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EDITORIAL

Pravaha is a multidisciplinary research journal that has been published since 2038 B.S., to advance knowledge across diverse fields, including management, social sciences, humanities, economics, banking and finance, statistics, literature, sociology, information and technology, education, human resources, globalization, trade, marketing, accounting, and more. The journal serves as a dynamic platform interconnecting ideas and perspectives from various disciplines. It is a double-blind peer-reviewed journal in the field of management.

We take great pride in presenting the 31st volume of **Pravaha** to our esteemed readers and researchers. This edition aims to highlight some of the latest trends and emerging issues in modern management and social sciences. We believe that the research findings, conceptual insights, and thought-provoking discussions contributed by the authors will be highly beneficial to the teaching-learning process, as well as to scholars, practitioners, and professionals in their respective fields.

The editorial board explicitly disclaims any responsibility for the personal opinions and views expressed by the authors in the published papers. Finally, we extend our sincere gratitude to everyone who contributed to the publication of this journal, including the advisory board, peer reviewers, authors, and the Nepal Commerce Campus Administration. Moving forward, we remain committed to continuing our efforts in publishing future editions of the journal.

Editorial Board
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Decoding Market Valuation: Panel Regression Insights into Nepalese Commercial Banks

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Abstract

This paper investigates the key influences, namely the Dividend payout ratio (DPR), Price-to-Earnings Ratio (P/E ratio), Earnings Per Share (EPS), Interest Rate (IR), Book Value per Share (BVPS), Return on Assets (ROA) and Stock Return (SR) on commercial banks' Market Price per Share (MPPS). It consists the panel dataset of 10 of the 19 commercial banks listed in NEPSE. It uses the 10-years data covering from fiscal year 2013/14 to 2023/24.

The fixed effect Hausman test suggests that DPR, P/E ratio, EPS, BVPS and ROA have significant impact on MPS, and P/E ratio is found to have the most influential to explain the equity price of Nepalese banks. Whereas IR and SR exert no notable effect on the prices. The results simply indicate that the market price is highly shaped by profit measure variables such as earnings, dividends, and efficiency. Future research extends incorporating a broader dataset at the population level, by employing alternative methodological approaches, macroeconomic variables, and investor behavioural issues that could provide in-depth facts in price creation process in the emerging capital markets.

Keywords: *Market price per share, dividend payout ratio, price-to-earnings ratio, earnings per share, interest rate, book value per share, return on assets, and stock return.*

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Introduction

Equity prices in commercial banking sector have a multidimensional aspect, as they not only reflect the investors' confidence and financial soundness but also carry important consequences for economic growth and market stability. It signals the investors to assess the degree of risk and returns (Brealey, Myers & Allen, 2020), evaluate the company's performance and market trends by financial experts (Damodaran, 2012), and formulating financial and monetary policies by the concerned regulators (Beck & Levine, 2004; World Bank., 2022). Moreover, the banking sector prices are equally vital in ensuring the stability and promoting economic growth to achieve high quality life in the society, particularly in emerging economies (Levine, 1997).

Commercial banks are the fundamental pillars to maintain the financial stability and promoting economic expansion and overall development of a country (World Bank, 2022). In the context of Nepal, commercial banking sector has significant dominance in the country's capital market with more than 30% of the total market capitalization representing from this sector alone (SEBON, 2023). This research on key contributors to market price is important for understanding the overall market behavior and investors' sentiment.

Dividend payout ratio is argued as important indicator of value to shareholders since a higher ratio conveys

investor confidence and stability, and its often linked to increased stock prices (Gordon, 1962). The higher ratio of market price relative to its earnings, on other hand, signals higher future earnings growth that driving prices upward (Damodaran, 2012). The income generated in relation to each unit of share is used to assess the investor behavior and stock price movements (Brealey et al., 2020) and measures the firm's net worth positively when it appears a greater financial transparency and consistent earnings growth (Hongkong, 2017).

The interest rate is considered a common measure influencing market prices of the companies as higher lending rates affect profitability, risk complexion, and investor sentiment. Fama (1970) in efficient market hypothesis argues stock prices of commercial banks adjust instantly to interest rate movements. Higher lending interest rates are associated with increased net interest margin, enhancing overall profitability, and stock prices (Mishkin, 2021). However, excessively higher lending rates, on the other hand, cause to raise default risk and reduce loan supply, impacting negatively the market price (Bernanke & Blinder, 1992). Nepal Rastra Bank (2023) reports the banks with higher book value per share are perceived as more resilient to economic shocks, driving market price positively. Despite the fact, the market inefficiencies and investors' key decisions especially in the developing economies like Nepal can sometimes lead to inconsistence relations of market price with book value (Dahal et al., 2024). The economies with relatively less efficient market and higher information asymmetry, investors use to have a profitability as a benchmark to measure the overall financial health of the companies, and therefore creating a market value. Brealey et al. (2020) acclaim the increased profitability enhance the investors' confidence, forcing higher stock prices.

This study primarily focusses to extend the existing literature from the findings obtained with the examination of the forces determining the equity prices of commercial banks, and can benefits stakeholders: investors, regulators, and other market participants. Despite the aforementioned parameters that are widely used globally to examine the performance of banking sectors; studies in the context of Nepal remains limited and outcomes vary with market dynamics that changing over time and across datasets. This study seeks to examine the issues using the most recent data set of selected listed banks in the country.

Literature Review

Investors, decision-makers, and scholars must comprehend the elements that influence commercial bank market pricing, especially in developing nations like Nepal. As previously discussed such as by Goldsmith (1969), McKinnon (1973), Pagano (1993), Shaw (1973); expansion in financial industry is essential to promoting economic expansion. While their work established that financial intermediation can enhance growth, it did not probe into how specific financial indicators directly affect the market prices of banks. According to Fama (1970) stock markets are thought to effectively represent all available information in their prices, according to the efficient market hypothesis.

Dahal (2024) and Tse (2002) discovered that businesses with a high earnings yield implies a poor ratio between price and earnings produced larger yield, highlighting the importance of stock price based on earnings valuation. Almumani (2014) analysed Amman's listed firms and found that the market P/E ratio, BVPS, and DPR are important factors that influence stock performance. Similarly, Ali and Chowdhury (2010) found that interest rates, dividends, P/E ratios, EPS, and other monetary aspects had a major influence on stock prices of the companies within industries when the Jordan equity market was examined. Nuraeni, Nuzula and Damayanti (2024) documented the effect of book value and return on stock on the company's stock prices, Awwad and Salem (2019) stress on the various financial measures that influencing on the stock prices around the world. Al-Dwiry, Al-Eitan and Amira (2022) highlight the profitability measured by return on assets as an important component in boosting stock prices of companies.

Earlier studies have documented the nexus between the stock price and several financial indicators. For instance, the market price has revealed a high degree of correlations with price-to-earnings ratio (Bhattarai, 2020), dividend payout ratio (Dahal & Puri, 2021), per unit earnings (Kumar, 2017), and accounting value of stock (Ahmadi & Bouri, 2018). The high interest rate, however, has found to influence negatively to the market values (Ellingsen & Söderström, 2001) that indicating a complex dynamic of financial variables to explain prices (Lobo, 2000). The

findings suggest the significance of financial indicators in order to understand the stock price creation process over the markets, including Nepal's banking sector. Nepal's financial market is characterized with typical conditions under the influenced of both domestic and global market trends (Kharel, 2024). Moreover, authorities have argued the importance of similar studies and findings to make the informed decisions to the investors (Olanrewaju et al., 2024; Thomas et al., 2007), the analysts (Hinze & Sump, 2019), and policymakers (Goyal & Kumar, 2021).

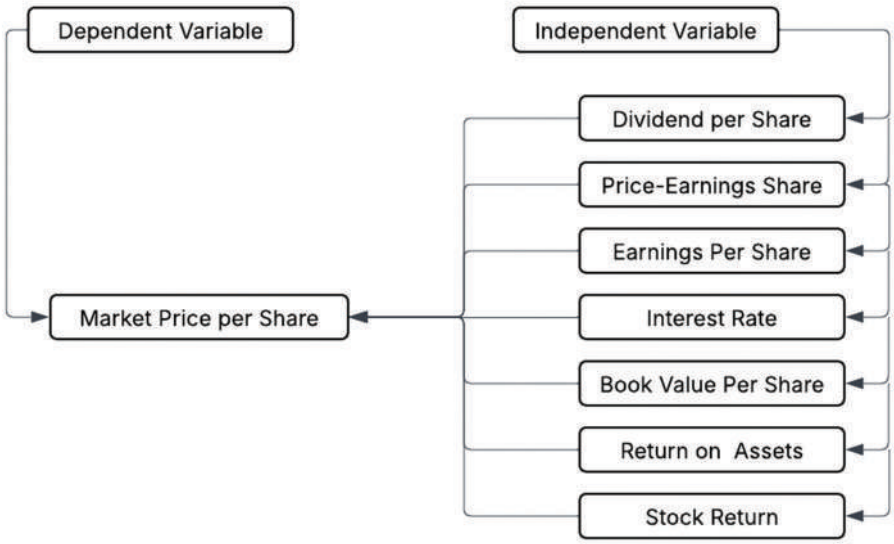

Figure 1: Conceptual Framework

Grounded on the theoretical and empirical review on the similar studies, this study considers the seven essential determinants of market price: dividend payout ratio, price-earnings ratio, income per unit, interest rate, accounting/book value per share, rate of return on assets, and stock return with respect to commercial banks operating in Nepal. As these indicators are supposed to capture profitability, investor perception, and financial performance collectively. The study aims to bridge theoretical perspective with empirical analysis by assessing how these indicators influence the equity price, the dependent variables. Drawing upon the reviewed literature and considering the Nepal's unique regulatory framework, emerging market structure, and limited prior evidence, the conceptual framework (Figure (1)) is developed to link key financial indicators with market price dynamics in Nepalese banking sector.

Research Methodology

Research Design

This study follows a quantitative research framework to assess the nexus of selected financial indicators in relation to the equity price of banking institutions functioning within Nepal; thereby providing empirical evidence regarding the price determination process of banks in Nepal. Particularly, it includes descriptive statistics, correlational analysis, and causal-effect approaches. Descriptive statistics summarize and present the general characteristics of the data; the correlational analysis to assess how strongly and in which direction two variables move each other. The cross-sectional time series regression model is utilized to analyse the causal-effect of the independent variables: dividend payout ratio, market price to earnings ratio, earnings per unit share, interest rate, balance sheet/book value per share, net profit to total assets and stock return on the predicted variable, the market price. The results of fixed effect The Hausman test confirmed the fixed effect (FE) model suitable for the estimation of relationship.

Data Source and Sample

The research applies the stratified sampling approach to choose ten commercial banks out of nineteen commercial

banks listed at NEPSE. They include two commercial banks with government investment involvement namely: the Agriculture Development Bank (ADBL) and Nepal Bank Limited (NBL); three jointly owned banks with foreign investments, and include: NABIL Bank Limited (NABIL), Everest Bank Limited (EBL), and Standard Chartered Bank Nepal Limited (SCB). The five commercial banks out of eleven private-public ownership banks. The included banks are: Global IME Bank Limited (GIME), Nepal Investment Mega Bank Limited (NIMB), Sanima Bank Limited (SANIMA), Prime Commercial Bank Limited (PCBL), and Kumari Bank Limited (KBL). It covers the period ranging from fiscal year 2013/2014 to 2023/2024. All the data that are specific to the sample banks have been taken directly from their respective official websites.

Variable Specifications

Table (1) reports a summary of explained variables and influencing variables, along with their tentative association, with * and ** indicating a directive and inverse associations, respectively. The publicly traded or market price (MPS) is the explained variable and it is obtained directly from the NEPSE website. One of the independent variables included in the model is dividend payout ratio (DPR), obtained dividing total cash and stock dividend paid to the shareholders by particular commercial banks, and the hypothesized to have a direct relationship with MPS (H_{11}*). The P/E Ratio represents the ratio of equity market price per unit with net earnings per unit, and expected to have positive impact on MPS as indicated by H_{12}* in the given Table 1. The EPS is obtained dividing total earnings available to the stockholders by total units of shares available in the market, and predicted to be a favourable impact on MPS (H_{13}*). The lending interest rate is directly sourced from Nepal Rastra Bank and anticipated to have a negative association with the MPS because of the investors' alternative choice between the interest income and stock market gains (H_{14}**). Book value per share (BVPS) represents the ratio total net worth to total units of shares available of the commercial banks, and Gurung and Dahal, et al. (2023) argued that its higher value is associated with higher MPS (H_{15}*). A very common profitability ratio, the ROA is simply the ratio of total net income to total assets employed by the banks, and it is anticipated to have direct impact on MPS (H_{16}*). Finally, the SR that is computed dividing capital gains and dividend received by the original investment, has expected to have positive influence on the MPS (H_{17}).

Table 1: Description of Variables

Variables	Symbol	Proxy	Hypothesis
Targeted Variable			
Market Price Per Share	MPS	Provided by NEPSE	
Explanatory Variables			
Dividend Payout Ratio	DPR	Cash and Stock Dividend Paid by CBs	H_{11}*
Price-Earnings Ratio	P/E Ratio	Unit Market Price /Unit Earnings	H_{12}*
Earnings Per Share	EPS	Net Income/Total Units of Shares Available in the Market	H_{13}*
Interest Rate	IR	Lending Rate Provided by NRB	H_{14}**
Book Value Per Share	BVPS	Total Equity/ Number of Shares	H_{15}*
Return on Assets	ROA	Net Income/Total Assets	H_{16}*
Stock Return	SR	(Capital Gain and Dividend Amount)/ Initial Investment	H_{17}*

Data stationary

Equation 1 examines the Augmented Dickey-Fuller (ADF) test of data stationary, that the time series is tested against previous period/lagged series in order to appropriately address autocorrelation suggested by Dickey and Fuller (1979).

$$\Delta y_t = \alpha + \beta y_{t-1} + \gamma \Delta y_{t-1} + \delta_1 \Delta y_{t-2} + \cdots + \delta_p \Delta y_{t-p} + \epsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Δy_t denotes the difference between the current time series, y_t and lagged period series, y_{t-1}. The Δyt-1, Δy_{t-2}, and so on represent the time series lagged differences, and $\alpha,\beta,\gamma,\delta 1,\ldots,\delta p$ are their respective coefficients. p indicates how many lagged is used in the model. The null hypothesis of the equation is non-stationarity time series,

suggesting series having a unit root against the stationary time series as alternative hypothesis. The sample size and significance level chosen determine the test's crucial values. The acceptance of alterative hypothesis indicates the time series with stationery and series is free from unit root (Kwiatkowski et al., 1992).

Table 2: Summary of unit root test analysis

Variables	ADF t-statistic	P-Value	Order of Integration
MPS	-3.294536	0.0178*	I (1)
DPR	-10.984910	0.0000*	I (1)
PE RATIO	-8.622912	0.0000*	I (1)
EPS	-12.060460	0.0000*	I (1)
IR	-3.141927	0.0268*	I (1)
BVPS	-10.509710	0.0000*	I (1)
ROA	-7.390563	0.0000*	I (1)
SR	-12.655250	0.0001*	I (1)
Critical values for 1%, 5% and 10% are -3.495715, -2.890051 and -2.58251, respectively.			

** indicates significance at a 5 percent level*

Table 2 displays results of a unit root, the ADF t-statistic values are key indicators in this test; higher negative values suggest greater chance of being the series a unit root problem (a sign of non-stationarity). Alternatively, smaller p-value suggests for a stationary time series supporting to alternative hypothesis. Results indicated that the time series are stationary at first difference, first order of integration of I(1).

Models Specification for Hausman Test

The equation (2) presents the general multiple linear regression models proposed to assess the relationship between the targeted variable MPS and other explanatory variables.

$$MPS = \beta_1 DPR + \beta_2 P/R\ Ratio + \beta_3 EPS + \beta_4 IR + \beta_5 BVPS + \beta_6 ROA + \beta_7 SR + \varepsilon \quad \text{.....(2)}$$

As the dataset combines the of cross-sectional and time-series, the Hausman test is chosen to optimize the model between fixed effects (FE) and random effects (RE) models, and reported in Table 3. The test demonstrates that the FE model is the optimal choice as the null hypothesis is not supported for both explained and explanatory variables with a p-value of 0.000 (Borenstein et al., 2010). Hausman test reported in Table 5 indicates the $\chi 2$ value of 29.116 with its associated probability of 0.0001. The probability value appearing below 0.05, suggesting against the RE model. This simply meaning that the unobserved specific effects are correlated with the explanatory variables, and FE model is the best to estimate the influence of variables of interest on the equity price.

Table 3: Hausman test summary

Test Summary		$\chi 2$- Statistic	$\chi 2$- d.f.	Prob.
Cross-section random		29.116	7	0.0001*
Variable	Fixed	Random	Var(Diff.)	Prob.
DPR	4.06665	8.56979	1.54253	0.0003
PE RATIO	37.4641	33.7492	2.69192	0.0236
EPS	7.91993	7.37492	0.18997	0.2111
IR	8.23343	-17.56	41.4151	0.0001
BVPS	3.39682	1.76382	0.21495	0.0004
ROA	264.959	164.37	549.849	0.0000
SR	81.1257	68.5694	160.197	0.3212

* indicates 1 percent level of significant

The FE model for a connection between the unobserved variable and any of the explanatory variables (αi, Xi) ≠ 0), as suggested by Hausman (1978), is specified as follows:

$$MPS_{it} = \gamma_0 + \gamma_1 DPR_{it} + \gamma_2 PE\ RATIO_{it} + \gamma_3 EPS_{it} + \gamma_4 IR_{it} + \gamma_5 BVPS_{it} + \gamma_6 ROA_{it} + \gamma_7 SR_{it} + \alpha_i + \varepsilon_i \quad \ldots(3)$$

While averaging in Equation (3) over a period, Equation (4) is produced.

$$\overline{MPSi} = \Upsilon_0 + \gamma_1 \overline{DPRi} + \gamma_2 \overline{PE\ RATIOi} + + \gamma_3 \overline{EPSi} + \gamma_4 \overline{IRi} + \gamma_5 \overline{BVPSi} + \gamma_6\ \overline{ROAi} + \gamma_7 \overline{SRi} + \alpha_i + \overline{\mathcal{E}i} \quad \ldots(4)$$

To eliminate the impact of the unobserved effect α_i before estimating, subtract Equation (4) from Equation (3). Subtracting Equation (4) from Equation (3), it eliminates the effect of unobserved factor α

$$(MPS_{it} - \overline{MPSi}) = \gamma_1 (DPR_{it} - \overline{DPRi}) + \gamma_2 (PE\ RATIO_{it} - \overline{PE\ RATIOi}) + \gamma_3 (EPS_{it} - \overline{EPSi}) + \gamma_4 (IR_{it} - \overline{IRi}) + \gamma_5 (BVPS_{it} - \overline{BVPSi}) + + \gamma_6(ROAit - \overline{ROAi}) + \gamma 7(SRit - \overline{SRi}) + (\varepsilon_{it} - \overline{\mathcal{E}i}) \quad \ldots(5)$$

The Equation (6) presents the final FE model used to estimate the relationship among the variables.

$$\Delta MPS_{it} = \gamma_1 \Delta DPR_{it} + \gamma_2 \Delta PE\ RATIO_{it} + \gamma_3 \Delta EPS_{it} + \gamma_4 \Delta IR_{it} + \gamma_5 \Delta BVPS_{it} + \gamma_6 \Delta ROA_{it} + \gamma_7 \Delta SR_{it} + \mathcal{E}_{it} \quad \ldots(6)$$

In the given model (6), the change in MPS (ΔMPS_{it}) is examined in light of how the independent variables have changed (ΔDPR_{it}, $\Delta PE\ RATIO_{it}$, etc.), isolating the impact of the observed variables on the MPS while controlling for unobserved, time-invariant factors.

Results

Descriptive statistics

Table 4 is the results associated to the descriptive statistics for MPS, DPR, PE Ratio, EPS, IR, BVPS, ROA, and SR. The MPS exhibits a strongly skewed distribution, indicating the prices among the sample banks have considerable volatility. Whereas, the DPR distribution shows a positive skew and also exhibits a considerable variability in dividend distribution between the commercial banks in Nepal. The positive skewness of the price multiplier, while combining with its large difference and greater standard deviation indicating that there is a considerable valuation of stocks of the banks, with a few banks valued their stocks moving the mean above the median.

Table 4: Descriptive Statistics

Variables	Observations	Mean	Median	Maximum	Minimum	Std. Dev.
MPS	110	629.79	433.50	3600.00	171.00	635.08
DPR	110	20.92	17.30	105.26	0.00	15.42
PE RATIO	110	21.07	17.64	78.33	0.86	11.55
EPS	110	30.28	23.93	198.53	5.30	22.85
IR	110	10.61	10.61	14.42	6.80	1.82
BVPS	110	185.78	162.06	370.84	59.26	62.36
ROA	110	1.62	1.59	3.12	0.47	0.55
SR	110	0.14	-0.03	2.64	-0.66	0.58

The distribution of EPS is positively skewed, with the mean value exceeding the median value. The wide range of EPS with its larger value of standard deviation indicates the significant variability in earnings across the sampled banks. The interest rates exhibit a same value of mean and median, indicating the symmetric distribution in

interest rates among banks. Moreover, the relatively its low standard deviation and lower range suggest the fairly stable level of interest rates across the sample period. The BVPS is positively skewed and its mean value exceeds over the median. The wide range of values supported by the substantial standard deviation indicates the considerable variability in the accounting value of the banks. The ROA distribution is relatively symmetric, as its mean value is closer to the median. Relatively the moderate range between the maximum and minimum value with low standard deviation shows the asset returns have modest variability. The stock returns distribution shows a slight positive skew with moderate level of standard deviation. The wide range in the returns, however, indicates the considerable variability in the equity returns of the company.

In sum up, the descriptive statistics provide notable differences in the distributions among the sample banks' key financial indicators. The ROA and interest rates exhibit relatively symmetric distribution, whereas other variables show positively skewed, indicating the presence of outliers in the series.

Correlation Coefficients

Table 5 presents the output of correlation between the unit equity price and other key variables of the sampled banks as in specified in models.

MPS and PE Ratio exhibits a strong positive correlation with its observed value of 0.733 and significant at 1% level. This shows the dividend payout ratio has higher association with the market price, and it is followed by the relationship with DPR (i.e., 0.712). The market price has moderate level of positive relationship with the EPS and BVPS, however the relationship is not as strong as that experienced for DPR and PE Ratio. While the ROA (0.287, significance at 1%) and SR (0,218, significance at 5%), both show the positive relations with the MPS, however, their relatively low values indicate the modest associations with MPS. In contrast, the interest rates have significant negative correlation, suggesting decline equity price and rising interest rates. The overall results highlight the impact variations between the independent variables and market price of commercial banks that providing perspectives for further analysis.

Table 5: Correlation coefficients

Correlation Probability	MPS	DPR	PE RATIO	EPS	IR	BVPS	ROA	SR
MPS	1 0.0000*							
DPR	0.712 0.0000*	1						
PE RATIO	0.7328 0.0000*	0.4139 0.0000*	1					
EPS	0.4306 0.0000*	0.3346 0.0004*	-0.0445 0.6442	1				
IR	-0.493 0.0000*	-0.307 0.0011*	-0.5851 0.0000*	-0.0324 0.7369	1			
BVPS	0.4993 0.0000*	0.4721 0.0000*	0.1521 0.1127	0.3309 0.0004*	-0.1038 0.2806	1		
ROA	0.2865 0.0024*	0.4198 0.0000*	-0.1684 0.0787**	0.4138 0.0000*	0.0682 0.4791	0.3126 0.0009*	1	
SR	0.2175 0.0225*	0.068 0.4801	0.2027 0.0337*	0.0834 0.3861	-0.0443 0.6459	-0.0462 0.632	-0.0024 0.9805	1

** indicates 1 percent level of significant, ** indicates 5 percent level of significant*

Hausman Test and FE Model Results

Table 6 reports the results after employing FE model, after the confirmation from Hausman Text. Particularly,

it shows the change in market price per share that resulting from every unit change in key financial indicators considered in the study.

The intercept value does not represent the starting value of MPS in the absence of independent variables; rather, captures the average of all unobserved, time-invariant bank-specific effects that influence MPS but are not directly included in the model. This serves as a baseline reflecting these latent characteristics rather than an initial value of MPS. Moreover, the Hausman test result reported strongly supports the use of the FE against the RE model, validating the interpretation. The influence of DPR on MPS is statistically significantly positive at the one percent level as it reports the coefficients of 4.067 and a probability of 0.0089. With a t-statistic of 12.628 and a probability of 0.0000, the PE Ratio's massive positive coefficient of 37.464 indicates a large and substantial influence on MPS. EPS and MPS also exhibits a significant positive correlation at the 1 percent level (coefficient of 7.920). The high probability of 0.5873 and the t-statistic of 0.545 indicate that the IR coefficient of 8.233 is not statistically significant.

Table 6: Fixed effect model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1643.571	253.847	-6.475	0.0000*
DPR	4.067	2.210	1.840	0.0089*
PE RATIO	37.464	2.967	12.628	0.0000*
EPS	7.920	1.097	7.221	0.0000*
IR	8.233	15.115	0.545	0.5873
BVPS	3.397	0.596	5.697	0.0000*
ROA	264.959	51.407	5.154	0.0000*
SR	81.126	37.824	2.145	0.0346**
R-squared	0.9082	Adjusted R-squared	0.8924	
F-statistic	57.5070	S.E. of regression	208.3110	
Prob(F-statistic)	0.0000	Durbin-Watson stat	1.9138	
ΔMPS= -1643.571 + 4.067ΔDPR + 37.464ΔPE RATIO + 7.920ΔEPS + 8.233ΔIR + 3.397ΔBVPS + 264.959ΔROA + 81.126ΔSR + €it				

** and ** are significant at significance levels of 1% and 5%, respectively.*

This implies that bank IR reveals no significant impact on MPS in the model. The BVPS also revealed a positive relationship with MPS. ROA significantly increases MPS with a low likelihood and a very high coefficient of 264.959. SR appears to have a positive but less clear impact on MPS than other components, as indicated by its coefficient.

In overall, the FE model suggests the DPR, PE Ratio, EPS, BVPS, and ROA have significant influenced on market price and SR exhibits relatively lower predictive power to explain the market price variation. The interest rates, however, do not show the relationship with market price. The model explains approximately 89.24% of the variations in MPS, implying a strong overall fitness. F-statistic (57.5057, 0.000) is significant and it further confirms that the set of key financial indicators collectively has influence on the equity price in Nepalese banking sector, validating the overall model's explanatory power. Finally, the Durbin-Watson statistics of 1.914 further suggest the free from any autocorrelation in the residuals of dataset used.

Results Discussion

The results indicate a significant relation of market price with DPR, PE Ratio, EPS, BVPS, ROA and SR; whereas the interest rates show no significant relationship with the stock market price of commercial banking institutions in Nepal. The positive association of DPR with MPS supports the H_{11}* of this study, and this linkage is grounded in both theory and investors' reactions. Essentially, the companies paying with higher dividends often signal as strong profit situation and resiliency power of the company against financial adversity, leading to higher investors'

confidence towards company performance that results higher prices with increased demand. The finding is consistent with (Al-Twaijry, 2007; Yanuarti & Dewi, 2019), among others, who claimed the dividends as a major factor affecting the share prices in all the industries. The association between PE Ratio and MPS, supporting the hypothesis H_{12}*, arises from the fundamental relationship between them as a high PE Ratio is usually perceived the investors with strong future earnings growth of particular company, and are eager to pay additional price for increased earnings. This is seen the common behaviour of the investors in Nepal; whey they place a higher value on the banks with higher perceived future earnings. The similar conclusions are supported by the earlier empirical studies carried out by the Kumar (2017), Bhattarai (2020), and Almumani (2014).

The notable relation of EPS on MPS, on the other hand, supports H_{13}*. Higher EPS causes to increase the MPS; theoretically it is argued that the increased EPS signals strong profitability that supports to push the prices up from the amplified investors' demand resulting from built up confidence. The earlier study by Gurung et al. (2023) also concluded that the EPS is one of key fundamental variables to explain the stock prices in the context of Nepalese companies. A high BVPS indicates the companies with strong asset base and financial position, and its positive relationship with the MPS is obvious even in the context of banking sectors of Nepal. This simply increase in investors' overall confidence and influences in the price creation process positively. The result supports H_{15}* hypothesis that stating a positive linkage between them. The finding aligns with the previous studies that argue the investors should consider the accounting value while judging companies' intrinsic value (Ahmadi & Bouri, 2018; Dahal et al., 2025; Nuraeni et al., 2024; Purnamasari, 2015).

The positive relationship between profitability, measured by ROA, with MPS (hypothesis H_{16}*) is similar to the findings supported by Al-Dwiry, Al-Eitan and Amira, (2022). They concluded that profitability demonstrates the company's effectiveness of utilizing its resources to produce revenue, and the asset efficiency is directly linked to stock price determination, particularly in emerging markets. The stock return has revealed a moderately related to the MPS, this simply imply that the companies past performance influences on current market prices. This finding is very much similar with the conclusion made by Banz (1981), who noted that stock returns are important factor to explain the market price, but at a lesser extent, especially in the equity market of developing nation. The interest rate in the study does not support H_{14}** hypothesis, and the result is not significant that implying the bank interest rates, at least in the context of Nepalese banks, do not explain the market price. The result, however, is contradictory with the prevailing theory and investor behaviour. The theory suggests that inclined interest rates make the stock market investment less attractive, that results stock prices down with decreased stock investment demand. One of the facts behind this result is the bank interest rates in Nepal often guided by the monetary policy in Nepal, that observed relatively stable over period even over the periods the stock prices moving ups and downs, largely influenced by public sentiments driven with other external forces (Gurung, 2020).

Conclusions

This study examined the dynamics of market prices in relation to key financial indicators, namely: the dividend payout ratio (DPR), price-earnings ratio (PE Ratio), earnings per share (EPS), interest rate (IR), book value per share (BVPS), return on assets (ROA), and the stock return (SR) within the context of commercial banking institutions in Nepal. The results revealed the market prices associated positively with the DPR, PE Ratio, EPS, BVPS, ROA and SR. This simply indicates that the bank specific components such as profitability, asset base, and investors' returns have important role in creating stock prices in the banking sector of Nepal. Though the interest rates are theoretically expected to influence the stock price negatively, the results show an insignificant relationship. It implies that the stock prices formation may be further driven from other macroeconomic forces, limiting the influence of interest rate in the study.

These results support the underlying theoretical premise that company-specific performance indicators play an important role to shape investor sentiment in stock price formation process. Notably, the results suggest to improve the company performance focussing on earnings generation, asset efficiency and dividend distribution policies to enhance the investors' confidence, that exerts direct impact on banks' equity price. The policymakers and regulators require to enhance transparency and strengthen sound governance to maintain the overall financial

stability to foster confidence among market participants. Further research could be carried with an extended dataset at the population level, by employing alternative methodological approaches. Moreover, inclusion of macroeconomic variables and investor behavioural issues can provide a further understanding of the dynamics of equity prices in emerging capital markets.

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Do Demographic Factors affect Glass Ceiling Perception of Women in Bank and Financial Institutions (BFIs) of Nepal?

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Abstract

In this competitive business world, still women perceive the continuation of the glass ceiling. Some demographic variables of women also seemed to influence their perception of the glass ceiling (GC). Therefore, the study examined how demographic characteristics impact women's perceptions of the GC in Nepalese banks and financial institutions (BFIs). The population of the study consisted of women holding positions from supervisor to senior manager in BFIs. BFIs were divided into three strata such as commercial banks, development banks, and finance companies. Information from 403 women was collected using purposive sampling. A descriptive cum analytical research design was used, using statistical tests like frequency, mean, and One-Way ANOVA, and an independent sample t-test. The outcome demonstrated that, except for education, demographic characteristics (marital status, age, position, income, women with children, and organization types) affect how women perceive the GC. The GC perception of women in financial institutions differed on average; however, there was no difference in between financial institutions, according to post hoc analysis. This study will assist organizations in understanding how women's perceptions of the GC are influenced by demographic considerations. The study's limitation is that it only looks at the perception of the GC in the organizational context.

Keywords: *Banking sector, demographic factors, glass ceiling, perception, women.*

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Introduction

According to Cotter et al. (2001), the GC is primarily to blame for women's progression in the organization at the top rather than at the bottom of the hierarchy in organizations. Still (2006) mentioned that despite the major legal rules and societal progress in the area of equity over the past 30 years, women have not significantly increased in Australia's leadership roles. Weyer (2007) stated that gender discrimination in the place of work is related to the lack of females in leadership roles. Moreover, it refers to the fact that females can hold high-ranking positions in the corporate field, but they will be stopped at a certain level due to barriers not visible to anyone. Similarly,

being women, they are prevented from ascending to higher positions (Morrison et al., 1987). Furthermore, women in organizations must go through many barriers due to discrimination, rejection of female leadership, and issues related to leadership style (Eagly & Carli, 2007). The overall trend showed that women's employment engagement in both public and commercial sectors has greatly expanded over the past few decades. However, the majority of the increase was seen at the entry-level, whereas the proportion of women continued to progress up the career ladder at a comparatively lower rate (Afza & Newaz, 2008; Shrestha et al., 2023). Given that gender balance is achieved at lower levels of the management ladder more quickly than at higher levels. Fain (2011) found that women ascend into upper-level corporate employment at a decreasing rate. Unconscious gender biases are highly prevalent in organizations today. Due to ingrained gender prejudices in the culture, women frequently experience challenges in receiving credit for their efforts, receiving compensation that is below what they deserve, and being promoted to critical leadership and C-suite positions before their male counterparts. In a similar vein, they battle more to be heard (Heath et al., 2019). Forty-five percent of women in India said that they get unfair treatment because they are women (Hewlett & Rashid, 2010).

According to the patriarchal social structure associated with Nepalese society, the study showed that it is challenging for women to achieve equivalent likelihood for headship roles in academic circles due to socially constructed gender role standards (Dhakal, 2022). Corporate and social factors are responsible for creating barriers to women's career advancement in the public sector of Nepal (Mahat, 2022). Socio-demographic variables are also responsible for affecting how women perceive the level of the GC (Çizel & Çizel, 2014). Although there have been numerous studies on the effect of demographic factors on the perception of the GC for women in international organizations, there have been relatively few studies on this specific topic in the Nepalese context. To fill this research gap, the study sought to examine the effects of demographic factors on the perception of the GC for women in Nepalese BFIs. Organizations can better serve their female workforce by having a better considerate of the demographics of women. It will contribute to the organization's increased productivity.

