Binary Logistic Regression Analysis of Filing Behavior of the Value-Added Taxpayers in Nepal [1]

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Abstract

The main purpose of this research was to assess the differences in Value-Added Tax (VAT) return filing behavior of Nepalese taxpayers as per their gender, geographic location, and business sector. The study is empirical research. Cross-sectional research design was used with quantitative, non-experimental approach using binary logistic regression to study the relationships between independent variables and a binary outcome, like filing behavior of taxpayers. The results showed that male taxpayers have a higher probability than female taxpayers of filing VAT returns on time. Kathmandu Valley-based taxpayers were found less eager to file on time than those outside the valley. Service-based taxpayers, and those in manufacturing and trade across Nepal, had a high probability of timely VAT filing.This research first-time uses binary logistic regression to analyze VAT filing behavior of taxpayers based on their gender, locations, and business sectors in Nepal.Its crucial findings that male taxpayers, those outside Kathmandu Valley, and service, manufacturing, and trade sectors being on-time filers help tax authorities impose legal enforcement to boost compliance**,** especially among female and taxpayers inside Kathmandu Valley. This research suggests drafting VAT policies that improve the VAT filing process by concentrating on important taxpayers' behavioral factors which make them not comply, based on unique socio- economic landscape of Nepal.

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Introduction

The Government of Nepal (GoN) introduced VAT on 16 November 1997 as a strategic effort to mobilize domestic tax revenue by taxing the consumption of goods and services within the country. The Nepalese VAT system follows the invoice-credit method. As per this method, businesses registered with the government collect VAT from buyers at the point of sale or supply and claim credits for VAT paid on their purchases ((Koirala, 2022; Khadka, 1989)). Although the legal (de jure) taxpayers are registered importers, exporters, manufacturers, traders, and service providers, the final burden of VAT rests with the final consumers, who are thus the effective (de facto) taxpayers (Koirala, 2017). VAT is, therefore, an indirect tax charged on the value added created by registered taxpayers. Nepalese VAT is structured as a comprehensive, invoice-based tax charged on final consumption within the area of Nepalese tax system. VAT was First-time originated in France in 1948 at the manufacturing stage. Later, it evolved into a consumption-type tax by 1954 and was further extended to the retail level by 1968 (Ebrill et al., 2001; Khadka, 1989). Nepalese VAT system operates under a self-assessment system grounded in voluntary compliance. The system needs taxpayers compulsorily to maintain accounts properly and issue tax invoices at the time of supply, no matter whether the items are subject to tax or enjoy partial or full exemption (Ebrill et al., 2001; Koirala, 2023a).Filing a VAT return is the process where a registered taxpayer has to report to the tax authorities the VAT collected on sales and the VAT paid on purchases during a certain period showing the net VAT payable or receivable by the taxpayer (Koirala, 2022).Filing a VAT return helps adhere to tax laws and provide a correct record of taxable transactions. It helps the government collect revenue on time from taxpayers. Filing also enables taxpayers to claim input tax credits, manage cash flow, avoid penalties and maintain trustworthiness. Not filing on time result in penalties, legal hazards, loss of credits, tarnished reputation, and disturbed financial planning (Koirala, 2023b).

Despite being implemented for many years, the Nepalese VAT system still faces major problems as many taxpayers have to struggle in filing correct tax returns on time.Taxpayers have to mandatorily file tax returns within 25 days after the end of each tax period and declare their output VAT minus input VAT to find their net tax liability

(Koirala, 2023a). On-time and accurate filing denotes compliance, whereas late-filing or non-filing shows issues of non-compliance. Late-filers, late-payers, and non-filers are burdens of revenue authority. The critical issues are rooted in understanding the behavioral factors behind why some VAT registrants file their tax returns on time while others delay or default. The behavioral factors for these patterns are not well understood and it creates a research gap. Almost all current research focus broadly on VAT revenue collection, compliance challenges, and tax system and performance, deeply lacking detailed behavioral analysis of filing decisions (Koirala, 2022; Sapkota, 2021; Poudel, 2025; Adhikari & Poudel, 2025; Kunwar, 2023). Addressing VAT filing behavior needs clear-cut analytical tools. Binary logistic regression is an effective quantitative alternative to study the filing decision, which is naturally binary (filed vs. not filed). It combines both categorical and continuous variables to find out statistically significant factors that influences taxpayers' probability of filing on time (Koirala, 2022).

