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The Impact of CSR on Firm Performance: Exploring the Moderating Effect of Earnings Management

ABSTRACT

This study checks the CSR impact on the financial performance of the financial sector in the moderator effect of earning management. The public and financial sector companies active in CSR have invested most of their capital in the financial industry. A sample of fifty financial firms from the banking, insurance, and mudaraba sectors that are listed on the Pakistan Stock Exchange from the period 2010 to 2023 was used in this study. Correlation and panel regression analysis were employed for the study. CSR has a positive but insignificant impact on the market's financial performance. Earning management has a negative association with accounting measures of financial performance, while earning management has a positive association with market-based measures of financial performance. Earning management is related to accounting measures, whereas market-basis measures depend on investors' perceptions. Hausman-test results of the model show a positive but insignificant impact of CSR on the financial performance of the financial sector in moderating the role of earning management. The findings of this study highlight the importance of CSR because CSR has a positive association with the long-term financial performance of firms. The bulk of cash in the financial industry has come from public and financial sector enterprises engaged in corporate social responsibility.

Keywords

CSR, Financial Sector, Earnings management, Tobin's q

JEL Classification

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Author's contribution to the article: 1- Conceived and designed the analysis, 2- Reviewed and compiled the literature, 3- Collected the data, 4- Contributed data or analysis tools, 5- Performed the analysis, 6- Wrote the paper, 7- Financial support for the conduct of the study, 8-Other

1. INTRODUCTION

Before the evolution of CSR, the primary objective of a firm was profit maximization without being concerned about its harmful effect on operations on society and the environment. The interchangeable term for Corporate Social Responsibility was "Social Responsibility," which emerged in the early 1950s. CSR was familiar in the late 1960s as a significant component of firms. Later, the firms are legally and ethically bound to spend some of their revenue on social welfare. Carroll (1991) presented the following four CSR dimensions: economic, ethical, legal, and philanthropic responsibilities. CSR refers to the marketing tools and practices of corporations that consider the responsibility of a business to benefit a large public (Matten & Moon, 2008). CSR is "the firm's commitment to maximizing long-term benefits for society and environment by eliminating its harmful effects on people and planet" (Webb et al., 2001). CSR has constructed multidimensionality (Rowley & Berman, 2000). The researchers identify many related concepts and dimensions of CSR. Swaen & Chumpitaz (2008) identified four dimensions of CSR related to the company strategies: to support activities related to the environment, value their consumers, support their employees, and take philanthropic initiatives. CSR is a tool to protect the public interest and maximize profit by caring for the public. The firms engaged in social welfare, improving the environment, and providing health and education facilities. It helps to stay away from strikes, opposition, and lawsuits. According to the triple Iron constraint, a firm should be concerned for profit, people, and the planet.

According to the Supreme Court of Pakistan, General Order, 2009, about companies' CSR, under section 2, "it is required for each corporation to provide details of CSR expenditures in its annual report during the financial year." The Board of Directors' fundamental obligation is to include the disclosure of CSR expenditures in the audit annual report (Waris, 2014).

Naz et al. (2016) defined financial performance as an indicator to measure the effective and efficient usage of assets to generate profit for specific periods. In addition, the firm aims to maximize shareholder wealth and profitability. The various barometers are used to measure the firm's financial performance. According to Al-Matari et al. (2014), market-based and accounting-based measures are used to check financial performance. Furthermore, measuring organizational performance is mandatory because of how an organization uses its resources to maximize its profitability. It provides in-depth insight regarding the attainment of goals, including financial goals. Studies show that CSR positively impacts firms' financial performance (FP). The firm is involved in CSR activities in social contribution; therefore, CSR has a long-term effect on the firm's FP. At the same time, CSR has no significant impact on the FP. There is no relationship between CSR and FP. On the contrary, CSR hurts the FP of the firm because it causes dilution of the goal. The core motivation of the firm is to maximize shareholder wealth. CSR activities are cost-effective in minimizing the firm's profit.

In academic research, the idea of CSR and firms' performance has gained importance in the past few years in analyzing its effect on the wealth of shareholders and FP of the firms. CSR is essential for every successful firm in today's competitive environment. From Pakistan's perspective, a limited number of laws related to CSR are provided by the Security and Exchange Commission of Pakistan (SECP) and the State Bank of Pakistan (SBP). It includes corporate law, labor law, and consumer protection law. However, no specific law in Pakistan governs CSR (Yunis et al., 2017). Previous studies have examined how CSR affects non-financial corporate performance in Pakistan. The public and financial sector companies active in CSR have invested most of their capital in the financial industry. However, Sayed et al. (2018) researched to check the impact of CSR on the FP of financial firms in Pakistan. According to Sha and Butt (2016), earning management is a technique of using accounting knowledge to manipulate the accounting reported figures while being within the limits of accounting standards. The core motivation of management behind earning management is to reflect the results that shareholders expect. This intentional manipulation of a firm's performance results is known as earnings management.