Review of Literature

Historical Background of the Glass Ceiling

Marilyn Loden (1987) was known for being the first individual to coin the term GC and giving a speech on the GC topic. According to Marilyn, the GC is a hurdle that is invisible that act as a barrier for women from progressing to a upper level in organizations (Pelican Bay Post, 2011). Wall Street Journal (1978) derived the term GC from the article of Hymowitz and Schellhardt (1986), and they highlighted the GC in a way that is neither found in the manual of the corporate house nor brought as an agenda to be discussed in a meeting in a business house. They further added that GC is a factor that is not visible to anyone, not spoken publicly, and that keeps leadership positions at the executive level in the hands of men.

Insch et al. (2008) stated that the origin of the term GC was the United States of America (USA), and the concept of the GC originated in the USA formed GC Commission (GCC) and became element of the US civil rights act 1991 to conduct a study aiming to provide suggestions for the US congress for getting a solution for removing artificial barriers that blocked women from reaching to the high-rank position of management level in the corporate house of America, It was realized that women could get promoted to a certain level but not above and were compelled to remain in middle-level management because of the presence of a GC. The GCC identified that organizations used to hire women into feminized positions in the organization, mostly in the human resource department rather than executive positions in market and manufacture line management. Meyerson and Fletcher (2001) described the GC as the underrepresentation of women in top-ranking posts or gender inequity within the organizational arena. They also talk about a systematic disadvantage for women that prevents them from advancing to a higher position, regardless of their ability.

Organizational Climate Causing the Glass Ceiling Perception

According to Ohlott et al. (1994), women in organizations felt that they needed to continuously fight for their recognition on the job. Knuston and Schmidgall (1999) claimed that women get unsupportive and discouraging

work environments. Women must follow a style according to men's comfort. Women are barred from the "old boys' network" and an unsupportive corporate climate. So, these are found to be important barriers to their career development. Much literature showed that women are perceived negatively regarding their level of commitment, capacity, level of participation, and degree of contribution (Jackson, 2001; Mott, 1998). According to Buttigieg and Walsh (2000), women must ensure to more stringent, performance-based criteria for achieving promotion than their male colleagues. The chilly climate found in organizations is a problem related to the GC (Currie & Jhiele, 2001; FGCC, 1995, cited in Jarmon, 2014).

Glass Ceiling Perception and Demographic Factor

Status Characteristic Theory

According to status characteristic theory, an identical group category (like age and other identical classifications as well) is linked to a particular status on a socially constructed level that affects how people are viewed (Beger et al., 1972). So, several demographic factors of women also influence perceptions of the GC (Cohen et al., 2020). Jabbar and Imran (2013) mentioned that demographic factors take part in a vital role in determining women's perceptions of GC. Thus, it is possible to hypothesize the effect of women's demographic status on the insight of the glass ceiling as per the aforementioned idea.

Marital Status and Glass Ceiling Perception

Cohen et al. (2020) studied the GC perception of female accounting professionals, and their results revealed that single women are more expected than married women to claim the continuation of a GC. Clech and Blair-Lay (2010) found that married women think women are not reaching top positions because of their lack of motivation and interest. In contrast, unmarried women perceive that an unsupportive organizational culture is affecting women's advancement. This finding indicated that unmarried women are more likely to perceive a GC in organizations.

H_1: Marital status of women affects glass ceiling perception of women

Education and Glass Ceiling Perception

Sharma and Sehrawat (2014) studied the existence of GC for women in modern India. Their results revealed no significant difference in GC perception in terms of education. Karakilic (2019) found that education affects women's perception of the GC.

H_2: Education of women affects glass ceiling perception of women

Age and Glass Ceiling Perception

Sharma and Sehrawat (2014) studied the existence of GC for women in modern India, and their results revealed no significant difference in GC perception in terms of age.

H_3: Age affects glass ceiling perception of women.

Position and Glass Ceiling Perception

Women who hold upper-ranking positions need to smash the GC, so they are very aware of gender inequality. So, they feel the continuation of a GC in the firm more (Cohen et al., 2020). Sharma and Sehrawat (2014) studied the existence of GC for women in modern India, and their results revealed that no significant difference in GC perception in terms of position. This statement suggests a development hypothesis related to the effect of position on GC perception.

H_4: Position affects glass ceiling perception of women.

Income and Glass Ceiling Perception

The existence of GC for women in modern India was investigated by Sharma and Sehrawat (2014), whose findings showed no discernible variation in GC perception according to demographic characteristics like income. Women's income is a major factor in determining whether they perceive career barriers (Alshammari, 2016).

H_5: Income affects glass ceiling perception of women

Women with Children and Glass Ceiling Perception

Women with children stop a career growth due to their responsibility to care for children, compared to women with no children (Budig & England, 2001; Kirchmeyer, 2002). According to the findings of Cech and Blair-Loy (2010) and Khodijah et al. (2024), mothers are more likely to have feelings of the GC in organizations.

H_6: Women with children affect glass ceiling perception

Organization Types and Glass Ceiling Perception

Sever (2016) studied the GC perception of employees and found that the types of organizations where employees work are important determinants of the GC elements. Khodijah et al. (2024) found that organization types do not affect GC perception. Blum et al. (1994) found that the nature of the organization also determines GC perception based on the women numbers who hold upper positions in that organization.

H_7: Organization type affects glass ceiling perception.

Conceptual Framework

The conceptual framework has been formulated based on hypothesis

Figure 1: Conceptual framework

Research Methods

Research design

The research used descriptive cum analytical methods. Descriptive statistics, like percentage frequency, were used to describe the sampled data. Independent sample t-test and one-way ANOVA were used to analyze the effect of demographic status on GC perception.

Population, sampling method, and sample size determination

Regarding the population, women holding positions from the position of supervisor to senior manager were the study population. The population of commercial banks, development banks, and finance companies was identified from the human resource department of the concerned firms. The mixed method sampling was used. Firstly, bank and financial institutions were divided into three strata, namely finance, development banks, and commercial banks using stratified sampling. The total population from commercial banks was 5706, development banks were 890, and finance companies were 305.Total population of bank and financial institutions = 6901women.

Total sample to be taken from banks and financial institutions,

$$(n) = \frac{N}{1 + N(e^2)} = \frac{6901}{1 + 6901(0.05^2)} = \frac{6901}{18.2525} = 378.09$$

For Commercial Banks (CB),

$$nh = \left(\frac{nh}{N}\right) * n = \left(\frac{890}{6901}\right) * 378.09 = 312.62$$

For Development Banks (DB),

$$nh = \left(\frac{nh}{N}\right) * n = \left(\frac{890}{6901}\right) * 378.09 = 48.76$$

For Finance Companies (FC),

$$nh = \left(\frac{nh}{N}\right) * n = \left(\frac{305}{6901}\right) * 378.09 = 16.69$$

Where n = sample size, nh = sample size for the nth stratum, Nh= population for nth stratum, N = entire population, e = margin of error (5 %)

Once the sample size was established, data were collected from each stratum via purposeful sampling. Purposive sampling was used to gather data from women who are at least employed as supervisors or higher, because women who are working at the managerial level may feel the situation of the GC. Despite the calculated sample size, the sample sizes obtained from CB, DB, and FC correspondingly 322, 54, and 27. The total population (women working as a supervisor and above) in the case of the development bank and finance company is very low. Therefore, the calculated sample to be taken from the development bank and finance company is very low.

Data collection and measures

To gather data on GC perception, a structured questionnaire was given to the intended respondents. An 18-item questionnaire was derived from (Hede & Ralston, 1993; Hewlett et al., 2010; Hobbler et al., 2014; Kim, 2014; Knuston & Schmidgall, 1999; Liu, 2013; Racioppi, 2018; Terefe et al., 2019), used to test the GC perception. A 5-point unipolar Likert scale was applied to measure the GC perception, ranging from strongly disagree (1) to strongly agree (5).

Table 1: Reliability test

	Cronbach alpha
GCP (18 items)	0.976

Note: GCP = glass ceiling perception

The reliability of GC perception was Cronbach alpha= 0.976 which is considered reliable.

Table 2: Respondent's demographics

Profile	Categories	Frequency	Percentage (%)
Marital status	Married	367	91.90
	Unmarried	36	8.90
	Total	403	100
Education	Bachelors	37	9.20
	Masters	366	90.80
	Total	403	100
Age	Less than 30	48	11.90
	31-35	238	59.10
	36-40	71	17.60
	41-45	29	7.20
	46-50	17	4.20
	Total	403	100

Profile	Categories	Frequency	Percentage (%)
Position	Supervisor	94	23.30
	Junior officer	87	21.60
	Officer	77	19.10
	Senior Officer	67	16.60
	Assistant Manager	38	9.40
	Manager	27	6.70
	Senior Manager	13	3.20
	Total	403	100
Income	Less than 50000	143	35.50
	50001-100000	186	46.20
	100001-150000	42	10.40
	150001-200000	18	4.50
	300001-350000	1	2.00
	450000-500000	10	2.50
	Above 500000	3	7.00
	Total	403	100
Women with children	Yes	354	87.8
	No	49	12.2
	Total	403	100
Organization type	CB	322	79.9
	DB	54	13.4
	FC	27	6.7
	Total	403	100

Note: CB = commercial bank, DB = development bank, FC = finance company

According to Table 2, the majority of 403 women (91.1%) were married, and the majority of women who entered the banking industry had master's degrees (90.8%). However, 9.2% of women had a bachelor's degree. 4.2 percent of women are in the 46–50 age group, while the largest percentage of women is in the 31–35 age group. It appeared that only 3.2% of women had a senior manager. The lower amount, 23.3%, appeared to be in higher positions, though. Of these, 7% were women who made above than Rs. 500,000. Majority of women (46.2%) made between Rs. 50,000 and Rs. 100,000. Of the women, 12.2% did not have children, while the majority (87.8%) did. 79.9% of the women worked for commercial banks, 13.4% for development banks, and 6.7% for finance companies, according to the types of institutions.

Results and Analysis

Relationship between Demographic Factors and Glass Ceiling Perception

The following Table 3 shows the glass ceiling perception of women based on their demographic status.

Table 3: Demographic factors and glass ceiling perception

Variables	Statistical tests	p-value	Status	Remarks
Marital status and GCP	t = -3.713**	0.006	Significant	H_1 accepted
Education and GCP	t = -3.713	0.099	Insignificant	H_2 rejected
Age and GCP	F = 5.909**	0.000	Significant	H_3 accepted
Position and GCP	F = 7.293**	0.000	Significant	H_4 accepted
Income and GCP	F = 4.346**	0.000	Significant	H_5 accepted
Women with children and GCP	t = – 3.469*	0.024	Significant	H_6 accepted
Organization types	F = 3.906*	0.045	Significant	H_7 accepted

*Note: GCP = glass ceiling perception, **, means significant at 0.01 level. *, means significant at 0.05 level.*

The mean scores of GC perception of women shown in Table 3 revealed that they have almost agreed on their GC perception. The GC awareness of married and unmarried women working for BFIs differs significantly, according to the independent samples t-test results. However, the values of the mean scores showed that unmarried women felt a moderate degree of GC perception (Mean value = 3.2438). Married women in the workforce (Mean value = 2.5675) showed a bit lower degree of GC than married women. From the above analysis, it can be noted that marital status (p-value = 0.006 < 0.05 level of significance) affects the GC perception of women, supporting the hypothesis H_1 set for the study.

The outcome of the independent samples t-test showed that there is no difference in the GC perception of women employees in BFIs who hold bachelor's degrees and those who hold master's degrees. The result showed that (p-value = 0.0.099 > 0.05 level of significance) education does not influence the GC perception of women, rejecting the alternative hypothesis H_2 set for the study.

The ANOVA result (F = 5.909) demonstrated a significant difference in the GC perception of women workers in BFIs according to their age. It suggests that the GC perception of women is influenced by the age of women, supporting the hypothesis H_3 set for the study.

The ANOVA value (F = 7.293) demonstrated a significant difference in the GC perception of women employees regarding their position in BFIs at a significance level of 0.01 (p-value = 0.000 < 0.01 level of significance), supporting the hypothesis H_4 of the study. It indicated that the position they hold in BFIs influences the GC perception of women employees.

At a significance level of 0.01 (p-value = 0.000 < 0.000), the ANOVA value (F = 4.346) demonstrated a significant difference in the mean of the GC perception of the female workforce regarding income in BFIs, supporting hypothesis H_5 set for the study. It suggests that their perception of women employees towards the GC is influenced by their level of income.

The results of the independent samples t-test showed that there is a difference in the GC perception of women employees in BFIs who have children and who do not. The result showed that (p-value = 0.0.024 < 0.05 level of significance) women's GC perceptions are influenced by whether they have children or not, which supports the study's alternative hypothesis H_6.

At a threshold of significance of 0.05 (p-value = 0.045 < 0.05 level of significance), the ANOVA value (F = 3.906) revealed that there is a substantial variation in the GC perception of the woman workforce as per the types of organizations they work in. The result showed that (p-value = 0.045 < 0.05 level of significance) the type of organization they work in influences the GC perception of women, supporting the alternative hypothesis H_7 set for the study. F value is significant, it indicates that the mean GC perception of women in one organization differs from the mean GC perception of the other type of organization. So, post-hoc analysis is employed to examine the genuine situation.

Table 3: Firm type and glass ceiling perception (Post-hoc Analysis)

GCP LSD		Multiple Comparison	
I (OS)	J (OS)	Mean Difference (I – J)	P-value
CB	DB	0.26340	0.163
	FC	0.55495	0.036
DB	CB	– 0.26340	0.163
	FC	0.29155	0.361
FC	CB	– 0.55495	0.036
	DB	– 0.29155	0.361
Mean (GCP) CB = 2.6867	DB = 2.4702	FC = 2.2428	

Note: CB=commercial bank, DB = development bank, FC = finance company, GCP = glass ceiling perception

Post hoc analysis results showed that there is a significant mean difference between CB and FC, as indicated

by p-value = 0.036 < 0.05. The GC perception of women working in commercial banks (mean = 2.6867) is higher than that of women working in FC (mean = 2.2428). Similarly, post hoc analysis showed that there is no significant mean difference in GC perception of women working in CB and DB, as shown by p-value = 0.163 > 0.05. However, there is no significant mean difference between the GC perception of women of DB and FC, as indicated by a p-value = 0.361 > 0.05 level of significance.

Discussions

The result of the effect of demographic variables on the GC perception of women demonstrated that marital status, age, position, income, and organization status, except for education, influence the GC perception of women. The result of the effect of marital status on GC perception is supported by (Cohen et al., 2020; Sever, 2016). Demographic situations like marital status affected GC perception, which is consistent with Cohen et al. (2020), mentioning that married women are more likely to perceive the existence of a GC. It might be that married women are occupied with dual responsibility. It might result in the establishment of some obstacles to professional advancement. However, Clech and Blair-Lay (2010) have different findings and mentioned that married women themselves are responsible for creating the GC due to a lack of self-motivation. Unmarried women take a view of GC due to the unfavorable organizational culture. While unmarried women may recognize the lack of a supporting culture for job advancement, married women appear to lack drive due to their dual responsibilities. According to their perception, organizations must thus support women. However, more than 90 % of women were married, and the rest of them were unmarried, based on the sample taken in the study. So, to get a precise result, a more or less equal sample size from married and unmarried women might be needed in the future study. The result of the influence of position on GC perception has been supported by Sever (2016) claimed that designation is an important determinant of women perceiving GC. So, women who have higher positions are less likely to perceive GC. So, it is important to have fair promotion in the organization. Fair promotion can minimize the GC perception of women in organizations. This study demonstrated that the respondents' ages have a big impact on how women perceive the GC. This contradicts Sharma and Sehrawat (2014), showing that the age of women does not have any influence on their perception regarding the GC. According to the result of this study, education did not show an influence on the GC perception of women, aligning with the result of Sharma and Sehrawat (2014), who found that the education level of women does not affect their GC perception. In this study, more than 90 % of women were master's degree holders, and the remaining were bachelor's degree holders. So, it might be a matter of further analysis in the future. This study revealed that monthly income determines the degree of GC perceived by women. This result is in line with Sever (2016) and contradicts Sharma and Sehrawat (2014). It showed different results in different contexts. It demonstrated that performance, not gender, should determine the pay scale. The outcome showed that the organizational standing of the women's workplaces also influences the degree of GC existence. This result is supported by Sever (2016), who claimed that women from different types of organizations perceive the GC to a different degree. So, the organizational environment of different organizations may be the reason for women to perceive the GC at different levels. Women who have children make a difference in GC perception and line with (Budig & England, 2001; Cech & Blair-Loy, 2010; Kirchmeyer, 2002). They found that women who have children feel no time for career progression to fulfill childcare responsibilities. So, organizations need to introduce a policy for work-life sense of balance for women with children.

Conclusion and Implications

This study shows the demographics such as marital status, women with children, age, income, organizational types) of women working in BFIs. Education level had no effect on the level of GC perception. The GC perception of women working in commercial banks is higher than that of women working in fiancé companies. It can be concluded that the culture and policies of the organization also affect the perception of the GC. The existing literature is accompanied by the results of the study; demographic factors also affect how women perceive the GC. As results showed in this study, education did not affect, indicating that context makes a difference. To attain equality in all organizational decisions, businesses must comprehend the extent to which women see career

barriers and how demographic factors influence this perspective.

The study's findings strengthened the status characteristic theory, which explains how an individual's status influences how they are perceived. To boost an organization's productivity, the GC notion must be eliminated. To address the issue that arose as a result of the demographic status of women, the organization can know how to strengthen its policies (such as work-life balance, equitable promotion, and women's empowerment).

Limitations and Further Research

To observe the impact of demographic factors on GC perception, only the organizational climate has been considered a GC. Other variables, such as family dynamics and societal effects, might be included by future researchers. A very low population of women, who were working as supervisors and above, in development banks and finance companies, was found. So very low calculated sample size was taken for the study. It might be a limitation in the part of statistical method. So future researchers may be suggested to take more samples despite the calculated sample size being low.

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Exploring Factors Associated with Community Perceptions towards Social Health Insurance

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Abstract

Background: In developing countries like Nepal, payment from pocket for health facilities is a prime challenge. This leads to financial hardship and sometimes makes delay in treatment, particularly for poor people. To overcome these problems, the Government of Nepal introduced the Social Health Insurance program. The objective of this program is to provide financial protection and ensure equal access to quality health treatment.

Objectives: The study aimed to explore the factors associated with community perception towards social health insurance in Sundarharaicha Municipality, Morang, Nepal.

Material and Methods: The study used a cross-sectional study design. Using a structured questionnaire, primary data was gathered from 392 households of three wards randomly selected from Sundarharaicha Municipality, Morang. Descriptive analysis, chi-square tests, log normal regression were used to explore relationships among perception status, and socio-demographic variables. Cronbach's alpha was used to measure Internal consistency of the perception.

Results: The overall mean perception score towards SHI was 2.30 which was below the neutral midpoint of 3 on a five point Likert scale, indicating an unfavorable perception. Most respondents were disagreed that SHI was a worthwhile investment while only two respondents were strongly agreed. Cronbach's alpha (0.92) confirmed the internal consistency of the perception scale. Mann-Whiteny test showed significant differences in perception scores across awareness status, gender, marital status, family type, ethnicity, religion, education status, and history of chronic disease of the household head ($p < 0.10$). Perception status was found significantly associated with ward of residence, gender, marital status, family type, source of information, and awareness status from bivariate analysis. A log normal regression revealed that ward of residence, awareness status, and source of knowing SHI were significant determinants of perception. Respondents residing in Ward no. 4 and Ward no. 8 had higher perception compared to those from the Ward no. 9. In contrast, respondents with high awareness status and those informed from health personnel, media, and relatives/friends had lower perception compared to those who had not heard about the program.

Conclusion: This study assesses the perception of respondents towards SHI. The perception score was found to differ significantly across the categories of awareness, gender, marital status, family type, ethnicity, religion, education, and history of chronic disease of the household head. A log normal regression analysis identified ward of residence, awareness status, and source of information as the significant determinants of perception.

Keywords: *Mann-Whiteny test, Cook's distance, Shapiro-Wilk test, Breusch-Pagan test, log normal regression.*

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Introduction

In developing countries where income is low or moderate, payment at the hospital or health care center is key problem. In such countries, people pay for health care directly from their pockets which cause not only financial hardship (Memirie et. al, 2017) but also delay in treatment. The delay in treatment worsens the patients' health problem (Russell, 2004; Gilson, 1998), particularly for marginalized groups (WHO, 2022; Nepal Government Health Insurance Board, 2022). To overcome these problems, Social Health Insurance (SHI) program was formally established by Nepal Government in 2015. The SHI program delivers protection against financial hardship and provides quality health services (Ghimire & Wagle, 2021).

The main principle of SHI is to share risk and provides equity. It provides an equal and fair access to defined healthcare for everyone regardless of their socioeconomic status. Every member has to contribute as premiums. The Nepal government offers subsidies to individuals who cannot afford the insurance premiums required for participation in the program.

SHI encounters challenges in enrollment in the program. Bharati et. al (2025) and Thapa et al. (2021) focused that awareness of households affects enrollment in SHI. Perception affects enrolment and retention decisions significantly (Appiah et al.,2012; Sharma & Banjara, 2020). Perception is defined as the combination of satisfaction, trust, and attitudes towards the program. Factors such as gender, age, education, ethnicity, chronic disease, family type etc. affect awareness and perception (Acharya et al., 2021; Dhungana et al., 2021).

To the best of our knowledge, only a limited number of studies have been conducted on community perception towards SHI, particularly in the eastern part of Nepal. Investigating the association between socio-demographic factors and community perception can provide valuable insights for policy makers to develop strategies about SHI. This study, therefore, seeks to assess the households' perception towards SHI and to identify major factors associated with perception.

Methodology

Data

The study was done in Sundarharaicha Municipality of Morang district, Nepal. A cross-sectional design was used in the study. To achieve the objective of the study, primary data were collected through personal interview method using a well-structured questionnaire. At 5% level of significance, the sample size was determined by the formula, Using the following formula

$$n = \frac{(Z_{\alpha/2})^2 \times p \times (1\text{-}p)}{E^2}(1+NR) = \frac{(1.96)^2 \times 0.5 \times (1\text{-}0.5)}{0.05^2}(1+0.05) = 403.37 \approx 403$$

Where, n = the sample size, Zα/2 = the Z-score, E = margin of error, and NR = non-response rate = 5%.

To obtain a representative sample, a two-stage sampling method was adopted. Three wards (4, 8 and 9) out of twelve wards were chosen randomly through simple random sampling in the first stage. In Sundarharaicha Municipality, there were 1449, 1209, 1782 households (4440 households in total) in ward no. 4, 8 and 9 respectively. From this households, 403 households were selected using proportional allocation from each ward: 131 from ward 4, 110 households from ward 8, and 162 households from ward 9 in the second stage. The households were selected through systematic sampling (Transect Walk). Approximately 2.7% non-response rate was found which resulted 392 households as an actual sample size.

The variables perception towards SHI were measured using multiple 5-point Likert items. Cronbach's alpha was used to assess the internal consistency. The median was used as the cutoff point to dichotomize the variables age, family size, and monthly family income into two groups.

Statistical Analysis

The perception of households towards SHI is the dependent variable. Ward of residence, gender, age, religion, marital status, ethnicity, occupation of household head, family type, household head's education status, family size, family monthly income, history of chronic disease in household head, history of chronic disease in family

member, source of knowing about SHI, and awareness are the independent variables included in the study. A condition lasting for one or more years was considered a chronic disease. The household's head was labeled as "High" if they correctly answered at least five out of ten SHI awareness questions; otherwise, they were classified as "Low" aware. The mean perception score was used as the cutoff point to divide perception into two categories: "High" and "Low".

The distribution of perception scores was initially found to be positively skewed (skewness = 0.95). A log transformation on the perception score reduced the skewness to 0.18. Therefore, the log of the perception scores followed approximately normal distribution. This justified the use of a lognormal regression model to identify the significant factors associated with respondents' perceptions of SHI. The lognormal regression equation is

$$\ln(Y) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_k X_k + \varepsilon$$

where,

Y = Perception towards SHI

β_i = unknown parameters

X_i = Predictors

ϵ = Random error

Model's performance diagnosis

Overall significance of the model was evaluated by using F-test. Variance Inflation factors (VIF) was applied to check multicollinearity. R^2 and adjusted R^2 were used to quantify the explanatory power of the model. Shapiro-Wilk test was used for normality and the Breusch-Pagan test for homoscedasticity of the residuals. Influence diagnostic was carried out by Cook's distance, and a sensitivity analysis was performed after removing the influential cases.

Results

The surveyed households showed variation across demographic and socio-economic characteristics. Out of 392 respondents, the largest number was from Ward No. 9 (40.82%), followed by Ward No. 4 with 32.14% respondents and Ward No. 8 with 27.04% respondents. Among the respondents, two-thirds were male (66.07%), and one-third were female (33.93%).

Respondents aged above 45 years were 51.79%, which was slightly higher than 48.21% who were 45 years or younger. In terms of occupation, only 17.35% were engaged in government/foreign employment, whereas the majority (82.65%) reported other occupations. The majority were married (94.39%), Hindu (86.48%), and Brahmin/Chhetri (61.99%). Most respondents were literate (90.82%). Around two-thirds of respondents (64.80%) reported that their monthly family income was up to Rs. 20,000 (sample median). 61.7% respondents had joint families. Three out of four (74.5%) households reported they had a small family size. One in five (19.6%) households reported a chronic disease in the household head, while 21.7% had a family history of chronic illness. Health personnel (59.4%) were the main source of SHI information, followed by media (20.2%) and friends or relatives (10.71%). About 10% respondents had never heard about SHI. A majority (71.7%) of respondents had high awareness; in contrast, 65% respondents showed low perception.

Table 1 shows the frequency of respondents' perceptions on ten statements related to SHI. Perception was measured on a five-point Likert scale - *"Strongly Disagree"*, *"Disagree"*, *"Neutral"*, *"Agree"*, and *"Strongly Agree"*. The majority of the respondents, among 392, selected Strongly Disagree (n = 155) and Disagree (n = 151), while only two respondents selected Strongly Agree for the statement *"A health insurance policy is a worth investment,"*. The mean score of 1.91 indicates the respondents' dissatisfaction with the perceived value of SHI. A similar pattern was observed in the response to the statement *"Health insurance could prevent financial hardship if you get sick"* and *"Health insurance can improve the healthcare delivery system in your family"*. Except for the statement *"There is an easy process for acquiring a health insurance policy,"* which received the highest response (n = 142) in *"Agree"*, most perception statements received their highest frequency of response in *"Disagree"* and *"Neutral"* categories.

Table 1: Distribution of respondents' perception across ten statements related to SHI

Perception Items	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean
Per_1: A health insurance policy is a worth investment.	155	151	56	28	2	1.91
Per_2: Health insurance could prevent financial hardship if you get sick.	134	165	66	26	1	1.97
Per_3: Health insurance can improve the healthcare delivery system in your family.	101	170	89	31	1	2.14
Per_4: Health insurance provides a sense of security regarding medical care for you and your family.	80	177	89	45	1	2.26
Per_5: It will be good to take a health insurance at a younger age.	80	173	97	40	2	2.26
Per_6: Taking health insurance is good for your family.	86	174	96	35	1	2.21
Per_7: Health insurance is essential for every family.	87	168	97	39	1	2.23
Per_8: A health insurance policy is a right instrument to mitigate health-related risk.	79	171	95	45	2	2.29
Per_9: There is an easy process for acquiring a health insurance policy.	52	95	98	142	4	2.87
Per_10: I am satisfied with the health insurance policy.	16	107	200	67	2	2.83
Overall Mean						2.30

The overall mean perception score of 2.30, which is below the neutral midpoint of 3.0 on a 5-point Likert scale, indicates that the majority of the respondents hold unfavorable perceptions towards SHI. In Figure 1, a grouped bar chart demonstrates the distribution of responses of respondents to each perception item.

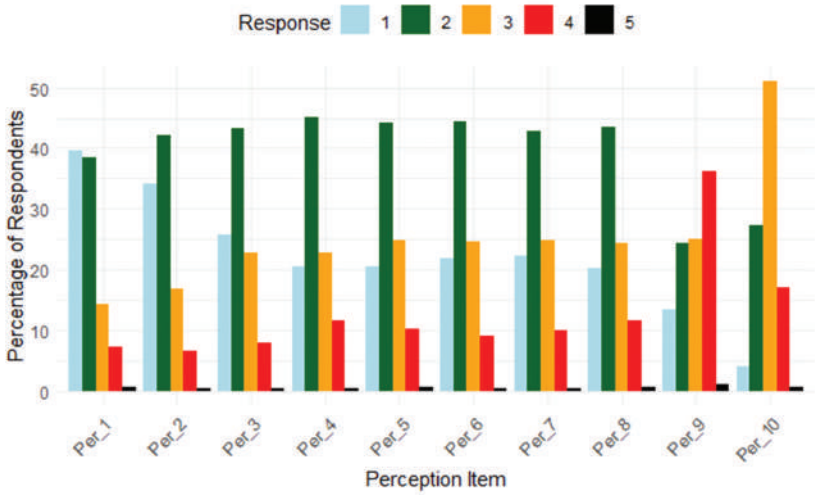

Fig 1: Percentage of responses across perception items.

Table 2: Internal consistency of the perception scale

Perception Items	1	2	3	4	5	6	7	8	9	10
Corrected item - Total correlation (r. drop)	0.78	0.80	0.75	0.77	0.75	0.76	0.77	0.72	0.49	0.49
Alpha if Item Dropped (std. alpha)	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.93	0.93
Average Inter-Item Correlation	0.53	0.53	0.54	0.53	0.54	0.54	0.53	0.54	0.58	0.58
Signal-to-Noise Ratio (S/N)	10	10	10	10	10	10	10	11	13	13
Item Mean	1.9	2.0	2.1	2.3	2.3	2.2	2.2	2.3	2.9	2.8
Item SD	0.93	0.89	0.90	0.92	0.92	0.90	0.92	0.93	1.08	0.77
Overall Cronbach's alpha = 0.92 [95% CI: 0.91-0.93]										

In Table 2, Cronbach's alpha coefficient was calculated to evaluate the internal consistency of the perception scale. The Cronbach's alpha was 0.92 [95% CI: 0.91-0.93], which exceeds the widely accepted threshold of 0.70 for acceptable reliability (Nunnally & Bernstein, 1994). Therefore, the items in the scale are highly consistent in measuring the perception construct towards SHI.

Corrected item–total correlation values ranged from 0.49 to 0.80. The first eight items exceeded the commonly recommended threshold of 0.50 (Field, 2018). This result indicates that most items were strongly correlated with the overall scale. With correlations of 0.49, items 9 and 10 showed a lower association with the total score.

The value of "alpha if item deleted" remained stable at 0.91 when any one of the first eight items was removed. This indicates that these eight items had an equal contribution to the internal consistency. In contrast, the reliability coefficient slightly increased from 0.92 to 0.93 if items 9 or 10 were removed from the scale. However, this increment in alpha was negligible; the dropping of items 9 and 10 was not statistically meaningful because Cronbach's alpha value above 0.90 was already considered excellent.

The average inter-item correlation values ranged from 0.53 to 0.58, close to the recommended range of 0.15 to 0.50 (Clark & Watson, 1995) for the first eight items, with slightly higher values observed for items 9 and 10.

The consistently high signal-to-noise ratios (10 to 13) across all items suggest that most of the variance in the item responses displays true score variance rather than error, providing robustness of the scale.

The item means ranged from 1.9 to 2.9, with standard deviations between 0.77 and 1.08, indicating adequate participant response variability.

Overall, the perception scale displays excellent internal consistency.

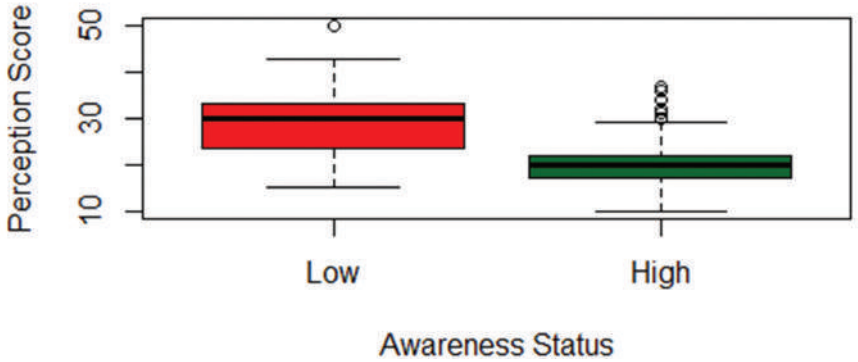

Fig. 2: Whisker-Box plot of perception scores against awareness status.

The difference between scores of perceptions against independent variables was tested using the Mann-Whitney test. This test shows that the perception score was significantly different with the awareness status ($p = 0.000$), with the low awareness status demonstrating a higher perception score shown in the Whisker-Box plot, figure 2.

The perception score was found to differ significantly across the categories of gender, marital status, family type, ethnicity, religion, education, and history of chronic disease of the household head at the 5% level of significance. Respondents who were illiterate, female, married, from nuclear families, belonging to ethnic groups other than Brahmin/Chhetri, and practicing religions other than Hinduism exhibited a higher median perception score. In

contrast, age, occupation, family history of chronic disease, and monthly family income did not have significantly different score perception scores.

