerable to the impacts of climate change. It identified, assisted, and implemented community-based development activities that strengthened the capacity of local people to adapt to living in a riskier and less predictable climate. Moreover, community-based adaptation generated adaptation strategies through participatory processes, involving local stakeholders, volunteers, local initiators, and development practitioners. It built on existing cultural norms and addressed local development concerns that made people vulnerable to the impacts of climate change in the first place. Bryan & Behrman (2013) explored that community-based adaptation (CBA) should prioritize local initiatives and collectivism, recognizing that adaptation to climate change required a

collective effort grounded in social capital. CBA was a group-based approach that emphasized collective action, where communities came together to address climate risks and build resilience. It integrated long-term climate change information into local planning, ensuring that communities were prepared for future impacts. Moreover, CBA incorporated local knowledge and perceptions of climate change, acknowledging the unique experiences and risks faced by each community. The approach placed importance on local decision-making, ensuring that solutions were rooted in the needs and priorities of the community. In doing so, CBA not only addressed climate challenges but also contributed to poverty reduction and enhanced livelihoods, promoting sustainable development. Relying solely on autonomous adaptation, where individuals independently adjusted their behavior, was insufficient to tackle the scale of climate change. Instead, a collective, community-driven approach was essential for fostering resilience and achieving meaningful change.

Community-based adaptation to climate change was an approach that prioritized local knowledge, needs, and capacities, empowering communities to manage the impacts of climate change. However, as Reid et al. (2007) noted, climate change was just one of several challenges faced by vulnerable populations, who also contended with issues such as unemployment, food insecurity, economic instability, and health problems. Therefore, focusing exclusively on climate-related risks did not address the broader concerns of these communities. To be effective, adaptation strategies had to integrate disaster risk reduction (DRR), livelihoods, and climate change adaptation, reflecting the interconnectedness of these issues and enabling communities to reduce vulnerability and strengthen resilience. This approach often involved co-learning, where both local and scientific knowledge were combined to better understand and mitigate the risks posed by climate change and other hazards (Reid et al., 2007).

Simon and Thomas (2020) emphasized two key insights for local government practitioners and decision-makers working to enhance climate adaptation and mitigation efforts. First, they argued that climate adaptation extended beyond infrastructure and engineering solutions and could not be addressed solely through one-time consultations. They stressed the importance of social learning in adaptation processes, aligning with those who asserted that sustainable climate responses required more than "one-time climate-proofing measures" (p. 17). Simon et al. (2020) suggested that local government planners engage professionals in community development, education, social services, and health when designing climate strategies. This approach ensured an understanding of ongoing community initiatives and encouraged meaningful dialogue with diverse community members.

Simon et al. (2020) criticized conventional planning engagement practices, which often excluded certain groups due to individualized formats and legal requirements. They pointed out that such practices separated marginalized people, such as incarcerated individuals, youth without voting rights, and those from collectivist cultures, which could play as effective governance mechanisms fostering social learning through collaboration, enhancing adaptive capacity. Additionally, the authors found that traditional planning approaches in Aotearoa New Zealand were often ineffective, as they suppressed social learning and led to costly, adversarial litigation. In contrast, the community-based initiative provided a successful model of community-based adaptation. The community-based adaptations focused on collective activities that promoted intergenerational connections and fostered joy, making climate

adaptation a more inclusive and less adversarial process. The initiative demonstrated that engaging communities around climate change did not have to center on property rights but could instead focus on shared concerns and collective actions, making the process more engaging and effective.

When comparing these findings with the beauty of community engagement, it became clear that fostering collaboration, social learning, and shared experiences provided a more holistic and inclusive approach to climate adaptation. This approach contrasted with traditional, individualized consultation methods, which often excluded significant portions of the population.

Siwi (2022) explored the impact of climate change on urban communities, particularly in relation to energy, food, and clean water crises.

While these community-based adaptation (CbA) measures proved beneficial at the local level, they often overlooked deeper socio-political factors, such as power dynamics and cultural structures, which limited their effectiveness. Traditional CbA strategies focused on addressing immediate environmental challenges but often failed to confront the underlying causes of vulnerability, such as unequal power relations and social exclusion.
In contrast, transformative community-based adaptation (TCbA), as discussed in Nath's (2024) findings, offered a more comprehensive approach. It incorporated the core characteristics of CbA but actively worked to empower communities by reframing decision-making processes, challenging power imbalances, and addressing the socio-political structures that shaped vulnerability.