The present global recession and the financial scams of Enron, WorldCom, Bank of Punjab, Etc. It is a question of how accounting professionals manage their expert accounting knowledge to achieve their goals. The economy runs more smoothly when financial institutions are operating smoothly. Financial crises result from disruptions in these institutions. Additionally, Javed and Ahmad (2020) evaluate the moderation effect of earning management on the relationship between CSR and FP on 80 listed firms in the Pakistan Stock Exchange using SPSS. Their study findings suggest that if there are CSR initiatives, the key motivation is to indulge in a higher level of earning management, which leads to lower FP. Therefore, shareholders should be concerned about this type of activity. Moreover, Malik and Kanwal (2016) examined the impact of CSR disclosure of FP of KSE-listed Pharmaceutical firms in Pakistan from 2005- 2014. CSR was used as an independent variable, FP as the dependent variable, and Brand Equity as the mediator. This revealed a significant impact of CSR disclosure on financial performance. Furthermore, Afza et al. (2015) investigated the impact of CSR on the FP of 76 manufacturing companies in Pakistan from 2009-2012. This research aims to investigate the impact of CSR on the firm's Financial Performance (PF) of financial sector companies in Pakistan through moderating variable effect of earning management in accounting and marketing measures of the firm's financial performances.

2. LITERATURE REVIEW

This literature review provides a comprehensive review of the empirical work conducted around the globe regarding the impact of CSR on a firm's performance. For example, Fu and Shen (2015) examined the relationship between CSR and PF of Chinese firms. A sample of 63 firms was taken using the prospect of stakeholder theory. The results showed a positive relationship between CSR and FP. Two schools of thought regarding CSR exist: classical theory and stakeholder theory. The classical theory says that CSR is a cost for the firms, which reduces the FP. Contradictory stakeholder theory says that CSR is one of the factors that can improve the corporate image, including improving FP. This empirical study validates the stakeholder approach that CSR significantly impacts the firm's FP. Hirigoyen and Rehm (2014) examined the relationship between CSR and FP of 329 listed companies in the US, Europe, and Pacific regions from the period 2009-2010 by using linear regression and the Granger causality test. The results showed that there is a negative relationship between CSR and FP. The government spends most of its budget on social sector development in developed countries. That might be the reason for the negative association of CSR with FP in developed countries. The other reason for the negative association might be that the research was conducted during financial crises in those countries.

Similarly, Mwangi and Jerotich (2013) examined the connection between CFP and CSR. Regression analysis was used on 14 listed businesses from the manufacturing, construction, and related sectors of the Nairobi Securities Exchange between 2007 and 2011. The findings indicated that corporate FP and CSR have a terrible relationship. In addition, Ahmad et al. (2014) examined the connection between FP and CSR. They used regression analysis and correlation with SPSS to examine Bursa Malaysia-listed firms between 2007 and 2011. The outcome demonstrated that company performance and CSR are positively correlated. To enhance and acquire long-term financial strength, business reputation, and image, these organizations must participate in CSR initiatives. To reap future benefits, they must encompass all CSR operations, including those that are morally, legally, and environmentally sound. Moreover, Ahmed and Adeneye (2015) examined the relationship between CSR and FP. They took 500 UK companies to find descriptive statistics, correlation, and regression. The financial performance indicators were used to determine market-to-book value, firm size, and return on capital employed. The results showed a positive relationship between CSR and market-to-book value and Return on capital employed and a negative relationship between CSR and the firm's size. Moreover, they recommended that companies get a more competitive advantage by doing more CSR practice activities in the UK. Murtaza et al. (2014) examined the relationship between CSR and FP in the food sector in Pakistan by collecting qualitative and quantitative methods and applying

the NVIVO test. The results of their study showed a positive relationship between CSR and FP. Research on this topic has shown that, on average, companies increase their earnings around the time of listing events to raise the issue's price and increase the firm's value. On the contrary, Mahdi, Al-Absy, and Alastal's (2023) study aims to investigate the effect of corporate social responsibility on the firm's performance of listed firms in Bahrain Bourse for 2018 and 2019. From the regression, the study did not find a significant relationship between corporate social responsibility and the firm's performance, neither by using the measurement of return on assets nor by measurement of return on equity.