Table 3: Bivariate analysis of socio-economic and demographic variables with perception

Variables	Perception			Chi-Square	P- value
	High (137)	Low (255)	Total		
Ward No.				53.987	<0.000
8	59 (56%)	47 (44%)	106		
4	55 (44%)	71 (56%)	126		
9	23 (14%)	137 (86%)	160		
Gender				4.071	0.044
Female	56 (42%)	77 (58%)	133		
Male	81 (31%)	178 (69%)	259		
Age Group				1.930	0.165
Up to 45 years	59 (31%)	130 (69%)	189		
Above 45 years	78 (38%)	125 (62%)	203		
Marital Status				5.703	0.017
Unmarried	2 (9%)	20 (91%)	22		
Married	135 (36%)	235 (64%)	370		
Family Type				37.444	<0.000
Nuclear	81 (54%)	69 (46%)	150		
Joint	56 (23%)	186 (77%)	242		
Occupation				0.236	0.628
Others	111(34%)	213 (66%)	324		
Government/ Foreign employment	26 (38%)	42 (62%)	68		
Ethnicity				3.381	0.066
Others	61 (41%)	88 (59%)	149		
Brahmin/Chhetri	76 (31%)	167 (69%)	243		
Religion				3.428	0.064
Others	25 (47%)	28 (53%)	53		
Hinduism	112 (33%)	227 (67%)	339		
Education status				3.255	0.071
Illiterate	18 (50%)	18 (50%)	36		
Literate	119 (33%)	237 (67%)	356		
History of chronic disease in the household				0.076	0.783
No	113 (35%)	206 (65%)	319		
Yes	24 (33%)	49 (67%)	73		
Family history of chronic disease in the household				1.169	0.280
No	112 (36%)	195 (64%)	307		
Yes	25 (29%)	60 (71%)	85		
Family Monthly Income				0.004	0.952
Low	88 (35%)	166 (65%)	254		
High	49 (36%)	89 (64%)	138		
Family Size				0	1
Small	102 (35%)	190 (65%)	292		
Large	35 (35%)	65 (65%)	100		
Source of knowing about SHI				79.213	<0.000
Not heard	36 (95%)	2 (5%)	38		
Health Personnel	53 (23%)	180 (77%)	233		
Media	27 (34%)	52 (66%)	79		

Variables	Perception			Chi-Square	P- value
	High (137)	Low (255)	Total		
Relatives/Friends	21 (50%)	21 (50%)	42		
Awareness status				105.6	<0.000
Low	83 (75%)	28 (25%)	111		
High	54 (19%)	227 (81%)	281		

The chi-square test was applied to assess the relationship between perception status and independent variables (Table 3). Ward of residence, gender, marital status, family type, source of knowing about SHI, and awareness were significantly associated with perception status at 5% significance level. However, ethnicity, religion, and the education status of households had p-values marginally above 0.05; they were also included as predictors in the model fitting.

Regression model

The total score for the perception was calculated by summing the responses on ten perception related statements/ items, each measured in a five-point Likert scale. The descriptive statistics of the aggregated perception score are presented in Table 4. To assess the distribution of data, a histogram was plotted (Figure 3). Both the histogram and skewness value indicated the positive skewness in the distribution. Therefore, logarithmic transformation was applied to the normality.

Table 4: Descriptive statistics of total perception score before and after log transformation

Descriptive Statistics	Min.	Q1	Median	Mean	Q3	Max.	Skewness	Kurtosis
Before log transformation	10	18.75	21.50	22.95	27.25	50	0.94	3.77
After log transformation	2.30	2.93	3.07	3.09	3.30	3.91	0.05	3.25

After transformation, both the skewness value (0.05) and histogram plot suggested that the data was approximately normally distributed.

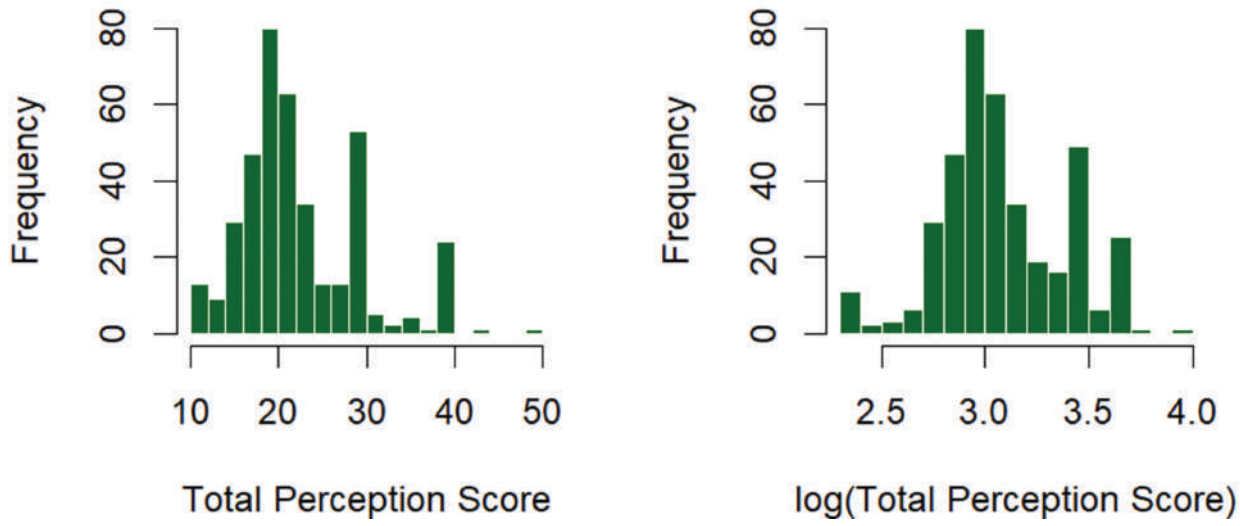

Fig. 3: Histogram of Total Perception Score Vs. Log (Total Perception Score)

A log normal regression model was used to identify the significant predictors of the perception suggested from the bivariate analysis. The multivariable regression analysis demonstrated that ward of residence, awareness, source of knowing were significant predictors of perception of households towards SHI. Respondents residing in Ward no. 4 (Exp $\beta = 1.161$, 95% CI: 1.059-1.273, p-value = 0.002) and Ward no. 8 (Exp $\beta = 1.204$, 95% CI: 1.109-1.308, p-value < 0.001) had approximately 16% and 20% higher perception compared to those from the Ward no. 9.

Table 5: Coefficients of log normal regression model

Coefficients		Beta (β)	SE (Beta)	Exp (β)	95% CI		P-Value
					Lower	Upper	
Constant	3.237	0.086	25.449	21.48	30.152	<0.001	
Ward No.	4	0.149	0.047	1.161	1.059	1.273	0.002
	8	0.186	0.042	1.204	1.109	1.308	<0.001
	9®	-	-	-	-	-	-
Gender	Female	0.017	0.025	1.017	0.969	1.068	0.481
	Male®	-	-	-	-	-	-
Education	Literate	-0.002	0.043	0.998	0.918	1.085	0.961
	Illiterate®	-	-	-	-	-	-
Marital Status	Married	0.051	0.05	1.052	0.954	1.16	0.311
	Unmarried®	-	-	-	-	-	-
Family Type	Nuclear	0.05	0.031	1.051	0.988	1.118	0.112
	Joint®	-	-	-	-	-	-
Ethnicity	Brahmin/Chhetri	-0.006	0.028	0.994	0.941	1.051	0.841
	Others®	-	-	-	-	-	-
Religion	Hinduism	0.004	0.041	1.004	0.926	1.087	0.931
	Others®	-	-	-	-	-	-
Awareness status	High	-0.259	0.031	0.772	0.727	0.82	<0.001
	Low®	-	-	-	-	-	-
Source of Knowing	Personnel	-0.146	0.049	0.864	0.784	0.952	0.003
	Media	-0.122	0.052	0.885	0.799	0.980	0.019
	Relatives/Friends	-0.152	0.056	0.859	0.768	0.959	0.007
	Not heard®	-	-	-	-	-	-

In contrast, respondents with high awareness showed 23% low perception score compared to those with low awareness, which infers that more informed respondents tended to evaluate the SHI program more critically. Similarly, respondents who got the information from health personnel (Exp β = 0.864, 95% CI: 0.784-0.952, p-value = 0.003), media (Exp β = 0.885, 95% CI: 0.799-0.980, p-value = 0.019), and relatives/friends (Exp β = 0.859, 95% CI: 0.768-0.959, p-value = 0.007) had approximately 14%, 12%, and 14% lower perception compared to those who had not heard about the program. Others socio-demographic factors including gender, marital status, ethnicity, religion, family type, education were insignificant predictors of perception.

Diagnostics of the fitted model

A linear regression on the log-transformed perception score was statistically significant ($F(12,379) = 28.45$, $p < 0.001$). This indicated that set of predictors in the model explained the variation in perception rating. The model explained 47.4 % of the variation in log-transformed perception score ($R^2 = 0.474$) with adjusted $R^2 = 0.457$. The variance inflation factors (VIF) were between 1.04 and 1.59, indicating that there was no serious multicollinearity. The histogram and Q-Q plot both showed that residuals were approximately normally distributed, but the Shapiro-Wilk test that it was not normal ($W = 0.972$, $p < 0.001$). The Breusch-Pegan test showed that residuals were not homoscedastic ($BP = 22.40$, $p = 0.033$). Influence diagnostic revealed that multiple observations with heightened Cook's distance, requiring additional scrutiny. After removing 20 important cases with Cook's distance flagged, a sensitivity model was used to see how strong the results were. The results were mostly the same with the sizes of the coefficients and confidence intervals. But the assumption checks got improved in normality. The residuals were found normal by Shapiro-Wilk test ($W = 0.995$, $p = 0.287$), and the Breusch-Pegan test showed no serious homoscedasticity ($BP = 19.4$, $p = 0.111$). This means the abnormality and heteroscedasticity were caused by few influence observations instead of an incorrect pattern specification.

The assumption checks got better: the residuals were normal (Shapiro-Wilk W = 0.995, p = 0.287), and the Breusch–Pagan test showed no signs of heteroscedasticity (BP = 19.4, p = 0.111). This means that the differences in the original model were likely caused by a few important observations instead of a pattern of incorrect specification.

Discussion

The average perception score was below the neutral point 3 on five point Likert scale. This suggests that most of the households did not show agreed view towards the program which is consistent with the previous studies (Paneru et al., 2022; Ghimire et at., 2024)

A remarkable finding was the paradoxical association between perception and awareness. This study found that higher awareness demonstrated more critical evaluations of SHI. This pattern is consistent with the previous study (Acharya et al., 2024), discussing that while awareness improves knowledge of the program, it may also expose problems such as bureaucratic delays and week service delivery. This suggests that awareness alone will not improve perception without real improvements in service quality and program design.

Households' perceptions also differed significantly by some socio-demographic factors such as ward of residence, family type, and ethnicity. Respondents from nuclear families and minority ethnic group expressed more positive perceptions, indicating varying expectations among different social groups. These findings align with community based health insurance studies conducted in South Asia and Africa, where social and cultural contexts strongly influenced participation and satisfaction (Dror et al., 2016; Eze et al., 2023).

The source of information also played a critical role. Respondents who learned about SHI through health personnel, media, or relatives/friends showed low perception than those who had never heard of the program. This suggests that current communication strategies may not convey the information in proper way or fail to develop confidence. Communication should be transparent, citizen centered, and emphasize concrete benefits and reforms (Ghimire et al., 2024).

Limitations

The study was conducted on randomly selected three wards of the Sundarharaicha Municipality of Morang. Therefore, the study may not be representative for the whole district or Nepal. Thus, the generalization of the results/findings is limited. Perception towards SHI was measured using Likert-scale. However, Cronbach's alpha showed that the scale was internally consistent; it might not capture the complete depth of respondents' perception.

Conclusion

This study assesses the perception of respondents towards SHI. The perception score was examined against socio-economic and demographic factors. Mann Whitney test showed that the perception score was found to differ significantly across the categories of awareness, gender, marital status, family type, ethnicity, religion, education, and history of chronic disease of the household head. Respondents who were illiterate, female, married, from nuclear families, belonging to ethnic groups other than Brahmin/Chhetri, and practicing religions other than Hinduism exhibited a higher median perception score. Bivariate analysis showed that perception status was significantly associated with ward of residence, gender, marital status, family type, source of knowing about SHI, and awareness at 5% significance level. The log normal regression analysis demonstrated that ward of residence, awareness, source of knowing were significant predictors of perception of households towards SHI.

Conflict of Interest

The authors declare that they have no conflict of interest.

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Financial Freedom: Pathways and Challenges to Economic Empowerment

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Abstract

Financial freedom has become a crucial element of individual well-being and sustainable economic progress in today's world. It goes beyond the conventional focus on accumulating wealth, instead highlighting the importance of financial independence, adaptability, and the freedom to make choices without being limited by economic barriers. This concept paper delves into the various aspects of financial freedom by exploring its sources, forms, and broader socio-economic relevance. It draws on theoretical frameworks such as the Life-Cycle Hypothesis and Financial Capability Theory and integrates empirical insights on how financial literacy, digital financial tools, and socio-economic conditions influence financial freedom. The paper pays particular attention to the situation in developing countries like Nepal, where obstacles such as irregular income, insufficient financial education, and gender inequality continue to hinder progress. Relying on a qualitative approach and secondary data, the paper proposes practical strategies to promote inclusive financial empowerment. These include improving financial education, encouraging income diversification, broadening access to financial services, and filling existing policy gaps. Ultimately, financial freedom is not just a personal milestone but a shared objective that can strengthen economic resilience, enhance mental health, and support sustainable development.

Keywords: *Financial Freedom, Economic Empowerment, Financial Literacy, Income Diversification, Digital Inclusion, Policy Reform.*

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Background

Finance is a field that focuses on the planning, management, and effective use of monetary resources within individual, corporate, and governmental settings. It involves essential activities such as budgeting, saving, investing, borrowing, and financial forecasting to achieve efficient and beneficial financial outcomes (Brigham & Houston, 2019). Through informed decision-making, finance contributes significantly to the equitable allocation of resources and promotes economic stability and development (Brealey, Myers, & Allen, 2020).The discipline is typically categorized into personal finance, corporate finance, and public (Fabozzi & Peterson Drake, 2009). In an increasingly interconnected and technologically driven world, financial literacy and strategic financial planning have become more crucial than ever (Lusardi & Mitchell, 2014). In this context, financial freedom has emerged as a key pillar of personal development and economic empowerment. It refers to the state in which individuals can meet their needs, pursue life goals, and make autonomous choices without being constrained by financial stress. More than just wealth accumulation, financial freedom now includes debt management, time autonomy, and investment capacity (Lusardi & Mitchell, 2014).

Global transformations—driven by digital innovation, escalating living costs, and widening income inequality—have reshaped what it means to achieve financial independence (OECD, 2020). Major economic disruptions, such as the 2008 global financial crisis and the COVID-19 pandemic, exposed the vulnerability of financial systems

and underscored the importance of income diversification and digital accessibility (Demirgüç-Kunt, Klapper, Singer, Ansar, & Hess, 2022).

In developingcountries like Nepal, barriers such as a largely informal job market, limited financial literacy, and deep-rooted socio-cultural norms continue to obstruct individuals' paths to financial autonomy (Pant, 2021). However, the growing adoption of mobile banking, financial technology (fintech), and increasing public awareness about financial tools present promising opportunities for empowerment (World Bank, 2022).Therefore, advancing financial freedom is not only critical for individual well-being but also for ensuring inclusive and resilient economic growth.

Concept of Financial Freedom

The concept of financial freedom is gaining prominence in the realm of both personal and global finance. Rather than simply accumulating wealth, it emphasizes the ability to manage finances wisely, make independent choices, and live without ongoing financial stress. Financial freedom enables individuals to achieve personal aspirations—whether it's retiring early, changing careers, starting a business, traveling, or investing in personal growth—without being hindered by monetary constraints(Lusardi & Mitchell, 2014).

Amid rising living expenses, unstable job markets, and recurring economic shocks, the desire for financial freedom has become increasingly relevant. This aspiration is especially prominent among youth and middle-income populations, who are acutely aware of the need for financial independence due to uncertain job opportunities and limited access to social protection systems (OECD, 2020).The COVID-19 crisis further underscored these challenges, revealing the risks of depending solely on one source of income. The widespread loss of jobs and income reductions during the pandemic highlighted the urgent importance of having emergency savings, generating passive income, and engaging in long-term financial planning (Demirgüç-Kunt, Klapper, Singer, Ansar, & Hess, 2022).

Crucially, financial freedom does not depend solely on high income or accumulated wealth. Instead, it stems from intentional and informed financial practices—such as financial literacy, regular saving, diversified investment strategies, and careful spending habits (Hilgert & Hogarth, 2003).Individuals with modest incomes can achieve financial autonomy by budgeting effectively, making sound investment choices, avoiding excessive debt, and preparing for future financial uncertainties.

In this regard, financial literacy serves as a cornerstone. A solid understanding of core financial concepts—like compound interest, inflation, credit management, and investment risk—is essential for making sound financial decisions. Without this foundational knowledge, even those with high earnings may mismanage their finances, potentially leading to long-term instability and insecurity (OECD, 2020), (Demirgüç-Kunt, Klapper, Singer, Ansar, & Hess, 2022).

This paper delves deeply into the concept of financial freedom to offer a structured framework that can inform individuals, educators, and policymakers. By analyzing the sources, categories, and barriers to financial independence—particularly within the context of developing nations like Nepal—it highlights how a combination of systemic reform and personal responsibility can lead to enhanced financial well-being and decreased economic vulnerability over time (Garman & Forgue, 2018).

Sources of Finance for Financial Freedom

It takes a variety of carefully managed funding sources to reach financial independence. These resources offer both active and passive revenue streams, which support stability and long-term economic independence.

Employment Income

For most individuals, income earned through employment remains the principal and most dependable source of personal finance. This typically includes regular salaries, hourly wages, performance-based bonuses, and other job-related perks or benefits such as health insurance or retirement contributions. Such income plays a foundational role in managing daily financial responsibilities—ranging from paying for essentials like housing,

food, and transportation to facilitating long-term goals such as saving for emergencies, investing, or retirement planning. Due to its consistent nature, employment income often serves as the baseline upon which personal budgets are created and financial security is built(Hilgert & Hogarth, 2003).

Business and Self-Employment

Engaging in entrepreneurship or freelance work empowers individuals to take direct control over their sources of income. Unlike traditional employment, these avenues offer significant flexibility—allowing people to choose their work schedules, clients, and projects. Additionally, self-employment provides opportunities for income scalability, meaning earnings can increase based on effort, innovation, and market demand. Although it comes with higher risks—such as income instability, lack of employment benefits, and the need to manage one's own taxes and business operations—self-employment can also result in greater financial rewards and independence over time. For many, the trade-off between risk and autonomy is worthwhile, especially when paired with strong business acumen and a clear value proposition(U.S. Bureau of Labor Statistics, 2021)(OECD, 2020).

Investments

Investing in assets such as stocks, bonds, mutual funds, and real estate is a powerful way to generate passive income—money earned with little to no ongoing effort. This form of income is a cornerstone of financial independence, as it allows individuals to earn beyond their active labor. Unlike employment income, which requires continuous work, passive income from well-chosen investments can continue to grow and provide returns over time. Strategic investments not only help diversify income sources but also reduce financial reliance on a single job or source of income. Over the long term, these investments can lead to substantial wealth accumulation, especially when compounded over years. By carefully managing risks and staying informed, individuals can use investments to secure their financial future and enjoy greater autonomy in their financial decisions(Investopedia),(U.S. Securities and Exchange Commission).

Savings and Interest

Savings accounts, certificates of deposit (CDs), and fixed deposits are low-risk financial instruments that play a crucial role in ensuring financial security. These options, though generally offering modest returns compared to high-risk investments, provide stability and predictable growth through interest earnings. They are especially valuable during times of economic uncertainty, acting as financial cushions that individuals can rely on for emergency needs or unforeseen expenses. Maintaining such savings not only fosters disciplined financial habits but also enhances overall financial resilience by ensuring liquidity and reducing the need for high-interest borrowing during crises. For those beginning their financial journey or seeking a conservative approach, these tools serve as foundational components of a well-balanced financial strategy(Investopedia)(U.S. Securities and Exchange Commission).

Pension Funds and Retirement Accounts

Retirement-oriented financial tools—such as provident funds, individual retirement accounts (IRAs), and pension schemes—are essential for ensuring financial stability and income continuity in the post-retirement phase of life. These long-term savings mechanisms are specifically designed to help individuals accumulate wealth gradually throughout their working years, providing a reliable source of income when they are no longer actively employed. By consistently contributing to these plans, individuals can benefit from compound interest, tax advantages, and in some cases, employer matching contributions. These instruments not only reduce the financial burden during old age but also support a sense of independence and dignity by lessening reliance on family or public support systems. Incorporating retirement planning early in life is a key aspect of achieving financial freedom and preparing for unforeseen health or living expenses in later years(Investopedia)(OECD, 2021).

Inheritance and Trust Funds

While not universally available, inheritance and trust funds can play a powerful role in shaping an individual's financial path. These forms of wealth—often passed down through generations—can provide a substantial financial head start, enabling beneficiaries to bypass certain economic hurdles that others may face. When managed responsibly, such assets can be leveraged for long-term investments, education, entrepreneurship, or home ownership, all of which can significantly accelerate the journey toward financial independence. However, the impact of inheritance depends greatly on financial literacy and sound decision-making, as mismanagement can quickly erode even substantial inheritances. Despite being a privilege not afforded to all, generational wealth through inheritance or trusts remains a key driver of financial security and upward mobility for those who receive it(Investopedia), (Kochhar, Moslimani, & Arditi, 2023).

Objectives of the Paper

1. To define and conceptualize financial freedom within the framework of personal finance and economic empowerment.
2. To identify and analyze the key sources of finance that contribute to achieving financial independence.
3. To examine the major challenges and socio-economic barriers individuals face in attaining financial freedom.
4. To propose practical strategies and policy recommendations for enhancing financial literacy and promoting inclusive financial empowerment.

Significance of the Study

Financial freedom is not just a personal goal but a public good that can enhance economic productivity and social well-being. Its significance includes:

- Financial freedom encourages individuals to make life decisions independently, such as choosing a career path, pursuing education, or making lifestyle changes, without being constrained by financial limitations.
- When individuals attain financial freedom, they are more likely to invest in productive ventures, start businesses, and create employment opportunities, thereby contributing to broader economic development.
- Through disciplined saving, budgeting, and long-term financial planning, people can break the cycle of poverty and build sustainable economic security for themselves and their families.
- Financial stress is one of the leading causes of anxiety and depression, and achieving financial freedom helps reduce this burden by fostering a sense of stability and control over one’s future.
- Financial freedom plays a crucial role in guiding governments and NGOs to design targeted financial literacy, inclusion, and empowerment programs that address systemic economic challenges and promote equitable growth

Theoretical Review

Life-Cycle Hypothesis (LCH)

Proposed by economists Franco Modigliani and Richard Brumberg in 1954, the Life-Cycle Hypothesis posits that individuals aim to optimize their consumption and savings over the course of their lives. Rather than spending based solely on current income, people strategically save during their working years and dissave (or draw down their savings) in retirement to maintain a stable standard of living. This theory underscores the importance of long-term planning and financial foresight, which are critical components of financial freedom, especially in later stages of life(Modigliani & Brumberg, 1954)

Permanent Income Hypothesis (PIH)

Formulated by Milton Friedman in 1957, the Permanent Income Hypothesis argues that people base their consumption decisions not on their immediate income, but on an estimation of their average lifetime income—what Friedman termed "permanent income." This concept explains why individuals may continue spending consistently

during temporary income fluctuations, and highlights the value of stable long-term financial expectations. It aligns well with financial freedom strategies, as it encourages individuals to think beyond short-term gains and manage finances based on anticipated long-term income(Friedman, 1971).

Financial Capability Theory

Developed by Michael Sherraden in 2010, the Financial Capability Theory highlights that achieving financial well-being depends on both individual financial knowledge and the systemic availability of financial tools and services. According to Sherraden, true financial capability combines ability (knowledge and skills) with opportunity (access to financial products and institutions). This theory is particularly relevant for developing contexts where access to services may be limited. Building financial capability enables individuals to make informed financial choices, which is a foundational step toward achieving sustainable financial freedom(Walstad, Rebeck, & Rebeck, 2010).

Empirical Review

Lusardi and Mitchell (2014) found that individuals with higher financial literacy were more likely to engage in prudent financial behaviors such as consistent saving and proactive retirement planning. These behaviors were identified as fundamental pillars of long-term financial independence. Their research highlighted that understanding key financial concepts—such as interest compounding, inflation, and risk diversification—greatly enhanced individuals' ability to make informed economic decisions over their lifetimes(Lusardi & Mitchell, 2014).

Atkinson and Messy (2012) emphasized that several socioeconomic factors—including income level, educational attainment, and access to formal financial services—played significant roles in shaping an individual's ability to attain financial freedom. Their study demonstrated that individuals with limited education or income often lacked the tools and opportunities to save, invest, or plan financially, which further widened inequality(Atkinson & Messy, 2021).

According to OECD (2013), women—particularly in developing countries—faced greater structural and cultural barriers to achieving financial freedom. These challenges included restricted access to financial institutions, lower levels of financial literacy, and limited involvement in household financial decision-making. The report highlighted the need for gender-sensitive financial education and inclusive policies to bridge the gap(OECD, 2013).

In a more recent study, Demirgüç-Kunt et al. (2022) reported that the expansion of digital financial services—such as mobile banking, online lending platforms, and e-wallets—had significantly contributed to improving financial inclusion. These innovations proved especially beneficial in underserved or rural regions, where access to traditional banking was limited. Their findings indicated that digital finance empowered users by offering secure, affordable, and convenient tools for saving, borrowing, and investing(Demirgüç-Kunt, Klapper, Singer, Ansar, & Hess, 2022).

Methodology

This concept paper employs a qualitative research approach grounded in a review of secondary data sources such as academic journals, policy documents, financial publications, and reputable online platforms. It utilizes a conceptual framework that connects financial literacy, income diversification, saving habits, and access to financial services with economic freedom. The study uses descriptive and thematic analysis techniques to organize findings from existing literature and offer actionable recommendations.

Types of Financial Freedom

Basic Financial Security

This foundational level of financial freedom entails the ability to cover essential living expenses—such as food, shelter, clothing, utilities, basic healthcare, and transportation—without relying on debt or external assistance. It ensures that individuals have a predictable income stream capable of managing both expected and unforeseen financial needs. Attaining this level lays the groundwork for higher levels of financial independence and protects

individuals from economic vulnerability(Consumer Financial Protection Bureau).

Debt-Free Living

Achieving a state free from high-interest and unsecured debt (e.g., credit card balances, payday loans, or informal borrowings) is a critical milestone in financial freedom. Being debt-free not only alleviates mental and emotional stress but also enables individuals to redirect income toward wealth-building avenues like savings and investments. This stage strengthens one's financial decision-making ability and fosters long-term stability(National Foundation for Credit Counseling).

Investment Capacity

Investment freedom is marked by the financial capacity to channel surplus income into diverse asset classes such as stocks, bonds, mutual funds, real estate, or business ventures. At this stage, individuals are not just saving money but actively growing their wealth. Investment not only enhances future financial security but also cushions against inflation and economic downturns, contributing to broader financial resilience(Investopedia).

Retirement Readiness

This level is reached when individuals can maintain their desired lifestyle after exiting the workforce, supported by passive income sources such as pensions, rental income, dividends, or retirement savings. Retirement freedom eliminates dependency on employment income, allowing people to focus on personal development, hobbies, health, or family during later life stages. It reflects thorough long-term financial planning(OECD).

Time Autonomy (Time Freedom)

The most advanced and holistic form of financial freedom is time freedom—the liberty to decide how to spend one's time without being bound by economic obligations. Individuals at this stage are not compelled to take jobs or work excessive hours for survival. Instead, they can prioritize activities that bring joy, purpose, or fulfillment, such as volunteering, travel, or creative pursuits. This state represents the convergence of financial independence, mental well-being, and life satisfaction(Harvard Business Review, 2019).

Challenges of Economic Freedom

There are many challenges of Economic Freedom which includes

- *Lack of Financial Education:* One of the primary obstacles to attaining economic freedom is the widespread lack of financial education. Many individuals have limited understanding of essential concepts like budgeting, saving, investing, and debt management. This knowledge gap increases their susceptibility to poor financial decisions and exploitation by predatory financial services.
- *Income Instability:* A significant number of people working in informal employment, freelancing, or running small businesses experience unstable and unpredictable earnings. This income volatility makes it challenging to plan for the future, establish emergency savings, or invest consistently—ultimately delaying or derailing financial independence.
- *High Cost of Living:* Urban growth, inflation, and increasing costs of basic services like housing, healthcare, and education greatly reduce disposable income. As a result, individuals often prioritize immediate necessities over saving or investing, making it harder to progress toward long-term financial goals.
- *Consumerism and Debt Culture:* Contemporary society often equates material consumption with status and success. Influences from advertising, social media, and peer pressure encourage people to spend beyond their means. This behavior frequently leads to overreliance on credit and loans, resulting in a cycle of debt and financial anxiety.
- *Gender and Social Barriers:* Contemporary society often equates material consumption with status and success. Influences from advertising, social media, and peer pressure encourage people to spend beyond their

means. This behavior frequently leads to overreliance on credit and loans, resulting in a cycle of debt and financial anxiety

- *Policy Gaps:* Weak government policies and the absence of inclusive financial programs further inhibit economic freedom. Without robust support for financial literacy, microfinance services, and consumer protection laws, disadvantaged populations often remain excluded from the formal financial system.

Conclusion

This paper views financial freedom not merely as the accumulation of wealth, but as the capacity to make independent financial choices, manage resources effectively, and secure long-term economic stability. The analysis reveals that key contributors to financial independence include income from employment, entrepreneurship, investments, savings, and retirement funds. However, access to these avenues is often constrained by structural and socio-economic barriers.

Major obstacles—such as inadequate financial literacy, irregular income, high costs of living, reliance on debt, and persistent gender inequalities—are particularly prominent in developing contexts like Nepal. These challenges hinder individuals from engaging fully with the formal financial system and restrict their ability to attain economic self-sufficiency.

The study emphasizes that financial freedom is attainable through deliberate interventions, including financial education programs, diversified income opportunities, expanded digital financial services, and inclusive policy reforms. Providing marginalized populations—especially women—with the tools and knowledge to navigate financial systems can build resilience and contribute to overall economic progress.

In summary, financial freedom is both a personal pursuit and a collective responsibility. Achieving it requires a coordinated approach that combines individual effort with supportive systems. The paper advocates for joint action by individuals, policymakers, and financial institutions to turn the vision of inclusive financial empowerment into a tangible and equitable reality.

Recommendations

1. Incorporating personal finance topics into school and university curricula is essential to equip individuals with practical money management skills from an early age, fostering long-term financial responsibility.
2. Encouraging entrepreneurship, freelance work, and accessible investment options can help individuals build multiple income sources, enhancing financial security and reducing dependence on a single livelihood.
3. Governments and financial institutions should offer tax incentives and simplify access to safe, reliable investment platforms to motivate individuals to save and invest regularly.
4. Expanding banking services and promoting digital financial tools—especially in remote and underserved regions—can improve financial inclusion and ensure broader access to essential financial resources.
5. Developing inclusive financial products and delivering tailored financial literacy programs can help bridge the gap for women and disadvantaged groups, fostering equitable access to financial opportunities.
6. Governments should adopt robust policies that encourage inclusive economic participation while safeguarding individuals from exploitative lending practices through effective financial regulation and public awareness initiatives.

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Investor Sentiment and Market Dynamics in Nepal's Hydropower Sector

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Abstract

To the author's best knowledge, it was the first study of variables determining the investor opinion on hydropower equity in Nepal, encompassing economic, social, environmental, and technological aspects. Therefore, with the employment of the structured questionnaire and statistical analysis, the question to be answered was: which of the specified factors determine the investor opinion regarding hydropower industry the most? It appears that economic aspects were the most critical variable, while ROI and government incentives indeed affected the likelihood of a favorable opinion. Social variables, community acceptance, and corporate social responsibility relevantly grew in the existing literature, which is consistent with SRI trend. Nevertheless, it could be posited that environmental factors -practices or compliance- represent the most paramount factor. Similarly, investor perceptions are minimally affected by consideration of technological factors since integration is still at an infancy stage in the Nepal hydropower industry, hence why technological factors do not appear to have an impact. The study revealed that economic stability, social responsibility and sustainability are significant considerations in establishing investor perceptions whilst technological factors are not a significant characteristic at this stage. Overall, the implications arising from these findings are substantial for investor investors and stakeholders, including policy makers or those potentially interested in attracting investor investment into hydropower projects.

Keywords: *Investor Perception, Hydropower. Stocks, Investment, Corporate Social Responsibility.*

JEL Classification: *G11, G14, Q42*

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Introduction

Hydropower is integral to Nepal's economy and stock market; this is unsurprising as Nepal is endowed with significant water availability and a focus on developing sustainable energy sources. With Nepal's growing dependence on hydropower to meet its growing domestic electricity requirements and to secure its energy future, hydropower equities have become one of the key components of Nepal's stock market that has attracted both local and foreign investors. This section examines the multitude of factors that influence investors' perceptions of hydropower equities, specifically with respect to the stock market, economy, and regional factors in Nepal.

Nepal's economy is significantly reliant on hydropower with its role as the largest energy source and one of the top sectors on the stock exchange. Hydropower stocks are very important in seeking domestic as well as foreign investment in the Nepal Stock Exchange (NEPSE) as Nepal has approximately 83,000 MW of potential hydropower (Shrestha, 2019; Khanal, 2022). There is active trading in hydropower stocks in Nepal's financial market since the government provides subsidies as well as favorable taxation and policy (Aryal, 2022). Several factors impact investment in this sector, as they are related to variations in the economy combined with government legislations and environmental legislations as well as technological advancements (Dhakal & Acharya, 2023).

A key determinant of investor attitudes towards hydropower in Nepal is its economic viability. The attractiveness of hydropower equities is determined by the project construction costs, expected returns, and the accessibility to financing. To facilitate investments in the sector, the government of Nepal has introduced a number of incentives including tax incentives, financial assistance, and reduced regulatory barriers. However, if some investors find the overall startup costs of construction, in addition to the ongoing operating risks, to be a disincentive, the ROI still matters, and hydropower investments are deemed more secure when cash flows are steady and backed by long-term energy contracts. To continue attracting investments towards hydropower, it will need to remain competitive with respect to other renewable energy technologies such as solar and wind.

The attitudes of investors rely heavily on economic factors. According to Bhatta (2021), there was considerable investment in hydropower equities because of financial incentives related to feed-in tariffs and government-subsidized lending. Investors' confidence in hydropower equities fluctuates depending on uncertain interest rates and inflation and the resulting unpredictability in the economy (Chalise, 2020). The market value of the hydropower stocks is greatly influenced by the attraction of capital from international investors via foreign direct investment (FDI) policies and bilateral treaties (Koirala & Sharma, 2024).