Value-added taxpayers in developed countries such as France, Germany, Sweden, the UK, etc. show higher willingness in filing VAT returns, supported by advanced electronic systems, stringent enforcement, and taxpayers' knowledge. Although they often face challenges like lengthy documentation, etc. Their governments employ advanced digital infrastructure and stringent penalties to maintain sincere filing compliance. Whereas, taxpayers in under-developed and emerging countries like Nepal and Ghana show low level of willingness because of low level of awareness, weak administration, poor infrastructure, etc. Their governments have to focus mainly on taxpayers' education and process simplification, but enforcement part remains largely inadequate and lenient(Koirala, 2022; Upadhyaya & Acharya, 2022).

Nepalese social and economic environment involves many different kinds of businesses**,** differing levels of financial literacy and income level with extreme geographical variation that obviously create various problems for tax compliance. As VAT plays an important role as a prime domestic revenue collection, boosting compliance through better understanding of taxpayers' behavior is most essential. Boosting VAT filing compliance helps in transparent tax administration and it ultimately helps in national economic development by providing adequate funds for public service (Koirala,2017)**.** Thus, this study attempts to analyze the behavior of taxpayers in Nepal by grouping them across different demographic characteristics, business sectors and geographic regions focusing on their attitudes towards filing VAT returns on time. This

study fills the empirical gap by using modern quantitative method to identify the prime factors that influence VAT filing behavior. This research is, therefore, useful for streamlining tax administration and promoting fiscal sustainability in Nepal.By the use of binary logistic regression, the research will unearth the underlying reasons for non-compliance, and address these critical areas often overlooked by previous research.The practical information gained from the findings will enable tax authorities to implement focused initiatives across various business sectors and geography, thereby boosting VAT compliance. Accordingly, this paper seeks to address the following research questions:

RQ1. Are male taxpayers less likely than female taxpayers to file VAT returns?

RQ2. Are manufactures and trade taxpayers more likely to file VAT returns than service taxpayers?

RQ3. Are taxpayers in Kathmandu Valley more likely to file VAT returns than those outside the valley?

This paper is grouped into main three sections. It starts with the introduction and then with results and discussion. The third section covers conclusion and implication.

Review of literature

In order to implement VAT, the GoN introduced Value Added Tax Act, 2052 (1996) and Value Added Tax Regulations, 2053 (1997). Sales Tax Department and Excise Department were converted into Value Added Tax Department on July 16, 1996 (Khadka, 1997) and different Value Added Tax Offices across the country. The Tax Department was established with groups based on job levels (cadres) and focus on officers with defined limits of authority and freedom to make decisions. To make the revenue administration professional and capable, Civil Service Act and Regulations were improved to create a revenue cadre under the Nepal Administrative Service. The VAT system delegates a function-based responsibility where each officer's performance can be measured (Koirala, 2022). Tax administration motivates taxpayers to follow tax policies; interacts with taxpayers, private sector companies, and with tax specialists to formulate tax policies. These policies are shared with individual taxpayers through educational programs and it is ensured by conducting audits and investigations that taxpayers obey tax laws (Inland Revenue Department, 2018). As per VAT laws, VAT registrants must file tax return with a true picture of taxable transaction for a tax period and pay tax dues within said period. The VAT policies have given filing period for VAT collection. Tax is collected monthly, bimonthly, and four-monthly. The monthly taxpayers have to file tax

return and pay tax monthly. Bi-monthly or four-monthly taxpayers can defer tax for at least two and four months respectively (Koirala, 2023b).

Subedi (2017) argued that despite large number of VAT registrants, the number of non-filers also increased alarmingly; growth of tax returns decreased, and subsequently increased non-compliance with laws. The filing compliance of the VAT registered taxpayers is low. The filing compliance is still low. VAT non-filers were 27.95% of the total registrants (Inland Revenue Department, 2024). Koirala (2022) conducted empirical research on the filing behavior of the taxpayers and he argued that small vendors especially those registered in the Kathmandu District have less likelihood of filing VAT return compared to the Large and Medium Level Taxpayers. Monthly-based taxpayers are more odds to file tax returns compared to trimester taxpayer; male taxpayers have high probability of filing tax returns**.** Taxpayers registered after the amalgamation of previous Value Added Tax Department and Income Tax Department are less likely to be filer compared to the taxpayers who were registered prior to the merger. Producer, importer, exporter, contractor, consultancy service providers have less probability to file tax returns compared to service sector taxpayers. Out of those who file tax returns, the most of the taxpayers report their transaction inaccurately and incompletely. The reporting behavior of the VAT registrants is found to be poor as there is extremely high tendency of filing zero return and credit return compared to debit returns (Koirala, 2023b). These findings are based on studies conducted on the basis of July 2019 sample. So, the filing behavior of different kinds of taxpayer can be studied based on latest sample so that new findings can be generated. Koirala (2022) claimed that VAT registrants were less eager to file their tax returns on time since the tax administration were ineffective in applying penalties against those who do not submit returns on time. Moreover, negligent non-filers are often awarded waivers of fines and penalties by the government itself, that has caused taxpayers to become complacent about timely filing returns.