In addition to that, Awan and Nazis (2016) examined the relationship between CSR and FP of sixteen banks in Pakistan from the period of 2009-2013. They adopted a quantitative methodology by using SPSS software. The results of their study showed a positive relationship between CSR and FP. In developing countries like Pakistan, there is a lack of educational institutes and social welfare development. If companies pay a small amount of attention, the people's standard of living will improve. Furthermore, Malik and Kanwal (2016) also examined the relationship between CSR disclosure and FP of Pharmaceutical Firms in Pakistan from 2005 to 2014. They used quantitative tools, content analysis, and regression analysis. They used CSR as an independent variable (disclosure of environment, HR safety, customer, product, and community involvement), brand equity as a mediating variable, and FP as a dependent variable. The study showed a significant positive relationship between CSR and FP. Pakistan comes under the category of developing nations where minimum investment in the form of CSR speaks louder.

Similarly, Afza et al. (2015) studied the theoretical framework of agency theory and stakeholder theory to empirically analyze the impact of CSR on the FP of the firm in the short-run and long-run manufacturing firms in Pakistan. They took a sample of 76 firms from the Chemical, Construction and Material, Pharma and Biotech, Automobile, Oil and Gas, Industrial Metal, and Mining sectors from the period 2009 to 2012. A panel data model, random model, and generalized least square regression were used, and the F-test, LM-test, and Hausman-test were applied. The results of the model reveal that CSR has a positive impact on the FP of firms in both the short run and long run. The reason for the positive impact of CSR in developing countries is much higher as compared to the developed world due to the lack of public services (such as education, health, pure and clean water, etc.) if the CSR is utilized in an effective and better manner in these countries. Additionally, Arshad et al. (2015) examine the effect of CSR on FP for the company. From 2009 to 2013, they selected 125 listed businesses from 25 different KSE industries in Pakistan. The dependent variable is FP, measured by ROA and Tobin's Q. The controlling variables are firm size, leverage, sales growth, and age. The independent variable is CSR, quantified by donations and environmental costs. The findings showed that, at a 5 percent confidence level, the impact of CSR on FP is statistically insignificant. In contrast, at a 10 percent confidence level, the relationship between CSR and FP is favorable.

Several studies have found Earnings management to impact business performance (Chakroun & Ben Amar, 2022; Ching et al., 2015; Indrawati & Hanif, 2023). Businesses can improve the accuracy of their financial reporting through effective external and internal audit processes, which will impact stakeholders' confidence in the reports. These studies offer proof that the perplexing phenomena of underperforming post-issue earnings can be explained by earnings management (Chakroun & Ben Amar, 2022; Espahbodi et al., 2022; Lin et al., 2021; Mangala & Dhanda, 2019). Ogolla, G. A. (2013) examined the relationship between CSR and FP of forty-one commercial banks in Kenya from 2007-2011. For the study of analysis, multiple regression models were adopted. The results showed a strong relationship between CSR and FP. The author emphasized that commercial banks should invest more in CSR to enhance their financial performance. CSR activities are an essential part of any business in the modern era, where no one can ignore CSR activities. The banking sector, including all other sectors, should do CSR activities to enhance their financial performance.

Conclusively, the firm's work for public welfare, which includes customers, investors, suppliers, employees, etc., and firms engaging in social work will earn more profit. A company formulates its rules and regulations regarding the needs of the employees. It includes regulations about the environment and the health and safety of employees. Evidence shows that the firm is socially responsible. Furthermore, according to the window of opportunity concept, most companies decide to go public when their operating performance is at its best, which may be transitory and unsustainable. Therefore, previous manipulation may impact future earnings, resulting in declining earnings (Chakroun & Ben Amar, 2022; Mangala & Dhanda, 2019). Javed and Ahmad (2020) took a stratified sample of 80 firms listed on PSX from 2013 to 2017 to check the impact of CSR on FP as earnings management as a moderating variable. Conclusively, CSR has a positive impact on ROA and P/E ratio. In addition, the moderation effect of earning management decreases CSR and ROA, but there is no moderation effect between CSR and P/E. The study further reveals that commencing CSR activities is linked to higher earning management.

2.1 Theoretical Framework

Two schools of thought regarding CSR exist: classical theory and stakeholder theory. The classical theory says that CSR is a cost for firms, which reduces the FP. Contradictory stakeholder theory says that CSR is one of the factors that can improve corporate image, including improving FP. Stakeholder theory has been employed, described by Edward Freeman and others as the mirror image of CSR. Sayed et al. (2018) and Javed and Karimullah (2010) followed the stakeholder perspective in the theoretical framework.