Investor market sentiment is highly dependent on environmental and social factors in addition to economic factors. Hydropower facility development arises multiple environmental issues that include deforestation and habitat destruction, and the relocation of the people living there (Venus et al., 2020). The development of sediment management systems and fish-friendly turbines demonstrate how technology respond to environmental risks and promote sustainability (Gurung and Adhikari, 2023). The viability of investment in hydropower projects is heavily aided by public perceptions of these projects and local community support (Poudel, 2021).

The investors' market sentiment is greatly affected by environmental and social factors along with economic factors. The establishment of hydropower plants creates multiple environmental problems that lead to deforestation, the destruction of habitats, and the displacement of nearby residents (Venus et al., 2020). Gurung and Adhikari (2023) state that the development of environmentally friendly fish turbines, sediment management systems, and other technology-based solutions demonstrate the manner in which technology addresses environmental problems and promote sustainability. The communities' perception of these activities and their degree of support are important to the viability of investments in hydropower (Poudel, 2021).

Market conditions and regulatory policies heavily influence the attractiveness of investments in hydropower projects. Government policy through price controls, in addition to legal frameworks, influence the prospect of capital investment in hydropower projects (Shakya, & Tiwari, 2022). The financial prospects associated with these securities are directly impacted through trade agreements in hydropower and ultimately, by the geopolitical relations with Nepal and India, and China (Rai, 2023).

In light of the fast-growing hydropower expansion in Nepal, an examination of investor perceptions factors becomes important if Nepal is to sustain an investment climate. The study will consider the interface of economic factors and environmental factors, social contexts and technological market development and how these factors influence investor confidence in Nepalese hydropower stocks and provide strategic guidance for future investment and policy development. A general objective of this research is to consider the different aspects that triangulate investor perceptions on hydropower stocks in Nepal, while focusing specifically on investors who are current or potential investors in the Nepalese stock market, in particular those who are investing in hydropower stocks. The focus of the study is an examination of social, economic, environmental, and technological factors that specifically influence investor decision-making. In addition, the analysis will include an examination of the underlying factors

impacting confidence in investor decision-making regarding investing in hydropower stocks in Nepal.

This research seeks to address the fundamental dilemma of the limited understanding of the specific concerns that contribute to investor perception of hydropower stocks. Economic performance, market behavior, and environmental sustainability are seen to be significant, but we do not have a coherent understanding of what actually determines investor sentiment and behavior when it comes to investing in hydropower. Without this understanding, it is problematic for hydropower companies to attract investment and develop the hydropower sector.

Literature Review

The hydropower sector constitutes one of the primary sectors in Nepal's stock market for share trading activities and has emerged as one of the principal sectors enhancing the overall market engagements. Hydropower companies are one of the famous listings and investors buy and sell investments in the Nepal Stock Exchange (NEPSE). Unprecedented interest in hydropower stocks is largely due to Nepal's potential for developing hydroelectric power through its abundant water resources. The hydropower sector has a vital role in the electricity supply but also has a significant impact in employment, economic development and national development (Aryal, 2022).

Shrestha (2018) researched the dynamics of factors contributing to the investment decision of Nepalese investors in the stock market. The research identified key factors that drive investor perception and decisions with respect to hydropower stocks as to include the performance of a company, the state of industry information, the media, advocate recommendation, accounting information, and the similarity in self-image/firm image.

According to Jamasb et al. (2019), The renewable energy market has investments decisions that respond strongly to economic factors such as inflation or exchange rate fluctuation and interest rates. Investors see hydroelectricity stocks as long term assets which strengthen the need for policy stability to maintain confidence in the market.

Browne et al. (2021) investigated the role of environmental, social, and governance (ESG) criteria with respect to investment in hydropower projects. Their results indicate that investors prefer hydropower projects that follow sustainable guidance because they alleviate reputation risk as well as long-term financial returns. Gatzert and Kosub (2022) evaluated how energy policy at the global level effects renewable energy project investments. Their research shows that policy uncertainties specifically in developing countries, are preventing developing-country investors from committing to long-term investments in hydropower. Environmental management technologies are also very important to increase investor confidence. Sustainable innovation is shown by environmental management systems which reduce the ecological footprint of hydropower plants with fish-friendly turbines or sediment management systems. These technologies correspond with the increase demand from investors for projects that mitigate the environmental footprint of hydropower while satisfying ESG criteria. Dhakal et al. (2023) argues that projects with environmental management technologies will draw investors who care to create sustainability in addition to making money.

Hydropower firms represent a significant proportion of the market capitalization in the NEPSE and are among the most frequently traded stocks. This recognition points to the increased desire of investors to profit from Nepal's abundant hydropower potential, which is viewed as a major component of the country's renewable energy potential. Hydropower stocks are now a central focus of investors who wish to capitalize on demand for sustainable energy options (Khanal, 2022).

Research conducted by Chaudhary (2022) also highlights stock market investor behaviour with a focus on risk-taking, return, and outside influences on investing decisions. It further highlights the role of market fluctuations affecting investor confidence whilst reinforcing the need for informed decision-making to achieve financial objectives. The research provides beneficial information for both individual and institutional investors. Foreign Direct Investments (FDIs) are attracted to Nepal due to its business-friendly environment, low taxation regime, and flexible foreign investment policy especially in hydropower, manufacturing, services, tourism, construction, agriculture, and minerals. The potential of hydropower combined with Nepal's rich soils, the influx of tourists from China and India, and the outsourcing along with medical tourism industry means attracting investment is highly favorable.

Venus et al. (2020) explored the factors that determine public acceptance of hydropower, which are indirect determinants of investor confidence. The research identifies the following main factors to be important to understanding public acceptance: economic costs and benefits, quality of life impacts, ecological impact, public participation, energy policy, and individual preferences for energy.
Understanding these factors is important for investors to determine the social license and potential risks associated with hydropower project.

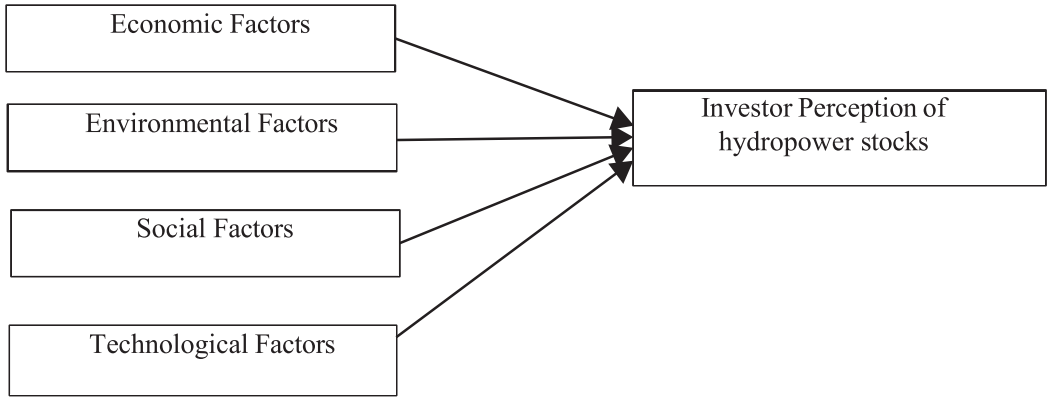
Economic Factors:
The evaluation of hydropower stocks by way of investors relies heavily on economic factors, including ROI calculations, market direction and financial benefits. As long as investors see reasonable financial returns, the hydropower project will be more appealing to them, along with government incentives, such as tax breaks and subsidies, that can also improve this project attractiveness (Aryal 2022). The measure of investor confidence is somewhat related to the financial market climate, including interest rates, as well as more general stability in economic performance, as stated by Khanal (2022).

Social Factors
The social components that influence investment attraction include community acceptance levels and stakeholder engagement and CSR activities. Public perception is vital when making investment decisions because Investor trust is heightened when stakeholders are engaged (Chaudhary, 2022). Hydropower facilities that engage community stakeholders and are design with sustainable practices through CSR initiatives will attract more investor interest.

Environmental Factors:
Investors' evaluations of hydropower stocks are based upon the environmental attributes of the platform that includes sustainability practices and regulation compliance standards. When investors assess projects, they give priority to ecologically sustainable initiatives because environmental risks cause both monetary damage and regulatory enforcement. The study by Venus et al. (2020) revealed that ecosystem effects in combination with public engagement and governmental regulations strongly affect investor trust in hydropower investments.

Technological Factors:
The combination of power-efficient technical developments and smart grid connections creates higher confidence among stock investors in hydroelectric energy businesses. According to Dhakal and Acharya (2023) sustainability gets boosted through fish- friendly turbine technology alongside sediment management systems that improve the appeal of investing in hydroelectric plants. Investor confidence for long-term project feasibility grows because of automation integration with advanced monitoring systems.

Conceptual Framework



H1: There is a significant relationship between economic factors and investor perception of hydropower stocks in Nepal.
H2: There is a significant relationship between social factors and investor perception of hydropower stocks in Nepal.
H3: There is a significant relationship between environmental factors and investor perception of hydropower stocks in Nepal.
H4: There is a significant relationship between technological factors and investor perception of hydropower stocks in Nepal.

Methodology

A descriptive and explanatory research design was adopted in this study to examine the relationship between various independent variables and the dependent variable—investor perception of hydropower stocks. The study primarily relies on primary data, which was gathered from the perspectives of investors. For this purpose, a structured questionnaire was developed and distributed through online platforms, mainly targeting respondents within the researcher's personal network. The conclusions have been drawn based on the findings from the analysis of research and appropriate recommendations has been made accordingly. Both primary well as secondary sources have been used while doing this study. The questionnaire contained close-ended questions in order to eliminate burden regarding lengthy and time-consuming response. Five points Likert-scales has been used for most of the close-ended questions so that the responses are easy and unbiased. The scores for measurement in Likert scales vary from a low of 1 indicating Strongly Disagree to a high of 5 indicating Strongly Agree. The questionnaire method is used in the current study keeping in mind the method is quicker, less time consuming and cheaper than other methods and is also easy to use in case of a large sample. Hence, making questionnaire tools is thought to be more preferable in this type of research. The study's results are solely based on the data and information provided by the sampled respondents (Taherdoost, H. 2022). The target population for this study consists of investors actively participating in the Nepalese stock market, particularly those investing in hydropower stocks. According to Hair et al. (2011), a sample size of 100-200 is sufficient for social sciences research. Therefore, the sample size 119 is taken for the purpose of study. The outcome generated from the sample is then analyzed through SPSS. Economic factors, Environmental factors, Social Factors and Technological factors are taken as independent variable whereas investment perception in hydropower stocks is taken as dependent variable for the research for which, Linear and multiple regressions have been used in the study to determine their influence on one another. As, regression analysis provides detailed insights into the slope of relationship, same has been utilized to explain the characteristics of the relationship and establish a certain prediction. The regression equation for this study is:

$IP = \alpha + \beta 1EF + \beta 2ENF + \beta 3SF + \beta 4TF + ej$

Where, ID = Investor Perception
α = Constant Term
β = Coefficient of Independent Variables
EF = Economic Factors
ENF = Environmental Factors
SF = Social Factors
TF = Technological Factors
ej = Error Terms

Results and Discussion

For the purpose of study, 119 investor answers in total were gathered. Verifying the validity of each questionnaire item is crucial before doing a thorough analysis. Model summary, descriptive, correlation, and ANOVA will be conducted for additional analysis.

Respondent's Profile Analysis

The respondent's profile analysis shows a brief about the demographic features of the investor studying about the key variables such as gender, age, education level and investment experience, determining the composition of the sample. Understanding participant characteristics and responses within the context of the study relies on the demographic data collected through profile analysis. It helps in refining insights and drawing meaningful conclusions about their perceptions and experiences. Total of 119 sample taken for the study presents a diverse population across various demographic categories and is show in in table

1. The table presents the demographic data of 119 respondents among which 71 are male representing 59.7% and 48 are female representing 40.3% of total population. The large group of population falls in between 20-30 (48.7%) followed by 31-40 (24.4%). It was observed that the population hold bachelor degree (52.1%) while 20.2 % has master's degree or higher. In terms of investment experience, the population have relatively limited experience as it shows 37.8% has experience between 1-3 years followed by 33.6% has less than 1-year experience in investing. The response has shown that there is significant investment in the hydropower as 83.2% has been investing in hydropower. The high percentage of investors in hydropower sectors reflects the growing interest and confidence in the market.

Table 1: Respondents' profile

Category	Subcategory	Frequency	Percentage
Gender	Male	71	59.7
	Female	48	40.3
Age	Below 20 years	28	23.5
	20-30 years	58	48.7
	31-40 years	29	24.4
	Above 40	4	3.4
Education Level	Intermediate or below	33	27.7
	Bachelor	62	52.1
	Masters and above	24	20.2
Investment experience	Less than 1 year	40	33.6
	1-3 years	45	37.8
	4-7 years	34	28.6
	More than 8 years	0	0
Investing in Hydropower	Yes	99	83.2
	No	20	16.8
Total		121	100

Source: questionnaire response

Reliability statistics

Reliability statistics measures the consistency of response in a dataset which ensures the survey instruments such as questionnaires produce stable and consistent results one of the most commonly used reliability measures is Cronbach's Alpha, which will assess the internal consistency of a set of items in survey. A Cronbach's Alpha value of 0.70 or higher is generally considered acceptable, suggesting that the items within the scale consistently measure the underlying construct (Field, 2013).

Table 2: Reliability Test

Cronbach's Alpha	N of Items
.953	5

Source: SPSS Software

The reliability test yielded a Cronbach's value of 0.953 for 5 items. The value of 0.953 indicates a very high level of internal consistency among the item. A value above .90 is generally considered excellent, suggesting that the items are highly consistent in measuring the construct.

Descriptive Statistics

Descriptive statistics shows the deviation of values from their mean values. To determine the true picture of the data, it is important to perform a descriptive analysis of each variable included in the study. The dataset includes responses from 119 participants, examining five variables. The mean score of 3.3235 suggest that the investor perception is moderately positive. The standard deviation of 0.90218 suggests a moderate level of variability. The investors generally have a slightly positive perception. The economic factor mean is 3.4118 which is the highest among all the variables. It indicates that investor has the greatest importance on financial and economic consideration when making investment decisions. The standard deviation is 0.84972 shows the response are relatively consistent with less variation compared to other factors. Social factors mean is 3.3193 and standard deviation of 0.86230 which is moderately influential in shaping investment perceptions. Environmental factors have a mean of 3.3319 and standard deviation of 0.87582. It indicates a moderate level of importance among investors. It shows the variability in response as it shows investor prioritizing environmental sustainability practices. Technology factors have the lowest mean (3.2710) among all the variables. It shows the technology is perceived as slightly less influential compared to economic or environmental factors. The standard deviation of technological factors has (0.91630) which shows greater variability in responses.

Table 3: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Investor perception	119	1.00	4.75	3.3235	.90218
Economic	119	1.50	4.75	3.4118	.84972
Social	119	1.00	4.75	3.3193	.86230
Environmental	119	1.00	5.00	3.3319	.87582
Technological	119	1.00	5.00	3.2710	.91630
Valid N	119				

Source: SPSS Software

Correlational Analysis

Correlation is the statistical technique that is used to determine the relationship or association between two variables. The value of coefficient of correlation ranges from +1 to -1. The direction of the relationship is indicated by the sign of the coefficient; a positive sign indicates a positive relationship and a negative sign indicates a negative relationship.

Table 4: Correlational Analysis

		Investor perception	Economic	Social	Environmental	Technological
Investor perception	Pearson Correlation	1	.789**	.767**	.801**	.744**
	Sig. (2-tailed)		.000	.000	.000	.000
Economic	Pearson Correlation	.789**	1	.812**	.850**	.824**
	Sig. (2-tailed)	.000		.000	.000	.000
Social	Pearson Correlation	.767**	.812**	1	.796**	.845**
	Sig. (2-tailed)	.000	.000		.000	.000
Environmental	Pearson Correlation	.801**	.850**	.796**	1	.802**
	Sig. (2-tailed)	.000	.000	.000		.000
Technological	Pearson Correlation	.744**	.824**	.845**	.802**	1
	Sig. (2-tailed)	.000	.000	.000	.000	

***. Correlation is significant at the 0.01 level (2-tailed).*

Source: SPSS Software

The above table shows the correlation analysis between variables. This study reveals the relationships between various factors influencing investor perception of the hydropower stock. Economic factors shows the strongest positive correlation with the investor perception (0.789) which indicates the financial consideration significantly impact investment decisions. Social factors (0.767) and environmental factors (0.801) exhibits strong positive correlation. It shows that investors consider social and environmental aspects when making the investment choices. Technological factors also show positive correlated with the investment perception. It highlights the role of technological advancement in shaping investor confidence

Model Summary

The model summary shows a framework of how dependent variables are explained by an independent variable in regression analysis. The model summary provided in the table outlines the results of a regression analysis. It shows the relationship between a dependent variable and one or more independent variables. The R value represents the correlation coefficient. The R value is 0.839 which suggests a strong positive correlation which means that as the independent variable increase the dependent variable tends to increase as well. The adjusted R Square of 0.693 indicates that 69.3% of the variance in the dependent variable is accounted by the independent variables. This provide a more accurate measure of the proportion of variance in the dependent variable that is explained by the independent variables. The standard error of the estimate value measures the standard deviation of the residuals or prediction errors in the regression model. A lower standard error indicates the model predication are closer to actual values. The R Square Change of 0.704 for model shows a significant improvement in the model's explanatory power when the predictors are included. The F change value tests whether the inclusion of independent variables significantly improves the model compared to a model with no predictors. The significant F change value of .000 shows that the model is statistically significant which means that the independent variables collectively have a significant impact the independent variable.

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.839a	.704	.693	.49961	.704	67.693	4	114	.000

a. Predictors: (Constant), Technological, Environmental, Social, Economic

Source: SPSS Software

ANOVA

A statistical technique called ANOVA (Analysis of Variance) compares the means of two or more groups to see whether there are any notable differences between them. Examining variation among groups aids in analyzing how one or more independent factors affect a dependent variable.

Table 6: Anova Table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	67.588	4	16.897	67.693	.000b
	Residual	28.456	114	.250		
	Total	96.044	118			

a. Dependent Variable: Investor perception

b. Predictors: (Constant), Technological, Environmental, Social, Economic

Source: SPSS Software

The Regression Sum of Squares is 67.588, which represents the variation explained by the regression model. The Residual Sum of Squares is 28.456 which represents the unexplained variation or the error term showing how much of the variation is not explained by the model. Df shows the degree of freedom where Regression (4) is the

number of independent variable and Residual df (114) means total number of observations minus the number of predictors minus 1. The regression Mean square is 16.897 which is the average amount of variation explained by the predicators. The F statistics is 67.693, it is the ratio of the explained variance to the unexplained variable. A higher F-value indicates a better fit of the model suggesting that the independent variable explains the dependent variable well. The significance value is 0.00 which indicates the p- value. It is less than 0.05 suggesting that the regression model is significant between independent variables and dependent variable.

Regression Coefficient

Regression coefficient provides detailed information about the influence of each independent variable on the dependent variable in a regression model. The Table displays both unstandardized and standardized coefficients and statistical tests that assess the significance of each independent variable.

Table 7: Regression coefficient

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.202	.197		1.025	.307
	Economic	.269	.118	.253	2.275	.025
	Social	.242	.110	.231	2.195	.030
	Environmental	.372	.108	.361	3.440	.001
	Technological	.049	.107	.050	.458	.648

a. Dependent Variable: Investor perception

Source: SPSS Software

The B in unstandardized coefficients represents the change in the dependent variable for every one-unit change in the independent variable, while keeping other variable constant. The constant (0.202) is the intercept representing the predicted value of investor perception when all independent variable is zero (not statistically significant. P=0.307). Economic factors (0.269) show a positive effect on investor perception with a p-value of 0.025 making is statistically significant. Social factors (0.242) also have a positive effect with a p-value of 0.030 making it statically significant. The Environmental (0.372) has the largest effect with a p-value of 0.001 confirming its high statistical significance and strong positive influence on investors perception. The technological factor (0.049) has a small effect with a p-value of 0.648 indicating it is not statistically significant. The Beta values in the standardized coefficients show the relative importance of each independent variable. The highest Beta value is for Environmental (0.361) which means it has the strongest effect on investor perception. The T-value tests whether each coefficient is significantly different form zero. Higher t-values indicates stronger relationships. The Sig values indicate the statistical significance of each predictor. A p-valueless than or equal to 0.05 means the predictor significantly affects the investor perception. The analysis shows that environmental, social and economic factors significantly influence investor perception, with the Environmental factors having the strongest effect while Technological Factors do not significantly impact investor perception in this model.

Discussion and Conclusion

Discussion

The research investigated what elements determined Nepalese investors' attitudes toward hydropower stock purchasing with special attention given to economic and social aspects along with environmental concerns and technological considerations. Investor perception

towards hydropower stocks in Nepal depends heavily on economic elements and social aspects as well as environmental factors but technological considerations have proven insignificant.

Investors base their view of hydropower stocks in Nepal on economic return on investment (ROI) and marketplace dynamics together with government support. Similar to Aryal (2022) and Khanal (2022) studies the hydropower

sector requires financial returns and economic stability to draw investor investments. The study findings show how economic factors with a positive link of (0.789) demonstrate that market performance together with financial incentives determine investment decision-making. Investor reactions to social factors are determined by how the community perceives projects and how companies implement corporate social responsibility efforts.

The results match those presented by Chaudhary (2022) who showed that public engagement alongside stakeholder interaction determines how investors choose their targets. The upward association between 0.767 demonstrates that financiers now inspect how hydropower initiatives affect society because social investment trends are expanding. Investors hold the strongest perceptions regarding environmental aspects including sustainability practices and regulatory compliance. Venus et al. (2020) proved environmental risks alongside public engagement as vital influences that impact investor confidence levels. Investor interest was highest in projects that had the greatest amount of environmental criteria because this criteria would lower operational risks while enhancing project sustainability.

The regression analysis also verified investor perception is more heavily influenced by environmental, economic, and social factors in comparison to technological factors that weigh less statistically. This doesn't mean investors removed technology from the decision-making process, but technology is not the primary lenses. After analyzing from an ANOVA perspective, results suggest there is a strong model fit and also adds validity to the analysis validity.

Conclusion

This research explored what affects investor perceptions toward hydropower stock purchases in Nepal through its examination of economic aspects and social elements and environmental

aspects and technological elements. The research indicates economic variables together with social elements and environmental criteria greatly affect investor perception but technological aspects produce no notable effects. Economic factors gained the highest weight because return on investment (ROI) and how market conditions and government incentives influence investment decisions.

Social factors together with community acceptance, and corporate social responsibility (CSR) practices demonstrate a significant role in investment decisions because they represent the growing trend of socially responsible investing. Investor perceptions strongly correlate with environmental factors that cover sustainability practices and regulatory compliance requirements because they guarantee project sustainability.

Investor perception towards technology innovations showed no significant change because Nepalese hydropower sector's technological advancement remained primitive. Investors do not appear to make their decisions based on technology features at present.

The research demonstrates that investors fundamentally base their perception on three critical elements including economic stability and social responsibility as well as environmental sustainability. The attraction of more investments depends on policymakers and industry stakeholders who should implement improved financial schemes and maintain local community relations while maintaining strict environmental standards. Research focusing on investment perception shifts because of technological advancements should be conducted to understand the maturation process of this sector.

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Modified Logistic Lomax Distribution: Model, Properties, Simulation, and Application to real dataset

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Abstract

We have introduced Modified Logistic Lomax (MLL) Distribution Modifying the Logistic Lomax model. Modification of the model makes it to give different shaped density curve and hazard rate curves enabling model more flexible and suitable for various type of the datasets. Study of various statistical properties and Simulation study is performed. The MLL model is more useful for real datasets where classical probability models do not analyze the dataset appropriately. Maximum likelihood estimation (MLE), Least square estimation (LSE) and Cramer-von Mises methods (CVM) are used for parameter estimation and consistent results of the parameters are seen. Information criterion and graphical approach demonstrate the superiority of the model over some probability models. The MLL model may be helpful for the researcher to know the formulation of the new probability model and its application for real data analysis. All the computation analysis is performed using R programming.

Keywords: *Estimation, Model formulation, Simulation, Statistical properties.*

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Introduction

Probability distribution is one of the basic statistical tools for the modern education and inference. In overall the field of life, probability distribution play crucial and decision level role. In literature, there are different significantly powerful probability distributions and has been helping in decision making, forecasting and simulation etc. In modern age, there are many data sets that cannot be fully captured by the classical models and cannot give the accurate analysis. To fulfill this gap, researchers have been formulating different new probability models that capture datasets more precisely. There are various methods of designing the classical model. Modification of the classical model by altering the position of the variables and parameter is one of the methods of getting new probability model. In some cases, we add some extra parameters to the original models to get more flexible model. In literature we can find various modification of the logistic distribution. Windarto et al. (2018) introduced a new modified logistic model by modification of classical logistic differential equation. The Richard model (Richard,

1959) is modification of the logistic growth model. Telee et al. (2023) inversed the variable to get the Modified Inverse Lomax distribution which is very flexible in real data analysis. Lemonte & Cordeiro (2013) modified Lomax to design extended Lomax distribution. Chaudhary et al. (2022) modified Lomax distribution to generate the Inverse exponentiated Odd Lomax Exponential distribution. This study formulates a new probability model by Modifying the Logistic Lomax distribution (Chaudhary & Kumar, 2020) using Lomax distribution as baseline distribution.

The cdf of the Logistic Lomax distribution is given by equation (1)

$$F(x,\alpha,\beta,\lambda)=1-\frac{1}{1+\left((1+\beta x)^{\lambda}-1\right)^{\alpha}},x>0,(\alpha,\beta,\lambda)>0 \qquad (1)$$

We have modified this model taking βx = eβx to introduce modified Logistic Lomax distribution. The cdf and pdf of the MLL are given by equation (2) and equation (3)

$$F(x,\alpha,\beta,\lambda)=1-\frac{1}{1+\left[\left(1+\beta e^{\lambda x}\right)-1\right]^{\alpha}};x>0,(\alpha,\beta,\lambda)>0 \qquad (2)$$

$$f(x,\alpha,\beta,\lambda)=2\alpha\lambda\beta e^{\lambda x}\left(1+\beta e^{\lambda x}\right)\left(\left(1+\beta e^{\lambda x}\right)^{2}-1\right)^{\alpha-1}\left(1+\left(\left(1+\beta e^{\lambda x}\right)^{2}-1\right)^{\alpha}\right)^{-2},x>0 \qquad (3)$$

Survival function of the model which gives the probability of the survival beyond the time x is expressed in by equation (4)

$$S(x,\alpha,\beta,\lambda)=\left(1+\left(\left(1+\beta e^{\lambda x}\right)^{2}-1\right)^{\alpha}\right)^{-1},x>0,(\alpha,\beta,\lambda)>0 \qquad (4)$$

Hazard rate which is the instantaneous failure rate of the MLL distribution is expressed by equation (5)

$$h(x)=2\alpha\lambda\beta e^{\lambda x}\left(1+\beta e^{\lambda x}\right)\left(\left(1+\beta e^{\lambda x}\right)^{2}-1\right)^{\alpha-1}\left(1+\left(\left(1+\beta e^{\lambda x}\right)^{2}-1\right)^{\alpha}\right)^{-1},x>0 \qquad (5)$$

The density plots and hazard rate plots for different sets of parameters are displayed in figure 1. Figure on left panel demonstrate different shaped and different natured density plot. Similarly, in right panel of Figure 1, is the hazard rate plots for five sets of parameters. These variation in shape of density and hazard rate curves confirms the flexibility of MLL for capturing different natured datasets.

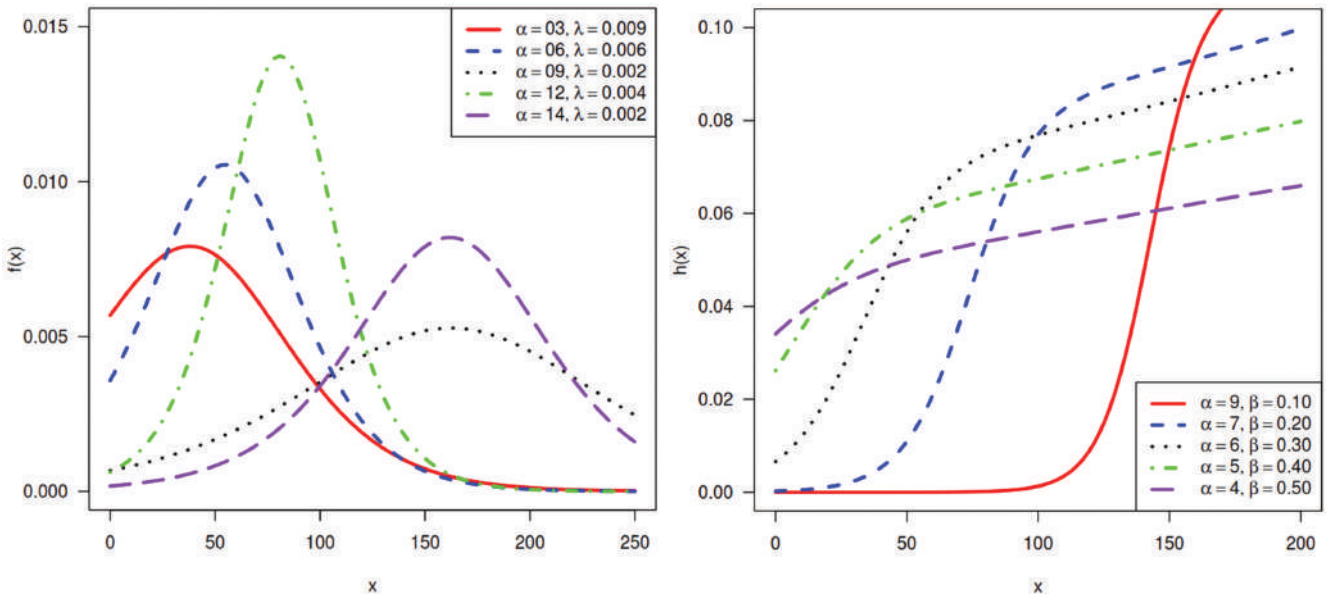

Figure 1: Density plots for β = 0.3 (left) and hazard rate plots for λ = 0.05 (right)

Quantile function

Quantile function generates quantile values which are essential for obtaining the theoretical quantiles. Theoretical quantile is used here to plot the Q-Q plot which helps to test the model validation graphically.

$$Q(p,\alpha,\beta,\lambda)=\frac{1}{\lambda}\ln\left[\frac{1}{\beta}\left(\sqrt{1+\left(\frac{p}{1-p}\right)^{1/\alpha}}-1\right)\right];0<p<1$$

Random Number of Generation

Random Number of Generation which helps to generate data sets following a particular model of the MLL model is given by equation (6)

$$X=Q(U,\alpha,\beta,\lambda)=\frac{1}{\lambda}\ln\left[\frac{1}{\beta}\left(\sqrt{1+\left(\frac{U}{1-U}\right)^{1/\alpha}}-1\right)\right];0<U<1 \qquad (6)$$

Simulation Study

The simulation study demonstrates the performance of maximum likelihood estimation for the proposed distribution. Simulation study for α =1, β =1, and λ = 1 demonstrate the gradual decrease in bias and MSE. As sample size increases from 50, 70, 90, …, 990, bias and MSE tends to zero indicating better fitting of the model.