The comparison between traditional community-based adaptation (CBA) and transformative community-based adaptation (TCbA) highlighted critical gaps in the current application of CBA, particularly in rural and marginalized communities. While CBA has shown promise in addressing immediate environmental challenges, it often overlooks socio-political factors such as power imbalances, economic instability, and the broader socio-economic structures that shape vulnerability. Despite the emphasis on local knowledge, its integration into scalable and sustainable adaptation practices remains uncertain, with insufficient empirical evidence on the long-term effectiveness of CBA.

Aforementioned literatures more emphasize environmental sustainability and governmental decision and focus to the out of context of inner terai related geographical region. Inner terai based climate change related issues and adopting pattern and livelihood strategies are still unanswered. Hence this research has been focused to identify the answer of the following question.
How people are adopted in the changing situation of climate in the specific area of Chitwan of Nepal?

Theoretical Underpinning

This study draws upon economic resilience theory, as conceptualized by Briguglio et al. (2006), to explore how communities adapt and transform in response to climate-induced disruptions. Economic resilience, as per this framework, involves three key components: absorptive, adaptive, and transformative capacities. Absorptive capacity enables communities

to withstand shocks, adaptive capacity allows them to adjust their practices to maintain core functions despite disruptions, and transformative capacity fosters long-term innovation, enabling communities to emerge stronger post-disruption. These capacities are influenced by factors such as economic diversification, social capital, market flexibility, and entrepreneurial activity. Social support mechanisms, as outlined in Briguglio's model, play an essential role in enhancing resilience by providing the necessary resources, financial aid, and emotional support during adverse events. This theoretical lens is particularly relevant when examining the role of green enterprises in fostering both community and economic resilience by integrating environmental sustainability and local knowledge. Green enterprises are seen as transformative agents, capable of driving innovation, creating jobs, and promoting long-term sustainability in the face of climate challenges. This research has been guided by this theoretical concept in study area.

The concept of community-based adaptation (CBA) serves as a critical bridge between theory and practice in climate change resilience capacities in different communities. CBA aligns with Briguglio's resilience framework, emphasizing the importance of local, local communities-based solutions tailored to the specific vulnerabilities and needs of communities. The participatory approach inherent in CBA ensures that adaptation strategies are grounded in local knowledge and priorities, empowering communities to lead their own adaptation processes. By focusing on local-level impacts, CBA fosters adaptive capacity and strengthens social cohesion, which are fundamental to both short-term survival and long-term resilience. The integration of durable solution in local level, climate change adaptation (CCA), and disaster risk reduction (DRR) within CBA ensures that adaptation strategies are not only reactive but proactive, mitigating future vulnerabilities while enhancing overall community resilience.

Theoretical Frame Work

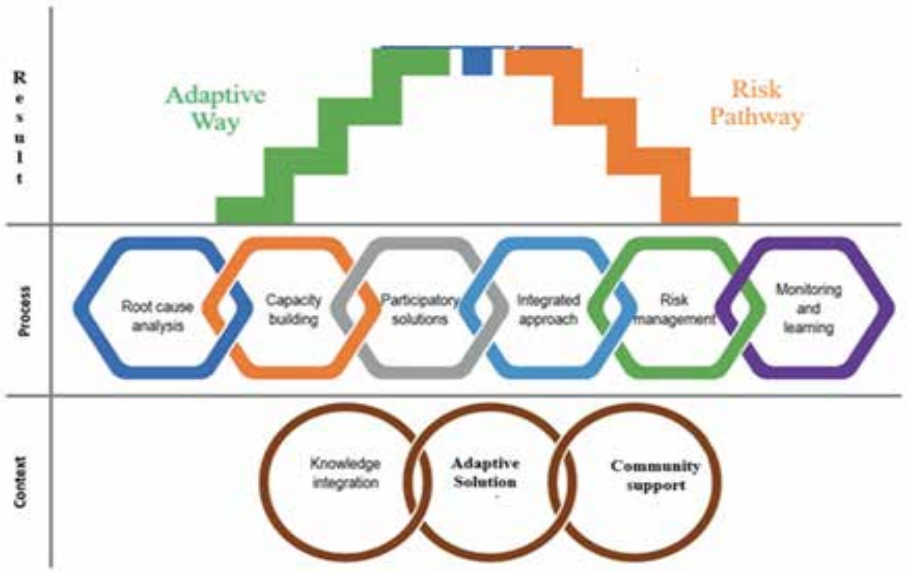
To build resilience in communities facing climate-induced disruptions, it is essential to integrate local, traditional, and scientific knowledge to craft effective adaptation strategies. This approach combines the lived experiences and coping mechanisms of community members with scientific insights, resulting in more comprehensive solutions to vulnerability. Adaptive strategies, such as sustainable farming practices and resource management, enable communities to not only survive but flourish in the face of environmental changes. Moreover, community support through social networks and green enterprises drives innovation, job creation, and long-term resilience by strengthening local economies and reducing climate vulnerability. This framework emphasizes the importance of knowledge integration, adaptive solutions, and community support in fostering resilience.

