

ICT Based Service Delivery and Value Added Tax in Nepal: A Service Providers Perspective

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Abstract: *Modern technologies play a central role in enhancing public service systems. This study focuses on assessing the effectiveness of ICT-based service delivery in VAT system in Nepal. For this, 165 valid IRD personnel had taken from the four IROs Thamel, Putalisadak, Tripureshwor and New Baneshwor, Kathmandu through purposive judgmental sampling. Similarly, IRD, MLTO, and LTO also added beyond four IROs. Regression model, ANNOVA, and correlation were used to analyze the data in this descriptive and explanatory study design. Service efficacy was treated as the dependent variable, while ICT infrastructure, employee competency, and employee attitudes were considered independent variables. Additionally, all these factors have a significant relationship with service efficacy. All IRD servers in every office should have adequate internet access. The majority of the respondents were able to use the e-filing system effectively, suggesting the employees' proficiency in using ICT-based VAT services. The IRD ITS and risk profiling will facilitate transparency, equity, and integration of business transactions. Further researchers could employ more variables, expand the sample size and methods.*

Keywords: ICT, value added tax, service provider's, service delivery, service effectiveness, ICT infrastructure, employee attitudes

I. INTRODUCTION

Information and technology were emerged and subsequently reduce the role of government since 1980s. By the late 1990s, the government started using ICT to indirectly create a more open and competitive environment. e-Government, has gained popularity in recent years for customer service and information accessibility (UNECE, 2017). Service delivery has increasingly shifted toward an online, user-centric approach with the advancement of

information and communication technologies (ICTs). ICT primarily encompasses modern technologies such as computers and internet connectivity. In this context, service delivery refers to the systems and structures through which services are designed and provided to users. The World Bank Group (2016) highlights that ICT has significantly enhanced the efficiency and effectiveness of service delivery. Furthermore, Michaels, Natraj and Van Reenen (2014) found that between 1980 and 2004, countries such as the United States, Japan, and several European nations experienced a shift toward a more skilled workforce due to the adoption of ICT. However, despite these benefits, challenges remain; for instance, ICT based service delivery in VAT also reduces the cost of revenue collection and helps to save the time and effective service delivery. Moreover, the use of ICT also shortens the bureaucratic proceeding and quick service delivery without physical appearances. Web-based services were starting to be replaced by digitalization and artificial intelligence (AI). With the administrative overhaul, ICT utilization also reduced transaction costs and enhanced prompt service delivery. In order to improve ICT-based service delivery and alter staff attitudes through training, tax administration is required. The first phase aimed to improve services for service recipients, such as filing and electronic payments. The institutional, legal, and ICT infrastructure are the four essential pillars of e-government. Overall, ICT helps to reduce costs and facilitate efficient e-government services and tax payments. This study mainly focused on the effectiveness of ICT based service delivery in VAT in Nepal.

The objective of the study is depicted as under.

- To assess the effectiveness of ICT based service delivery in value added tax in Nepal from service provider's perspective.
- To analyze the ICT infrastructure, employee competency and employee attitudes in ICT based service delivery in VAT in Nepal.
- To analyze the relationship between ICT infrastructure, employee competency and employee attitudes and their effect on the effectiveness of ICT based service delivery in VAT in Nepal.

II. REVIEW OF LITERATURE

Efficiency of ICT equipped tax administration in Nepal. ICT has played an instrumental role in the modernization of Nepal's tax administration since the fall of the Rana dynasty in 1951. IRD employs 989 out of 2,439 staff members in revenue administration. It is responsible for tax administration, income tax, VAT, excise duty, and taxation awareness (IRD, 2019). Tax administration involves registration of business profit and ensuring awareness about taxpayer responsibilities (Yesegat, 2008; Lighthizer, 2019). Effective tax administration requires taxpayers' confidence in the efficiency and equity of tax administration according to Koirala (2019). Nevertheless, several obstacles exist such as inadequate expansion of ICT infrastructure, poor electricity and network systems, and human resource shortages.