Table 1: Simulation study for α =1, β =1, and λ = 1

n	α	α_bias	α_MSE	β	β_Bias	λ	λ_bias	λ_MSE
50	3.07	2.07	49.58	4.7	3.7	1.56	0.56	2.25
70	3.67	2.67	58.91	3.03	2.03	1.38	0.38	1.96
90	2.55	1.55	30.34	3.59	2.59	1.51	0.51	2.05
110	1.86	0.86	13.39	2.46	1.46	1.35	0.35	1.28
130	2.05	1.05	20.15	1.82	0.82	1.29	0.29	1.17
150	2.03	1.03	13.91	1.72	0.72	1.21	0.21	0.93
170	1.86	0.86	12.54	1.85	0.85	1.15	0.15	0.75
190	1.47	0.47	5.60	1.51	0.51	1.18	0.18	0.57
210	1.36	0.36	1.86	1.3	0.3	1.11	0.11	0.46
230	1.71	0.71	7.74	1.28	0.28	1.08	0.08	0.44
250	1.46	0.46	6.77	1.84	0.84	1.21	0.21	0.78
270	1.47	0.47	2.93	1.16	0.16	1.04	0.04	0.29
290	1.37	0.37	2.59	1.24	0.24	1.11	0.11	0.34
310	1.32	0.32	2.51	1.11	0.11	1.04	0.04	0.24
330	1.24	0.24	2.3	1.23	0.23	1.15	0.15	0.35
350	1.22	0.22	0.91	1.36	0.36	1.08	0.08	0.37
370	1.10	0.1	0.31	1.12	0.12	1.08	0.08	0.18
390	1.10	0.1	0.32	1.16	0.16	1.09	0.09	0.22
410	1.25	0.25	0.94	1.06	0.06	0.99	-0.01	0.16
430	1.24	0.24	0.64	1.10	0.10	1.01	0.01	0.21
450	1.10	0.10	1.19	1.18	0.18	1.12	0.12	0.21
470	1.05	0.05	0.20	1.17	0.17	1.10	0.10	0.19
490	1.04	0.04	0.16	1.14	0.14	1.10	0.10	0.18
510	1.20	0.20	1.16	1.05	0.05	1.00	0.00	0.13
530	1.06	0.06	0.31	1.12	0.12	1.08	0.08	0.14
550	1.08	0.08	0.17	1.06	0.06	1.04	0.04	0.11
570	1.14	0.14	0.24	1.05	0.05	1.00	0.00	0.13

n	α	α_bias	α_MSE	β	β_Bias	λ	λ_bias	λ_MSE
590	1.05	0.05	0.12	1.08	0.08	1.05	0.05	0.11
610	1.05	0.05	0.15	1.08	0.08	1.07	0.07	0.12
630	1.09	0.09	0.17	1.06	0.06	1.03	0.03	0.12
650	1.08	0.08	0.15	1.07	0.07	1.04	0.04	0.11
670	1.09	0.09	0.18	1.09	0.09	1.04	0.04	0.14
690	1.06	0.06	0.14	1.08	0.08	1.05	0.05	0.12
710	1.07	0.07	0.13	1.07	0.07	1.04	0.04	0.11
730	1.09	0.09	0.18	1.06	0.06	1.03	0.03	0.1
750	1.04	0.04	0.1.0	1.05	0.05	1.03	0.03	0.07
770	1.03	0.03	0.12	1.09	0.09	1.07	0.07	0.11
790	1.04	0.04	0.11	1.07	0.07	1.04	0.04	0.09
810	1.03	0.03	0.09	1.06	0.06	1.04	0.04	0.07
830	1.08	0.08	0.12	1.05	0.05	1.02	0.02	0.1
850	1.09	0.09	0.11	1.02	0.02	0.99	-0.01	0.07
870	1.11	0.11	0.15	1.01	0.01	0.99	-0.01	0.08
890	1.08	0.08	0.13	1.04	0.04	1.02	0.02	0.08
910	1.04	0.04	0.08	1.04	0.04	1.03	0.03	0.07
930	1.06	0.06	0.13	1.05	0.05	1.02	0.02	0.08
950	1.06	0.06	0.1	1.04	0.04	1.01	0.01	0.08
970	1.00	0	0.07	1.07	0.07	1.05	0.05	0.06
990	1.02	0.02	0.10	1.07	0.07	1.05	0.05	0.09

Figure 2-4 demonstrate the bias, MSE and convergence probability of 95% CI interval

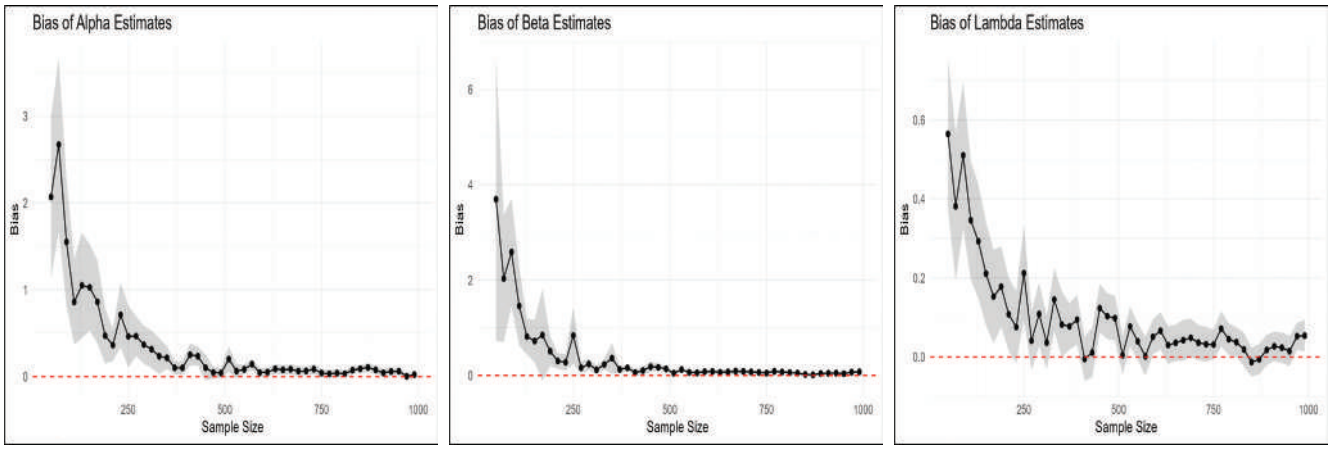

Figure 2: Bias of Parameter Estimates

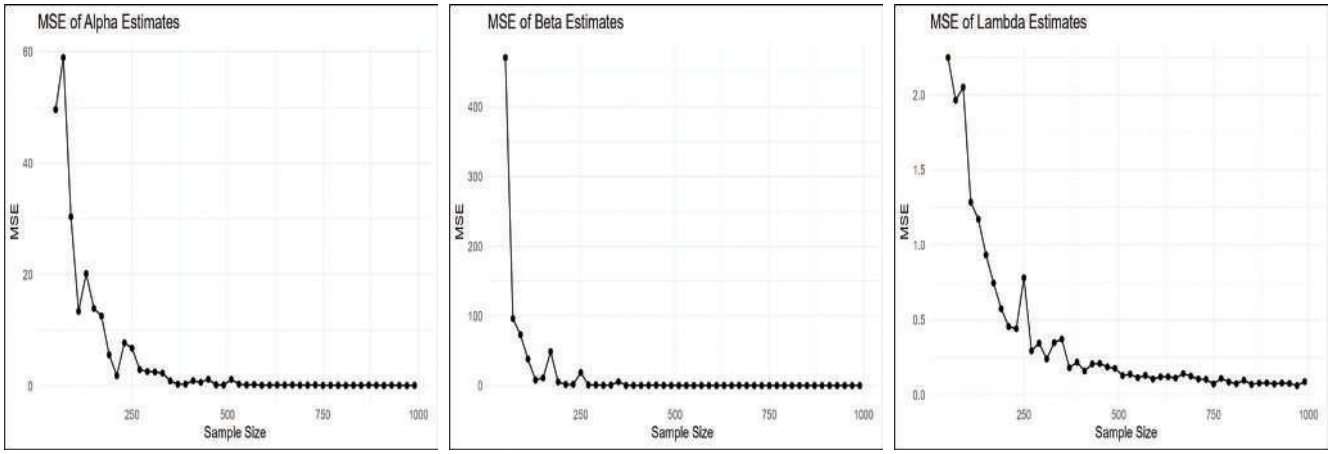

Figure 3: Mean Squared Error of Parameter Estimates

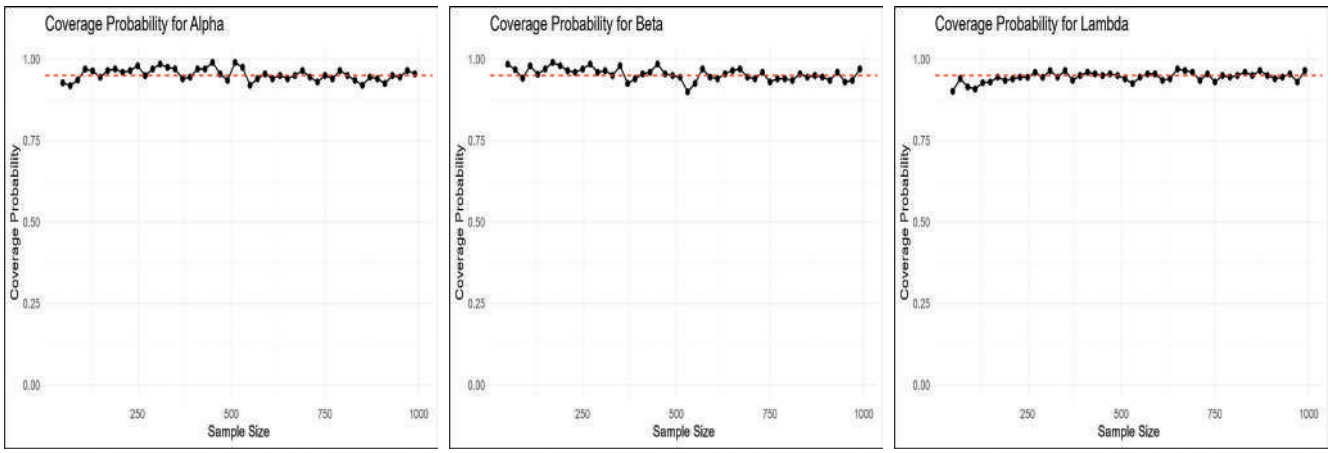

Figure 4: Coverage Probability of 95% Confidence Intervals

Parameter Estimation

Parameter of the model are estimated using maximum likelihood (MLE), Least square methods (LSE) and Cramer-von-Mises methods (CVM).

Maximum Likelihood estimation (MLE)

Maximum likelihood estimation uses the likelihood function to estimate the parameters of the model. The likelihood function of the MLL is given by equation (7)

$$l\left(\alpha,\beta,\lambda \mid x\right) = n\log 2 + n\log\alpha + n\log\beta + n\log\lambda + \lambda\sum_{i=1}^{n} x_i + \sum_{i=1}^{n}\ln\left(1+\beta e^{\lambda x_i}\right) + (\alpha-1)\sum_{i=1}^{n}\ln\left[\left(1+\beta e^{\lambda x_i}\right)^2 - 1\right] - 2\sum_{i=1}^{n}\ln\left[1+\left\{\left(1+\beta e^{\lambda x_i}\right)^2 - 1\right\}^{\alpha}\right] \quad (7)$$

The maximum likelihood estimates (MLEs) of the parameters α, β, and λ can be obtained by maximizing the likelihood function. Analytic methods of optimizing are rigorous so it can be optimized numerically by use of newton-Rapson methods, BFGS or Nelder- mead method.

Least Square Methos (LSE)

Least square method is aa alternative methods for parameter estimation which minimize the sum of squared

differences between the empirical and theoretical cumulative distribution function. In these methods of estimation, we minimize the sum of square of the differences between F (x, α, β, λ) and ωi. The LSE function (eq 8) is minimized for a set of parameters that will be the estimated parameter.

$$LSE(\alpha,\ \beta,\ \lambda \mid x) = \sum_{i=1}^{n}\left(F(x_i;\alpha,\beta,\lambda) - \omega_i\right)^2 \text{ ; where, } \omega_i = \frac{i}{n+1} \quad (8)$$

Differentiating equation (8) with respect to parameters, equating to zero and then simultaneous solution for unknown parameter gives the estimated parameter value. In Case of non-linear equation, it becomes quite impossible to solve the equation we use numerical methods to estimate the parameters.

Cramer-von Mises methods of estimation (CVM)

This is another option for estimation which also minimize the difference the sum of squared differences between the empirical and theoretical cumulative distribution function. In these methods of estimation also, we minimize the sum of square of the differences between F (x, α, β, λ) and ωi. The CVM function (eq 9) is minimized for a set of parameters that will be the estimated parameter.

$$CVM(\alpha,\ \beta,\ \lambda \mid x) = \frac{1}{12n} + \sum_{i=1}^{n}\left(F(x_i;\alpha,\beta,\lambda) - \omega_i\right)^2 \text{ ; where, } \omega_i = \frac{2i-1}{n} \quad (9)$$

Application To real dataset

In this section of study, we have applied the MLL distribution on a real dataset to check the applicability of the model. Birnbaum and Saunders (1969) originally analyzed the data given below which represents the fatigue life of 6061-T6 aluminum coupons cut parallel to the direction of rolling and oscillated at 18 cycles per second (cps) which consists of 101 observations with maximum stress per cycle 31,000 psi.

70, 96, 212, 90, 97, 99, 100, 103, 104, 104, 105, 107, 108, 108, 108, 109, 109, 112, 112, 113, 114, 114, 114, 116, 119, 120, 120, 120, 121, 121, 123, 124, 124, 124, 124, 124, 128, 128, 129, 129, 130, 130, 130, 131, 131, 132, 131, 131, 131, 132, 132, 133, 134, 134, 134, 134, 134, 136, 136, 137, 138, 138, 138, 139, 139, 141, 141, 142, 142, 142, 142, 142, 142, 144, 144, 145, 146, 148, 148, 149, 151, 151, 152, 155, 156, 157, 157, 157, 157, 158, 159, 162, 166, 163, 164, 166, 163, 168, 170, 174, 196.

Parameters of the model are estimated using optim () function of R software (R Core Team, 2024). Summary statistics which give insight dataset. Summary statistics give descriptive measure of the data. Summary statistics demonstrate that the model in non-normal with positive skewness.

Table 2: Summary Statistics of the dataset.

Min	Q1	Median	Mean	Q3	Max	SK	Kurtosis
70	120	133	133.7	146.0	212.0	0.3304	4.0528

Figure 5 demonstrate the box plot and TTT plots. Box plots confirms that the data set is positively skewed while

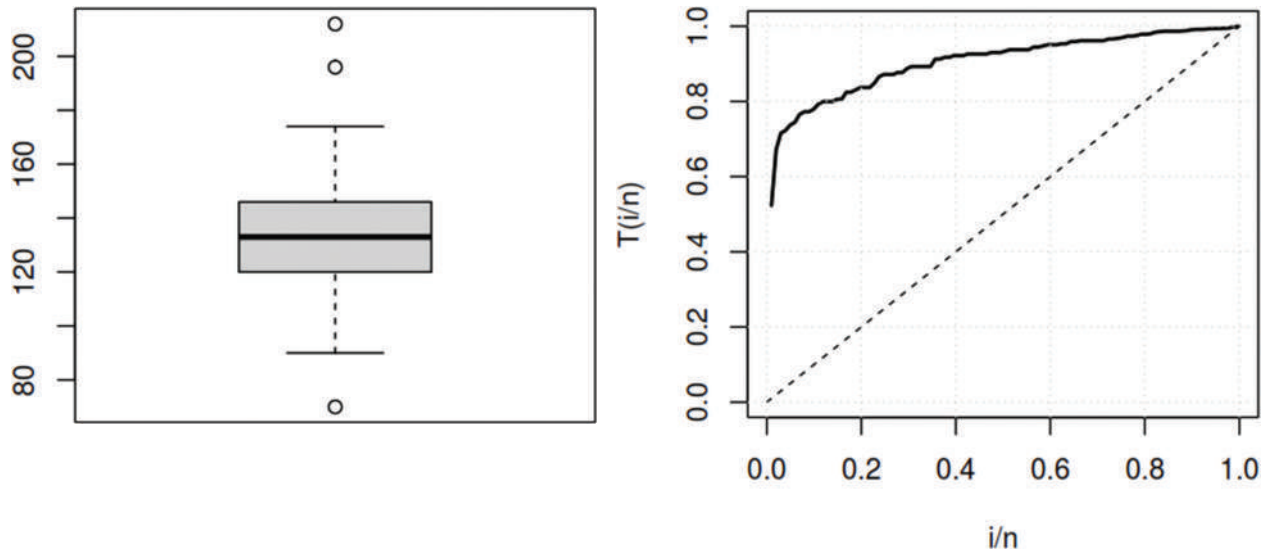

Figure 5: Whisker Box plot (Left) and TTT plot (Right side)

Table 3: Estimated parameters, SE, and 95% Credible Intervals

Method	Parameter	Estimate	SE	CI_lower	CI_upper
LSE	alpha	8.261	2.305	3.035	11.010
	beta	0.137	0.048	0.021	0.185
	lambda	0.008	0.004	0.006	0.022
CVM	alpha	6.382	2.429	3.121	11.351
	beta	0.099	0.049	0.027	0.182
	lambda	0.011	0.004	0.006	0.020
MLE	alpha	8.335	0.974	6.425	10.244
	beta	0.138	0.019	0.101	0.175
	lambda	0.008	0.001	0.006	0.010

Table 4 displays the information criterion values under MLE, LSE and CVM estimates. We have also compared the information criteria, Akaike information (AIC), Bayesian Information Criteria (BIC), Hanna- Quinan Information Criteria (HQIC) and Consistent Akaike Information Criteria (CAIC).

Table 4: Information Criteria under MLE, LSE and CVM

Methods	_-LL	AIC	BIC	CAIC	HQIC
MLE	455.658	917.316	925.161	917.563	920.492
LSE	457.048	920.096	927.941	920.343	923.272
CVM	457.3542	920.708	928.554	920.956	923.885

Table 5: KS, AD and CVM test for MLE, LSE and CVM methods of estimation

Methods	KS(p-value)	AD(p-value)	CVM(p-value)
MLE	0.049(0.969)	0.267(0.961)	0.036(0.953)
LSE	0.112(0.162)	1.573(0.160)	0.278(0.156)
CVM	0.124(0.091)	1.885(0.106)	0.373(0.085)

To describe, how well model fits the dataset, the histogram versus fitted probability density plot is demonstrated in figure 6 (Left) indicating that model fits data better as curve cover most of the are covered by histogram. Similarly,

Figure 6 (Right) demonstrate the empirical cumulative distribution plot versus fitted cdf indicating model fits datasets more adequately.

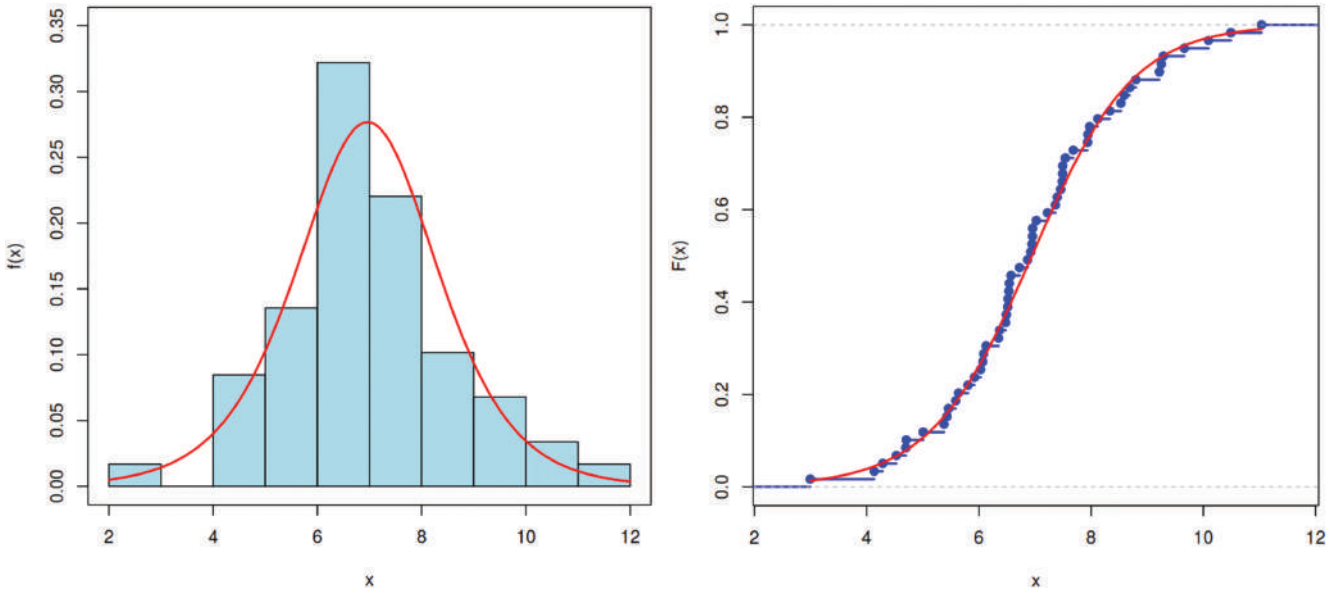

Figure 6: Histogram versus fitted PDF(Left) and ECDF vs Fitted CDF

The P-P and Q-Q plots are the graphical testing of the model whether it fit the data or not. PP plot in figure 7(Left) shows that most of the data point lie in the diagonal indicating that data fits the model well. The QQ plot in figure 7(right) indicate that data fits the proposed model better but a little week fitting at the tails.

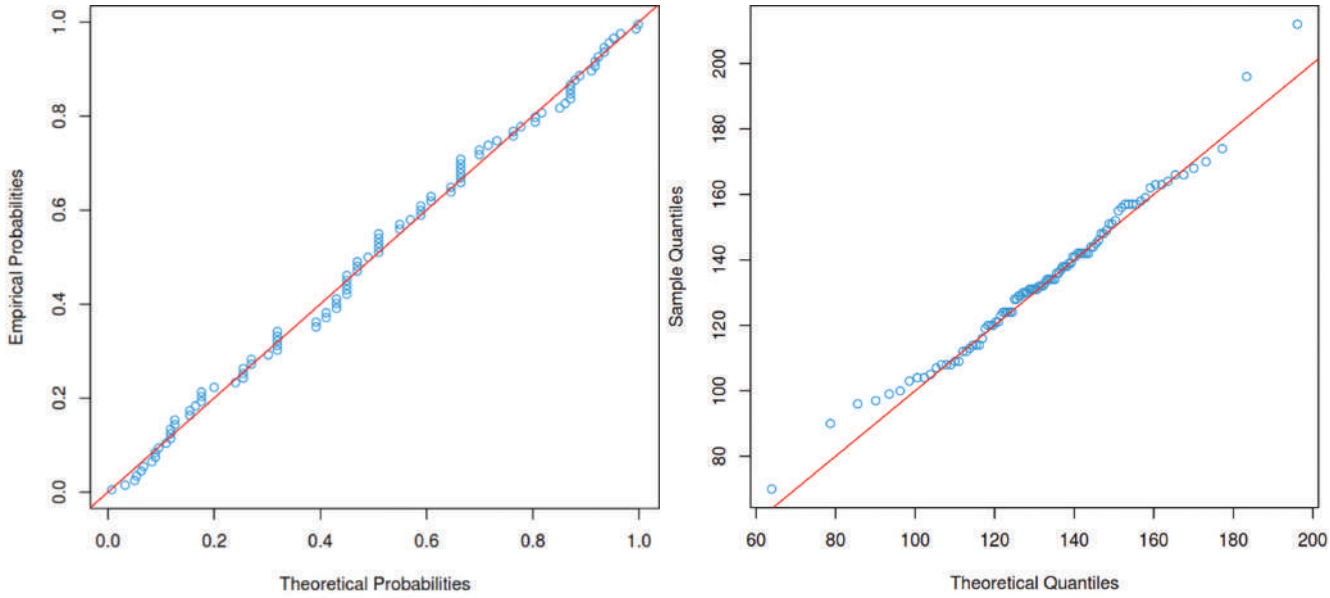

Figure 7: P-P plots (Left) and Q-Q plots (Right) of the MLL

To prove the superiority of the MLL distribution, it is compared with some classical models. The model compared are Generalized Rayleigh (GR) distribution (Kundu & Raqab, 2005), Generalized Exponential (GE) distribution (Gupta & Kundu, 1999) and Exponential power (EP) distribution (Smith & Bain, 1975). Results demonstrate that model MLL fits better compared to classical models (Table 6)

Table 6: Log likelihood and information criteria of competing models

Models	-LL	AIC	BIC	HQIC	CAIC
MLL	455.658	917.316	925.161	917.563	920.492
GR	457.767	918.756	923.980	918.878	920.871
GE	463.732	941.465	936.600	931.875	933.582
EP	476.789	957.579	962.810	957.700	959.697

Also, to test the goodness of fit and comparing as better fit, KS, AD and CVM test statistics and respective p values are mentioned in table 7.

Table 7: Test Statistics and respective p values

Models	KS(p-value)	AD(p-value)	CVM(p-value)
MLL	0.049(0.969)	0.267(0.961)	0.036(0.953)
GR	0.090(0.385)	0.603(0.645)	0.105(0.562)
GE	0.107(0.201)	2.072(0.084)	0.311(0.126)
EP	0.137(0.043)	4.506(0.005)	0.694(0.013)

To verify the superiority of MLL model, Histogram against the fitted pdf of MLL and competing models are displayed in 8(left). Furthermore, empirical CDF versus theoretical CDF of MLL and competing models are plotted in figure 8(Right)

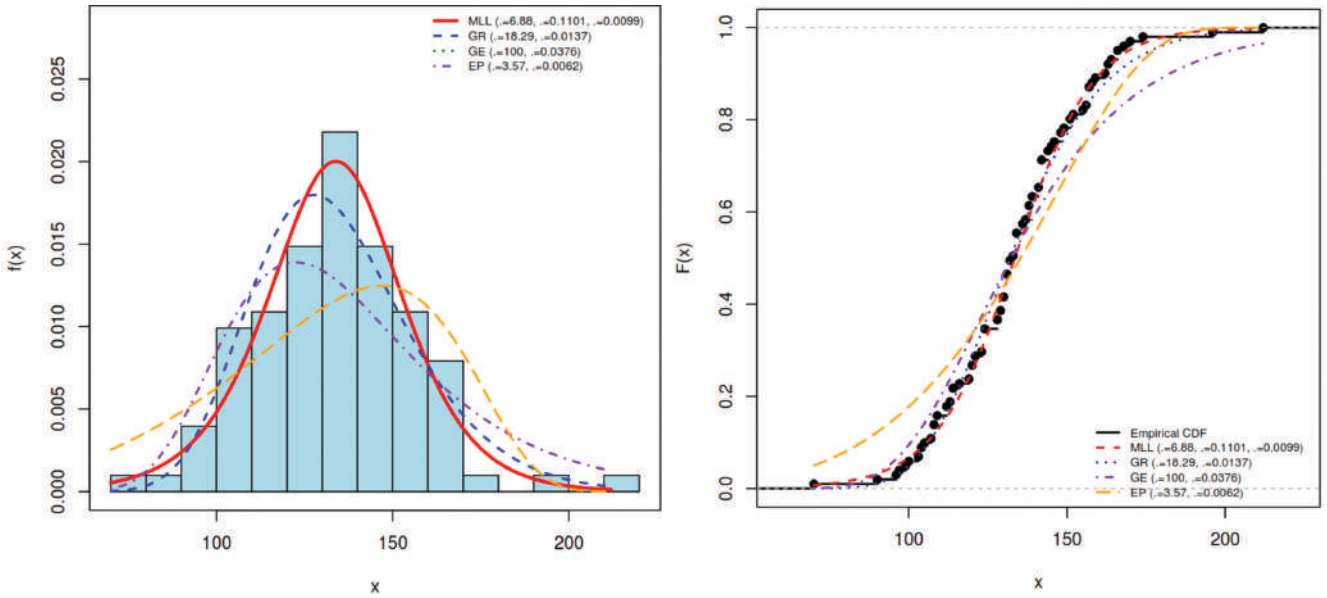

Figure 8: Histogram versus fitted pdfs and ECDF versus theoretical CDF

Conclusion

This study introduces Modified Logistic Lomax Probability distribution formulated using Logistic Lomax (MLL) Distribution. Modification of the model enabled MLL more flexible an applicable for real dataset more precisely. The simulation study demonstrates the performance of maximum likelihood estimation for the proposed distribution. Parameters are estimated using Maximum Likelihood estimation (MLE), Least square estimation (LSE) and Cramer- von Mises Estimation showing consistent parameter estimates. Information criterion and the goodness of fit testing support the MLL as better compared to some classical distributions. The MLL distribution will play a vital role in modern data analysis and will help researchers to know about the formulation of custom probability models and its uses in real life problem solution.

Limitations of study

Although MLL give better results on some of the classical probability model. Comparisons with another model is not performed here. Application on only one set of data may not generalize overall performances of the MLL model.

Future Work of study

Application of the model on different types of datasets, studying basic statistical properties and application of some vital methods of estimation like Bayesian estimation may be subjects of further study.

Conflicts of Interest

Authors has no any conflict of interest

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Performance Improvement Analysis of Micro-Enterprises: Outcomes from Field Survey of Kavre District

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https://doi.org/

Abstract

This research aims to analyze influence of Micro-Enterprise Development (MED) model implemented by the Ministry of Industry (MoI) in the performance of micro-enterprise. Kavrepalanchowk district has been purposively sampled for the study whereas micro-entrepreneurs are sampled using systematic random sampling. A Descriptive research design is used for this study. This study has used mixed approach while analyzing data. The opinion survey of micro-entrepreneurs is based on structured questionnaires constructed using Five-point Likert Scale. Most of the publication reports from websites of the Ministry of Industry and UNDP are collected as sources of secondary data and primary data has been collected from field visit. Both the descriptive and inferential data analyses have been undergone using SPSS. Analysis have revealed that the MED model is effectively supportive for the performance improvement of micro-enterprises. From the outcome of this study, it is concluded that the MED model is appropriate to be replicate by other private and non-government sector entrepreneurship and skill training providers as well as Nepal Government's other programs for skills and employment generation.

Keywords: *Enterprise development, Micro-Enterprises; Performance Improvement; Micro and Small Enterprises (MSEs), MED Model*

Cite this paper
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Background of the Study

Enterprise development models assist in acquiring knowledge related to improving performances like entrepreneurship development; skills development and advancement; access to technology; access to lending by linking to financial institutions; brand and marketing related support, access to information and communication, and other operational management supports. Such components are composed in a package and delivered to micro and small-scale entrepreneurs through Busies Development Services Centers (Goldmark, 1996). Ayele (2018) has identified a significant role of micro and small enterprises (MSEs) to the entrepreneurial households for improving their living standards through income generating activities. Despite, they are facing challenges like lack of financial access, working space, marketing knowledge, skill, input supply etc. hindering their performance improvement. Arage (2025) has concluded that access to saving and credit, training, and market have significant impact in profitable performance improvement of micro and small enterprises. He has recommended to facilitate them with infrastructures, lowered trade tariffs, marketing and distribution support, access to credit, tools and

techniques to achieve higher productivity etc. Such recommended services are supplied through professional Business Development Service providers.

Kharel and Dahal (2020) have revealed that the performance improvement and promotion of SMEs in Nepal is challenged by lack of information on available subsidies and funding incentives, access to finance, skills and technology, market access etc. Gimire (2011) has stated that micro and small industry play a pivotal role in economic development through promotion of industrialization. Their role is widely accepted regarding job creation and self-employment. He has also observed that there are two types of micro enterprises in Nepal i.e. formal and informal. The formal one is promoted by government agencies and NGOs for generating income to poor families whereas informal micro-enterprises are executed by individuals to earn family income by utilizing their traditional professional skills. He has identified lack of savings, small domestic market, poor quality of local products, and lack of skills, technology, and enterprise supporting mechanisms as challenges for promoting SMEs in Nepal.

Kharel (2023) (cited by Chitrakar and Kang, 2023) states that MSEs require handholding with various type of support for their establishment, growth, and sustainability. There are many enterprise support programs in Nepal. Despite this, he has identified that their scale and types of supports are not able to generate employment by meeting the needs of MSEs. Most growth support models indicate that Micro and Small Enterprises (MSEs) are poorly resourced at their pre and initial stages. They lack resources like financial, technological, operational, and managerial skills. Therefore, they need a supportive approach having multiple components of enterprise development. Because, according to Nepal (2006), standalone training models are inefficient in creating growth-oriented enterprises with longer sustainability.

The importance of MSEs in economic growth is highly recognized by many developed and developing nations. Therefore, various countries have provisioned MSE promotion programs. Such enterprises are generally based on utilizing available skills and resources at local levels. Therefore, the usefulness of MSEs in economic development cannot be under looked for promoting income-generating activities at local level. Sinarwati et al. (2021) have identified that micro and small enterprises have specific characteristics that differentiate them from medium and large enterprises so that they should be supported with appropriate promotional tools. Their finding is also matched with Chitrakar and Kang (2023). They have identified a huge gap between receiving stand-alone skills trainings and getting into operation of an enterprise and stated that MSEs should be supported by holistic BDS models like business incubation.

Growth models have also been framed showing various crises at different stages of enterprise growth. Growth models delineated by Larry E. Greiner and Churchill and Lewis indicate such crises; especially lack of access to resources and leadership crisis (Churchill & Lewis, 1987; Greiner, 1998). Traditionally, government and donor agencies were directly involved in supporting MSEs through various types of single-time standalone training before 1990 (Eligmann; 2005). Such standalone models were criticized for not being able to promote intended number of enterprises making the waste of resources spent by government and donor agencies. After the 1990s, holistic approach models evolved as a paradigm shift to support MSEs. Private sector training providers and enterprise development experts are encouraged to directly supply support services to MSEs. The role of the Government and donors are shifted toward creating conducive environment at policy and institutional structural level to develop a sustainable BDS market.

According to DEDC (2001), sustainable BDS market development is concerned with the development of competent private sector institutions so that they can offer BDS-related assistance to MSEs and sustain themselves without government funding support. Nepal also lacked a holistic model of enterprise development before 1998. Almost all training models were shaped providing standalone support component. The budget spent by the government and donors were not effectively productive from such models. In 1998, the Ministry of Industry launched Micro-Enterprise Development Program (MEDEP) which has implemented a holistic business development service named micro-enterprise development (MED) model. This model was initially funded by UNDP (Bajracharya et al., 2005). This model aimed for micro-enterprise promotion in Nepal to support the poverty alleviation plan (MEDEP, 2017).

With respect to the importance of micro and small enterprises for economic development and sustainability, attempts that Nepal has made by using appropriate tools and techniques is very important for study. Therefore, this

research has raised questions on the effectiveness of the MED model to improve performance of micro-enterprises in Nepal. This type of study will be equally beneficial for government to decide on continuation or drop out of performance improvement models while promoting micro-enterprises based on their effectiveness. Similarly, the outcomes of this study will be also beneficial to other government programs of income and employment generation, private sector training providers, and NGOs for replicating effective performance improvement models. Therefore, this article aims to evaluate the performance improvement of micro-enterprises under the MED model implemented by the Ministry of Industry (MoI) to promote micro-enterprises in Nepal.

Literature Review

Micro-Enterprises

Micro-enterprises are defined variedly in different nations. The definitions include both qualitative and quantitative criteria (Neupane, 2024). There was a lack of a uniform definition of micro-enterprise in Nepal. A study focused on policy review has found that there is a need to have a uniform definition of micro-enterprise in Nepal. This lack has resulted various complications while making plans and programs to promote them micro-enterprises (Bajracharya et al., 2005). Therefore, they have proposed to formulate a national-level policy to uniformly define micro-enterprises which will be applicable to all industrial sectors in the country. Similar voices were also raised from trade and umbrella associations in Nepal.

In the year 2010, a new Industrial Policy-2010 defined micro-enterprises as a separate category of industry. Current definition of micro-enterprise by the Industrial Enterprise Act 2016 is given in Table 1.

Table 1: Definition of Microenterprise According to Nepal Industrial Enterprise Act 2016

Category	Criteria
Micro Enterprises	• Maximum of 9 employees including the owner-manger • Annual turnover of the maximum amount of NRs. 5 Million • Maximum application of 20 Kilo Watt energy • Maximum fixed asset of NRs. 5,00,000 except land and building • Annual sales not exceeding NRs. 5,000,000 (Note: Except those industries needing approval mentioned in Annex 1 of IEA, 2016)

Note. Compiled from Industrial Enterprise Act 2016 (Ministry of Industry, 2016)

The Industrial Enterprise Act 2016 has defined micro-enterprises on the quantitative basis such as fixed asset investment, number of employees, maximum consumption of energy, and annual sales turnover which is applicable to all sectors of industries i.e. manufacturing, agriculture, and others. Such quantifiable criteria have enhanced the concreteness in defining micro-enterprise in Nepal.

Business Development Service (BDS)

Goldmark (1996) conducted study on BDS has referenced Entrepreneurship Development Institute of India (EDII) training. Since the 1970s, EDII has been working for enterprise promotion. According to her, training, technical assistance, financial credit, marketing advice, input supply for enterprise creation, management, and regulatory advice are components of an integrated approach to Business Development Service (BDS) which are delivered through BDS Centers. These services have traditionally been called non-financial services, though they include some financial assistance like raising seed funds through group savings and technology grants along with many non-financial services in a package.