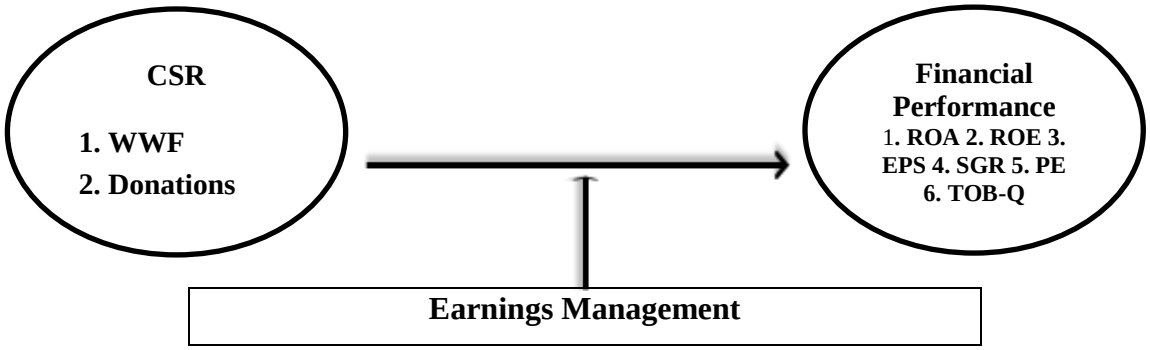

Figure 1: Linkage between CSR and Financial Performance

Dechow et al. (1995) used the Modified Jones model, which used the expected and discretionary variables to capture the effect of earnings management. We consider this model to grab the effect of earning management as a moderating variable between CSR and financial performance.

$$\mathrm{TA} = \mathrm{N.I} - \mathrm{CFO} \tag{1}$$

The modified Jones model is:

$$\frac{TA}{\mathrm{A}_{(t-1)}} = \beta_1\left(\frac{1}{\mathrm{A}_{(t-1)}}\right) + \beta_2\left(\Delta\mathrm{Rev} - \frac{\mathrm{A/R}}{\mathrm{A}_{(t-1)}}\right) + \beta_3\left(\frac{PPE}{\mathrm{A}_{(t-1)}}\right) \tag{2}$$

The left-hand side of the equation shows total accruals. The right-hand side equation provides non-discretionary accruals, which have three different accruals. Here, total accruals have been calculated as $\mathrm{DA} = \mathrm{TA} - \mathrm{NDA}$, where DA represents discretionary accruals, TA represents total accruals, and NDA represents non-discretionary accruals.

2.2 Empirical Models

The empirical model for evaluating CSR impact on financial performance in the moderating effect of the earning management.

$$ROA_{it} = \beta_0 + \beta_1 CSR_{it} + \beta_2 EM_{it} + \beta_3 LVRG_{it} + \beta_4 SZFS_{it} + \beta_5 SZFA_{it} + \beta_6 RISK_{it} + \beta_7 AG_{it} + \beta_8 EM_{it} CSR_{it} + \varepsilon_{it} \quad (3)$$

$$ROE_{it} = \beta_0 + \beta_1 CSR_{it} + \beta_2 EM_{it} + \beta_3 LVRG_{it} + \beta_4 SZFS_{it} + \beta_5 SZFA_{it} + \beta_6 RISK_{it} + \beta_7 AG_{it} + \beta_8 EM_{it} CSR_{it} + \varepsilon_{it} \quad (4)$$

$$EPS_{it} = \beta_0 + \beta_1 CSR_{it} + \beta_2 EM_{it} + \beta_3 LVRG_{it} + \beta_4 SZFS_{it} + \beta_5 SZFA_{it} + \beta_6 RISK_{it} + \beta_7 AG_{it} + \beta_8 EM_{it} CSR_{it} + \varepsilon_{it} \quad (5)$$

$$SGR_{it} = \beta_0 + \beta_1 CSR_{it} + \beta_2 EM_{it} + \beta_3 LVRG_{it} + \beta_4 SZFS_{it} + \beta_5 SZFA_{it} + \beta_6 RISK_{it} + \beta_7 AG_{it} + \beta_8 EM_{it} CSR_{it} + \varepsilon_{it} \quad (6)$$

$$PE_{it} = \beta_0 + \beta_1 CSR_{it} + \beta_2 EM_{it} + \beta_3 LVRG_{it} + \beta_4 SZFS_{it} + \beta_5 SZFA_{it} + \beta_6 RISK_{it} + \beta_7 AG_{it} + \beta_8 EM_{it} CSR_{it} + \varepsilon_{it} \quad (7)$$

$$TOBQ_{it} = \beta_0 + \beta_1 CSR_{it} + \beta_2 EM_{it} + \beta_3 LVRG_{it} + \beta_4 SZFS_{it} + \beta_5 SZFA_{it} + \beta_6 RISK_{it} + \beta_7 AG_{it} + \beta_8 EM_{it} CSR_{it} + \varepsilon_{it} \quad (8)$$