ICT used in VAT. The IRD has employed ICT-based e-governance approaches like e-filing e-payment, e-audit, e-inspection, and EBM registration, and ICT-based measures like the use of mobile applications, portals of taxpayers, and CBMS in 2074 B.S. have made Nepal's taxation process more digital (Dotel, 2019; IRD, 2019). According to statistics, about \$50 billion has been invested in IT integration in addition to software, consultancy, and IT engineering (Rodden, 2018). ICT has helped minimize bureaucracy, enhance transparency, and accelerate service delivery. Innovations like online tax filing and payment have contributed to global digital taxation (OECD, 2017).

Major theories and models. According to the World Bank (2016), there is no universal philosophy regarding e-government because of the ongoing evolution of practices. Therefore, it is vital to utilize the theories of public administration and information systems in analyzing the ICT-based service delivery in Nepal. The New Public Management theory stresses efficiency, accountability, transparency, and customer orientation through ICTs while the New Public Governance stresses responsiveness, equity, participation, and user orientation. Both these theories have practical relevance in assessing ICT-based VAT administration in Nepal (Osborne & Gaebler, 1993; Kato, 2000). The Theory of Planned Behavior states that attitudes and perceived behavioral control determine the intention to use e-services. Thus, the theory is useful in analyzing the willingness of service providers to adopt ICT-based VAT systems (Hung et al., 2009). In turn, the Technology Acceptance Model explains technology adoption in terms of its perceived usefulness and ease of use (Davis, 1989). Moreover, previous research has shown that user attitudes, perceptions, and behavioral intentions play a crucial role in ICT adoption and system usage in the context of e-government (Agarwal & Karahanna, 1998; Gefen et al., 2003; Carter & Bélanger, 2005; Karahanna et al., 1999).

Besides TAM, there is other research theory like Theory of Reasoned Action (TRA), Unified Theory of Acceptance and Use of Technology (UTAUT), and models on e-Government User Acceptance that can also be used to justify the analytical model in this study (Francis, & David, 2017).; Gefen et al., 2003; Carter & Bélanger, 2005). They provide insight into the effect of ICT adoption and service delivery.

To sum up, the new public governance theory emphasizes institutional reforms, ICT facilities e-governance, human competencies, and service delivery effectiveness, whereas governance theory concentrates on user attitudes, accountability, responsiveness, and service delivery friendliness. These theories together offer a sound theoretical foundation for evaluating ICT-based VAT service delivery in Nepal.

ICT Infrastructure. ICT infrastructure, which includes telecommunication systems, digital platforms, and governmental networks, plays an important role in providing services efficiently and facilitating socio-economic development (OECD, 2009; UNDP, 2014). In this regard, Nepal's "Digital Nepal" strategy emphasizes the role of mobile money transfer,

servers, networks, and operating systems in financial and administrative processes (MOIC, 2019; Hamilton, 2002). Governments have to focus on increasing connectivity, improving privacy, enhancing accessibility, and boosting security to enhance the ICT infrastructure (Adera et al., 2014; Mwila & Ngoyi, 2019). However, internet access is not widespread in many developing nations such as Nepal, while other developing nations like India continue to suffer from low bandwidth (Banga, 2019).

Empirical review. Rupakhhetee (2008) found that ICT transformed the traditional economy into a knowledge-based and integrated system, while GIZ (2018) reported that online tax registration and e-filing improved VAT service effectiveness. ICT has also supported the development and revision of tax laws and helped reduce revenue collection costs (Koirala, 2018; Adhikari, 2022). In Nepal, about 57.8% of taxpayers file returns on time and 35.5% submit VAT returns, while recent reforms in 2024 increased the Digital Services Tax threshold from NPR 2 million to NPR 3 million, with penalties such as 0.1% late fee and 15% interest on overdue payments. Technology-based public service delivery has further made services faster, simpler, and more cost-efficient (Giri & Shakya, 2018).