The MED Model's Stages of Enterprise Development

Many adhere that enterprise creation and growth support models should be demand-driven in design and delivery. Enterprise development support models based on mitigating the constraints that entrepreneurs are facing will help

able to respond to such obstacles properly (Eligmann, 2005). ILO (2007) has also identified Business Development Services (BDS) as an evolving tool for enterprise creation and growth support. The recent BDS interventional approach is more broadly conceived and market-driven compared to traditional enterprise development trainings. The enterprise growth stages under the MED model to support such stages are presented in Table 2.

Table 2: Enterprise Growth Stages under the Micro-Enterprise Development (MED) Model

Stages	Stages of Enterprise Development	Supports	Achievement Indicators	Tentative Duration
I	Pre-starting	Orientation of model, Group Formation of Similar Enterprises, Group savings and mobilization, and management training.	Enterprise created/Micro-Entrepreneurs Group (MEG) formed for specific types of enterprise	1 to 2 months
II	Start-up	Preliminary level courses of entrepreneurship development training, basic skills training, Appropriate technology grant supports, supports for access to financial/donor institutions, marketing knowledge supports	Number of micro-entrepreneurs started a business	1 year from the date of creation
III	Scale-up	Advanced level courses of entrepreneurship development training, refresher level skills and marketing relationships training.	Running business profitably/ recovered initial investment	2 years from the date of creation
IV	Resilience	Formation of/link to product associations, product diversification, Quality control supports, market relationship expansion support, supports for enhanced business partnership	Number of micro-entrepreneurs running profitable businesses for two or more years. Micro-entrepreneurs are graduated in this stage.	3 years from the date of creation

Note. From UNDP, Program Document-MEDEP IV, 2014

Based on the MEDEP model, enterprise evaluated by the program reached in the resilience stage (tentatively not more than 3 years of joining) are graduated from the program. The graduated entrepreneurs are expected to support handholding to newly joined entrepreneurs, provide advocacy support etc. (MEDEP; 2017).

Major Constraints on Successful Micro-Enterprise Performance

Many studies have identified a contributory role of enterprise development support model on performance improvement of micro and small enterprises (MSEs). Study of Ayele (2018) has viewed that lack of finance, working space, skills, marketing knowledge, infrastructure, and raw materials are general constraints for performance improvement of micro-entrepreneurs. In Nepal, Bista (2004) has gained insight that skills training and technology supports, accounting training, marketing linkage and coordination supports, promotional and motivational supports, handling and managing inputs are major activities carried out by enterprise support service providers to overcome the constraints of MSEs. Karki (2020) has identified that lack of technology for production, input supply, cold storages, skill labor, fund are major challenges that micro-enterprises are facing. Therefore,

entrepreneurial and accounting knowledge, skills training, access to technology, market, and finance, coordination and counseling are major constraints facing by MSEs. Therefore, service providers have to design their support models accordingly.

There are various factors influencing performance of MSEs. In this respect, Tehulu (2019) has identified politico-legal, working premises, technological, infrastructural, marketing, financial, management, and entrepreneurial factors affecting less or more in the performance of MSEs. In this respect, this study has developed a conceptual framework on factors affecting micro-enterprises for their performance improvement.

Figure 1: Conceptual Framework

Note: Constructed by Researcher, 2025

Research Methodology

This research has applied both qualitative and quantitative methods of data analysis. The quantitative primary data is analyzed using SPSS while field observations are interpreted as observed and interviewed. Sample enterprises were targeted up to the age of twelve years. Therefore, sample size was taken more than calculated size with an anticipation of non-response caused by migration, death, and shift to other professions.

Sample Area

A purposive sampling method is applied while selecting Kavrepalanchok as sample district for this study. The suitability of the district as a sample is supported by twelve year continuous experiences of service provider implementing the enterprise development program, have regular and close contact with the micro-entrepreneurs, have sufficient information on the support model, implementation process, progress, and closer from Kathmandu for field visit to the researcher.

Data Collection Techniques

To analyze the efficiency of offered support services under the MED model for the performance improvement, 469 micro-entrepreneurs of Kavreplanchok District have been randomly sampled and 435 responded for interview. The total population is 3000 entrepreneurs created in all village palika and municipalities of Kavrepalanchok. Since the research is based on the MED model and its effectiveness for performance improvement, the support service components under this model are used as independent variables and performance improvement is used as a dependent variable. Both descriptive and inferential statistical tools have been used while analyzing the data. The Five Points Likert scale is used while collecting information on provided supports for performance improvement. The collected data is analyzed using SPSS.

Study Duration

The article is based on the part of findings from my Ph.D. work completed in 2024. Field visits was started in the year 2022 and accomplished in February 2023. Data analysis and report writing took one more year to complete.

Limitations

Although, the selection of the district is backed by its ability to generalization based on the experts' advice and information holdings, due to time and cost limitations; only micro-entrepreneurs only from Kavrepalanchowk district has been studied. Similarly, though the status of micro-enterprise businesses has been observed in the field and they were well informed about the researchers' purpose, there could be possible response biases from micro-entrepreneurs in an expectation of further or additional support from the project.

Results

Support Services under the MED Program for Performance Improvement

The Miro-enterprise Development (MED) model offers six categories of enterprise creation and growth supports as presented in Table 3. The support services are generally provisioned according to the expected needs of each growth stage of micro-enterprises. Small enterprise owners face various crises in different growth stages (Churchill & Lewis, 1987; Greiner, 1998). Therefore, enterprise creation and growth support system should be designed and implemented in such a manner that assists entrepreneurs to properly respond to the issues they face in different growth-stages.

Table 3: Framework of Enterprise Support Service under the MED Model

S.N.	Variables	MED Service Components	Expected Outcomes for Performance Improvement
1	Entrepreneurial Knowledge (EK)	Entrepreneurship Development Training (EDT)	Knowhow of business opportunity identification techniques, market identification techniques, improved commitment toward entrepreneurship etc.
2	Skill Improvement (SI)	Skill Development Training (SDT)	Basic and advance level skills development in the interested enterprise areas
3	Access to Technology (AT)	Appropriate Technology Support (ATS)	Access to technology grant in the developed skill areas
4	Access to Credit (AC)	Access to Finance	Enhanced borrowing capacity by linking with banks and cooperatives
5	Marketing Linkage (ML)	Market Linkage Support (MLS)	Enhanced participation in trade fairs, B2B and B2C linkages, Labelling, packaging, advertisement, access to showrooms, formation or linkage to product associations, linkages with local suppliers
6	Performance Improvement (PI)		To assess whether the performance have been improved or not as indicated by sales increase, profitability, number of employees, and capital growth.

Note: Rai et al. (2018)

The last stage of growth in the MED model is resilience stage. When micro-enterprises reach the resilience stage, the program provides them follow-up services only.

Created Enterprise Business in Nepal through the support of the MED model

The MED model has created a total of 172,514 micro enterprises all over the country till the year 2020. Bajracharya and Joshi (2012) have stated that the MED model is cost-effective in generating employment compared to other government training and employment generation programs. The Ministry of Industry's MED model has adopted a comprehensive support approach to create and develop micro-enterprises by assisting their performance improvement. This approach comprises training like entrepreneurship development, market study, and skills development. After completion of these trainings, entrepreneurs are also facilitated for getting appropriate technology grants to operate an enterprise business. Support to access to micro-credit loan, business

counseling, support for enhancing linkages to market, and assistance in developing the subcontracting system are other supports of the MED package to micro-entrepreneurs as their business grows (MEDEP, 2017).

Bajracharya and Joshi (2012) have identified that through the initiation of the MED model, the Ministry of Industry is successful in the socio-economic transformation of rural micro-entrepreneurs. Due to its demonstrating effect in transforming the rural poor into entrepreneurs, they have recommended the MED model as an alternate model of micro-enterprise development in Nepal for sustainable livelihood. They also found it inclusive and gender-responsive while selecting micro-entrepreneurs. The MED has approached to create enterprises based on indigenous skills and local resources. Therefore, the model is effective in micro-enterprise promotion in the country.

Findings from Descriptive Analysis

An opinion survey on the effectiveness of the MED model for performance improvement was conducted at the field level throughout the Kavrepalanchok district. The obtained values from the descriptive analysis is presented in Table 5.

Table 5: descriptive Statistics Enterprise Performance Improvement

n=435

Variables	Mean Value	Standard Deviation
Entrepreneurial Knowledge (EK)	3.39	1.02
Skill Improvement (SI)	3.55	0.83
Access to Technology (AAT)	4.11	0.79
Access to Credit (AC)	2.98	0.80
Market Linkage (ML)	2.89	0.99
Performance Improvement (PI)	3.42	1.32

Note: Field Survey, 2023

From the table data, performances improvement through an access to appropriate technology have highest mean value 4.11 indicates that micro-entrepreneurs to a very large extent agree that it helped for their enterprise development. Similarly, to a large extent, they agree that the MED model helped them to improve entrepreneurial knowledge and skills for their enterprise development. They agree that the MED support have helped them in improving access to finance and market to some extent only. Overall, the MED model has contributed positively to improve the performance of micro-enterprises for their development. Finding of Tehulu (2019) has also concluded that financing and marketing factors, entrepreneurial knowledge, skills and technological factors have very important role for enterprise performance development.

Relationship between Support Components and Enterprise Development

The correlation analysis results in identifying associations among variables. Therefore, the result of correlation tests presented in Table 6 shows the degree of association among affecting factors and performance improvement.

Table 6: Correlation Matrix between affecting factors and Performance Improvement

	PI	EK	SI	AAT	AC	ML
PI	1					
EK	.945	1				
SI	.902	.890	1			
AAT	.825	.822	.846	1		
AC	.848	.845	.778	.726	1	
ML	.796	.798	.720	.673	.622	1

Stokemer (2019) states that the degree of correlation greater than 0.6 indicates a strong positive relationship among variables. All the service components of the MED model show strong positive associations with enterprise creation and growth. The result indicates that the model is effectively helpful in enterprise promotion. Analysis of Giday (2017) has also resulted with significant impact of these variables to enterprise performance improvement.

Discussions

To fulfill the inefficiency gaps created by traditional training and enterprise support approaches in Nepal, the Ministry of Industry (MoI) implemented a holistic micro-enterprise creation and growth. The number of enterprises created all over the country is proof that the enterprise creation and growth model of the Ministry of Industry is effective for the performance improvement of micro-enterprises for their growth and longer sustainability.

The outcome of the field survey also indicates that each of the service components of the MED are considered positively by sampled entrepreneurs for their performance improvement in different categories. Similarly, a test of associations among performance factors and the state of performance improvement also resulted showing a strong positive relationship. Therefore, the findings from the primary data analysis also match with the findings of secondary data.

Conclusion

The implemented holistic approach of the MED model from 1998 to 2018 to support micro-enterprises for poverty alleviation in the country is effective in promoting sufficient micro-enterprises in all districts of Nepal. Around the same period, Nepal's plans and development strategies were also aligned to achieve the millennium development goals by promoting micro-enterprises.

Demographic characteristics, socio-cultural standards, norms, and values are always changing according to the pace of time due to the change in general environmental factors like political, socio-cultural, technological, environmental, and global. After the year 2018, the MED is being extended from 77 districts to 753 Local Bodies of the Country. The structure of the governance has been changed since 2016. The era of MDG also shifted to Sustainable Development Goal (SDG) since the year 2016. The conclusion is whether the successes achieved in one specific period of 20 years can be enhanced and sustained longer or not. For this, successful adaptation in the environmental change is mandatory. Therefore, the Ministry of Industry should be careful in preservation of past achievements along with successful accommodation of the appeared changes while implementing the model in an ambiguously extended manner.

Implications

The finding and conclusion of this study indicates that this research can be extended in the form of identifying changed shifts of importance to innovation in the demographic and socio-cultural sectors in Nepal. Similarly, the impact of changed political structure and possible customization in the facilitation aspects of the Nepal government while promoting this model could also be researched. The procedures of adaptations to the appeared and upcoming changes undergone by the Ministry of Industry could also be a topic for further research. The similar impact study could also be researched in other districts to match with the outcomes of this study.

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Random Walk Hypothesis Under Scrutiny: Nepal's Stock Market before the Pandemic Era

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Abstract

The efficient processing and dissemination of information are fundamental to the proper functioning of a stock market, as they directly affect capital allocation and economic growth. This study investigates the Random Walk Hypothesis (RWH) in the Nepalese stock market by analyzing daily NEPSE Index returns from March 2011 to March 2020. Utilizing both parametric and non-parametric tests—including the Kolmogorov-Smirnov test, run test, autocorrelation, autoregression, Augmented Dickey-Fuller test, ARIMA modeling, and variance ratio test—the study consistently finds evidence against the RWH. The results reveal that NEPSE returns are not independently and identically distributed, indicating weak-form inefficiency. This suggests that historical price movements can predict future returns, highlighting significant market inefficiencies and potential opportunities for abnormal gains. However, such inefficiencies also increase investor vulnerability to misinformation, manipulation, and risk. The findings align with similar outcomes in emerging markets and challenge the universal applicability of the Efficient Market Hypothesis (EMH). Furthermore, the study underscores the growing importance of behavioral finance in explaining stock price dynamics in underdeveloped markets. It offers crucial insights for policymakers, researchers, and investors focused on enhancing the Nepalese capital market's efficiency.

Keywords: *Stock market, RWH, EMH, Historical price.*

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Introduction

The RWH asserts that future price changes are independent of historical price movements because stock prices fluctuate randomly and unpredictably. This theory holds that it is impossible to regularly generate returns above average by employing historical price trends or patterns because all available information is already reflected in current market prices. Technical analysis is therefore ineffective for forecasting future price changes based on the RWH's assumptions. The RWH is closely linked to the EMH, particularly its weak form, which claims that technical analysis is irrelevant because current stock prices already reflect all historical trade data, including prices and volumes. Eugene Fama developed the EMH in the 1960s. It describes three types of market efficiency: weak-form (prices reflecting historical trading data), semi-strong (prices reflecting all public information), and strong-form (prices reflecting both public and private information). The RWH advocates in favor of weak-form efficiency by arguing that if prices follow a random walk, it is impossible to forecast them using past data since price changes are the consequence of new, and unexpected information. Not all efficient markets must have totally random pricing pathways, despite the conceptual alignment of RWH and EMH. This is particularly true in emerging or less developed markets where price behavior can be distorted by behavioral biases, information asymmetries, and market inefficiencies.

The Securities Exchange Center, which was first established in 1976 with an emphasis on trading government bonds, marked the beginning of Nepal's stock market's development. When the center changed its name to the Nepal Stock Exchange (NEPSE) in 1993. The Securities Board of Nepal (SEBON) was established as the regulating body in 1994, and it marked a significant turning point. Important advancements in the ensuing years were the 2007 introduction of semi-automated trading, the 2011 creation of CDS and Clearing Ltd. for settlement and dematerialization, and the 2013 deployment of fully computerized trading platforms. Real-time online trading through brokers was made possible by NEPSE's Online Trading System (NOTS), which was introduced in 2021. NEPSE's operational capacity has been expanded, governance has been strengthened, secondary market investment by non-resident Nepalese (NRNs) is permitted, and IPO listing requirements have been tightened. Furthermore, monetary and regulatory actions like loosening regulations on margin lending, encouraging digital disclosures, and preventing insider trading have aimed to improve market liquidity, transparency, and confidence in investors.

The aim of this paper is to test the random walk behavior in the Nepalese stock market. The structure of this analysis is organized as follows: Section 2 presents a review of relevant literature on the RWH, summarizing key empirical findings. Section 3 outlines the methodology employed to test the RWH in the context of Nepalese stock market. Section 4 reveals the results of the various statistical tests. Section 5 offers a comprehensive discussion on how the study's results align or contrast with existing literature and what they imply for financial theory and practice. Section 6 draws conclusions based on these findings, while Section 7 highlights the broader implications of the study.

Review of Literature

The RWH posits that stock prices evolve in a stochastic manner, implying that historical price movements do not influence future price paths. This notion, first mathematically hinted by Bachelier (1900), was empirically reinforced by Working (1934) and formalized in economics by Samuelson (1965), who introduced the concept of a martingale process. Fama (1965, 1970) further refined the theoretical foundations by aligning market efficiency with randomness in price movements, classifying it into weak, semi-strong, and strong forms. In developed markets like G7, studies by Kendall (1953), Granger and Morgenstern (1963), Fama (1965), Solnik (1973), and Narayan & Smyth (2007) generally support the RWH. Fama's (1965) comprehensive examination of the NYSE's daily returns strongly advocated for weak-form efficiency and randomness.

Contrarily, emerging markets exhibit mixed evidence. Omar et al. (2013) found that the Karachi Stock Exchange (KSE) does not follow a random walk, suggesting inefficiencies exploitable by technical traders. Similarly, Raquib and Alom (2015) rejected the RWH in the Dhaka Stock Exchange (DSE) using autocorrelation and partial autocorrelation analyses, concluding that the market is inefficient in the weak form. In the Nepalese context, Dangol (2016) revealed that observed stock returns in the Nepal Stock Exchange (NEPSE) violated the RWH. However, after adjusting for infrequent trading, the corrected data appeared to support the hypothesis, indicating data irregularities may mask underlying patterns. A broader regional study by Hamid et al. (2017) covering 14 Asia-Pacific markets concluded that none of the examined markets exhibited random walk behavior during the 2004–2009 period. Their results suggested persistent opportunities for arbitrage, driven by inefficiencies. Similarly, Sadat and Hasan (2019) employed parametric tests to analyze DSE indices and found them inconsistent with the RWH, rejecting weak-form efficiency.

Empirical results from developed markets generally favor the RWH. In contrast, developing and emerging markets like Pakistan, Bangladesh, Srilanka, and others consistently display violations of weak-form efficiency, often attributed to structural market deficiencies such as low liquidity, higher information asymmetry, and underdeveloped regulatory frameworks. As such, findings across emerging economies remain inconclusive and market-specific, reinforcing the need for localized analysis and deeper structural reforms.

Table 1: Summary of empirical studies on the RWH

Author(s)	Market Studied	Methodology	Key Findings
Bachelier (1900)	Commodity Prices in US	Conceptual – Mathematical theory of random movement	Prices fluctuate randomly; idea ignored for decades
Working (1934)	US Stock Market	Empirical price analysis	Confirmed price fluctuations are random
Samuelson (1965)	General Economics, US	Martingale model (stochastic process)	Prices follow a random walk
Fama (1965, 1970)	NYSE, US Capital Market	Autocorrelation, variance ratios, information classification	Supported RWH and weak-form efficiency
Kendall (1953); Granger and Morgenstern (1963); Solnik (1973)	US and Developed Markets	Time series analysis of returns	Largely consistent with RWH
Narayan and Smyth (2007)	The G7 countries	Unit root tests	G7 markets supported the RWH
Omar et al. (2013)	Karachi Stock Exchange (KSE), Pakistan	Descriptive statistics, VAR, KS test, run test, ADF, PP (1998–2012)	RWH rejected; market not efficient
Raquib and Alom (2015)	Dhaka Stock Exchange (DSE), Bangladesh	Autocorrelation, Partial Autocorrelation (2001–2013)	Weak-form efficiency and RWH both rejected
Dangol (2016)	Nepal Stock Exchange (NEPSE), Nepal	Analysis of observed and adjusted return series	Observed data violated RWH; corrected data supported RWH
Hamid et al. (2017)	14 Asia-Pacific Markets	Autocorrelation, unit root, Ljung-Box Q, runs test, VR (2004–2009)	All markets violated RWH
Sadat and Hasan (2019)	DSE, Bangladesh	JB test, ADF, Autocorrelation Function, VR test (daily data)	RWH rejected; weak-form inefficiency evident

The main criticism of the RWH is that it oversimplifies the complexity of financial markets by ignoring the behavioral aspects of market participants. In today's context, one of the biggest challenges to the theory arises from the behavioral concerns and actions of investors, which significantly influence stock prices and market outcomes. It is observed from the above discussion that the validity of the random walk model is contradictory in various markets. So, it is interesting to test the RWH on relatively small and developing markets like Nepal. This paper is an attempt in this direction to examine random walk behaviour before the pandemic era.

Methodology

This section describes the research methodology employed to test the RWH in the Nepalese stock market over the nine-year period from March 24, 2011 to March 22, 2020, covering the post-automation trading period up to the pre-COVID era. It includes details on the data sources, selected models, statistical tests, and relevant hypotheses. This study primarily relies on secondary data to examine the RWH in the context of Nepalese stock market. The daily closing prices of the NEPSE All-Share Index having observations of 2087—sourced from the official NEPSE website—serve as the main dataset. The NEPSE index, a value-weighted index of all listed companies, is calculated daily based on closing prices. Daily market returns are computed as shown in Equation 1. A variety of statistical and econometric methods are applied to examine the randomness of return series during the study period. This study employs parametric and non-parametric tests to avoid the bias resulting from the non-normal distribution of the data.

The model specification

The RWH is a narrower form of the weak-form EMH. It assumes that stock returns are independent and identically distributed over time, making them inherently unpredictable. However, the fair game model (Fama and Macbeth, 1973), which underpins this hypothesis, does not require returns to be time-independent. It acknowledges that factors such as a company's increasing debt or risk may lead to higher expected returns over time, creating correlations between current and past returns. Despite this, under weak-form efficiency, such historical information cannot be used to earn excess returns. To examine this, stock returns are first calculated using the following model:

$R_t = L_n P_t - L_n P_{t-1}$ ……..... (1)

Where, R_t= Return on share prices

P_t= Stock prices

L_n = Natural logarithm

However, there is a concern with the EMH in that some portions of the returns are predictable (Sharpe, 1983). The asset's return contains two components: (a) the expected component, and (b) the unexpected component. The return on share price is calculated by using the following model, which incorporates these two components of return.

$R_t = E_{t-1} (R_t^e) + U_{t-1}$ …… (2)

Where, R_t^e = Expected return

E_{t-1} = the conditional expectations operator with the conditions sets consisting of information up and including period t-1.

U_{t-1} = the unexpected return or stochastic term or predication on stock prices in period t-1.

However, the available information is introduced in Model 2 becomes,

$E_{t-1} (R_t^e) = E (\frac{R_t^e}{V_{t-1}})$ …… (3)

Where, V_{t-1} = the available information in t-1 period.

However, the component of unexpected returns depends on the set of information i.e. $E(\frac{U_t}{V_{t-1}})$. Thus Model 3 is restated as in Model 4.

$R_t = E_{t-1} (R_t^e) + E (\frac{U_t}{V_{t-1}})$ ……... (4)

If the market is informationally efficient, then

$E (\frac{U_t}{V_{t-1}}) = 0$ ……. (5)

If V_{t-1} contains only past returns then Model 5 becomes as

$E (\frac{U_t}{V_{t-1}}) = (\frac{U_t}{R_{t-1}, R_{t-2} \ldots R_{t-n}})$ …….. (6)

Model 6 exhibits that the market is weak form efficient. In a fair game model, the stock market performs in such a way that the actual and predicted stock returns are same. The following is a mathematically fair game model:

$R_{i,t+1} = E (\frac{R_{i,t+i}}{V_t}) + U_{i,t+1}$ …….(7)

Where, $R_{i,t+1}$ = Actual returns on stocks i in period t+1

$\frac{R_{i,t+i}}{V_t}$ = Expected returns on stock i in period t+1 (if the set of information is available)
$U_{i,t+1}$ = Stochastic term error on stocks i in period t+1.

The statistical properties of a stochastic term error are: consistency, independence, and efficiency.
If the expected return given the available set of information is an unbiased estimator of actual returns, the prediction error is consistent.

$$E\left(\frac{U_{i,t+1}}{V_{i,t+1}}\right) = 0 \quad \text{..……,,,(8)}$$

If the prediction error is unrelated to the expected return, it will be independent.

$$E\left(\frac{U_{i,t+1}}{V_{i,t+1}}\right) = 0 \quad \text{…….....(9)}$$

If the prediction error is serially uncorrelated, it will be efficient.

$$E\left[U_{i,t+1}, U_{j,t}\right] / V_t = 0 \quad \text{……,,(10)}$$

The return on stocks today will now be the best estimate of the return on stocks tomorrow. So, the EMH is true then

$$R_{i,t+1} = R_{i,t} + U_{i,t+1} \quad \text{…….....(11)}$$

The above Model 11 represent the random walk model.
The random walk model with linearities and non-linearities to test the RWH is explained in Model 12 and Model 13 respectively.
The random walk model with linearities for returns for NEPSE index on daily basis is,

$$R_t = \alpha_0 + \alpha_1 R_{t-1} + \varepsilon_t \quad \text{……..(12)}$$

The random walk model with non-linearities for returns for NEPSE index on daily basis is,

$$R_t = \alpha_0 + \alpha_1 R_{t-1} + \alpha_2 {R_{t-1}}^2 + \alpha_3 {R_{t-1}}^3 + \varepsilon_t \quad \text{….. (13)}$$

Where, R_t = Return on share prices for t period
$R_{(t-1)}$ = Return on share prices for t-1 period
ε_t = Error term for t period

Statistical tests for random walk hypothesis

This paper has used statistical methods, namely K-S test, run test, autocorrelation test, AR test, ADF test, and variance ratio test to examine the RWH of the Nepalese stock market.

Kolmogorov Smirnov goodness of fit test

The Kolmogorov-Smirnov (K-S) test is a non-parametric test used to check if a sample comes from a specified continuous distribution, typically to assess data normality.
The K-S test statistic is,

$$\text{K-S} = \max_{1 \le i \le N}\left[F(R_i) - \frac{i-1}{N}, \frac{i}{N} - F(R_i)\right] \quad \text{…….. (14)}$$

Where, F = the theoretical cumulative distribution function of a continuous distribution.

Run test

The run test is a non-parametric test for serial dependence of time series, also known as the Geary test. The

total expected number of runs is distributed as normal with the following mean under the null hypothesis that successive outcomes are unbiased:

$$\mu = \frac{N(N+1)-\sigma_{i=1}^{3} n_i^2}{N} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (15)$$

Where, μ = Mean of stock return
N = The total number of return observations and
n_i = the number of runs of type i.

By comparing the actual number of runs in the price series to the expected number μ, the standard normal Z-statistic is carried out to test serial dependence.

$$Z = (R-\mu)/\sigma_{\mu}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (16)$$

Where, R = The actual number of runs in the price series

Autocorrelation test

The autocorrelation test is a parametric test that assesses whether or not time series data successive returns have serial correlation. The autocorrelation coefficient ρ_k indicates the degree of relationship between the present stock return R_t and the return separated by K lags$R_{(t-k)}$.
The autocorrelation coefficient ρ_k measures the degree of correlation between the current stock return R_t and the return separated by K lags $R_{(t-k)}$ is measured as:

$$\rho_k = \frac{COV(R_t, R_{t-k})}{\sigma(R_t)(R_{t-k})} = \frac{E[(R_t-\mu)(R_{t-k}-\mu)]}{E[(R_t-\mu)^2]} \ldots\ldots\ldots\ldots (17)$$

Where, μ = The population mean of stock return,
The autocorrelation coefficient at lag k ($\hat{\rho}_k$) is expressed as:

$$\hat{\rho}_k = \frac{\sum_{t=1}^{n-k}[(R_t-\bar{R})(R_{t-k}-\bar{R})]}{\sum_{t=1}^{n}[(R_t-\bar{R})^2]} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (18)$$

Where, $\hat{R}$ = The sample mean of stock returns, and
n = Number of observation in the return series.

The Ljung-Box Q test can be calculated as follows:

$$Q_k = n(n+2)\sum_{j=1}^{k}\frac{\hat{\rho}_j^2}{n-j} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (19)$$

Where, $\hat{\rho}_j$ = The sample autocorrelation coefficient at lag j.

Autoregression test

The autoregressive (AR) model with one lag to investigate if the current return series and the first lag of the return series have a non-zero significant relationship. The AR model of order one
can be defined as follows:

$$R_t = c + \beta_0 R_{(t-1)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (20)$$

Where, R_t = The current return series,
$R_{(t-1)}$ = The first lag of return series, and
β_0 = The coefficient of the first lag.

Augmented Dickey Fuller test

The Augmented Dickey-Fuller (ADF) test is applied for a unit root in the data. The unit root of the data can be computed using the OLS model:

$$\Delta P_t = \alpha_0 + \alpha_1 t + \delta P_{(t-1)} + \delta_1 \Delta P_{(t-1)} + \ldots + \delta_q \Delta P_{(t-q)} + \varepsilon_t \ldots. (21)$$

Where, P_t = The stock price at time t,
$\Delta P_t = P_t - P_{(t-1)}$ = Change in stock price,
δ_i = Coefficients to be estimated,
q = The number of lagged terms,
t = The trend term,
α_1 = The estimated coefficient for the trend,
α_0 = The constant, and
ε_t = White noise.

Variance ratio test

Variance ratio (VR) test is employed to examine the random walk properties of asset prices. The VR (q) is defined as:

$$VR(q) = \frac{\sigma^2(q)}{\sigma^2(1)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (22)$$

Where, σ^2 (q) = The variance of the q-differences, and
σ^2 (1)) = The variance of the first differences.

Hypothesis

The hypothesis are tested as:
H_0: The Nepalese stock return series follows a random walk.
H_1: The Nepalese stock return series does not follow a random walk.

Results

Table 2 presents the descriptive statistics of daily NEPSE index data. The index shows positive average daily returns. However, the return series deviates from normality. The Kurtosis value of 7.544 indicates a leptokurtic distribution, while Skewness suggests asymmetry. The Jarque-Bera (JB) test confirms non-normality. Overall, Skewness, Kurtosis, and JB test results indicate that NEPSE returns do not follow a normal distribution, violating a key assumption of the random walk model.

Table 2: Descriptive statistics of market return

The table shows mean, standard deviation, minimum value, maximum value, Skewness, Kurtosis, Jarque-Bera, probability and coefficient of variation of NEPSE all share index returns.

Index	Mean (%)	S.D. (%)	Min (%)	Max (%)	Skew	Kurt	JB	Prob	CV
NEPSE	0.066	1.272	-6.04	5.94	0.423	7.544	1857.937	0.000	19.395

Kolmogorov Smirnov (K-S) Goodness of Fit

The Kolmogorov-Smirnov (K-S) test assesses the normality of return series. A K-S value above 0.05 indicates a good fit, while values below 0.05 suggest a significant lack of fit. Table 3 shows that the K-S statistic for NEPSE daily returns is above 0.05, yet the p-value is below 0.05, indicating the series does not follow a normal distribution. Thus, the null hypothesis of normality is rejected. This violates the assumption of identically distributed returns required by the random walk model, suggesting no evidence of RWH in the Nepalese stock market.

Table 3 Kolmogorov Smirnov goodness of fit

The table shows the Kolmogorov-Smirnov (K-S) test to check normal distribution for daily return series variable for NEPSE all share index. The probability value < 0.05 indicates that the returns series reject the null of normality at 5% significance level.

		Normal Parameters		Most Extreme Differences				
Index	N	Mean	S.D.	Absolute	Positive	Negative	Test Statistic	Prob.
NEPSE	2087	0.066	1.272	0.092	0.092	-0.087	0.092	0.000

Run Test

The run test evaluates randomness in daily NEPSE returns by comparing observed and expected runs. Table 4 shows that at the 95% confidence level, the return series does not follow a random walk. The results indicate serial correlation, suggesting autocorrelation in NEPSE returns. Thus, the null hypothesis of randomness is rejected.

Table 4 Run test

The table shows the run test to measure whether return series (daily) for NEPSE index follows random walk. The probability value < 0.05 indicates that the returns series reject the null of random walk at 5% significance level.

Index	Test Value	Cases < Test Value	Cases >= Test Value	Total Cases	No. of Runs	Z	Asymp. Sig. (2-tailed)
NEPSE	0.066	1162	925	2087	807	-9.939	0.000

Autocorrelation Test

The autocorrelation test checks serial correlation in returns across lags 1 to 10. Table 5 shows significant autocorrelation in NEPSE returns at the 5% significance level. This indicates serial dependence, rejecting the RWH in the Nepalese stock market.

Table 5 Autocorrelation test

The table shows the autocorrelation test to examine whether return series (daily) for NEPSE index serially correlated at lag 1 to lag 10. The probability value < 0.05 indicates that the returns series reject the null of serial correlation at 5% significance level.

Index		Lag 1	Lag 2	Lag 3	Lag 4	Lag 5	Lag 6	Lag 7	Lag 8	Lag 9	Lag 10
NEPSE	Coef	0.22	-0.03	-0.01	0.04	0.01	0.02	0.08	0.08	0.01	-0.05
	p-val	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Autoregression Test

The autoregression (AR) test checks if current returns are influenced by past returns. Using an AR(1) model, Table 6 shows a significant AR(1) coefficient at the 5% level. This rejects the null hypothesis of independence, indicating that NEPSE returns are predictable and do not support the RWH.

Table 6 Autoregression test

The table shows the autoregression test to detect for the overall significance of first order lag on the current return series (daily) for NEPSE index. An autoregressive model of order one is: $R_t = c + \beta_0 R_{t-1}$ *. Where* R_t *is the return series,* R_{t-1} *is the first lag of return series and* β_0 *is the coefficient of the first lag. The probability value < 0.05 indicates that the returns series reject the null of return series are independent at 5% significance level.*

Index		Constant	AR(1)
NEPSE	Coef	0.052	0.219
	t-test	1.900	10.254
	p-value	0.058	0.000

Augmented Dickey Fuller Test

The Augmented Dickey-Fuller (ADF) test checks for stationarity in the NEPSE return series. Table 7 shows that the p-value is below 0.05, indicating no unit root. Thus, the null hypothesis of non-stationarity is rejected. Since stationarity contradicts the random walk requirement of a unit root, the results do not support the RWH.

Table 7 Augmented Dickey Fuller test

The table shows the ADF test to examine the stationarity for daily return series variable for NEPSE index at the level and 1st difference. The ADF statistic is a negative number. The test statistic is more negative the stronger the rejection of the hypothesis that the return series data has a unit root (i.e. non-stationary). The probability value < 0.05 indicates that the returns series reject the null of non-stationarity at 5% significance level.

	Level		1st diff	
Index	t-Stat	Prob	t-Stat	Prob
NEPSE	-30.810	0.000	-18.477	0.000

Variance Ratio Test

The Variance Ratio (VR) test is used to examine the random walk behavior of NEPSE return series, accounting for short-term fluctuations. It is applied under both homoscedastic and heteroscedastic assumptions. Table 8 presents VR test results at lags 2 to 34, showing that the variance ratio coefficients differ from one, indicating mean reversion. The homoscedastic Z(k) values for NEPSE shows p-values below 0.05, rejecting the null hypothesis of no serial correlation. The results suggest positive autocorrelation, implying stock prices react slowly to new information and that past prices can help predict future movements.