Building resilience is a dynamic and iterative process that involves several key steps: root cause analysis, capacity building, and participatory solutions. Root cause analysis allows communities to identify systemic barriers, such as over-reliance on unsustainable Agri-practices, thereby informing the development of targeted, context-specific interventions. Capacity building enhances communities' ability to absorb shocks, adapt effectively, and transform in response to climate challenges, ensuring greater preparedness for future disruptions. Participatory solutions and integrated approaches promote inclusivity, enabling communities to collaboratively design and implement adaptive strategies. Effective risk management, along with

continuous monitoring and evaluation, supports flexibility, progress assessment, and strategic refinement, ensuring long-term resilience in the face of evolving climate risks. This process ensures that resilience-building efforts are not only comprehensive but also adaptive and sustainable.

Figure 1

Theoretical Frame Work



Communities engaging in resilience-building efforts ultimately follow one of two pathways: an adaptive pathway or a risk pathway. The adaptive pathway represents a community's capacity to proactively respond to challenges, leveraging sustainable solutions and innovation to mitigate climate induced vulnerability and foster long-term resilience. In contrast, the risk pathway arises when communities fail to address underlying vulnerabilities or build necessary adaptive capacities, leading to persistent cycles of vulnerability and inadequate responses. This distinction underscores the importance of a balanced, integrated approach that supports both immediate adaptation and long-term transformation. Future research should prioritize strengthening local capacities, promoting inclusive strategies, and formulating policies that facilitate sustainable resilience, ensuring communities are equipped to navigate evolving climate challenges.

Objective and Methodology

This research has been focused on exploring how local adaptation practices build up to manage the livelihood in the changing context of climate in the specific area of Chitwan, Nepal. The ontological assumption of this research is that the livelihood of local people in the Madi community of Chitawan is influenced by climate change. It is concerned to the subjectivity and practices of the local people of the Madi community. The interpretive approach has been applied as the epistemology. The interpretive approach demands a qualitative research design. To gain this objective, a qualitative research approach has been applied. The qualitative research approach refers to case study, focus group discussions, observation etc methods

for the data collection (Adhikari, 2020a; Adhikari, 2020b; Adhikari et al., 2024d; Adhikari et al, 2024 c; Adhikari et al, 2024 a). The approach drew on the qualitative research design to capture the complex dynamics of climate change adaptation within the community. This research design allows for the exploration of the subjective experiences of community members and households while also offering measurable data on the success of these strategies. Fifteen cases have been selected based on a purposive sampling procedure. The research has investigated how house-led initiatives, rooted in local knowledge and priorities, contribute to the resilience of vulnerable populations in Madi (Chitwan) village.

Given the subjective nature of community responses to varying weather conditions, this study necessitates further qualitative research to gain a comprehensive understanding of local adaptation strategies. A participatory approach will be employed, engaging local stakeholders through focus group discussions (FGDs), semi-structured interviews, observation and participatory rural appraisal (PRA) methods. These methods have facilitated an in-depth exploration of community perceptions, indigenous knowledge, and socio-political factors shaping adaptation practices.

FGDs method has involved diverse community groups—such as farmers, women, youth, and elders—to explore their views on climate change impacts, adaptation measures, and empowerment, while also examining the role of local institutions, including community-based organizations (CBOs) and authorities, in adaptation planning. Semi-structured interviews with local government officials, CBO leaders, and key informants will provide insights into the challenges and effectiveness of current weather-related strategies. Additionally, PRA methods like participatory mapping, seasonal calendars, and vulnerability assessments will enable the community to identify climate-related risks, adaptive actions, and gaps in their coping capacities. Collectively, these qualitative approaches will yield context-specific insights into how local knowledge, community values, and power dynamics influence the adoption and effectiveness of climate adaptation practices.