According to Adhikari (2015, 2023), ICT-enabled e-filing brings about convenience, saves time, makes taxpayers more satisfied, and contributes to PAN/VAT registration, compliance, and tax base growth. Likewise, digitization has made tax filing easier and enhanced service delivery by fostering transparency and efficiency in the operations of the IRD of Nepal (Dhungana et al., 2024; Chalaune, 2026). Nonetheless, this approach remains effective due to several limitations such as institutional resistance, digital literacy, inadequate infrastructure, and resource constraints (Verma & Singh, 2025; Sharma, 2025; Bhatta, 2025).

Thus, many research articles, and reports were written on understanding the ICT based services delivery in public institutions in the international context but not found sufficient in the international and Nepalese scenario.

III. RESEARCH METHODOLOGY

This methodology will be influenced by the researcher's epistemology, which is an assumption about knowledge. Consistent with this perspective, the present study employs a descriptive and explanatory research design. The current state of ICT-based service delivery in VAT administration within Nepal's IRD is methodically described using the descriptive design manner. Such design is capable of measuring how employees perceive ICT infrastructure, their competence, system usability, service provision, and overall efficiency. Descriptive research gives explanations about current situations, relations, and attitudes of the respondents (McCombe, 2022). This approach is useful for understanding employee perceptions and practices in public sector institutions.

In addition, an explanatory research design is applied to examine causal relationships and to explain the outcomes of ICT adoption in IRD, particularly in relation to e-filing and electronic VAT (e-VAT) services from the service provider's perspective. The research

employs explanatory analysis to investigate the influence of ICT infrastructure, attitude, and competency on ICT-based VAT service delivery. The methodological approach aligns with prior empirical studies; for example, Daba and Tilahun (2015) examined ICT usage among government employees and civil service reform using descriptive statistics and inferential techniques such as the chi-square test. The study includes qualitative research using interviews as a means of supplementing the quantitative analysis and providing contextual depth. Interviews can help researchers understand the experiences of service providers regarding the efficiency of ICT usage, employees' attitudes, IT infrastructure, competency, and other obstacles encountered at IRD.

To sum up, a strong methodological framework for assessing the efficacy of ICT-based VAT service delivery in Nepal from the service provider's point of view is ensured by the combination of descriptive, explanatory, inferential approaches.

Population and sample of Service providers (IRD Employees)

Table 1

Sample design for service providers

SN	Revenue Office	Total No. of Employees	Sample Employee
1	Inland Revenue office Thamel	20	16
2	Inland Revenue office, Tripureshwor	20	16
3	Inland Revenue office, New Baneshwor	25	22
4	Inland Revenue office Putalisadak	25	22
5	MLTO	74	38
6	LTO	76	34
7	IRD	75	32
	Total	315	180

Note: Concerned IROs, MLTO, LTO, IRD, official record, 2023

This section deals with the data collected from service providers in Kathmandu valley in different four Inland Revenue offices, each IRO staffs are ranges 20 to 30 employees and some of vacant also. In Central head office IRD, MLTO and LTO the number of employees is about 80 each office in which chief tax administrator is headed with ten undersecretary (Chief tax officer) and forty tax officer and remaining are non-officers' staffs. Likewise, one engineer, legal officer and one computer/IT officer are also working in stated offices (According to the respected office record and field survey, 2023). However, the actual number of employees currently employed is 75, 74, and 76, respectively, for a total of 225 employees (IRD/MLTO/LTO records, 2023). Accordingly, the total population of service providers included in the study is 315 employees.

The study uses Daniel's (1999) sample size calculation method to select a suitable sample size. Using a 5 percent margin of error, a 50 percent population proportion, the minimum required sample size is computed to be 174 service providers from the total population

of 315. The researcher exceeded the minimum sample size requirement by distributing questionnaires to 180 service providers in which 165 were returned with valid and complete responses, giving in a 91.66 percent response rate.

For the interview purpose, 73 respondents were taken for the interview through purposive judgmental sampling in which researcher was taken under secretary, IT officer, computer engineer and chief tax officer and chief tax administrator respond as the compulsion for the interview from the selected IROs (Thamel, Putalisadak, Tripureshwor and New Baneshwor), IRD, MLTO and LTO.