Table 8 Variance ratio test

The table shows the VR test to detect dependency (non-randomness) of stock return series (daily) for NEPSE index at different lags. The probability value < 0.05 indicates that the returns series reject the null of the RWH with the rise in lags value at 5% significance level.

Index		Lag2	Lag6	Lag10	Lag14	Lag18	Lag22	Lag26	Lag 30	Lag 34
NEPSE	Coef	0.66	0.21	0.13	0.09	0.07	0.06	0.05	0.04	0.04
	Z(k)	-7.62	-7.73	-6.56	-5.89	-5.40	-5.03	-4.76	-4.53	-4.34
	p-val	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Random Walk Model with Linearity

This study tests the linear relationship between consecutive NEPSE returns, as shown in Table 9. The results reveal a statistically significant model with a significant coefficient (α), indicating market inefficiency and a rejection of the RWH. No evidence of heteroskedasticity is found. However, the Ramsey RESET test shows significant non-linearity in the NEPSE return series.

Table 9 Random walk model with linearity of returns series for NEPSE index

The table shows the random walk model with linearities to examine the linear relationship between two successive returns for NEPSE Index on daily basis. The model is: $R_t = \alpha_0 + \alpha_1 R_{t-1} + \varepsilon_t$. Where, R_t is the return series; R_{t-1} is the first lag of return series; α_0 is constant, α_1 is the coefficient of the first lag; and ε_t is error terms. The probability value < 0.05 indicates that the regression coefficients reject the null of statistical significance at 5% significance level.

Index		Constant	AR(1)	F test		Heteros test		Ramsey Reset test	
		α_0	α_1	F-stat	p-val	χ^{2a}	p-val	χ^{2b}	p-val
NEPSE	Coef	0.052	0.219	105.141	0.000	0.003	0.957	4.945	0.000
	p-val	0.058	0.000						

Random Walk Model with Non-linearity

The study examines the relationship between successive NEPSE returns using a non-linear random walk model that accounts for investor biases and neutral risk behavior. Table 10 shows the model is statistically significant (p-value < 0.05), with all coefficients (α1, α2, α3) significant. This indicates market inefficiency and rejects the RWH. Evidence of heteroscedasticity is present (p-value < 0.05), while the Ramsey RESET test finds no significant non-linearity (p-value > 0.05).

Table 10 Random walk model with non-linearity of return series for NEPSE index

The table shows the random walk model with non-linearities to examine the non-linear relationship between two successive returns for NEPSE index on daily basis. The model is: $R_t = \alpha_0 + \alpha_1 R_{t-1} + \alpha_2 R_{t-1}^2 + \alpha_3 R_{t-1}^3 + \varepsilon_t$. *Where* R_t *is the return series,* R_{t-1} *is the first lag of return series,* α_0 *is constant, and* α_1 *is the coefficient of the first order function,* α_2 *is the coefficient of the second order function,* α_3 *is the coefficient of the third order function and* ε_t *is error terms. The probability value < 0.05 indicates that the regression coefficients reject the null of statistical significance at 5% significance level.*

Index		α_0	α_1	α_2	α_3		F test	Het. Test	Ram. test
NEPSE	Coef	-0.008	0.401	0.042	-0.017	test stat	70.871	424.923	0.173
	p-val	0.789	0.000	0.000	0.000	p-val	0.000	0.000	0.863

Discussion

According to Fama (1965), the randomness and independence of price changes are fundamental to market efficiency. The weak form of the EMH asserts that stock prices reflect all past information, making price changes random and unpredictable—consistent with the random walk theory. This theory gained popularity after the 1970s, positing that stock prices follow a random walk, and that consistently outperforming the market is impossible. The RWH implies that stock price movements are independent, identically distributed, and follow no predictable pattern, thus making future price prediction based on past data futile.

This study investigates the operation of the RWH in the Nepalese stock market by applying various statistical tests, including Jarque-Bera, Skewness, Kurtosis, Kolmogorov-Smirnov, Run, Autocorrelation, Autoregression, Augmented Dickey-Fuller, Variance Ratio, and both linear and non-linear random walk models. The consistent outcome across these tests is that the return series are not independently and identically distributed, leading to the conclusion that stock returns in Nepal do not follow a random walk. This findings align with similar results observed in several emerging markets, including studies by Omar et al. (2013) in Pakistan, and Sadat & Hasan (2019) in Bangladesh. However, they contrast with findings from developed markets, such as Kendall (1953) in the UK, Solnik (1973) in the US, and Narayan & Smyth (2007) in G7 countries, where the RWH tends to hold. Literature on different markets often shows mixed results, which is expected due to institutional differences. Developed markets generally exhibit weak-form efficiency, benefiting from high liquidity, active trading, strong institutions, and low information asymmetry. In contrast, small markets like Nepal suffer from weak infrastructure, greater information asymmetry, and thin trading, leading to inefficiencies. However, investors should exercise caution, as Nepal's market is relatively illiquid and inefficient, increasing the risk of substantial losses. For regulatory authorities should need to improve informational efficiency and boost investor confidence.

The fundamental premise of EMH—that stock returns are random—is challenged by the Nepalese market's empirical evidence. The non-randomness suggests that the Nepalese stock market is weak-form inefficient, where past information can be used to predict future returns. This means current stock returns are the best predictors of future returns, implying that abnormal profits can potentially be earned by exploiting historical price patterns. This study contributes valuable insights into the time series behavior of the Nepalese stock market and serves as a foundation for future research aimed at improving market efficiency.

Conclusion

The findings of this study lead to the conclusion that the Nepalese stock market does not follow the RWH. Results

from parametric and non-parametric tests, as well as ARIMA and linear/non-linear models, reveal significant serial correlation in NEPSE returns. This supports the conclusion that stock prices are predictable to some extent, indicating a lack of weak-form efficiency. The findings are consistent with those of other emerging markets such as Pakistan, Bangladesh, and Srilanka, but contrast with results from developed markets like the UK, US, and other G7 nations. This results further concludes that the Nepalese stock market is informationally inefficient, challenging the core assumptions of the EMH. Future studies should examine semi-strong and strong-form efficiencies using sector-specific data to better capture the complexities of Nepal's stock market behavior.

Implications

The findings of this study hold important implications for policymakers, researchers, and investors.

Implications for Policy Makers:

- The study reveals that the Nepalese stock market suffers from informational inefficiency, largely due to inadequate dissemination of reliable financial data. Policymakers should prioritize enhancing transparency by improving public access to trustworthy information. This is critical since market returns are predictable, driven by thin trading, low financial literacy, and limited investor expertise. Therefore, regulatory reforms combined with investor education programs are urgently needed.
- Market inefficiencies have allowed dominant investors to manipulate stock prices, which undermines investor confidence and hampers capital market development. To address this, policymakers must establish and enforce stringent disclosure requirements supported by an effective system of rewards and penalties to ensure timely and accurate reporting.
- The adoption of electronic disclosure platforms should be accelerated, with strict monitoring of corporate disclosures and synchronization of reporting timelines to promote consistency and comparability of information across the market.
- Strong legal frameworks are essential to deter herding behavior and unfair trading practices. Policymakers should facilitate the creation and empowerment of independent financial research institutions and credit rating agencies to foster transparency and market discipline.
- Protecting investors must remain a top priority. This includes implementing robust regulations to prevent insider trading and speculative manipulations, thereby safeguarding both retail and institutional investors and enhancing overall market integrity.

Implications for Researchers:

- This study provides strong evidence of informational inefficiency in the Nepalese stock market, challenging the EMH's validity in emerging markets. The persistent non-random behavior of stock prices in NEPSE indicates market anomalies, highlighting the need to re-evaluate EMH's universal applicability in contexts with structural and behavioral constraints.
- The findings reinforce the growing relevance of behavioral finance in explaining market dynamics in less developed markets. Investor psychology, biases, and herd behavior significantly shape outcomes, suggesting the importance of alternative models that incorporate cognitive and behavioral dimensions.
- Future research should adopt mixed-method approaches, blending quantitative analysis with qualitative insights into investor behavior, regulatory performance, and market sentiment. Exploring factors like financial literacy, investor protection laws, and technological advancements in disclosure can offer deeper insights into improving efficiency.
- Overall, the study reveals the limitations of classical theories in emerging economies and calls for broader frameworks rooted in behavioral finance and institutional economics to better reflect the realities of markets like NEPSE.

Implications for Investors:

- The study's rejection of both the EMH and RWH has important implications for investors in the Nepalese stock market. It suggests that stock prices do not fully reflect all available information, and that returns may

be predictable based on historical data. This creates both opportunities and risks for investors.

- For investors with analytical skills and access to reliable data, market inefficiencies offer the potential to outperform average returns. Strategies such as technical analysis, trend-following, and other data-driven approaches may prove effective in capitalizing on predictable patterns.
- However, these inefficiencies also pose heightened risks for investors. The market is vulnerable to manipulation by dominant players, and price movements are often influenced by rumors, misinformation, and herd behavior. Therefore, investors—especially individuals—should exercise caution and avoid making decisions based solely on market sentiment.
- The widespread lack of expertise underscores the need for financial education for investors. New and existing investors alike should participate in literacy programs to strengthen decision-making and avoid common pitfalls like panic selling, overtrading, or chasing speculative gains.
- A deeper understanding of market behavior and investor psychology can offer a competitive edge for investors navigating the uncertain and evolving environment of Nepal's financial market.

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Success Factors of Commercial Banks in Nepal

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Abstract

The study aims to analyze the determinants of the financial performance of commercial banks in Nepal. A descriptive and causal research design is adopted in the study. The population consists of twenty commercial banks listed on NEPSE. HBL, NABIL, NIMB, SCNBL, EBL, and SANIMA were randomly selected, comprising ten years of data and sixty firm-years observations. Descriptive and inferential statistical analyses have been performed in the study. The study concludes that Nepalese commercial banks maintain an overly high capital adequacy ratio. Banks size is adequate when considering the overall asset base. However, commercial banks remain unable to fully employ all their available assets in various forms. The rising net interest margin ratio suggests that commercial banks are successfully mobilizing and utilizing their available assets. The financial performance of commercial banks is positively impacted by increase in gross domestic product. The capital adequacy ratio has a positive effect on financial performance. Nonetheless, bank size, measured by total assets, has a negative effect on financial performance.

Keywords: *Bank Size, CAR, Inflation, GDP, NIM, ROA.*

JEL Classification: *B21, B22, D4, E43, G2*

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Introduction

Nepal has seen significant changes in its banking industry over the past few decades, with liberalization policies leading to increased competition and innovation within the sector. Pokharel (2014) concluded that the financial performance of commercial banks in Nepal is influenced by capital adequacy, asset quality, management efficiency, earnings quality, liquidity, and sensitivity to market risk. According to Karki (2016), profitability and asset management ratios have a significant effect on the financial performance of Nepalese commercial banks. Shrestha (2017) revealed that higher credit risk levels and fluctuating interest rates have a negative impact on the financial performance of commercial banks in Nepal. Jha and Hui (2012) discovered that private commercial banks in Nepal generally outperform state-owned banks in terms of profitability and overall financial performance. In a similar vein, Bhandari and Nakarmi (2014) analyzed the performance of Nepalese commercial banks using the Analytic Hierarchy Process (AHP), considering key indicators such as profitability, liquidity, and risk management. Bhattarai (2018) concluded that both bank-specific variables (capital adequacy & asset quality) and macroeconomic variables (GDP growth & inflation) have a significant influence on the return on assets (ROA) of commercial banks in Nepal. Rai et al., (2015) found that capital adequacy, asset quality, and management

efficiency have a positive influence on the financial performance of commercial banks in Nepal. Furthermore, inflation and economic growth have a significant impact on bank performance in Nepal.

There has been a rapid increase in the establishment of banks and financial companies over the past few years in Nepal. However, following the enactment of BFIs Merger and Acquisition Bylaws, 2073 BS, there has been a decline in the number of banks and financial institutions operating in the country. With the rapid growth of financial markets, banks are grappling with intense competition. The banking industry has witnessed significant transformations, primarily driven by advancements in technology and the increasing impact of globalization. These factors have not only presented opportunities for expansion but have also posed challenges to bank managers who strive to sustain profitability and competitiveness. Hence, industry managers must be familiar with and comprehend the key factors that impact bank's profitability. This is essential because banks play a pivotal role in economic development. While joint venture banks have shown stronger performance compared to local commercial banks in the short term, they are also engaged in intense competition among themselves. Therefore, this study aims to investigate the factors that affect the financial performance of selected banks. Based on priori signs from on the previous literature, the following hypotheses have been developed and formulated as follows;

Statement of Hypothesis

H_1 : The Capital Adequacy Ratio has a significant positive effect on the Return on Assets of selected banks.
H_2 : The Capital Adequacy Ratio has a significant positive effect on the Net Interest Margin of selected banks.
H_3 : Bank Size has a significant positive effect on the Return on Assets of selected banks.
H_4 : Bank Size has a significant positive effect on the Net Interest Margin of selected banks.
H_5 : GDP growth rate has a significant positive effect on the Return on Assets of the selected banks,
H_6 : GDP growth rate has a significant positive effect on the Net Interest Margin of the selected banks.
H_7 : Inflation Rate has a significant negative impact on the Return on Assets of the selected banks.
H_8 : Inflation Rate has a significant negative impact on the Net Interest Margin of the selected banks.

Literature Review

Conceptual Review

Financial Performance

The capacity of a company to earn funds and employ assets from its principal operations is measured objectively by its financial performance, which describes the general state of the financial health of an organization over a specific time frame. Decision-makers can assess the outcomes of business strategies and actions in monetary terms objectively by evaluating the financial performance of the company. A company's worth is anticipated to be positively impacted by well-designed and effectively implemented financial management practices (Padachi, 2006). Similarly, financial analysis involves examining the financial statements to determine whether the results meet the firm's objectives, to identify any problems in the past, present, or foreseeable future, and to provide recommendation to address them (Pradhan, 1986).

Return on Assets

Return on Assets (ROA) is a financial measure that indicates the percentage of return a firm generates relative to its total resources. ROA reflects a bank's management team's capacity to generate profits from the assets employed in its operations. It demonstrates how effectively assets are managed to produce income. Siraj and Pillai (2012) stated that the return on total assets (ROA), after interest and taxes, is determined by dividing net income by total assets. Mathematically, it can be expressed as:

$$\text{ROA} = \frac{\text{Net profit after tax}}{\text{Total Asstes}}$$

Net Interest Margin

The difference between the interest income generated and the interest expenses incurred on interest-earning assets is known as the Net Interest Margin (NIM). Financial intermediaries determine this margin at a level that accounts for the associated costs and risks of financial intermediation. The cost of a bank's intermediation services and its overall efficiency are both reflected in its NIM. Mathematically, it can be expressed as:

$$\text{NIM} = \frac{\text{Net interest income}}{\text{Total loans and advances}}$$

Macroeconomic Factors

Inflation Rate

An important macroeconomic metric is inflation, which measures changes in the average price of household purchases of consumer goods and services. Clements and Galbiao (2008) found that the performance of enterprises become more volatile as the average inflation rate increases. Perry (1992) discovered that the impact of inflation on bank profitability varies depending on whether the inflation is expected or unexpected. Managers can enhance the positive effects on inflation on profitability by raising loan rates more quickly than operating costs if they can accurately forecast inflation. When unexpected inflation occurs, bank managers may hesitate to adjust interest rates on bank loans, causing operational costs to rise more quickly than revenue and negatively affecting profitability.

Gross Domestic Product

Gross Domestic Product (GDP) is a commonly used economic indicator that represents the total economic activity of a nation within a specific year. Shubiri (2010) discovered a strong positive association between stock market prices, firm performance, and GDP. Since higher GDP growth stimulates greater economic activity and consumption, it is generally believed that GDP growth has a beneficial impact on bank performance.

Bank Specifics Factors

Bank Size

Kosmidou and Zopounidis (2006) stated that bank size has a detrimental impact on performance, whereas Masood and Ashraf (2012) concluded that bank size has a favorable effect. They further noted that the economies of scale enjoyed by larger banks allow them to acquire capital at a lower cost, thereby reducing overall expenses.

Capital Adequacy Ratio

A bank's capital is gauged by the Capital Adequacy Ratio (CAR), expressed as a proportion of a bank's risk-weighted credit exposures. The amount of internal funds that a bank maintains to support operations and serve as a safety buffer in adverse situations is referred to as capital. Poudel (2012) found a strong inverse relationship between bank performance and capital adequacy ratio. Mathematically, it can be expressed as:

$$\text{CAR} = \frac{\text{TOTAL CAPITAL FUND}}{\text{TOTAL RISK WEIGHTEF ASSETS}}$$

Empirical Review

Table 1: Review of Empirical Studies

Authors/Year	Major Findings
Bhandari and Nakarmi (2014)	Financial performance of commercial banks in Nepal largely depends on liquidity, efficiency, profitability, capital sufficiency, and asset quality
Jha (2014)	CAR, interest costs to the total loans, and net interest margin had a negative impact on ROA, while ROE was positively affected by CAR.
Murerwa (2015)	External market structure and industry-specific variables are important determinants of financial performance.

Authors/Year	Major Findings
Rai et al. (2015)	Higher ROE and ROA were associated with improved management effectiveness, liquidity management, and higher CAR. Inflation and GDP growth positively influenced ROE and ROA.
Murewa (2015)	Internal factors played a more significant role than macro-economic factors in determining performance.
Baba & Nasieku (2016)	Interest rate and exchange rate had a negative effect on financial performance, while inflation rate was not significant.
Dhakal et al., (2016)	The ratio of loans to assets, GDP per capita, interest rate, and inflation all had a substantial impact on non-performing loans.
Pandey et al., (2016)	Private commercial banks outperformed state-owned banks. Capital adequacy, asset quality, and management efficiency were major determinants of performance.
Pradhan & Parajuli (2017)	Bank size and ROA were positively related, while equity capital and CAR had a negative relationship with ROA.
Antoun et al., (2018)	Bank size negatively affected asset quality and earnings. Bank concentration and economic growth positively influenced CAR.
Bhattarai (2018)	Bank's profitability was negatively correlated with cost per loan asset.
Egburibe (2018)	Inflation and GDP growth rates had a significant impact on ROA.
Koju et al., (2018)	GDP, inflation rate, and capital adequacy ratio all had a favorable effect on bank performance.
Bacteng (2019)	Bank size, GDP growth rate, capital sufficiency, and non-performing loans negatively affected profitability.
Pradhan & Shrestha (2019)	CR and ROA showed a negative relationship.
Bhattarai (2019)	Non-performing loans were negatively affected by the exchange rate. GDP was insignificant, while inflation had a positive effect on non-performing loans.
Hosen (2020)	CR significantly affected profitability, and CAR had a significant influence on ROA.
Khadka (2020)	Banks with higher capital adequacy and asset quality performed better. GDP growth and inflation played crucial roles in financial performance.
Neupane (2020)	GDP, inflation, and exchange rate all increased ROA. Inflation rate and capital sufficiency significantly affected NIM.
Gurung (2021)	A diverse ownership structure positively influenced bank performance.
Ichsan et al., (2021)	Non-performing loans negatively affected ROA, While CAR had a significant positive effect on profitability.
Bista (2022)	Maintaining optimal liquidity ratios and cash flows enhanced the profitability of commercial banks.
Karki (2023)	Higher credit risk reduced the financial performance of commercial banks
Lama (2023)	Interest rates volatility negatively affected the financial performance of commercial banks.
Singh (2023)	Higher capital adequacy improved bank stability.
Acharya (2024)	Banks with higher market shares exhibited better financial performance.

Theoretical Framework

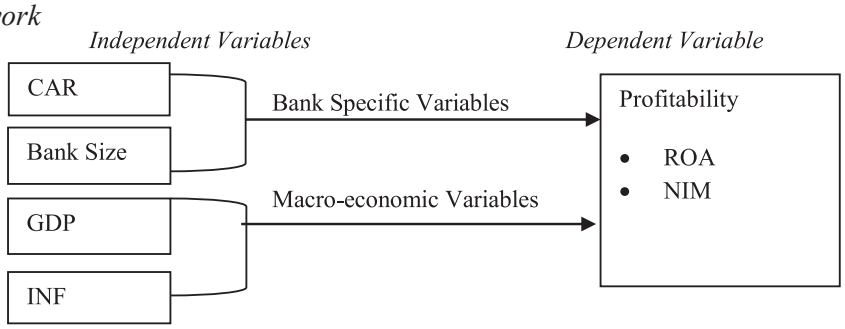

Figure 1: Theoretical Framework

Research Methods

The study is quantitative in nature and adopts the descriptive and causal research designs. The primary statement of the research is that the performance of commercial banking is influenced by macroeconomic parameters such as GDP, inflation (INF), along with bank-specific variables such as bank size and CAR. The dependent variables used in the study are ROA and NIM. Among twenty commercial banks (the population), six were taken as the sample using a random sampling method; Sanima Bank Ltd., Nabil Bank Ltd., Nepal Investment Mega Bank Ltd., Standard Chartered Bank Nepal Ltd., Everest Bank Ltd., and Himalayan Bank Ltd. The study period spans ten fiscal years. The sample includes secondary data from 2013/2014 to 2022/2023 AD. Descriptive and inferential analysis have been conducted using Microsoft Excel and IBM SPSS Version 26.

Model Specifications:

$$Model\ 1: ROA = \beta + \beta_1 CAR_{it} + \beta_2 SIZE_{it} + \beta_3 GDPGR_{it} + \beta_4 INF_{it} + e_{it} \ldots\ldots \quad (1)$$

$$Model\ 2: NIM = \beta + \beta_1 CAR_{it} + \beta_2 SIZE_{it} + \beta_3 GDPGR_{it} + \beta_4 INF_{it} + e_{it} \ldots\ldots \quad (2)$$

Where,

CAR_{it}= Capital adequacy ratio of i^{th} bank for the period 't'; ROA_{it}= Return on assets of i^{th} bank for the period 't'; $SIZE_{it}$= Size of i^{th} bank for the period 't'; $GDPR_{it}$= Gross Domestic Product for period 't'; INF_{it}= Inflation Rate for period 't'; β= Intercept (constant term); β1, β2, β3, β4 = Coefficients of independent variables; e= component of error

Table 2: Description of Variables and Measurements

Variables	Measurements
Dependent Variables	
Return on Assets (ROA)	Net Income/ Total Assets
Net Interest Margin (NIM)	Net Interest Income to Average Earnings
Independent Variables	
Bank Size	Natural logarithm of total assets.
Capital Adequacy Ratio (CAR)	(Tier 1 capital + Tier 2 Capital)/ Risk Weighted
GDP Growth Rate	Annual change in growth rate.
Inflation Rate	Aggregate of price level change in general price level of goods and services in an economy.

Results and Discussions

Capital Adequacy Ratio

Ayele (2012) pointed out that capital adequacy is a measure of a bank's financial strength, reflecting its ability to withstand operational costs and fund liquidity. Capital adequacy also indicates the ability of a bank to undertake additional business. The size of the capital provides financial flexibility to bank and financial institution.

Table 3: Pattern of Capital Adequacy Ratio (CAR)

Year	Capital Adequacy Ratio					
	HBL	NABIL	NIMB	SCBL	EBL	SANIMA
2013/14	11.23	11.18	11.27	12.27	11.31	12.54
2014/15	11.14	11.57	11.9	13.1	13.33	11.08
2015/16	10.84	11.73	14.92	16.38	12.66	12.36
2016/17	12.15	12.9	13.02	21.08	14.54	15.57
2017/18	12.46	13	12.66	22.99	14.2	12.41
2018/19	12.6	12.5	13.26	19.69	13.74	13.19
2019/20	14.89	13.07	13.54	18.51	13.38	13

Year	Capital Adequacy Ratio					
	HBL	NABIL	NIMB	SCBL	EBL	SANIMA
2020/21	13.93	12.77	13.54	17.17	12.48	13.57
2021/22	12.69	13.78	14.79	15.9	11.89	13.51
2022/23	12.31	12.68	15.96	14.91	13.36	14.42
Mean	12.82	12.52	13.49	17	13.39	13.08
SD	1.36	0.85	1.41	3.58	1.07	1.19
CV	10.61	6.82	10.43	21.06	8.11	9.14

Source: Annual Reports, 2013/14 to 2022/23 AD

Table 3 reveals that the CAR of commercial banks is maintained and within accessible limits in Nepal. According to Nepal Rastra Bank's new capital adequacy framework, the minimum capital requirement is 10%, with at least 6% as core capital. However, due to high standard deviation, the capital adequacy ratio has fluctuated and remained somewhat inconsistent over the past ten years across all commercial banks. Moreover, since the coefficient of variation is not zero, annual fluctuations and inconsistencies in the capital adequacy ratio have been observed.

Bank Size

The total assets of the sample banks were used to represent the size of each bank. For analytical purposes, bank size was calculated using the natural logarithm of total assets.

Table 4: Pattern of Bank Size (BS) in Terms of Total Assets 'in million'

Year	Total Assets					
	HBL	NABIL	NIMB	SCBL	EBL	SANIMA
2013/14	74,718	87,274	86,173	53,324	73,589	60,018
2014/15	84,753	115,986	104,345	65,059	82,801	69,186
2015/16	101,217	127,300	129,782	65,185	99,863	88,682
2016/17	100,309	144,017	134,516	663,501	108,063	117,893
2017/18	118,388	169,076	155,361	688,762	116,462	125,847
2018/19	133,151	201,138	185,841	93,264	170,077	151,653
2019/20	155,884	237,680	203,023	116,438	185,023	273,876
2020/21	178,490	291,066.2	227,930	114,739	211,650	160,751
2021/22	216,286	419,818.1	244,449	123,356	225,381	192,511
2022/23	332,392	481,203.5	447,505	151,378	249,983	215,643
Mean	149,558.8	227,455.8	191,892.5	213,500.6	152,289.2	145,606
SD	73,865.9	125,981.1	98,430	233,169,4	60,669.9	64,333.8
CV	49.39	55.39	51.29	109.21	39.84	46.57

Source: Annual Reports, 2013/14 to 2022/23 AD

Table 4 reveals that the selected banks appear to have earned a satisfactory amount of the available assets. The ten-year period's asset fluctuations and inconsistencies were illustrated by the standard deviations for bank sizes. The study found that the assets held by commercial banks in Nepal were completely inconsistent. The coefficient of variations of HBL, NABIL, NIMB, SCBL, EBL, and SANIMA over a ten-year period have reflect annual variations in terms of fluctuation and inconsistency over assets.

Net Interest Margin

A company's ability to successfully invest its cash in relation to its expenses on the same investments is gauged by its net interest margin ratio. When interest costs outweigh the profits on investments, a negative value indicates that the company has not made the best choice in terms of investments.

Table 5: Net Interest Margin (NIM) Ratio

Year	Net Interest Margin Ratio					
	HBL	NABIL	NIMB	SCBL	EBL	SANIMA
2013/14	3.19	4.23	3.48	3.39	3.57	2.79
2014/15	4.02	3.04	3.03	2.39	3.31	2.82
2015/16	3.48	3.39	3.01	3.30	3.34	3.08
2016/17	3.50	3.89	3.17	2.87	3.25	3.20
2017/18	3.46	3.46	3.95	3.72	3.37	3.29
2018/19	4.34	3.63	3.48	3.72	3.48	3.86
2019/20	3.59	2.94	2.95	2.97	3.02	3.76
2020/21	1.92	2.27	2.37	2.18	1.81	2.56
2021/22	1.80	1.98	1.69	2.72	2.18	2.28
2022/23	2.99	3.69	2.76	3.93	2.96	3.00
Mean	3.23	3.25	2.99	3.12	3.03	3.06
SD	0.77	0.67	0.597	0.56	0.55	0.47
CV	23.98	20.59	19.98	17.97	18.23	15.29

Source: Annual Reports, 2013/14-2022/23 AD

Table 5 reveals that each bank shows fluctuations in NIM, reflecting changes in interest income and expenses relative to their interest-earning assets. For instance, HBL's NIM ranges from 1.80 to 4.34, with an average of 3.23 and a standard deviation of 0.77, indicating moderate variability. Similarly, NABIL exhibits a narrower range of 1.98 to 3.89, averaging 3.25 with a lower variation of 0.67. In contrast, NIMB demonstrates a wider range of 1.69 to 3.95, averaging 2.99 with a standard deviation of 0.60, suggesting greater variability in its NIM over the years. SCBL, EBL, and SANIMA also show varying patterns in NIM, reflecting their individual financial strategies and market conditions. These metrics are crucial for assessing a bank's operational efficiency and financial health over time.

Return on Assets

A company's financial performance, measured by return on assets (ROA), gauges its ability to create value for shareholders.

Table 6: Return on Assets (ROA)

Year	ROA					
	HBL	NABIL	NIMB	SCBL	EBL	SANIMA
2013/14	1.3	3.65	2.3	2.51	2.25	1.46
2014/15	1.34	2.06	1.9	1.99	1.85	1.55
2015/16	1.94	2.32	2	1.98	1.59	1.78
2016/17	2.19	2.69	2.1	1.84	1.83	1.86
2017/18	1.67	2.61	2.13	2.61	1.97	1.85
2018/19	2.21	2.11	1.79	2.61	1.94	2.07
2019/20	1.79	1.58	1.19	1.71	1.42	1.41
2020/21	1.68	1.56	1.56	1.22	1.87	1.44
2021/22	1.09	1.01	1.55	1.83	1.10	1.09
2022/23	0.47	1.33	0.83	2.29	1.34	1.21
Mean	1.57	2.05	1.71	2.00	1.74	1.57
SD	0.58	0.86	0.72	0.498	0.40	0.296
CV	37.1	41.88	42.34	24.90	23.03	18.85

Source: Annual Reports, 2013/14-2022/23 AD

Table 6 reveals that the commercial banks made efficient use of the available resources. Consequently, the analysis found that Nepalese commercial banks were effectively mobilizing and utilizing their available assets. For HBL, NABIL, NIMB, SCBL, EBL, and SANIMA, the corresponding standard deviations for ROA were 0.58, 0.86, 0.72, 0.498, 0.40, and 0.296 percent, illustrating the variability and irregularities in return on assets throughout the course of the ten-year period. HBL, NABIL, NIMB, SCBL, EBL, and SANIMA coefficients of variation over ten-year period had represented annual variations in terms of volatility and inconsistency over return on assets. As a result, the analysis found that Nepalese commercial banks' returns on assets were completely inconsistent.

Microeconomic Variables

The inflation rate and GDP growth rate are key macroeconomic variables.

Table 7: Structure and Pattern of GDP Growth Rate (GDPR)

Year	GDP Growth Rate
2013/14	3.8
2014/15	5.7
2015/16	3.3
2016/17	0.6
2017/18	8.2
2018/19	6.7
2019/20	7.0
2020/21	-2.4
2021/22	4.2
2022/23	5.6
Mean	4.27
S.D.	3.03
C.V.	70.94

Source: Economic Survey of Nepal

The highest and lowest GDP growth rates were recorded in the fiscal years 2017/18 and 2020/21, respectively. The mean GDP growth rate over the ten-year period is 4.27 percent, with a standard deviation of 3.03. The coefficient of variation for this period is 70.94 percent.

Table 8: Structure and Pattern of Inflation Rate (IR)

Year	Inflation Rate
2013/14	7.70
2014/15	8.10
2015/16	7.60
2016/17	10.40
2017/18	2.70
2018/19	4.60
2019/20	6.00
2020/21	4.80
2021/22	4.20
2022/23	8.10
Mean	6.42
S.D.	2.34
C.V.	36.49

Source: Economic Survey of Nepal

The highest and lowest inflation rate can be seen in fiscal year 2016/17 and 2017/18 respectively. The mean of inflation rate is 6.42 having standard deviation of 2.34 over the ten years' period. The coefficient of variance over the ten years' period is 36.49 percent.

Assessment of Status of Variables Used in the Study

Table 9: Descriptive Analysis

Variables	Range	Minimum	Maximum	Mean	Std. Deviation
TA ('in 000')	81849887	145606000	227455887	180050498	326426869.4
CAR	4.61	11.86	16.47	13.72	1.5
GDPR	10.6	-2.4	8.2	4.27	3.03
IR	2.30	8.10	10.40	6.42	2.34
NIM	0.26	2.99	3.25	3.11	0.098
ROA	0.48	1.57	2.05	1.77	0.19

The bank size has a minimum of Rs. 145,606,000,000 and a maximum of Rs. 227,455,887,000. As a result, the bank size range is Rs. 81,849,887,000. Similarly, over a ten-year period, the capital adequacy ratio has a mean value of 13.72 percent and a standard deviation of 1.5. Similarly, over a ten-year period, the GDP growth rate has a mean value of 4.27 percent and a standard deviation of 3.03. The GDP has a minimum percentage of -2.4 and a maximum percentage of 8.2. As a result, the GDP range is 10.6 percent. Comparably, over a ten-year period, the average inflation rate is 6.42 percent with a standard deviation of 2.34. As a result, the inflation rate range is 2.30 percent. Over a ten-year period, the net interest margin ratio has a mean value of 3.11 percent and a standard deviation of 0.098. NIM has a minimum of 2.99 and a maximum of 3.25 percent. Therefore, the net interest margin ratio ranges from 0.26 percent. Additionally, over a ten-year period, the mean return on assets is 1.77 percent with a standard deviation of 0.19. The ROA percentage ranges from 1.57 to 2.05 percent at the minimum and maximum. As a result, the ROA range is 0.48 percent.

Relationship Analysis

The Bivariate Pearson's correlation was used to analyze the relationship between the variables.