The above Acronyms show as CSR represent Corporate Social Responsibility, ROA represent Return on Assets, ROE represent Return on Equity, EPS represent Earnings per Share, SGR represent Sales Growth rate, PE represent Price to Earnings ratio, $TOBQ$ represent Tobin's Q ratio, LVG represent Leverage, $SZFS$ represent Size of the Firm in sales, $SZFA$ represent Size of the Firm in Assets, $RISK$ represent Risk and AG represent Age, EM represent Earning management, $EM_{it}CSR_{it}$ represent interaction term 'i' represent Company, t represent time , β_0 represent intercept, β represent slope parameters, and ε represent error term.

2.3 Summary of the Variables

Table 1 below describes the variables used to investigate the impact of CSR on the performance of the financial sector Firm by taking earning management as a moderating variable. A few studies in which we have adopted this model are e.g., Nguyen (2021), Zhang and Daly (2013), Zafar et al. (2012), Sayed et al (2018), Afza, Ehsan and Nazir (2015), Ibrahim and Bambale (2016); Ghafoor and Nazish (2016); Fu and Shen, (2015), Yasir et al. (2023), Arshad et al., (2015) and Javed and Ahmad (2020).

Table 1: Variables Description

Variable Name	Description
Independent Variable	
CSR (CSR)	Workers Welfare Fund (WWF) and Donations
Dependent Variables	
a. Earnings per Share (EPS)	EPS before Tax
b. Return on Asset (ROA)	Earnings before tax / Total Asset
c. Return on Equity (ROE)	Earnings before tax / Number of Common Shares Outstanding
d. Sales Growth Rate (SGR)	(Current year Sales - Previous year Sales/Previous year Sales) *100
e. Tobin's q (TOBQ)	Capitalization ratio / Total Asset
f. Price to Earnings ratio (PE)	The market value of each Share / EPS
Moderating	
Earnings Management (EM)	$\mathrm{DA} = \mathrm{TA} - \mathrm{NDA}$
Controlling Variables	
a. Firm Size in Assets (SZFA)	Logarithm of Total Assets
b. Firm Size in Sales (SZFS)	The logarithm of Total Sales
c. Firm Age (AG)	Number of years after Incorporation to Date
d. Leverage (LVRG)	Long-term debt to total assets
e. Risk	$(\sigma^{\mathrm{i.m}} * r^{\mathrm{i.m}})/\sigma^{2m}$

3. DATA AND ITS SOURCES

The sample comprises 50 financial firms from the Banking, Insurance, and Modaraba sectors companies listed on the Pakistan Stock Exchange from 2010-2023 from annual reports, Yahoo Finance, and the Pakistan Stock Exchange. Correlation and panel regression were employed for the analysis of data.

The firms' financial data are reported in Pakistan in millions of rupees. The data is normalized to be in the form of tenth or unit-digit form. The firm's size is calculated by taking the total Assets and sales log. The firm's age is determined by the number of years from the incorporation date. The leverage of the firm normalizes by dividing Long-term debt by total assets. The risk is calculated through beta. The discretionary accruals are calculated using the Modified Jones model. CSR is measured by summing the Workers Welfare Fund (WWF) and denotations as a percentage of the total sales. Return on Asset (ROA) is calculated as the earnings before taxes divided by total assets. Moreover, Return on Equity (ROE) is computed as the earnings before taxes divided by the number of Common Shares Outstanding. EPS before tax is taken into account in this study for EPS. The sales Growth Rate is calculated as the previous year's sales subtracted from the current year's sales divided by the previous year's sales and multiplied by 100. Tobin's q (TOBQ) is computed as the capitalization ratio divided by total assets. The price-to-earnings ratio (PE) is calculated as the market value of each Share divided by the EPS.

4. RESULTS AND DISCUSSION

The CSR has a weak positive correlation with ROE, ROA, SGR, EPS, and Tobin Q investment. It has a negative relation with P/E and DA. Controlling variables like the firm's size, risk, age, and earnings management negatively correlate with CSR. Earnings management has a weak positive correlation with ROE, SGR, EPS, and Tobin Q investment and a negative relation with the firm's size. Positive correlations with earnings management, except for risk, are among the controlling variables. The DA-CSR has a weak positive correlation with ROE, SGR, EPS, and Tobin Q investment and has a negative relation with P/E, ROA, and SGR. DA_CSR is positively correlated with the size of the firm (assets and sales) and leverage but is negatively associated with risk and age of the firms.