Data instrumentation. The question regarding service effectiveness in ICT based service delivery or e-VAT variables, ICT infrastructure, employee attitudes, employee ICT competency and attitudes determinants is obtained from Likert five-point questionnaire survey ranging from 1 indicates Strongly disagree, 5 equals Strongly agree. Similarly, suggestion and the opinion were also gathered from the semi-structured questions. Under this research, Pearson correlation was use to analyze the relationship between dependent and independent variable of service effectiveness in ICT based service delivery dependent and independent variables at 5% level significance level.

Regression Model. A multiple linear regression model with k independent variables can be written as:

$$\hat{Y} = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_kX_k + \varepsilon$$

Service provider's effectiveness in ICT based service (E-VAT) filling return

$$\hat{Y} = b_0 + b_1\text{ICT infrastructure} + b_2\text{employee competency} + b_3\text{employee attitudes} + \text{error term}$$

Where, $\hat{Y}$ = Satisfaction of service providers in ICT based services or e-filling VAT return,

b_1 = beta coefficient of ICT infrastructure

b_2 = beta coefficient of employee competency

b_3 = beta coefficient of employee attitudes

ε = error term

X_1 , X_2 , and X_3 are the ICT infrastructure, employee competency and employee attitudes variables.

ANOVA. The impact of independent variables information, system and service quality on the dependent variable, service recipient satisfaction with the overall quality of ICT-based services or e-filling VAT returns is assessed using ANOVA.

Factor analysis. Factor analysis allows a great number of inter-correlated measurements by assuming that all variables have some degree of connection forms. The principal aim of component analysis is to discern these highly correlated clusters as separate factors.

Table 2*Item-total statistic service provider's variables*

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
ICT infrastructure	205.671	238.018	.189	.812
Employee competency	205.730	234.213	.383	.772
Employee attitude	205.412	238.670	.221	.751

Note: by using SPSS, Field Survey 2023

For this research under service providers perspective, Cronbach Alpha value is 0.781 which indicates the high level among stated detected items ICT infrastructure, employee competency, and employee attitude variables. Likewise, Service effectiveness in ICT based service delivery independent variables; ICT infrastructure, employee competency and employee attitude alpha value is 0.812, 0.772 and 0.751 respectively. All of Cronbach Alpha is greater than 0.70 i.e., acceptable for the validity. However, George and Mallery (2009) depicted that Cronbach Alpha of all variables is more than 0.60 is sufficient for the reliability to accept the questionnaire. The principal aim of factor analysis is to recognize these highly intercorrelated clusters as independent factors. In this analysis, Bartlett's test of sphericity yielded a value of 35.34 and an associated level of significance 0.00 smaller than 0.01 and 0.05. The correlation matrix is an identity matrix is rejected.

Commonalities. The commonalities present the commonality of each variable i.e., the proportion of variance in each variable accounted for by the common factor under the principle of component method. Hence, the proportion of variance accounted for by the common factor or the commonality of the variable is greater than 1 for all variables.

Table 3*Total variance explained*

Component	Initial Eigen values			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.57	45.27	45.27	1.57	45.27	45.27
2	.95	35.92	81.19			
3	.79	18.81	100.00			

Extraction Method: Principal Component Analysis.

a. Only cases for which ICT service Satisfied are used in the analysis phase.

Table 3 presents the total variance explained and presents the number of common factors computed, the Eigen values associated with these variables' factors. Although the three factors have been computed, it is clear that not all should accurately reflect the facts. Using the criterion of retaining only the Eigen value of 1 or greater one factor will be retained for the rotation. Similarly, one factor accounts for 45.27% and another for 35.92% respectively. It indicates that these factors account for nearly 81.19% of the overall variance, with the

remaining factors together accounting for 18.81% of the variance. As a result, a two-factor model might be sufficient to describe the data.

IV. RESULTS AND DISCUSSION

The demographic factors under it includes employees' profiles such as age, gender, and their position.