Adhikari and Poudel (2025) studied Nepal's total revenue trends, contributions of direct and indirect tax, and their correlation using descriptive statistics. Shrestha (2025) examined the contribution of VAT through the C efficiency ratio and its relationshipwith GDP structure and trade competition. Singh (2025) analyzed the influence of tax collection and import taxes on Nepal's economic growth. Kandel (2024) observed macroeconomic impacts on VAT collection to streamline tax policies. Dahal et

al. (2024) highlighted VAT's vital contribution in Nepal's tax revenue and guiding policy upgradation by using 48 years of data and various econometric tools. However, all these studies overlooked Nepalese taxpayers' VAT filing attitudes and practices. This research, therefore, attempts to address that gap by investigating their timely tax filing behaviors so that it can assist policymakers in enabling taxpayers for better VAT compliance.

Theories and hypotheses

The basic principles that guide VAT in Nepal include neutrality, destination and transparency and efficiency.VAT treats all businesses and goods equally**.** As per the Neutrality Principle, it does not favor any production method or business type impartially, so all sectors are taxed equally. As per the Destination Principle, VAT is charged where the goods or services are consumed, rather than where they are actually manufactured**.** It indicates that goods and services are free from VAT in the manufacturing country and are taxed in the importing country where consumption has to occur. Thus, it proliferates equitable international trade and eliminates double taxation. Similarly, as per the Transparency and Efficiency Principles**,** VAT is clearly shown on invoices and sale prices so that the tax is visible to buyers and sellers. This visibility in VAT helps increase accountability and compliance on the part of taxpayers (Tait, 1988; Daniel, 2021). VAT is an indirect tax and is applied on the additional value added to goods and services during the processes at each point of production and distribution. It allows taxpayers to deduct the tax paid on inputs from the tax collected on outputs and hence it prevents cascading taxes and ensures the final consumer has to bear the tax burden (Oakland, 1964). Regarding filing of VAT returns, businesses registered for VAT should regularly submit VAT returns to the tax offices. These returns represent the VAT collected from sales and the VAT paid on purchases during a certain period of time. The difference between VAT collected and VAT paid is either remitted to the government or claimed as a refund. It depends on whether the business has an outstanding tax or has a credit balance (Thuronyi, 1996; Mudrecki, 2018).

As per the IRD Annual Report, 2080/81 (FY 2023/24), total numbers of the VAT taxpayers, including manufacturing industries, trading firms, and service sector, were 335,017. Manufacturing industries include all businesses that are established as industry category and that are producing different kinds of goods, while trading businesses include import, export, distribution, wholesale and retail level sales of different kinds of

goods. The service-sector businesses include all business that deal with supply of services other than goods. Manufacturing and trading businesses have a fixed place of business in urban and city areas, organization, staffs, and infrastructure of information and communication technology (ICT). Manufacturing businesses are supposedly capable of complying with VAT laws and filing their tax returns on time (Subedi, 2017). Trading businesses are also concentrated in the urban and city areas but thinly dispersed across the country. Traders having taxable transaction above the threshold are also supposed to be able to file their tax returns on time. Service-sector business includes contract and consultancy services, hotel, restaurants, and other tourism-oriented businesses, telecommunication, insurance, aviation etc. Except some corporate business houses in service-sector, most of the service businesses run with small budget, lack fixed place of business; change business place frequently, and supply services moving around the customers (Inland Revenue Department, 2024; Koirala, 2022).

Taxpayer density and concentration in the Kathmandu valley is excessively high compared to the periphery. Kathmandu valley-based industries and trading businesses have much access to tax office physically and virtually to comply with tax laws and to file tax returns on time. Within the territory of the Kathmandu valley, there are 18 tax offices established to manage the compliance of the small, medium and large taxpayers (Koirala, 2022). Given the taxpayer data, business conditions and current status of filing compliance, the following hypotheses are tested:

H1: Male taxpayers are less likely than female taxpayers to file VAT returns.
H2: Manufacture and trade taxpayers are more likely to file VAT returns than service taxpayers.
H3: Taxpayers in Kathmandu Valley are more likely to file VAT returns than those outside the valley.