The collected data was analyzed using a qualitative research approach. The content analysis method is a major method for analyzing qualitative data (Adhikari and Acharya, 2023; Adhikari, 2024a; Adhikari, 2024b; Adhikari et al., 2024b). Hence, the content analysis method has been used to analyze the gathered qualitative data approach to provide a comprehensive understanding of community-based adaptation strategies. This combination of data will offer a holistic view of the effectiveness of these strategies, identify key barriers like socio-political constraints, limited resources, and power imbalances, and explore how local adaptation practices intersect with broader climate change adaptation and disaster risk reduction frameworks.

Framed within an interpretive epistemology and a multiple reality ontology, the study recognizes the subjective nature of community members' experiences and acknowledges varying perspectives from different stakeholders. This qualitative research approach, combining empirical data and local narratives, offers a comprehensive, context-sensitive exploration of changing weather patterns, & climate change adaptation strategies in Madi village, Nepal, contributing valuable insights into the role of community-based adaptation in building resilience to climate change impacts

Results and Discussion

The study addressed the multifaceted impacts of climate change on the rural community of Madi village, Chitwan, where agricultural practices had long been the primary livelihood. As highlighted in an in-depth case study, key informant interviews (KIIs), and focus group discussions (FGDs), climate change had led to recurring droughts, erratic rainfall, and water scarcity, which drastically reduced crop yields, heightened food insecurity, and disrupted local water supplies. This situation forced many families to abandon farming, seeking alternative livelihoods through migration, both within urban centers and abroad, thus exacerbating economic instability and social fragmentation. Marginalized groups, already disadvantaged by limited access to land and caste-based discrimination, were disproportionately affected, making adaptation even more challenging for them. In response, the community emphasized the need for adaptive strategies, including water conservation techniques such as rainwater harvesting, groundwater recharge, and the adoption of eco-friendly agricultural practices to ensure long-term sustainability. Furthermore, the discussions underscored the importance of livelihood diversification as a crucial adaptive measure, though the shift to alternative forms of income, such as unskilled labor, often brought about economic instability. As climate change continued to disrupt traditional livelihoods, promoting resource management practices like forest restoration and sustainable agriculture offered potential for more resilient and sustainable solutions for the future. The findings highlighted several constraints faced by the Madi community due to changing local weather patterns, including:

Impact on Agriculture

The focus group discussions (FGDs) in Madi village, Chitwan, revealed the profound impact of climate change on local agriculture, which had been the primary livelihood for the community for generations. Participants, including case A: B:C, shared how recurring droughts and erratic rainfall patterns had drastically reduced crop yields, leading to severe food insecurity. Water scarcity, both for irrigation and drinking, exacerbated the situation, leaving many families unable to sustain their agricultural practices. This led to widespread migration, with families seeking alternative sources of income in urban areas or abroad. The migration, however, disrupted familial and community ties, leading to social fragmentation and perpetuating cycles of poverty. Furthermore, the encroachment of wild animals into farmlands and soil degradation compounded these challenges, making traditional farming methods increasingly ineffective.

The discussions also highlighted the vulnerability of marginalized groups, as pointed out by case A: B:C:D, who emphasized that climate change had intensified pre-existing social and economic inequities, particularly for those already burdened by limited access to land. The compounded effects of drought, heatwaves, and land degradation disproportionately affected these vulnerable groups, further restricting their ability to adapt and thrive. Participants stressed the need for adaptive strategies and resilient infrastructure to safeguard livelihoods and reduce vulnerabilities in rural communities. Additionally, they called for the promotion of eco-friendly agricultural practices, such as rainwater harvesting and groundwater recharge, as essential measures for mitigating the impacts of climate change on agriculture and ensuring long-term sustainability of local food systems.

Water Availability

During the focus group discussions (FGDs) in Madi village, Chitwan, participants highlighted the severe impact of changing climate patterns on water availability, which had become a critical issue for both agricultural and domestic needs. Many, including case A: B:C:D, discussed how recurring droughts and prolonged dry spells had drastically reduced the availability of water for drinking and irrigation. This scarcity had intensified food insecurity, as crops could no longer be reliably watered, forcing many families to abandon agriculture and consider migration to urban areas in search of better opportunities. This disruption of agricultural practices not only threatened the community's economic stability but also exacerbated social fragmentation, as families were often forced into labor migration, leading to the erosion of traditional community social structures and relationships.