Table 4
Profile of the respondents (employees)

Variables		Frequency	Percent (%)
Gender	Male	110	66.67
	Female	55	33.37
	Total	165	100.0
Age :(in years)	20-30	9	5.45
	30-40	79	47.88
	40-50	49	29.70
	50-58	28	16.97
	Total	165	100.0
Position	Non-officer	47	28.48
	Officer	118	71.52
	Total	165	100.0

Note: Field Survey, 2023

Stated table shows 66.67% and 33.37% are females and males respectively. This means that the majority employees are male. Under the age group, the least 5.45% of respondents are 20-30 years old and the most 47.88% are between 30-40years. This finding is similar to Lavin, Epping & Davies (2004) depicted that gender and age factors influence the e-filing innovativeness in ICT. Among the employees, 71.52% are officers and the remaining 28.48% are non-officers.

ICT infrastructure. Francis and David (2017); Infrastructure gap, power failure, and insufficient ICT equipment are the major hindering factor for ICT-based service delivery in revenue collection. Schillemans (2011) pointed out that the institutional capacity of the government or well-equipped ICT infrastructure and internal hot spot facilities are important for the ICT-based service delivery or e-filing VAT. It can be briefly sketched in the following manner.

Table 5
Descriptive statistics

	N	Mean	Std. Deviation	p-Value
Telecommunication network is effective	165	3.34	0.86	0.001
I agree that server system led to prompt service delivery	165	3.33	0.92	0.003
ICT based service delivery is effective	165	4.03	0.95	0.001
ICT-based service delivery is accessible	165	3.79	0.75	0.002
All servers have internet access in IROs	165	4.27	0.57	0.000
IRD has power supply system for the effective ICT services	165	4.23	0.54	0.000
IRD maintained the digital services for service quality	165	3.83	0.73	0.001
IRD frequently updated the server	165	3.97	0.57	0.002
IRD has DRS for data security	165	4.18	0.56	0.002
IRD uses CBMS for E-VAT	165	3.69	0.64	0.001
IRD ICT based system has ITS and risk profiling	165	4.14	0.72	0.000
IRD develop e-VAT or e-payment apps	165	3.39	0.83	0.001
Weighted mean	165	3.86	0.98	0.001
Valid N (list wise)	165			

Note: Field survey, 2023

Majority of respondents agree regarding the IRD telecommunication being effective with mean and SD is 3.34 and 0.86 respectively. IT infrastructure with new e-services systems both for internal and external connection is crucial under ICT-based service delivery. An active network, safe internet connection, efficient server system, and computer with a browser at the workplace are required for prompt service delivery as respond by employees through in-depth interview. Regarding the server system of IRD being prompt in service delivery, the mean is 3.33. The disagreeing respondents mentioned that due to the centralized server system, most employees feel uneasy that if the central server fails then all other operating systems depending on the central server fail and the employees have faced such problems frequently once a month or more times. The reason behind the system failure is problems in the power supply or lack of a backup system as the respondents further pointed from interview. This finding is similar to Adera et al. (2014); system and connectivity affect ICT-based service delivery. Similarly, the satisfied respondents claimed that the IRD server system is gradually updated and ready for prompt service delivery. In the same vein, Henning et. al. (2014) depicted that high bandwidth network infrastructure, communication network, electricity grid, and well-equipped servers are the major factors for the availability of infrastructure and e-governance. An active network and secure internet connection are crucial for effective ICT-based service delivery; the mean value is 4.02. The majority of the respondents i.e., 67.6% agree including 10.1% strongly agree

whereas 6.3% disagree minimally with the same view. This finding is also supported that ICT network and storage have become an integral part of e-tax administration as depicted by Hill and Shaw (2017).

The mean value regarding ICT-based service delivery access point is effective is 3.79. As respondents' view, the majority of employees 78.9% agree including 7.6% strongly agree that ICT-based service delivery access point is effective. The agree or satisfied respondents said that ICT-based service delivery or e-filing/E-VAT is accessible compared to the physical bureaucratic process. On the other hand, the disagreeing respondents argued that though the ICT-based service delivery is accessible while conducting interview. This finding is also supported by Olson and Lucas (1982) coded that an ICT-based service delivery access point is effective and enhances the electronic application, submission, and approval.