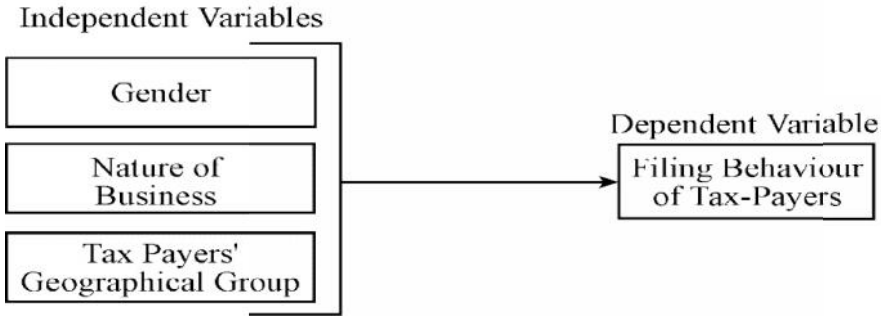
Conceptual framework

Dependent variable (Filing behavior) was classified into two categories, namely, Filer (Category = 1), Non-Filer (Category = 2). The independent variable, gender, is classified into two categories, namely, Male (Category = 1) and Female (Category = 2). Second independent variable, Nature of Business is classified into three categories, namely, Manufacture (Category = 1), Trade (Category = 2), and Service (Category = 3). Third independent variable, Taxpayer Group, is classified into two categories, namely,

Kathmandu Valley (Category = 1), other than Kathmandu Valley (Category = 2). The following figure illustrates the research framework:

Figure 1

Conceptual framework



Methods

This paper aims to understand the filing attitude of the taxpayers registered for VAT and to forecast the probability of filing VAT returns by the taxpayers. Taxpayers are classified in terms of gender, geographical location, and nature of their business. A quantitative, non-experimental, cross-sectional design is appropriate for research that uses secondary government data, as it examines data at one point in time without variable manipulation (Setia, 2016). The research approach is quantitative, using binary logistic regression to study how independent factors affect a binary outcome, i.e., a yes-or-no outcome (e.g., filing behavior**)** (Workie et al., 2017).As per the Inland Revenue Department's Annual Report 2023-24, Nepal had 335,017 VAT-registered taxpayers, with 136,495 (40.74%) from the Kathmandu Valley and 198,522 (59.26%) outside the Kathmandu Valley (Inland Revenue Department, 2024, p.24). From this population, a sample of 104,603 taxpayers, representing 31.22% of the total registered VAT taxpayerswas randomly selected across subgroup (strata) like: gender, business type, and geographic location, comprising taxpayers from the Kathmandu Valley and from other regions of Nepal. Thus, this sample size outpaces the normal threshold of 30% for reliable analysis of categorical data (Boos & Hughes-Oliver, 2000).

The data was categorical and measured in nominal scale and hence the logistic regression method was used (Niu, 2018). Binary Logistic Regression Analysis examines the relationship between a binary outcome (like compliance vs. non-compliance) and

several predictor variables (Hosmer & Lemeshow, 2004)**.** The multinomial logistic regression model estimates the probability of happening of an event over probability of failure. It is useful where the research method focuses on either an event occurs or not, instead of when it occurs (Boateng & Abaye, 2019). As per Peng et al. (2010), it is famous for testing hypotheses about associations between a categorical outcome variable and one or more categorical or continuous predictor variables. The research uses numbers and data, applying binary logistic regression to study how independent factors affect a yes-or-no outcome. Software like SPSS-27 was used to perform all analyses including multiple regression that indicated no concern for multicollinearity among independent variables as shown in Table 2.

When all of the other independent variables are held constant, log odds of outcome are expected to change β units when the independent variable with a regression coefficient β is altered by 1 unit. The regression coefficient β shows the degree of link between each independent variable and dependent variable.

Logit = $\ln Py1- Py = \beta_0 + \beta_1 X_1 + \ldots + \beta n.Xn$

Where,

P(y) = the probability that a case is in a particular category,

ln = natural logarithms

β_0 = the constant (Beta) of the equation, and

β_1, β_2, …βn = the beta coefficients of the independent variables. X_1, X_2, … Xn = the independent variables.

Odds ratio represent a ratio of probability of happening of an event to the probability of not happening. It is the exponential of logit. Field (2017) argued to predict probability of y from the logistic regression equation.