Table 10: Correlation Matrix for Macroeconomic Factors

		GDPR	IR	NIM	ROA
GDPR	Pearson Correlation	1	-0.215**	0.294*	-0.149
	Sig. (2-tailed)		0.003	0.023	0.213
IR	Pearson Correlation		1	-0.005	0.342**
	Sig. (2-tailed)			0.969	0.008
NIM	Pearson Correlation			1	0.075
	Sig. (2-tailed)				0.568
ROA	Pearson Correlation				1

***. Significant at the 0.01 level (2-tailed).*

**. Significant at the 0.05 level (2-tailed).*

Table 10 reveals a positive correlation between the net interest margin ratio and the growth rate of the gross domestic product. This suggests that as the GDP grows, so does the net interest margin ratio, indicating that the two variables are leading each other in the same direction. As a result, the corresponding hypothesis H_6 is accepted. Nonetheless, there is a negative correlation between the inflation rate and the net interest margin ratio, meaning that when the inflation rate rises, the net interest margin ratio falls and vice versa. As a result, the corresponding hypothesis H_8 is accepted. Similarly, return on assets and GDP growth rate have a negative relationship, meaning that while GDP grows at a faster rate, return on assets also grows at a slower rate because they lead each other in

opposing directions, and vice versa. It concludes that the corresponding hypothesis H_5 has been rejected. There is a positive correlation between the inflation rate and return on assets, meaning that as the inflation rate rises, return on assets falls and vice versa. As a result, H_7 has been rejected. This might be since Nepalese banks are effective at quickly adjusting interest rates to outpace rising costs during inflationary periods. This finding has questioned the existing theory. A positive relationship between inflation and ROA can occur because higher inflation often leads to higher nominal ROA as sample banks can pass on increased costs, and a generally growing economy. The gross domestic product growth rate and inflation eventually show a negative association, suggesting that they follow one another in the opposite direction.

Table 11: Correlation Matrix for Bank Specific Variables

		CAR	BS(Ln_TA)	NIM	ROA
CAR	Pearson Correlation	1	0.105	0.038	-0.145
	Sig. (2-tailed)		0.423	0.775	0.268
BS(Ln_TA)	Pearson Correlation		1	-0.247	-0.025
	Sig. (2-tailed)			0.057	0.852
NIM	Pearson Correlation			1	0.075
	Sig. (2-tailed)				0.568
ROA	Pearson Correlation				1

Table 11 indicates a positive link between the net interest margin ratio and the capital adequacy ratio. This suggests that when the net interest margin ratio rises, the capital adequacy ratio rises as well, leading each other in the same way. It implies that the corresponding hypothesis H_2 is accepted. On the other hand, there appears to be a negative correlation between the net interest margin ratio and bank size. This means that as the net interest margin ratio raises, bank size falls, and vice versa. It implies that the corresponding hypothesis H_4 has been rejected. Similarly, there is a negative correlation between return on assets and both the capital adequacy ratio and bank size. This means that as both variables rise in opposition to one another, return on assets likewise falls and vice versa. This implies that H_1 and H_3 have been falsified respectively. The net interest margin ratio and return on assets eventually show a negative association, indicating that they eventually lead one another in the opposite direction.

Impact Analysis of Bank Specific Variables and Macro-economic Variables on NIM

Table 12: Regression Analysis of CAR, BS(Ln_TA), GDPR and IR on NIM.

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.421[a]	0.177	0.117	1.65866	0.630

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	32.551	4	8.138	2.958	0.028
	Residual	151.313	55	2.751		
	Total	183.864	59			

Coefficients[a]							
Model		Unstandardized Coefficients		t-value	p-value	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	Constant	26.760	8.682	3.082	0.003		
	CAR	0.033	0.073	0.458	0.648	0.809	1.236
	GDPR	0.173	0.063	2.731	0.008	0.854	1.170
	IR	0.096	0.114	0.837	0.406	0.712	1.404
	BS(Ln_TA)	-0.763	0.338	-2.257	0.028	0.975	1.026

a. Dependent Variable: NIM

b. Predictors: (Constant), BS(Ln_TA), CAR, GDPR, IR

Table 12 reveals that the model's R-square is 0.177 which indicates that independent variables; the capital adequacy ratio, the rate of inflation, the growth rate of the gross domestic product, and the size of the bank can account for 17.7 percent of the variation in the dependent variable, net interest margin ratio. It meant that after accounting for the number of predictors and sample size, the model explains 11.70 percent of the variance. The difference shows the model's R-squared value was likely inflated by the number of variables, and the adjusted R-squared provides a more conservative and reliable measure of the model's explanatory power. The Durbin-Watson test result is 0.63, falling between 0 and 4 indicates no autocorrelation in the residuals. Since the variance influence factor (VIF) is less than 10, multicollinearity is not a severe problem. The model's fitness is shown by an F-value of 2.958 at the 5 percent significance level suggests the fitness of model. The significant coefficient of GDPR indicates that if the gross domestic product growth rate is increased by one percent, NIM would increase by 0.173 percent. At the end, the significant negative coefficient of bank size is -0.763, meaning that for every percent increase in the inflation rate, the average impact on the net interest margin ratio would fall by 0.763 percent.

Impact Analysis of Bank Specific Variables and Macro-economic Variables on ROA

Table 13: Regression Analysis of CAR, BS(Ln_TA), GDPR and IR on ROA.

Model Summary[b]						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson	
1	0.344[a]	0.191	0.121	0.48973	0.986	
ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.776	4	0.444	4.851	.032[b]
	Residual	13.191	55	0.240		
	Total	14.967	59			
Coefficients[a]						
Model		Unstandardized Coefficients		t-value	p-value	Collinearity Statistics
		B	Std. Error			Tolerance VIF
1	(Constant)	1.086	2.563	0.424	0.673	
	CAR	0.001	0.022	0.015	0.988	0.809 1.236
	GDPR	-0.006	0.019	-.310	0.758	0.854 1.170
	IR	0.074	0.034	2.197	0.032	0.712 1.404
	BS(Ln_TA)	0.018	0.100	0.179	0.859	0.975 1.026

Predictors: (Constant), BS(Ln_TA), CAR, GDPR, IR

Dependent Variable: ROA

The R-square value of 0.191 indicates that independent variables; the capital adequacy ratio, the rate of inflation, the growth rate of the gross domestic product, and the size of the bank can account for 19.1percent of the variation in the dependent variable, returns on assets. The Durbin-Watson test result, which is 0.986, is between 0 and 4. There is no autocorrelation in the data. The model's fitness is indicated by the F-value of 4.851 at 5% level of significance suggests that the study model fits the data well for describing Nepal's commercial banks' financial performance. Additionally, the average influence on return on assets would grow by 0.074 percent for one percent increase in the inflation rate, according to the significant coefficient value of 0.074.

Discussion

The capital adequacy ratio and return on assets have a statistically significant positive relationship. The finding is consistent with the findings of Rai et al., (2015), Dhakal et al., (2016), Pradhan and Parajuli (2017), Antoun et al., (2018), Koju et al., (2018), and Ichsan et al., (2021). This is consistent due to the reason that the capital adequacy strengthens a bank's financial health, which typically improves profitability (ROA), a well-established theoretical relationship. The results, however, contradict those of Jha (2014) and Bacteng (2019). The contradictions may

arise because those studies might have used different samples, time periods, or modeling approaches or external economic conditions such as crisis might have impacted banks differently. Similarly, a statistically significant positive relationship between return on assets and gross domestic product (GDP) growth rate is in line with earlier findings of Koju et al., (2018) and Bacteng (2019). Nonetheless, the findings are at odds with those of researchers like Egburibe (2018) and Rai et al., (2015). Economic growth usually enhances bank profitability by increasing demand for loans and services, a logical and commonly supported finding. Moreover, the positive relationship between the inflation rate and return on assets in the study is consistent with the findings of Rai et al., (2015), Baba and Nasieku (2016), Antoun et al., (2018), Egburibe (2018), Koju et al., (2018) and Bacteng (2019). The moderate inflation can lead banks to increase interest rates, boosting profitability, which many studies have observed in stable inflationary environments. However, the results contradict the findings of Dhakal et al., (2016). Ultimately, the negative significant impact of bank size on NIM is in line with the studies of Dhakal et al., (2016), and Pradhan and Parajuli (2017). The differences here may reflect that a researcher studied a period of high or volatile inflation, where inflation harms banks profitability, or their model accounted for different confounding factors. Jha (2014) found that CAR, interest expenses to total loan, and net interest margin were significant but had a negative effect on ROA, Non-performing loan and credit to deposit ratio did not have any effect on ROA. This study supports Jha (2014) since CAR is positively correlated with net interest margin ratio. Neupane (2020) found GDP, Inflation and exchange rate had a positive effect on ROA. Thus, the finding of this study is consistent with the Neupane (2020), since there is a positive correlation between capital adequacy, GDP, inflation, and the net interest margin ratio (NIM).

Conclusions

Finally, Nepalese commercial banks are overly maintaining the capital adequacy ratio. The bank's size is adequate when considering its overall assets. Additionally, the whole asset is trending upward year. The use of the assets is not optimal, though. The commercial banks are still unable to make use of all their various asset types. The net interest margin ratio is rising annually, a sign of the commercial banks' efficient mobilization and acquisition of accessible assets. Financial success and the growth rate of the gross domestic product are favorably associated. Additionally, the financial performance of commercial banks is positively impacted by increase in the gross domestic product. The capital adequacy ratio, for example, is a bank-specific statistic that positively affects financial performance. Nonetheless, a bank's size relative to its overall assets has a detrimental effect on its financial performance.

Implications

The study's findings help the financial manager prepare the plan and policies related to financial decision-making by providing information on how to maintain the return on assets, net interest margin ratio, dividend distribution ratio, and maintenance of the non-performing loan ratio to increase the profitability of commercial banks. By implying superior ideas through its conclusions, the study contributes to efficient and profitable investment. As such, it facilitates investors' allocation of capital to these joint venture industries. Since fund managers and stock investors can utilize the characteristics to estimate the right ratio, the study's findings appear to be very helpful to them. The study contributes to the theoretical understanding of frameworks that promote better decision-making and financial performance.

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Understanding Consumer Behaviour towards Green Apparel: A Study of Purchase Intention in Kathmandu

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Abstract

This study investigates the determinants of consumers' purchase intention and behaviour toward green apparel by extending the Theory of Planned Behaviour (TPB). The research model integrates attitude, subjective norm, and perceived behavioural control, the core TPB constructs alongside environmental concern and environmental knowledge. Data were collected from 269 respondents in Kathmandu, providing insights into urban consumers' attitudes toward sustainable clothing. The findings reveal that all five factors positively influence consumers' intention to purchase green apparel. Moreover, green purchase intention significantly mediates the relationship between these antecedents and actual purchase behaviour. The study suggests that marketers should work on improving consumer attitudes, raising awareness about the environment, and building a strong brand image focused on sustainability. Policymakers should encourage eco-friendly behaviour by offering educational programs and incentives for green apparel production. Although the study provides valuable insights, it also has limitations, such as focusing on general apparel and not specific products. Future research could explore different product types and other factors affecting green purchases. Overall, the findings offer practical ideas to promote sustainable fashion in urban Nepal.

Keywords: *Purchase Intention, Green Apparel, Theory of Planned Behaviour, Sustainable Consumption, Environmental Concern.*

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Introduction

Consumers may either purchase products based on immediate needs or make purchase decisions by evaluating factors such as personal needs, product features and expected performance. People regularly buy a wide range of products but with increasing awareness of environmental issues and diverse consumer needs, there is a growing demand for green alternatives (Charter & Polonsky, 2017). In Asia, green consumerism has just recently begun to spread (Gura˘u and Ranchhod, 2005). As environmental threats continue to worry local governments and citizens, the Asian region has embraced the power of "going-green" to take responsibility for the environment (Lee, 2008). Green products are more advantageous for society because they have less of an impact on the environment, ecosystem, and resources from the point of manufacture to the point of consumption. Depletion of the environment is a result of excessive use and exploitation of natural resources and various environmental problems have been connected to human consumption (T. B. Chen & Chai, 2010). Individuals are becoming more conscious of environmental issues, which has a direct impact on their attitude toward buying eco-friendly goods (Pagiaslis & Krontalis, 2014). There is increasing concern related to the organically produced products throughout the globe due to the concern of unusual agriculture related practices, human health consideration, environment concerns,

environment protection concerns and animal welfare concern (Wee et al., 2014). There have been changes in consumer preferences and behavior regarding green products as a result of growing environmental sustainability concerns and consumption (Mendleson & Polonsky, 1995).

Several studies in Nepal have explored consumer behaviour and awareness related to green products. Chhetri and Karki (2023) examined how consumer attitudes influence green product purchasing in Chitwan, revealing a growing interest in eco-friendly consumption. Ghimire (2019) also observed rising demand for organic products in urban centers like Kathmandu, Chitwan, and Pokhara. Despite these encouraging trends, research on green marketing in Nepal remains limited. Shrestha et al. (2023) investigated green marketing awareness among consumers in the Kathmandu Valley, highlighting a still-developing understanding of sustainable choices. Ghimire (2020) focused on Nepalese youth, analysing their attitudes and purchase intentions toward eco-friendly products and sustainability. However, these studies lack a specific focus on the apparel industry, leaving a research gap in understanding consumer behavior toward green clothing. Collectively, these studies suggest that while environmental awareness and eco-consumerism are on the rise in Nepal, further research is needed to explore specific product categories and the underlying drivers of green consumer behaviour. The present study tries to fill the research gap by using the Theory of Planned Behaviour (Ajzen, 2002) to comprehend the intention and purchase behaviour of the adult Nepali consumers of Kathmandu towards green and sustainable apparels. It provides a complete picture of the Nepalese urban consumers' green product preference and purchase behavior. The understanding of consumer attitude and behavioural intention concerning green and conscious purchases will help in the policy making and developing marketing strategies for the target group that are both appropriate and sustainable. The study examines the relationship of purchase intention five variables i.e attitude, subjective norm, perceived behavioural control, environmental concern and environmental knowledge which leads to purchase behaviour.

Literature Review

According to Elkington, Shamdasani, and Wasik (1996), green products are those that can be recycled or preserved and won't damage the environment or natural resources. Green products are recyclable, require less packaging, and are safer for the environment (T. B Chen & Chai, 2010). Accordingly, the terms "green," "environmentally friendly," and "ecologically conscious" are used (Vernekar & Wadhwa, 2011). Patra and Dhani (2011) studied that frequently consumers are mindful of green marketing and are ready to purchase green products.

Green apparel often known as eco-friendly or sustainable fashion, refers to clothing that has a low environmental impact and which often considers social responsibility during its lifecycle (Patwary et al., 2022). This definition endorses using organic materials, avoiding hazardous chemicals and maintaining ethical labour conditions during the production process (Montero, 2009). These programs attempt to upgrade the garment industry's less ecologically friendly production, processing processes and to the usage of renewable, recyclable or biodegradable materials (Li et al., 2024). Green clothing can be further defined as having an impact on the environment, society and economy and this can be done by understanding how consumers behave toward green clothing, which is essential for creating strategies that encourage sustainable consumption and encourage the industry as a whole to adopt eco-friendly production techniques (Balasubramanian & Sheykhmaleki, 2024)

The Theory of Planned Behavior (TPB) is a most popular and useful model for clarifying complex human behavior. It is used in sociology, psychology, social psychology alike and is an extended version of Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975). Attitude toward the behavior, Subjective norm, and Perceived behavioral control (PBC) together forms behavioral intention which in turn influences the human behavior (Ajzen, 2002). In a variety of industries, TPB has proven to be highly effective in prediction consumer intention and behavior (Sheppard et al. 1988). TPB is regarded as a highly effective model for elucidating environmentally friendly behavior (Bamberg and Schimdt, 2003). An individual has an inclination to a favourable attitude if the consequences are positively evaluated and if there is probability to contribute in the detailed behaviour (Ajzen, 1991; Han et al., 2010). Attitude toward behaviour describes if a person has a favourable or unfavourable valuation of the behaviour in the question (Ajzen, 1991).

Subjective norm is defined as 'perceived social pressure to perform or not perform the behavior' (Ajzen, 1991). Subjective norm are the principles of other important people that influence one's decisions (Hee, 2000). Subjective norms are the hypothetical social pressure for showing or not behaving (Ajzen, 1991). Subjective norms are the formed by family, colleagues, peers and close friends (Paul et al., 2016). Subjective norms are typically formed by education, media, consumers' perceptions about what is good and moral, popular culture and are and perception about what is desirable and what is not (Ertz, 2016).

Perceived Behavioural control is 'an individual awareness of how easy or difficult it is to achieve a particular behavior' and those people having a higher degree of control over themselves have solider purpose to attain a specific behaviour (Ajzen, 1991). It is perception that people have regarding the prospects to complete a certain task using available means (Ajzen, 2005) In many studies, Perceived Behavioral control is positively related with intentions and behaviour (Azjen, 1991; Taylor and Todd, 1995; Straughan and Roberts, 1999).

Environmental Concern is defined as a 'strong attitude for defending the environment' (Crosby et al., 1981). "Environmental concern is related to the consciousness of a person about environmental problems" (Suki, 2015, p. 3) and is very significant factor in customer decision making (Diamantopoulos et al., 2003). Environmental concern is affected by experiences and the media (do Paço et al., 2008).

Chan and Lau (2000) define environmental knowledge as familiarity that an individual possesses about environmental issues. It is the knowledge people have about environment and the significant association leading to environmental impact and communal functions of people for sustainable development (Fryxell and Lo, 2003). It is the understanding about environmental attitude, environment changes and individual's consumption behaviour and how it is impacted by the knowledge of environmental (Scott and Vigar-Ellis, 2014). Environmental Knowledge about different environmental subjects leads to pro-environmental or eco-friendly behavior (Peattie, 2010). It also impacts how a customer builds intention of purchasing an eco-friendly product (Rokicka, 2002).

According to Ajzen and Fishbein (2000), intentions are very significant and the best analyst of the behaviour. Intention of an individual is to show a specified behaviour is a considered as an important factor in the Theory of Planned Behaviour (Ajzen, 1991).

Objectives of the study

The objectives of the study are as follows;

- To examine the impact of consumers' attitudes on their intention to purchase green apparel.
- To assess the influence of subjective norms on consumers' intention to purchase green apparel.
- To evaluate the effect of perceived behavioural control on consumers' intention to purchase green apparel.
- To investigate the relationship between environmental concern and consumers' intention to purchase green apparel.
- To analyse the influence of environmental knowledge on consumers' intention to purchase green apparel.
- To determine the impact of purchase intention on consumers' actual green purchase behaviour.

Research Hypothesis

The research hypothesises of the study are as follows;

H1: Consumers' attitude significantly impacts consumers' intention to purchase.

H2: Subjective Norm significantly impacts a consumers' intention to purchase.

H3: Perceived Behavioural Control significantly impacts a consumers' intention to purchase.

H4: Environmental concern significantly impacts a consumers' intention to purchase.

H5: Environmental knowledge significantly impacts a consumers' intention to purchase.

H6: Purchase intention significantly impacts a consumers' Green Purchase Behaviour

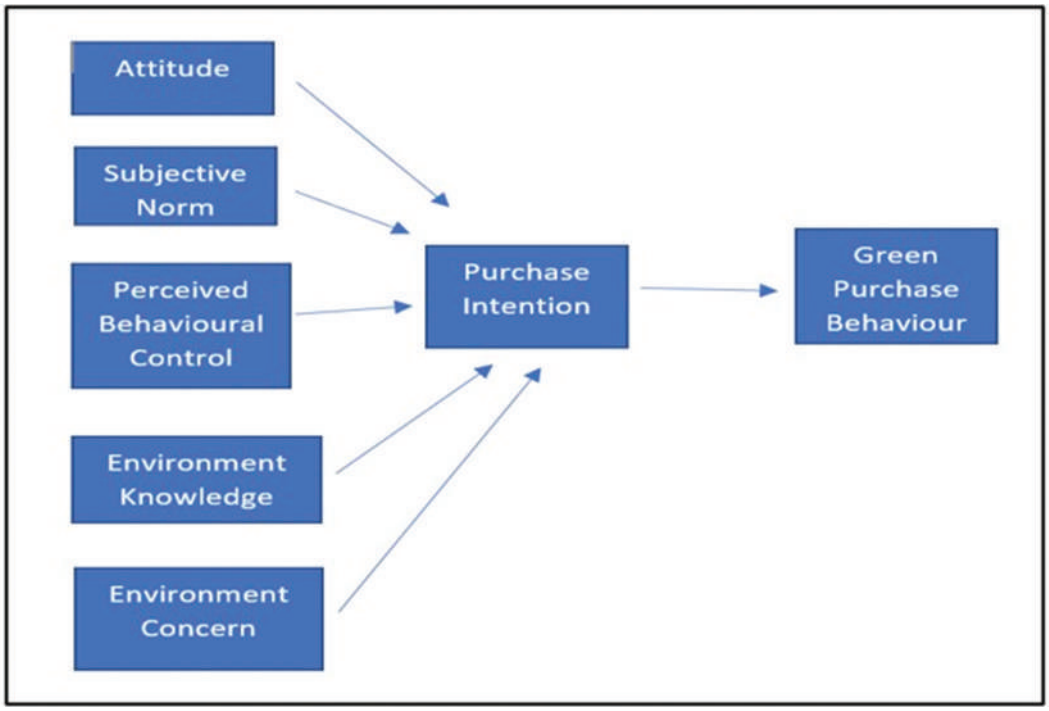

Figure 1 : Conceptual framework for the study.

Research Methods

This study adopts a quantitative, descriptive and causal research design. The unit of analysis for this study is individual consumers in Kathmandu who have purchased green apparel products. The study is based on the response of 269 respondents using convivence sampling. Both primary and secondary data has been used for the study. For the primary data collection, structured questionnaire method is adopted to collect the data respondents above the age of 18. Information has also been gathered from secondary sources, such as books, journals, the internet, and other accessible sources.

For the study, instruments by Do Valle (2005), Vermier and Verbeke (2008), Kim and Han (2010), Mostafa (2009), Kim et al., (2013) and Schlegelmilch et al. (1996) for Attitude, Subjective Norm, Perceived Behavioural Control, Environmental Concern, Purchase Intention and Green Purchase Behaviour were used respectively. The response of the respondents was measured on a 5-point Likert scale with a list of statements to which participants responded using a scale of possible answers. Always, very often, sometimes, seldom, never were used in the study to see the level of agreement of the respondent.

Demographic Status of Respondents

Table 1: Descriptive profile of respondents

Demographic Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	121	44.9
	Female	148	55.1
	Total	269	100
Highest Degree	Matriculation	11	4.1
	Intermediate	107	39.8
	Bachelors	86	32
	Masters	61	22.7
	Any Other	4	1.5
	Total	269	100

Demographic Variable	Category	Frequency (n)	Percentage (%)
Age	18–23	62	23.2
	24–28	94	34.8
	29–33	43	15.9
	34–38	62	23.2
	39–43	4	1.4
	Above 49	4	1.4
	Total	269	100
Monthly Income	10,000–30,000	50	18.6
	31,000–50,000	73	27.1
	51,000–70,000	75	27.9
	71,000–90,000	44	16.4
	Above 91,000	27	10
	Total	269	100
Caste	Brahman	86	31.9
	Chhetri	70	26.1
	Gurung	4	1.4
	Madeshi (Others)	8	2.9
	Madhesi (Brahmin/ Chhetri)	12	4.5
	Magar	4	1.4
	Newar	66	24.5
	Others (Please Specify)	3	1.1
	Tamang	12	4.5
	Tharu	4	1.4
	Total	269	100

This study included 269 people. Out of them, 55.1% were female and 44.9% were male. Most participants (39.8%) had completed Intermediate-level education. About 32% had a Bachelor's degree, and 22.7% had a Master's degree. Only 4.1% had completed Matriculation, and 1.5% had some other qualification.

When looking at age, the largest group was between 24 to 28 years old (34.8%), followed by 18 to 23 years and 34 to 38 years (both 23.2%). People aged 29 to 33 made up 15.9%, while very few were in the 39 to 43 and above 49 age groups (1.4% each).

Regarding monthly income, 27.9% earned between NPR 51,000–70,000, and 27.1% earned between NPR 31,000–50,000. About 18.6% had income between NPR 10,000–30,000, while 16.4% earned between NPR 71,000–90,000. Only 10% of people earned more than NPR 91,000.

In terms of caste, 31.9% were Brahman, 26.1% were Chhetri, and 24.5% were Newar. Others included Madhesi (Brahmin/Chhetri) and Tamang (4.5% each), Madeshi (others) (2.9%), and Gurung, Magar, and Tharu (1.4% each). About 1.1% belonged to other castes.

Results and Analysis

The factors influencing the purchase of green apparel were assessed based on their mean scores. Environmental Knowledge emerged as the most significant factor, with a mean score of 10.56, indicating that greater awareness of environmental issues strongly motivates consumers to choose green apparels. Subjective Norms also play a crucial role, with a mean of 10.20, showing that social influences from family, friends and society impact individuals' buying decisions. Environmental Concern, with a mean score of 7.30, reflects consumers' growing awareness and worry about environmental problems, which encourages green product purchases. Perceived Behavioral Control, scoring 6.15 on average, suggests that individuals feel capable of making eco-friendly choices independently. Lastly, Attitude towards sustainability and environmental preservation, with a mean of 6.08, positively affects

consumers' decisions to purchase green apparel.

In this study, the internal reliability of the questionnaire was tested using Cronbach's alpha. The result showed a Cronbach's alpha value of 0.885, which confirms that the questionnaire items were consistent as value above 0.70 is generally considered acceptable.

Table 2: Correlation Matrix of Variables

Variables	1	2	3	4	5	6	7
1. Attitude	1						
2. Subjective Norm	.449**	1					
3. Perceived Behavioural Control	.308**	.273*	1				
4. Environment Knowledge	.386**	.359**	.443**	1			
5. Environment Concern	0.194	–.063	0.134	0.079	1		
6. Purchase Intention	.460**	.411**	.332**	.373**	.503**	1	
7. Purchase Behaviour	0.116	0.194	0.173	.451**	.323**	.390**	1

Attitude showed a moderate positive correlation with Subjective Norm ($r = .449$, $p < 0.01$), Perceived Behaviour ($r = .308$, $p < 0.01$), Environmental Knowledge ($r = .386$, $p < 0.01$), and Purchase Intention ($r = .460$, $p < 0.01$). This suggests that individuals with a positive attitude towards the environment are more likely to be influenced by social norms, feel in control of their behaviour, be environmentally informed, and intend to purchase green apparel. Subjective Norm was also significantly and positively correlated with Perceived Behaviour ($r = .273$, $p < 0.05$), Environmental Knowledge ($r = .359$, $p < 0.01$), and Purchase Intention ($r = .411$, $p < 0.01$), indicating that social pressure or support may influence a person's beliefs and intentions regarding green apparel. Perceived Behavioural Control had positive and significant correlations with Environmental Knowledge ($r = .443$, $p < 0.01$) and Purchase Intention ($r = .332$, $p < 0.01$), implying that individuals who feel more capable of taking green actions are also more informed and likely to intend to purchase eco-friendly clothing. Environmental Knowledge showed strong positive correlations with Purchase Behaviour ($r = .451$, $p < 0.01$) and Purchase Intention ($r = .373$, $p < 0.01$), suggesting that awareness and knowledge about the environment play a critical role in translating intention into actual behaviour. Environmental Concern was moderately correlated with Purchase Intention ($r = .503$, $p < 0.01$) and Purchase Behaviour ($r = .323$, $p < 0.01$), showing that concern for environmental issues encourages both intention and action toward green purchases. Purchase Intention had a significant positive relationship with Purchase Behaviour ($r = .390$, $p < 0.01$), which supports the idea that intention is a strong predictor of actual buying behaviour.

Overall, the results indicate that Environmental Knowledge, Environmental Concern, and Attitude are particularly important in shaping both the intention and behaviour related to purchasing green apparel.

Table 3: Regression Model Summary for Green Apparel Purchase Factors

Model	R	R^2 (Coefficient of Determination)	Adjusted R^2	Std. Error of the Estimate
Attitude	0.46	0.211	0.199	1.6853
Subjective Norm	0.411	0.169	0.157	1.7295
Perceived Behavioural Control	0.332	0.11	0.097	1.7899
Environmental Knowledge	0.373	0.139	0.126	1.7609
Environmental Concern	0.503	0.253	0.242	1.6396
Purchase Intention	0.39	0.152	0.139	3.4779

Table 3 presents the model summary statistics for different predictors of purchase intention and purchase behaviour. The R values indicate moderate positive relationships between each predictor and the dependent variable. The R^2 values show that Environmental Concern explains the highest proportion of variance in purchase intention

(25.3%), followed by Attitude (21.1%) and Subjective Norm (16.9%).

Table 4: ANOVA of Independent Variables Affecting Purchase Intention and Behaviour

Predictor Variable	Dependent Variable	Sum of Squares (Regression)	F-value	Sig. (p-value)
Attitude	Purchase Intention	50.951	17.939	0.000
Subjective Norm	Purchase Intention	40.828	13.649	0.000
Perceived behavioural control	Purchase Intention	26.605	8.305	0.005
Environmental Knowledge	Purchase Intention	33.491	10.8	0.002
Environmental Concern	Purchase Intention	61.142	22.745	0.000
Purchase Intention	Purchase Behaviour	145.221	12.006	0.001

The results from Table 4 show that attitude significantly affects purchase intention, with a sum of squares of 50.95, an F-value of 17.94, and a p-value of 0.000, indicating a strong influence. Subjective norm also significantly predicts purchase intention (sum of squares = 40.83, F = 13.65, p = 0.000). Environmental knowledge has a meaningful effect as well (sum of squares = 33.49, F = 10.80, p = 0.002). Environmental concern has the strongest impact on purchase intention with a sum of squares of 61.14, F-value of 22.75, and p = 0.000. Perceived behavioural control also significantly influences purchase intention (sum of squares = 26.61, F = 8.31, p = 0.005). Lastly, purchase intention strongly predicts actual purchase behaviour, with a sum of squares of 145.22, an F-value of 12.01, and p = 0.001. Overall, these values confirm that all these factors significantly shape consumers' intention to buy green apparel, which then leads to their actual purchase.

Discussion

This study examined the factors influencing consumers' purchase intention and actual purchase behavior toward green apparel. The study shows that people's attitudes toward green apparel have a strong influence on their intention to buy, explaining 21% of the variation with a correlation of 0.46. Subjective norm, also matters, accounting for 17% with a correlation of 0.41. How much control people feel they have over bought green clothes influence intention too, though a bit less, explaining 11% with a correlation of 0.33. Caring about the environment is the strongest factor, explaining 25% of the intention and showing a correlation of 0.50. Knowing about environmental issues is also important explaining 14% with a correlation of 0.37. Finally, the intention to buy green apparel leads to actual purchase behaviour, explaining 15% with a correlation of 0.39. Overall, these results tell us that attitudes, social influence, perceived control, environmental concern, and knowledge all play important roles in shaping buying intentions, which in turn influence real buying decisions.

The strong influence of attitude confirms that consumers' positive evaluations and feelings about green apparel play a crucial role in shaping their intention to buy. This aligns with previous studies that acknowledge attitude as a key determinant of purchase intentions (Emekci, 2019; Mostafa, 2007; Yadav & Pathak, 2016). Similarly, the significant impact of subjective norm highlights the importance of social pressures and the influence of important others, suggesting that consumers are likely to consider the opinions and expectations of peers and family when deciding to purchase green products. This finding supports other studies done by Chen and Peng (2014) and Chen & Tung (2014). This study result shows that Perceived behavioural control significantly influences purchase intention. This result aligns with the study done by conducted by Palomino & Barcellos-Paula (2024). Environmental concern emerged as the strongest predictor of purchase intention indicating that consumers who are more worried about environmental issues are more motivated to buy green apparel. Heightened environmental awareness creates stronger green purchasing intention. The significant effect of environmental knowledge further supports this relationship, indicating that well-informed consumers appreciate the advantages of green products and increase purchase intentions. The same result is supported by other studies (Aman et al., 2012; Chan, 2001; Dhir et al. 2021; Emekci, 2019; Flamm, 2009; Siyal et al. 2021; Yadav & Pathak, 2016). This finding aligns with study by and that environmental knowledge has significant effect on influencing purchase intention.

The relationship between purchase intention and actual purchase behaviour is statistically significant reinforcing

the well-established notion that intention is a reliable predictor of behaviour. Previously conducted studies had found similar results that green purchase intention has a positive impact on green purchase behaviour (Astarini & Pratomo, 2022; Gleny & Bernardo 2023). Theory of Planned Behaviour includes attitude, subjective norm and perceived behavioural control. However, this study shows the importance of environmental concern and environmental knowledge in consumers' intention to purchase green products.

These findings highlight the complex nature of green apparel purchasing decisions, where psychological factors, environmental attitudes, social influence, consumer knowledge and prior behaviour collectively shape both intention and action. For marketers and policymakers aiming to promote sustainable consumption, efforts should focus on enhancing environmental awareness and knowledge, fostering positive attitudes toward green products, and leveraging social norms to encourage eco-conscious purchasing behaviour.

Conclusion and Implication

The study shows purchase behaviour of green apparel in Kathmandu. This study extended the Theory of Planned Behaviour (TPB) to explore the determinants of consumers' green purchase intention and its subsequent influence on green purchase behaviour. The findings confirmed that all five variables; attitude, subjective norm, perceived behavioural control, environmental concern, and environmental knowledge positively influenced green purchase intention and green purchase intention further impacted green purchase behaviour.

The findings of this study provide evidence-based recommendations for both marketers and policymakers aiming to promote sustainable consumer behaviour in the context of green apparel. Environmental concern and knowledge should be reinforced through targeted messaging, public education and brand storytelling. Communicating the environmental impact of fast fashion and the benefits of sustainable apparel can significantly improve consumers' willingness to purchase green alternatives. Similarly, policy interventions such as subsidies, tax incentives and certification programs for sustainable clothing producers could further encourage both businesses and consumers to adopt environmentally responsible behaviour.

The integration of environmental concern and knowledge into the TPB framework offers valuable insights for theory and practice in promoting sustainable consumption. It can be argued that consumers still need to be educated about the benefits and distinctive value addition that green features offer. An eco-friendly lifestyle is a continuous process that must be implemented daily. A single purchase or association with an occasion doesn't make one sustainable.

While the findings of this study have important implications, it also has some limitations. The sample size considered for the study was 269 only and the study used convenience sampling. A cross-sectional design was used which limits causal inferences. Future work should consider longitudinal or experimental methods. The sample size can also be increased. In summary, this study confirms that a range of psychological, informational and perceptual factors contribute positively to green purchase intention and serve as the main driver of actual green apparel purchase behaviour. The study used convenience sampling and as the sample was taken from Kathmandu only, it limits the generalizability of the findings. Therefore, rather than representing the preferences of the larger community, the results might represent the views and perceptions of as particular location only. To provide a more comprehensive understanding of consumer attitude related to green apparels, future research should consider more representative sampling techniques across various demographic variables.

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