For sustainable and long-term effectiveness, 52.5% agree that all servers of IRD all offices have proper internet access. The reason behind the dissatisfaction is that the server infrastructure is still in the upgrading process and henceforth is not sufficient for all servers. Likewise, during the e-filing system, E-VAT on the last date or tax collection time, the taxpayer feels inconvenienced. However, IRD has power supply system for the effective ICT services with mean 4.23. employees respond that IRD frequently updated the server and IRD has Disaster Recovery System (DRS) for data security with mean value is 3.97 and 4.18 respectively. IRD has used the CBMS (Central Billing Monitoring System) for the above 10 cores annual transaction of the company/business. E-VAT system with mean value 3.69 reflects the prevent or minimize the data mismatch of the taxpayers and trustworthiness of service providers. Likewise, IRD ICT based system has ITS (Integrated Tax system) and risk profiling with mean value is 4.14 which helps to increase the transparent and fair of the business transaction and integrate the business transaction. However, IRD has not properly or fully develop the separate e-VAT rather use the e-payment system for the limited payment through connect IPS. Moreover, after Covid-19, IRD has incorporated the e-payment system in order to fully digitalize the tax system. Presently service recipients can pay the tax payment or liabilities through Connect IPS (real-time) up to Rs. 20 lakhs and up to Rs. 30 cores through NCHL-IPS (Non-real time) by logging in with user ID and password of service recipients' bank account for the payment made bank. Regarding the e-payment system, service recipients need to select from the government service payment but not yet separate e-VAT or IRD apps as employees respond through interview.

From the findings, it is evident that the ICT infrastructure and service provision at the Inland Revenue Office (IRO) have been well received by the respondents with a weighted mean score of 3.86 ($p = 0.001$). The stated variables under ICT infrastructure are significant since p-value is less than 0.005 at 5% level of significance. This finding is also supported by Banga (2019), developing nations continue to face challenges in establishing ICT infrastructure and Internet penetration services for providing ICT-based services. Hence, digital framework Nepal also reflects the IRD digitalization and, a robust ICT infrastructure is necessary.

ICT and employee competency and attitude in e-filing VAT returns or e-services. Employee competency and attitude in ICT-based services or e-filing VAT returns plays a crucial role in an effective ICT-based service delivery of IRD. Grossman, Michelitch, and Santamaria (2017) pointed out that the use of ICT platforms for service-related communication is effective if the service recipients and employees of service providers both feel or perceive it positively. It can be depicted as under.

Table 6

Descriptive statistics of employee competency and attitude in ICT based service delivery or E-VAT return

	N	Mean	Std. Dev.	p-value
I'm competent with ICT based e-filing tax system	165	4.06	0.36	0.001
I usually used and perceived application system in e-services (e-VAT) is effective	165	3.85	0.45	0.002
ICT based e-filing system shorten the administrative bureaucracy	165	4.15	0.62	0.000
I feel ICT based e-filing VAT system is easy and quick respond	165	4.15	0.50	0.002
I always perceive positively towards updated technology	165	4.07	0.56	0.000
ICT facilitate the quality software for e-filing return	165	3.91	0.53	0.001
Re-engineering IRD/IROS increased the internal efficiency	165	3.88	0.73	0.000
I think user's perception is shaped by attitudes	165	3.92	0.56	0.002
Weighted mean	165	4.00	0.54	0.001
Valid N (list wise)	165			

Note: By using SPSS, Field survey, 2023

The competency and attitudes of employees about ICT-based service delivery, particularly the e-filing VAT (E-VAT) system, the mean is 4.06. The majority of employees claimed high competency in utilizing the e-filing system, suggesting that staff members are usually proficient in providing ICT-based VAT services. Similarly, employees' perceptions of the effectiveness of the e-services application system (E-VAT) are reflected in the mean value of 3.85. Interviews also revealed that IRD/IROS offices have state-of-the-art PCs that facilitate staff members' efficient usage of ICT systems. The ICT-based e-filing system is also estimated to reduce administrative bureaucracy, with a mean value of 4.15. Each employee has access to a computer and possesses the requisite technological knowledge, which also correlates to a mean value of 4.15. Similarly, 78.3% respondents agreed that IRD has an integrated interconnectivity network for information and data management, according to in-depth interviews. This result is in line with Henning et al. (2014), who highlighted the importance of interconnectivity networks for efficient ICT-based service delivery and their alignment with e-governance concepts.