$P(y) = 11+ e - (\beta_0 + \beta_1 X_1 + \ldots + \beta n.Xn)$

Results

Case processing summary

The case processing summary shows 104,603 valid cases with no missing value. Table 1 shows the cross tabulated data that 68.9% filers and 31.1% non-filers. There were 88,027 male and 16,576 female taxpayers. Of total male taxpayers, 68.5% were filer and 31.5% non-filer and 71.0% female taxpayers were filer and 29.0% non-filer. Taxpayers being registered in outside the Kathmandu valley were 67,334 and the Kathmandu valley-based taxpayers were 37,269. The filing ratio of the Kathmandu

valley-based taxpayers and other-than-Kathmandu valley-based taxpayers were 63.9% and 71.7% respectively. The sample included 14,312 manufacturing industries, 69,969 trading business, and 20,322 service-related businesses. The filing ratio of manufacturing, trading, and service-sector taxpayers were 69.4%, 69.3%, and 66.9% respectively.

Table 1

Cross tabulation of VAT return filing by gender, taxpayer group, and business nature

Category	Subcategory	Non-Filer Count	Non-Filer %	Filer Count	Filer %	Total Count	Total %
Gender	Male	27,733	31.5%	60,294	68.5%	88,027	100.0%
	Female	4,809	29.0%	11,767	71.0%	16,576	100.0%
Taxpayer Group	Other Than Kathmandu Valley	19,080	28.3%	48,254	71.7%	67,334	100.0%
	Kathmandu Valley	13,462	36.1%	23,807	63.9%	37,269	100.0%
Business Nature	Manufacture	4,375	30.6%	9,937	69.4%	14,312	100.0%
	Trade	21,448	30.7%	48,521	69.3%	69,969	100.0%
	Service	6,719	33.1%	13,603	66.9%	20,322	100.0%
Total		32,542	31.1%	72,061	68.9%	104,603	100.0%

Note. Percentages within each subgroup represent the proportion of non-filers and filers relative to their respective totals.

Multiple regression analysis

A multiple regression analysis was performed to observe the effects of Taxpayer Group, Gender, and Business Nature on VAT return filing. The overall model was found statistically significant as shown in Table 2. No predictor showed multicollinearity issues since all variance inflation factors (VIF) were found to be less even than 2 and a tolerance value less than 0.1 or 0.2 is usually considered as the standard for concern in collinearity test (Hair et al., 2014).

Table 2

Regression analysis predicting VAT return filing with collinearity diagnostics

Variable	Unstandardized Coefficients (*B*)	Std. Error	Standardized Coefficients (β)	t-Value	Sig.	Tolerance	VIF

Variable	Unstandardized Coefficients (*B*)	Std. Error	Standardized Coefficients (β)	t-Value	Sig.	Tolerance	VIF
Constant	0.787	0.008	—	97.751	.000	—	—
Taxpayers Group	-0.077	0.003	-0.080	-25.79	.000	0.997	1.003
Gender	0.023	0.004	-0.018	5.932	.000	0.999	1.001
Business Nature	-0.010	0.002	-0.012	-3.918	.000	0.996	1.004

Note. Sig. is significance level representing *p*-value, Collinearity diagnostics includes Tolerance and Variance Inflation Factor (VIF).

Model evaluation and summary

The Enter Method shows how much the model improves compared to a model with no predictors. Initially, the -2 Log Likelihood value was 129,738.062. After adding the independent variables, it decreased down to 128,957.268 after 3 iterations. It means the model fits better. The Omnibus Test of Model Coefficients shows a chi-square value of 745.853 with 4 degrees of freedom and a p-value less than 0.001. Thus, it becomes evident that the model is capable of predicting the result significantly. But, the values of Cox and Snell R^2 (0.007) and Nagelkerke R^2 (0.010) are lower which means that the predictors explain only a small fraction of the variation in the outcome. The Hosmer-Lemeshow Test (Hosmer & Lemeshow, 2004) was used to check how well the model's predicted value is consistent with the observed data. For example, a large p-value (close to 1) represents a good fit, and a small p-value (below 0.05) shows a poor fit (Boateng & Abaye, 2019). In this case, the test gave a chi-square value of 232.036 with 5 degrees of freedom and a p-value less than 0.001, which shows the model does not fit the data well. The classification table also showed that prediction did not improve even after adding the variables. This poor performance may be because of high correlations among variables and the large sample size, which can impact the results.

Predictive parameter estimates

Table 3 shows the parameter estimates. Wald Statistic indicates whether the beta coefficient for that predictor is considerably different from zero or not. The coefficients indicate how gender and province affect the probability of belonging to that ethnic group.