4.1 Panel Regression

The results based on the equation are given in Table 3. In model 1, CSR has a positive but insignificant impact on ROE. If one unit increases in CSR on average, ROE increases by 5.4 units by keeping other variables constant. Earnings management has a negative but statistically insignificant impact on ROE. Leverage has a positive but significant impact on ROE. One unit’s Leverage on average ROE increases by 0.0005.4 units by keeping other variables constant. Assets have a negative but insignificant impact on ROE. Inversely, sales have a positive but insignificant impact on ROE. Risk has a negative but insignificant impact on ROE. The age of the firm has a statistically significant positive impact on ROE. The earnings management interaction with CSR has a negative but statistically insignificant impact on ROE. The R-squared value is 0. 2761, which means that the explanatory variables have explained 27.61% of the variation in ROE, and there is no autocorrelation, as can be seen from the Durbin Watson stat, which is 1.623. The Hausman Test statistic is significant at a 1% level. Therefore, the fixed effect model is used for the panel regression.

Table 2: Correlation Matrix

	ROE	**ROA**	**SGR**	**EPS**	**PE**	**TOBIN'S Q**	**CSR**	**DA**	**LVG**	**SZFS**	**SZFA**	**RISK**	**AGF**	**DA_CSR**
ROE	1													
ROA	-0.003	1												
SGR	0.034	0.014	1											
EPS	0.089	-0.014	0.060	1										
PE	-0.001	-0.005	-0.010	-0.024	1									
TOBIN'S Q	0.101	0.021	0.013	0.029	-0.020	1								
CSR	0.018	0.032	0.036	0.038	-0.001	0.041	1							
DA	0.017	-0.008	0.001	0.011	-0.003	-0.035	-0.020	1						
LVG	0.142	-0.043	-0.036	-0.002	0.001	-0.169	-0.026	0.013	1					
SZFS	0.006	-0.035	-0.050	0.371	0.066	-0.327	-0.031	0.047	0.227	1				
SZFA	-0.126	-0.085	-0.058	0.432	0.071	-0.357	-0.040	0.024	0.270	0.732	1			
RISK	-0.008	-0.013	0.004	0.112	-0.050	-0.017	0.021	-0.035	-0.070	0.061	0.046	1		
AGF	0.042	0.026	-0.028	0.487	0.075	0.183	-0.003	0.017	-0.094	0.148	0.167	-0.011	1	
DA_CSR	0.002	-0.002	-0.020	0.004	0.002	0.004	-0.216	-0.321	0.024	0.037	0.033	-0.010	-0.079	1

Table 3: CSR Moderating Effect on Earnings Management with ROE, ROA, EPS, SGR, P/E, and Tobin's Q

Variables	Accounting-based Financial Performance				Market-based Financial Performance	
	Model 1 (ROE)	**Model 2 (ROA)**	**Model 3 (EPS)**	**Model 4 (SGR)**	**Model 5 (P/E)**	**Model 6 (Tobin's Q)**
	2.444***	0.1196***	-9.202***	65.541	119.980	-0.160
C	(0.546)	(0.012)	(2.492)	(155.058)	(233.645)	(0.24)
CSR	5.430	0.0001***	0.000	-0.012	0.001	0.000
	(0000)	(0.000)	(0.001)	(0.116)	(0.175)	(0.000)
DA	-0.021	-0.0005	0.088	1.255	-2.128	-0.008
	(0.074)	(0.003)	(0.331)	(21.139)	(31.841)	(0.029)
LVG	0.005***	-0.0001**	-0.003	-0.185	-0.024	0.000
	(0.001)	(0.000)	(0.005)	(0.373)	(0.562)	(0.000)
SZFS	0.01	-0.0046***	0.414***	14.236**	0.501	0.005
	(0.025)	(0.001)	(0.001)	(7.130)	(10.739)	(0.013)
SZFA	-0.344***	-0.005***	0.150	-7.890	-1.243	0.008
	(0.04)	(0.001)	(0.208)	(13.285)	(20.011)	(0.018)
RISK	-0.042	0.004	0.019	-28.613	-0.732	-0.091**
	(0.1)	(0.005)	(0.448)	(28.621)	(43.170)	(0.045)
AGF	0.037***	0.000***	0.271***	-2.613	-2.993	0.01***
	(0.007)	(0.006)	(0.035)	(2.241)	(3.384)	(0.003)
DA_CSR	-0.0001	-0.0003	-0.003	-0.326	-0.033	-0.000
	(0.004)	(0.002)	(0.02)	(1.303)	(1.963)	(0.001)
		Diagnostic Tests				
R-squared	0.276	0.115	0.878	0.153	0.757	0.738
Adjusted R^2	0.181	0.0005	0.863	0.042	0.689	0.697
F-statistic	2.917	2.004935	55.596	1.387	5.849	18.049
Prob(F-statistic)	0.000	0.004	0.000	0.038	0.007	0.000
D-Watson stat	1.623	2.483	1.193	1.741	2.466	1.888
Hausman Test	26.051***	16.013***	23.584***	33.626***	32.854***	11.815***