Employees indicated fairly positive views of the use of ICTs in IRD with mean values between 3.88 and 4.07 reflecting that they agree with the improvements in efficiency, accessibility, and perception of use of these technologies. The variables were all statistically significant at 5%, meaning that they can be considered relevant in relation to the results achieved through service delivery using ICTs. Some difficulties mentioned by respondents included lack of ICT training for employees, delays in ICTs' systems upgrade and budgetary limitations for development of systems and infrastructure as similar to Bekkers (2013); OECD, 2009, 2016; Banga, 2019; Polikanov & Abramova, 2003).

Table 7
ANOVA test of variables

		Sum of Squares	df	Mean Square	F	Sig.
ICT infrastructure	Between Groups	49.13	4	11.23	27.38	0
	Within Groups	64.39	160	0.43		
	Total	115.43	164			
Employee competency	Between Groups	9.15	4	2.07	3.56	0.01
	Within Groups	90.63	160	0.6		
	Total	101.08	164			
Employee attitude and ICT use	Between Groups	4.73	4	0.53	3.15	0.03
	Within Groups	32.54	160	0.22		
	Total	33.91	164			

Note: Field survey, 2023

ANOVA (analysis of Variance) helps to explain regression by dividing the total sum of squares into regression (explained) and error (unexplained) sums. **ICT-based service or e-filling VAT returns effectiveness with ICT infrastructure**, total sum of squares (114.43) is split into regression between group (48.93) and residuals (within the group) (65.49) which ascertain the condition, $F(4,15) = 28.39$, $p(0.00) < \alpha(0.05)$. It shows the relationship between ICT infrastructure and service effectiveness on ICT based service delivery in IRD or well-equipped ICT infrastructure increases the ICT based service delivery or e-filling VAT return effectiveness in IRD. Similarly, for **ICT-based service or e-filling VAT return effectiveness and employee competency**, the total sum of squares (100.089) is split into regression between group (8.35) and residuals (within group) (91.73) which ascertain the condition, $F(4,152) = 3.46$, $p(0.01) < \alpha(0.05)$ at 5% level of significance. It shows the relationship between ICT-based service or e-filling VAT return effectiveness and employee competency. The result states that employee competency increases the ICT-based service delivery or E-filling VAT return service effectiveness in IRD. Likewise, for **ICT-based service or e-filling VAT return effectiveness and employee attitude in ICT used**, the total sum of squares (34.91) is split into regression between group (4.37) and residuals (within group) (33.54) which ascertain the condition, $F(4,152) = 3.25$, $p(0.01) < \alpha(0.05)$ at 5% level of significance. It states that there is a relationship between ICT-based service effectiveness and employee attitude in ICT used. The result states that employee positive attitude in ICT used increases the ICT-based service delivery or E-filling VAT

returns service effectiveness in IRD. Hence, the stated variables are significant since the p-value of all variables is less than 0.05 at 5% significance level by the ANOVA test. These observations indicate disparities in ICT infrastructure development and variations in employee competency and attitude across different IRD branches, which is supported by literature on fragmentation in ICT adoption and limitations in capacity in the Nepalese government organizations (Bhatta, 2025). In addition, employee competency and attitude are factors that support the technological adoption theory as discussed in the literature that emphasizes the role of user competency and attitude in ICT adoption (Davis, 1989; Carter & Bélanger, 2005; Gefen et al., 2003; Adhikari, 2022).

Regression model (multiple regressions) analysis. The *Multiple Linear Regression Model* with k number of independent variables is

$$Y = b_0 + b_1X_1 + b_2X_2 + \dots + b_kX_k + u \quad \dots(1)$$

Where Y is the dependent variable and $X_1, X_2 \dots X_k$ are independent variables, u is an error term, b_0 is Y-intercept, and $b_1, b_2 \dots b_k$ are partial slope coefficients.