In addition to the immediate strain on water resources, the FGDs also underscored the broader environmental impacts of water scarcity. Participants like case A: B:C:D pointed out that the depletion of local water sources had significantly worsened living conditions, particularly for marginalized groups who already faced challenges due to limited land access. These groups were disproportionately affected by water shortages, further deepening existing social inequities. Moreover, the discussions emphasized the urgent need for water conservation measures such as rainwater harvesting, groundwater recharge, and more sustainable agricultural practices to combat the ongoing water crisis. The participants stressed that these adaptive strategies were essential for maintaining community resilience in the face of climate change and safeguarding both water resources and livelihoods for the future.

Livelihood Diversification

The focus group discussions (FGDs) in Madi village, Chitwan, revealed that changing climate patterns had profoundly disrupted traditional livelihoods, especially those reliant on agriculture, forestry, and livestock. Many participants, including case A: B:C:D, emphasized that prolonged droughts and irregular rainfall had severely affected crop yields, leaving agricultural families struggling to maintain their income. The lack of water for irrigation and domestic use had forced many community members to abandon farming altogether. As a result, households increasingly turned to alternative forms of livelihood, such as unskilled labor, which led to greater economic instability and migration, particularly to urban areas. However, the shift to alternative livelihoods had not been without challenges, as it often involved low-paying, unstable jobs that did not provide the same level of security or community cohesion that traditional farming once did.

The discussions also highlighted the importance of livelihood diversification as a necessary adaptive strategy in the face of climate change. Participants, like case A:B:C:D, noted that while diversifying into non-agricultural activities such as construction or labor markets might provide temporary relief, it was not a sustainable solution for long-term community resilience. The compounded impacts of climate change, including livestock losses and the degradation of forests and water resources, had further strained the community's ability to diversify. Additionally, marginalized groups, already struggling with limited access to land and resources, faced even greater challenges in adapting to these changes. As case A: B:C:D suggested, local resource management practices, such as forest restoration and sustainable

agriculture, could offer more sustainable alternatives to diversify livelihoods and strengthen resilience in the face of a changing climate.

Crop Diversification

In response to the adverse impacts of climate change, particularly the increasing frequency of droughts and erratic rainfall patterns, the community in Madi village, Chitwan, began adopting crop diversification strategies to cope with the changing agricultural environment. During the focus group discussions, participants like case A: B:C:D highlighted the importance of shifting to drought-resistant and early maturing crop varieties. These crops not only offered resilience against erratic weather patterns but also helped ensure better yields during shorter, less predictable growing seasons. By diversifying crops, farmers could spread the risk of crop failure and mitigate the economic impacts of climatic variability, ensuring more reliable food production and income throughout the year. This approach became particularly crucial as traditional crops, which once thrived in the area, could no longer adapt to the changing weather conditions.

Additionally, the community recognized the necessity of integrating other climate-resilient practices alongside crop diversification. Case A: B:C:D's accounts of food insecurity and water scarcity emphasized the role of water management strategies in supporting agricultural adaptation. This included rainwater harvesting and better irrigation systems, which were critical for sustaining diversified crop systems during dry and changing weather periods. Furthermore, participants like Karuna BK noted the importance of combining agricultural adaptations with broader ecological restoration efforts, such as maintaining vegetation and promoting sustainable water use practices. Together, these community-based adaptation practices provided a multi-faceted approach to climate resilience, offering both immediate relief from the impacts of climate change and long-term solutions for ensuring the sustainability of livelihoods in the face of ongoing environmental challenges.

Water Management

In Madi village, Chitwan, local communities devised a range of adaptive water management strategies in response to the escalating challenges posed by recurrent droughts and unpredictable rainfall patterns, which significantly undermined agricultural productivity. Focus group discussions with community members, such as case A:B:C:D, highlighted the construction of small-scale water harvesting structures—such as ponds and reservoirs—as a pivotal intervention to mitigate water scarcity during dry spells. These structures functioned by capturing and storing rainfall during wetter periods, ensuring a continuous supply of water for both irrigation and potable purposes during droughts. According to case A:B:C:D, these water harvesting systems were essential for sustaining both domestic and agricultural water needs, thereby alleviating the growing pressure on already limited water resources. Such initiatives became fundamental to maintaining agricultural yields and supporting the livelihoods of farming families in the region, enhancing local resilience to climate change.