*** and ** indicate a significance level of 1% and 5%. The standard error of each variable is shown in bracket

In model 2, CSR positively and significantly impacts the ROA mean. If one unit increases in CSR on average, ROA increases by 0.00118 units, keeping other variables constant. Earnings management has a negative but statistically insignificant impact on ROA. Leverage has a negative but significant impact on ROA. Assets have a positive but insignificant impact on ROA. Inversely, sales have a positive but insignificant impact on ROA. Risk has a positive but insignificant impact on ROA. The age of the firm has a statistically significant positive impact on ROA. The earnings management interaction with CSR has a negative but statistically insignificant impact on ROA. The squared R-value is 11.5, which means the explanatory variable has explained an 11.5% variation in ROA. There is no autocorrelation, as seen from the Durbin-Watson stat, which is 2.48. The Hausman Test statistic is significant at a 1% level. Therefore, the fixed effect model is used for the panel regression.

In model 3, CSR has a positive but insignificant impact on EPS, meaning that if one unit increases in CSR on average, EPS increases by 0.0005 units by keeping other variables constant. Earnings management has a Positive but statistically insignificant impact on EPS. Leverage has a negative but insignificant impact on EPS. The firm's size (sales has a positive and significant and Assets have a positive but insignificant impact

on EPS. Risk has a positive but insignificant impact on EPS. The age of the firm has a statistically significant positive impact on EPS. The earnings management interaction with CSR has a negative but statistically insignificant impact on EPS. The R squared value is 87, which means the explanatory variable has explained 87% of the variation in EPS, and there is no autocorrelation, as can be seen from the Durbin-Watson stat, which is 1.193. The Hausman Test statistic is significant at a 1% level. Therefore, the fixed effect model is used for the panel regression.

In model 4, CSR has a negative and insignificant impact on the SGR mean. If one unit increases CSR on average, SGR decreases by 0.012 units by keeping other variables constant. Earnings management has a positive but statistically insignificant impact on SGR. Leverage has a negative but insignificant impact on SGR. Assets have a negative but insignificant impact on SGR. Sales have a positive and significant impact on SGR. Risk has a negative but insignificant impact on SGR. The age of the firm has an insignificant and negative impact on SGR. The earnings management interaction with CSR has a negative but statistically insignificant impact on SGR. The R-squared value is 15, which means the explanatory variable has explained 15% of the variation in SGR. There is no autocorrelation, as seen from the Durbin-Watson statistic, which is 1.74. The Hausman Test statistic is significant at a 1% level. Therefore, the fixed effect model is used for the panel regression.

In model 5, CSR has a positive but insignificant impact on the P/E mean. If one unit increases in CSR on average, P/E increases by 0.0019 units by keeping other variables constant. Earnings management has a negative but statistically insignificant impact on P/E. Leverage has a negative but insignificant impact on P/E. Assets have a negative but insignificant impact on P/E. Inversely, sales have a positive but insignificant impact on P/E. Risk has a negative but insignificant impact on ROA. The age of the firm has a statistically insignificant negative impact on P/E. The earnings management interaction with CSR has a negative but statistically insignificant impact on P/E. The R squared value is 0.75, which means the explanatory variable has explained 75% of the variation in P/E, and there is no autocorrelation, as can be seen from the Durbin Watson stat, which is 2.46. The Hausman Test statistic is significant at a 1% level. Therefore, the fixed effect model is used for the panel regression.

In model 6, CSR has a positive but insignificant impact on Tobin Q's mean. If one unit increases in CSR, on average, Tobins Q increases by 4.4 units by keeping other variables constant. Earnings management has a negative but statistically insignificant impact on Tobins Q. The Leverage has a positive but significant impact on Tobins Q. The size of the firm likely Assets and sales (size) of the firms have a positive but insignificant impact on Tobins Q. Risk has a negative but significant impact on Tobins Q. The age of the firm has a statistically significant positive impact on Tobins Q. The R squared value is 73, meaning the explanatory variable has explained 73% of the variation in Tobins Q. There is no autocorrelation, as seen from the Durbin Watson stat, which is 1.88. The Hausman Test statistic is significant at a 1% level. Therefore, the fixed effect model is used for the panel regression.