Table 8

Model summary

Model		R	R Square	Adjusted R Square	Std. Error of the Estimate
Dimension	1	.645 ^a	0.417	0.401	0.70

Predictors: (Constant), ICT infrastructure, employee competency in ICT, employee attitude and perceive ease of use.

Dependent variable: Service effectiveness in ICT based services (e-filing VAT return)

Measurement of Coefficient (beta) with service effectiveness in ICT-based services.

Coefficient of beta measures the role of the standardized or the portion of the effect for the dependent variables service effectiveness with independent variables ICT infrastructure, employee competency and employee attitudes. It can be further depicted in the following table.

Table 9
Beta coefficient

Model		Unstandardized Coefficients		Standardized Coefficients	T		Sig.		Co linearity Statistics	
		B	Std. Error	Beta					Tolerance	VIF
1	(Constant)	.30	.52		.57		.56		.98	1.01
	ICT infrastructure	.22	.10	.13	2.06		.04		.86	1.16
	Employee competency	-.15	.08	-.12	-1.82		.00		.91	1.09
	Employee attitude	.59	.06	.56	8.93		.00		.87	1.13

a. Dependent Variable: Server effectiveness in ICT based services

Note. Using SPSS

Table 9 depicts the dependent variable service effectiveness in ICT-based services (e-filing VAT return) with the independent variables are related in the following multiple regression equation, $\hat{Y} = 0.30 + 0.22 \text{ ICT infrastructure} - \text{employee competency} + 0.59 \text{ employee attitudes} + \text{error term}$. b1 = if the ICT infrastructure is increased by 1, then Service effectiveness is also increased by 0.22 or 22% holding the values of other independent variables constant, b2 indicates if the employee competency is not high or the e-filing system is easy for employees by a factor of 1 then service effectiveness is increased by 0.15 or 15% holding the values of other independent variables constant. Similarly, b3 indicates if the employee attitudes in ICT-based services of IRD is increased positively by 1, then service effectiveness in ICT-based services is increased by 0.59 or 59% holding the values of other independent variables constant. By testing the beta significant test, given that the p-value is less than 0.05 at the 5% significance level, all of the variables are significant.

Multi-co linearity test of dependent variable Service effectiveness with independent as stated variables, as considering the VIF (Variance Inflation Factor), since VIF of all independent variables are less than 2, there is no possibility of multi-collinearity. Likewise, all of the independent variables have tolerance values greater than 0.10, which further suggests that multi-collinearity is unlikely to arise of stated independent variables.

V. CONCLUSION AND IMPLICATIONS

This study examined ICT infrastructure, staff expertise, and employee attitudes from the perspective of service providers as the main variables affecting the efficiency of ICT-based service delivery in Nepal's VAT. Regarding the ICT infrastructure, many of the respondents agree that the IRD provides internet access to the clients through Wi-Fi across all IROs. The IRD has its interconnectivity network and an integrated system where it has its data/information associated with E-VAT. Infrastructure availability and service quality were shown to be significantly influenced by well-equipped servers and other technological resources. In line with the ideas of e-governance and New Public Governance (NPG)

philosophy, this interconnectedness and integration are crucial for the efficient provision of ICT-based services. Additionally, SCI (2019), which highlights that effective digital government policies improve transparency and raise social value for the business sector, supports these findings. In conclusion, all independent variables ICT infrastructure, employee competency and employee attitude in ICT use, are correlated with ICT-based service effectiveness or e-filing VAT return of IRD.

The study also shows that the effectiveness of ICT-based VAT services is significantly enhanced by employee expertise. Respondents emphasized that proper internet connection in all IRD offices, sufficient funding for staff training and skill development, expanded broadband capacity, and the use of modern technology are all necessary for long-term service efficiency. Maintaining high-quality ICT-based service delivery requires certain actions. In order to further understand ICT-based service delivery in e-filing VAT systems and its efficacy within IRD, future researchers may investigate more variables, use different research methodologies, increase the sample size, and include qualitative data.

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