Moreover, the community engaged in the enhancement and modernization of irrigation systems, as noted by participants such as case A: B:C:D. Traditional irrigation methods had proven inadequate in the context of prolonged droughts and decreasing water availability. In response, the community adopted more water-efficient techniques, including drip irrigation,

to optimize water use for agricultural purposes. This shift toward precision irrigation ensured the more efficient distribution of water, conserving resources while sustaining crop production. Additionally, Soniya Gurung emphasized the importance of groundwater recharge efforts, particularly through ecological restoration activities such as tree planting in the Chure hills, which played a critical role in replenishing local water sources. Collectively, these water management practices—centered on efficiency, sustainability, and resource conservation—were integral to strengthening community resilience and securing water resources for future generations in the face of an increasingly uncertain climate.

Discussion

The findings from the Madi village focus group discussions aligned with the theoretical framework of economic resilience, as outlined by Briguglio et al. (2006). The community's efforts to adapt to climate-induced disruptions through water management strategies, livelihood diversification, and agricultural adaptation reflected the three core components of economic resilience: absorptive, adaptive, and transformative capacities. For instance, the construction of small-scale water harvesting structures, such as ponds and reservoirs, exemplified the community's absorptive capacity, enabling them to withstand the immediate shock of water scarcity during droughts. Similarly, adaptive capacity was evident in the adoption of water-efficient irrigation methods like drip irrigation and crop diversification, which allowed the community to adjust agricultural practices to changing climate conditions. The shift toward these practices indicated the community's ability to modify core activities to maintain food production and economic stability despite adverse environmental conditions. Furthermore, the emphasis on sustainable resource management, including forest restoration and groundwater recharge, illustrated the transformative capacity of the community, which not only sought to recover but also to innovate for long-term environmental and economic sustainability.

However, the findings also highlighted several challenges in achieving the full potential of these adaptive strategies, particularly in relation to marginalized groups. The vulnerability of these groups, compounded by caste-based discrimination and limited access to resources, reflected gaps in the absorptive and adaptive capacities of the community. While some households diversified their livelihoods by migrating for unskilled labor opportunities, this shift led to economic instability and weakened social cohesion, which directly affected the community's overall resilience. Briguglio's theory emphasized the importance of social capital and support mechanisms in enhancing resilience, yet the Madi community's experience revealed that migration and economic diversification into low-wage sectors did not necessarily foster long-term resilience. These challenges underscored the need for a more integrated approach to resilience-building, one that not only focused on economic and environmental adaptations but also strengthened social cohesion and reduced socio-economic inequalities. This gap called for further research and intervention to address the disparities faced by marginalized groups and ensure that adaptation strategies were inclusive and equitable, thus enhancing the overall resilience of the community.

Future research may focus on addressing the gaps related to the resilience of marginalized groups within the community, as highlighted in the findings. While Madi village made strides in enhancing absorptive, adaptive, and transformative capacities through various water

management and agricultural strategies, these efforts did not fully account for the socio-economic inequalities faced by marginalized groups, particularly those burdened by discrimination and limited access to resources. Future studies could explore how adaptation strategies could be tailored to inclusively address these disparities, ensuring that vulnerable groups were not left behind in resilience-building efforts. Additionally, there was a need for more in-depth analysis of the long-term impacts of livelihood diversification, especially in relation to migration for unskilled labor, which may have exacerbated economic instability and social fragmentation. Research should also investigate how social capital and community-based support mechanisms could be strengthened to promote cohesion and collective action, fostering a more holistic approach to resilience that integrated both environmental sustainability and social equity. These gaps pointed to the importance of developing adaptive strategies that were not only effective in environmental terms but also equitable and inclusive, ensuring sustainable community resilience across all segments of the population.

Conclusion

In The primary objective of this study was to explore the constraints faced by the Madi community in Chitwan district due to changing weather patterns and to evaluate the effectiveness of local adaptation strategies in mitigating these impacts. In conclusion, the community of Madi village demonstrated significant resilience in adapting to the increasing frequency and severity of climate extremes, largely through locally driven, community-based strategies. The findings aligned with the theoretical framework of economic resilience, emphasizing the community's ability to absorb, adapt, and transform in response to climate disruptions. Through practices such as water harvesting, adoption of efficient irrigation methods, crop diversification, and sustainable resource management, Madi villagers showcased their absorptive and adaptive capacities. These efforts allowed them to mitigate immediate shocks, adjust agricultural practices to shifting climatic conditions, and foster long-term sustainability in the face of uncertainty. However, the challenges faced by marginalized groups, particularly those affected by socio-economic inequities like socio-economic and natural resource-based discrimination, underscored the gaps in the community's resilience efforts. Economic diversification, while offering some relief, introduced instability and social support, highlighting the need for a more community based inclusive approach to adaptation that also strengthened social cohesion and addressed deep-rooted vulnerabilities.