If the beta efficient (β) is largely different from zero, it can be assumed that the predictor makes a great contribution towards the outcome prediction.

Table 3

Parameter estimates for logistic regression predicting VAT return filing

Variable	β	S.E.	Wald	df	Sig.	Exp(β)	90% CI Lower	90% CI Upper
Gender (1)	-0.107	0.019	32.650	1	.000	0.899	0.866	0.932
Business Nature			38.049	2	.000			
Business Nature (1)	0.074	0.024	9.794	1	.002	1.077	1.028	1.128
Business Nature (2)	0.105	0.017	37.925	1	.000	1.111	1.074	1.149
Taxpayer Group (1)	0.357	0.014	668.880	1	.000	1.429	1.391	1.468
Constant	0.580	0.024	593.156	1	.000	1.787		

Note. β represents estimated logistic regression coefficients; Standard Errors;Wald chi-square statistics; Exp(β) are odds ratios with 90% confidence intervals. Significant predictors at $p < .01$ indicate significant impact on VAT return filing.

Table 4

Logit coefficients, odds, probabilities, and odds ratios for VAT return filing

Comparison	Logit	Odds	Probability	Odds Ratio
Male Vs Female Taxpayer	0.473	1.605	0.616	0.899
Other Than Kathmandu Valley Vs Kathmandu Valley Taxpayer	0.937	2.552	0.718	1.429
Manufacture Vs Service Sector	0.654	1.923	0.658	1.077
Trade Vs Service Sector	0.685	1.984	0.665	1.111

Note. Odds ratios above 1 show higher probability relative to the reference group.

Gender: Male Vs. Female Taxpayers

H1: Male taxpayers are less likely than female taxpayers to file VAT returns.

The logistic regression model for gender (Male) is as follows:

$\text{logit}(P) = 0.580 + (-0.107) \times \text{Male} = 0.473$

Here, "Male" is coded as a binary variable (usually 1 for male, 2 for female). The coefficient β for Male is − 0.107, which shows the effect of being male on the log odds of filing VAT returns. The statistical test results show gender significantly predicts whether a person files a VAT return or not. A Wald chi-square statistic of 32.650 and a

p-value less than 0.001 means this effect is highly significant. The model shows the predicted probability that a male taxpayer files a VAT return is nearly 61.6%. The odds ratio related with the male category is 0.899. It means the odds of a male taxpayer filing a VAT return are about 0.899 times the odds for a female taxpayer. Since this value is less than 1, it suggests that males are less likely to file VAT returns compared to females. Alternatively, we take the reciprocal:

$$\frac{1}{0.8} = 1.112$$

It means female taxpayers have 1.112 times higher odds of filing VAT returns than male counterparts, showing females are more likely to file returns. However, the first hypothesis statement at the end disagrees with the earlier interpretation based on the odds ratio and coefficient sign. Since the coefficient for Male is negative ($\beta = -0.107$) and the odds ratio is less than 1, it can be concluded that female taxpayers are more likely to file VAT returns than male counterparts.

Nature of Business: Manufacture Vs. Service Sector

H2: Manufacture and trade taxpayers are more likely to file VAT returns than service taxpayers.

The logistic regression model for the variable "Manufacture" is as follows:

$\text{logit}(P) = 0.580 + 0.074 \times \text{Manufacture} = 0.654$

Here, variable "Manufacture" shows if a taxpayer is in the manufacturing sector (1) or the service sector (2, reference group). A positive coefficient β of 0.074 shows that manufacturing taxpayers have greater log odds of filing VAT returns than from service-sector. This relationship is significantly supported by a Wald chi-square of 9.794 ($df = 1$) and $p < 0.001$. The estimated likelihood of VAT filing for manufacturing taxpayers is nearly 65.8%, higher than for service-sector taxpayers. The odds ratio of 1.077 means manufacturing taxpayers have 7.7% higher odds of filing VAT returns than those in the service sector. Conversely, the reciprocal of the odds ratio is:

$$\frac{1}{1.0} = 0.928$$

It shows that service-based taxpayers have odds 0.928 times those of manufacturing taxpayers for filing VAT returns. It means they are less likely to file compared to the manufacture-based taxpayers.