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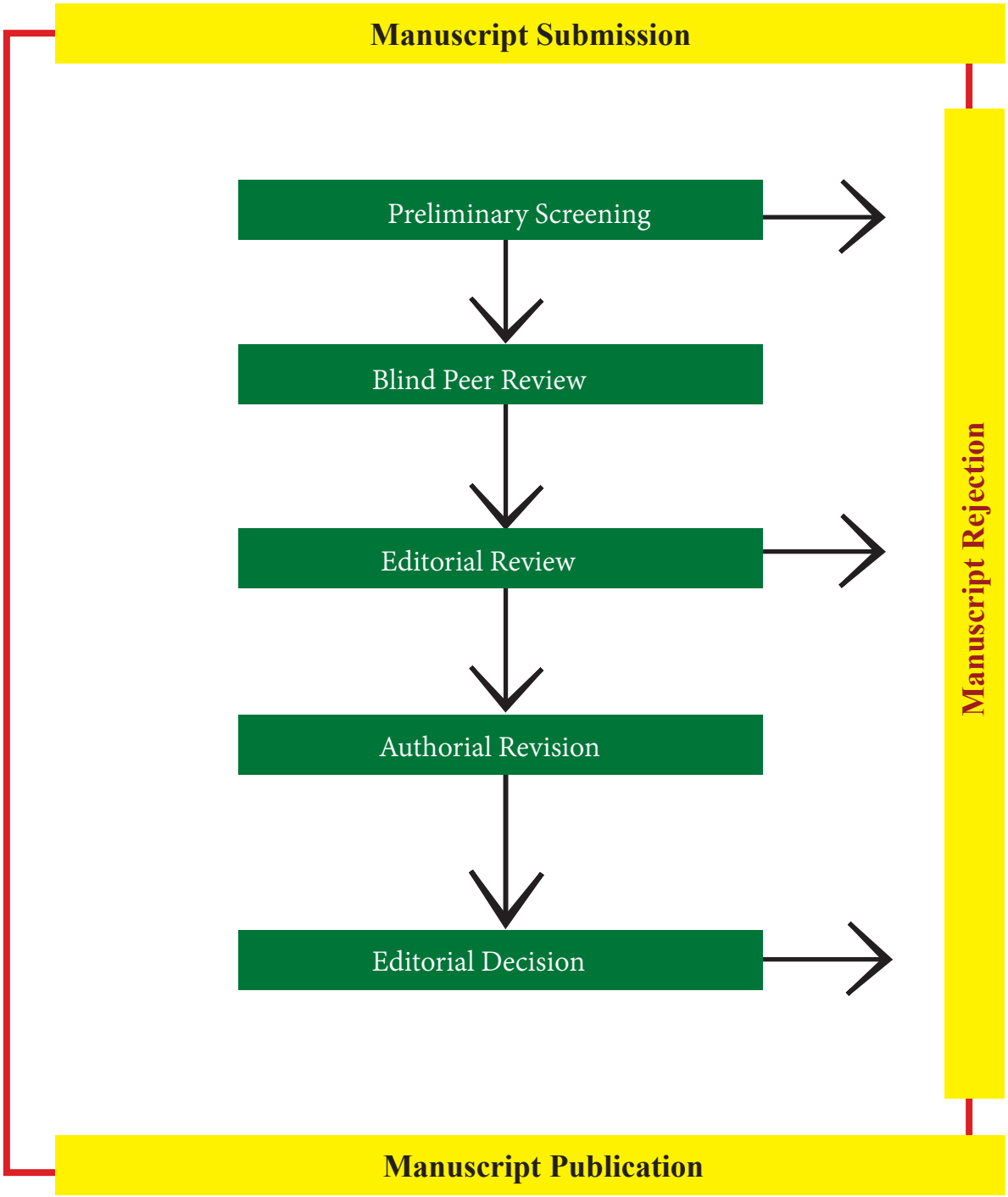

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