Nature of Business: Trade Vs. Service Sector

The logistic regression model for the Trade sector is as follows:

logit(P) = 0.580 + 0.105 × Trade = 0.685

Here, "Trade" is a binary variable showing whether the taxpayer belongs to the trade sector (1) or the service sector (2, the reference group). The positive coefficient β of 0.105 shows that being in the trade sector increases the log odds of filing a VAT return rather than being in the service sector. This link is highly significant as shown by a Wald chi-square of 37.925 with 1 degree of freedom and a p-value less than 0.001. As per the model, the predicted probability of a trade-based taxpayer filing a VAT return is 66.5%, higher than the probability for service-sector taxpayers. The odds ratio for trade-based taxpayers relative to service-sector taxpayers is 1.111. It indicates that the odds of a trade-sector taxpayer filing VAT returns are 11.1% higher than those in a service-sector taxpayer. Since the odds ratio is higher than 1, it shows that taxpayers in the trade sector are more likely to file VAT returns in comparison to those in the service sector. Conversely, the reciprocal of the odds ratio is as follows:

$$\frac{1}{1.1} = 0.900$$

Service-based taxpayers have 0.900 times the odds of filing VAT returns in comparison to trade-based taxpayers. It indicates a lower compliance. This analysis shows that business type significantly influences VAT filing behavior. Trade-sector taxpayers are more eager to comply than those who are in the service sector. Thus, the hypothesis that manufacturing and trading business are more likely to file VAT returns than service businesses seem to be strongly supported.

Taxpayer Group: Kathmandu Valley-based Vs. Other than Kathmandu Valley-based Taxpayers

H3: Taxpayers in Kathmandu Valley are more likely to file VAT returns than those outside the valley

The logistic regression model for taxpayers based on their registration location is as follows:

logit(P) = 0.580 + 0.357 × Kathmandu valley-based taxpayer = 0.937

Here, 'Kathmandu valley-based taxpayer' is a categorical variable (1 if registered within Kathmandu valley, 2 if outside).A positive coefficient β = 0.357 means being a Kathmandu valley taxpayer increases the log odds of filing VAT returns in comparison to those outside. The association is statistically significant, as shown by a very large Wald chi-square value of 668.880 with 1 degree of freedom and a p-value less than 0.001. This finding strongly proves that the VAT location affects VAT filing behavior

of the taxpayers significantly. Further, 71.8% probability was found for taxpayers outside Kathmandu valley in filing VAT returns on time which was more than those from Kathmandu valley itself. Likewise, the odds ratio for outside Kathmandu valley taxpayers as against Kathmandu valley taxpayers was nearly 1.429. It means the odds of filing VAT returns are 42.90% higher for taxpayers outside Kathmandu valley as against those within the Kathmandu valley. In short, as this odds ratio is above 1, it shows taxpayers outside the Kathmandu valley are more eager to follow VAT return filings on time. Contrarily, the odds for Kathmandu valley taxpayers as against those outside the Kathmandu valley is 0.70 (i.e., $\frac{1}{1.4}$). It shows Kathmandu valley taxpayers have 0.70 times the odds of filing VAT returns in comparison to those from outside. It shows lower compliance among these taxpayers. Hence, the third hypothesis is statistically rejected.

Discussion

The study conducted the logistic regression analysis and it provided important information about the filing behavior of Nepalese VAT-registered taxpayers by considering various factors like gender, geography, and business-type that affect VAT filing compliance. The research found male taxpayers to be showing higher compliance rates than female counterparts in filing VAT return on time. This finding was consistent with the previous research conducted by Koirala (2022), who also found gender as a key determining factor in VAT compliance. Males were more inclined to file on time than female because of the facts that they have more authoritative decision-making roles in the Nepalese society and thus they can fulfill VAT obligations more effectively than their female counterparts. Another, astonishing and crucial finding is related to taxpayers from Kathmandu valley. In spite of being comparatively in better digital infrastructure and technological progress, the valley-taxpayers were found to be more unwilling in filing VAT returns on time than those in outside the Kathmandu valley. The findings challenged the expectations of hypothesis and showed that accessibility alone do not assure timely compliance. Behaviors of taxpayers in Kathmandu Valley indicated that they have weaker intrinsic motivation than those outside the valley. This behavior can be attributed to the factors like soft regulation enforcement, urban lifestyle, and existing complexities in VAT filing. Other results of this study showed thatmanufacturing and trading sectors in Nepal having significantly higher chances of timely VAT filing than

those in service-oriented sectors. This can be mainly due to the disparities in how an organization is structured and how various departments within it function. Manufacturing and trading organizations normally operate from fixed locations and stable cultures with easier access to tax administration that obviously promote better VAT regulations, awareness and compliance. However, many service businesses like doctors, lawyers, contractors, consultants and other professionals, barring some service industries such as telecommunications, insurance, hotels, and restaurants, usually work individually or in small groups in a less formalized way. Thus, they face less organizational help and hence get demotivated, leading to delayed or non-filing.

Consistent with the findings of this research, Adhikari (2022) **f**ounds that nearly 21.25% of VAT-registered taxpayers in Nepal fail to file returns. It highlights a crucial compliance problem in the form of aggressive tax avoidance and lenient legal initiatives enforcement. Another research by Adhikari (2023) showed that taxpayers have usually to face awareness and moral problems. They think that the VAT system is excessively complex and their inadequate technical knowledge hinders them to follow it properly. These factors make taxpayers reluctant and unwilling to file properly. As yet, no recent reliable studies on this topic are there in Nepal which contradicts these findings. Acharya (2023), highlighted that lack of sufficient technical expertise and thinking that the filing process is complicated make it harder for taxpayers to follow VAT regulations, particularly for those who lack formal adequate training or resources. Studies by Upadhyaya and Acharya (2022) and Gnawali (2018) also validated the influence of gender on VAT filing behavior.

Conclusion

This study found that Nepalese VAT taxpayer filing behavior differ as per taxpayers' gender, business type, and geographic location. Male taxpayers were found to be more sincere to VAT regulations than their female counterpart. Manufacturing and trading businesses showed higher degree of compliance to VAT rules than businesses in service-oriented sectors. Geographical location-wise, Kathmandu valley taxpayers were found to be more hesitant and unwilling in obeying VAT filing rules than those from other locations. With the help of binary logistic regression, this study identified main factors that influence taxpayers' filing behavior by highlighting the motivating factors like taxpayers' tax morale, their intrinsic motivation and legal enforcement initiatives.

These findings can contribute to boost VAT revenue collection, which presently contributes nearly 24% of government income (Inland Revenue Department, 2024).

The conclusion of this research provides many practical suggestions for tax authorities. It suggests focused efforts to motivate non-compliant taxpayers for timely VAT filing in Kathmandu valley. It also strongly highlights gaps in Nepalese VAT research especially on taxpayers' filing behaviors, which often hinders accurate understanding of VAT implementation, its issues and challenges, and policy implementation results. This research may have many limitations in dealing with the complex socio-economic and psychological factors that affect taxpayer behavior directly and indirectly. For example, tax compliance may have complex and indirect impacts which are not easily captured by logistic regression. This research, therefore, suggests latest and more advanced approaches for upcoming related studies, like longitudinal designs to observe changes over time. Research with qualitative and quantitative data mixed is also possible. Sophisticated statistical techniques can be used to well model complex behavioral patterns. These new approaches will definitely ease understanding of taxpayer behavior and reformulate existing VAT policy design in Nepal.

Implication

This study provides important outcomes for policymakers and tax administrations in order to boost VAT compliance in Nepal. First and foremost, the findings emphasize the need to concentrate on focused educational initiatives that can aware taxpayers who delay or avoid filing VAT returns in time. For this, these initiatives should concentrate on factors like gender, business type, and location to foster voluntary compliance and morale of the taxpayers. Secondly, this study underlines the importance of focused audits and enforcement. The tax authority should concentrate more actively on higher-risk zone tax groups like Kathmandu Valley tax-payers and service businesses than those who are sincere so that enforcement can be more effective in nabbing rule breaking tax-payers. This study suggests tax authorities to customize training, administration and communication to make filing process easier and more transparent. VAT and its filing rules can be clearly explained to the tax-payers through effective communication mechanism. Customized training program can help them follow rules easily. Integrating filing processes with computer software can eliminate haphazard mistakes. This study also shows how socio-economic factors of Nepal determine tax compliance and help formulate VAT policies suitable for the country. Thus, by making policies based on real

behaviors of the taxpayer, the government can grow revenue equitably without creating undue pressures on the honest taxpayers. To improve upon this study further, future research is advised to use longitudinal data to observe behavior changes in taxpayers over time. Qualitative and secondary data can also be mixed to yield richer results over VAT filing compliance. Advanced statistical methods like structural equation modeling and machine learning can also be used for better detection of the challenging factors that influence tax filing decisions and designing effective policies to enhance VAT compliance and revenue in Nepal.

Declarations

There are no conflicts of interest as regards this study and no external parties were involved to fund this research. General research ethical guidelines were sincerely followed. Pre-consent was taken from the related staffs of Inland Revenue Department of Government of Nepal for required authentic data. The taxpayers' identities are fully made anonymity and recoded.

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