The firm's financial performance is measured through accounting-based measures and market-based performance. The finding regarding CSR has a positive but insignificant impact, as Sayed et al. (2018) confirmed. CSR has a negative impact on the market based on financial performance, as validated by Guatam et al. (2016). The core motivation of the firm is to maximize shareholder wealth, not to be engaged with social engagements. Earnings management is negatively associated with market-based performance because these indicators are based on investors' perceptions. Earnings management is an accounting-based activity that is directly linked to accounting-based performance. It is positively associated with the accounting-based measure of financial performance except for return on equity. CSR is the mechanism of malpractice in its name to achieve its desired financial objectives through earnings management. Gautam et al. (2016) confirmed that leverage harms financial performance. The size of the firms (sales and assets) impacts FP positively, as confirmed by Sayed et al. (2018). Risk has a negative but significant impact on

Tobins Q, which is also confirmed by Sayed et al. (2018). The firm's age has a statistically significant positive impact on Tobins Q, as confirmed by Sayed et al. (2018). Earning management has a negative association with accounting measures of financial performance while earning management has a positive association with market-based measures of financial performance (Javed & Karimullah, 2020). Earning management is related to accounting measures, whereas market-basis measures depend on investors' perceptions.

In banking companies, CSR disclosure is one key factor in maintaining the trust of stockholders and customers. Implementing CSR programs and earning management negatively influence companies' profitability because they require a lot of money.

5. CONCLUSION AND POLICY IMPLICATIONS

The study's conclusion is based on three points: CSR positively impacts accounting-based and market-based financial performance indicators, except for sales growth rate. The second conclusion is from earning management's impact on financial performance. Earning management is negatively associated with the accounting measure of FP except for two indicators of accounting-based financial performance, e.g., sales growth rate and EPS. CSR has a negative but insignificant impact on the FP of the financial sector in moderating the role of earning management. The study's findings emphasize the significance of CSR because corporate social responsibility has a favorable correlation with a company's long-term financial performance. Most funds in the financial sector come from public and private companies that participate in CSR. CSR's insignificant impact on the firm's financial performance is due to firms' unawareness of the exact segment where the problem exists. Malpractices in the name of CSR negatively impact the FP. Firms can boost their financial performance by engaging in societal needs-based CSR and averting malpractices, particularly in earning management.

These findings have important implications for CSR. They could help policymakers in Pakistan evaluate companies' roles in society. Further, regulators and companies need to issue guidelines that may increase the quality of CSR and enhance society and shareholder interest.

This study has some limitations. First, it is based on 50 financial firms from the Banking, Insurance, and Modaraba sectors listed on the Pakistan Stock Exchange; thus, it does not reflect the whole financial sector of Pakistan. Second, the study used only the Workers Welfare Fund and Donations inputs to measure CSR. Third, the data was taken from 2010 to 2023.

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A Structural Break Unit Root Test to Test Purchasing Power Parity Hypothesis: An Empirical Analysis of South Asian Economies

ABSTRACT

The purchasing power parity hypothesis is evaluated through examination of whether real exchange rate exhibits mean-reverting behavior implying that any transient deviations from its equilibrium level will eventually converge with the mean value. Traditional unit root tests like Augmented Dickey-Fuller (ADF) test usually fail to reject null hypothesis about unit root in the situation of structural breaks. Hence, this study utilizes structural break test for south Asian countries (Bhutan, Bangladesh, China, Maldives, Nepal, Pakistan, and Sri Lanka) with the objective of finding out if there are structural breaks in data collected annually from 1991 until 2023. In this research study we have used Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test, Augmented Dickey Fuller (ADF) test, and structural break unit root break test. The unit root tests with structural breaks indicate that for Bhutan, China, the Maldives, Nepal, Pakistan, and Sri Lanka, the null hypothesis of a unit root cannot be rejected at the 5% significance level, regardless of the model used (IO or AO). This means that the actual price levels for these countries follow a non-stationary trend and PPP is not proved true. But in case of Bangladesh, the AO model disposes off null hypothesis therefore suggesting stationarity and supporting PPP. While for India, both models eliminate null hypothesis which confirms stationarity and thus supports PPP within the sampled period.

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Author's contribution in the article: 1- Conceived and designed the analysis, 2- Reviewed and compiled the literature, 3- Collected the data, 4- Contributed data or analysis tools, 5- Performed the analysis, 6- Wrote the paper, 7- Financial support for the conduct of the study, 8-Other

1. INTRODUCTION

Purchasing power parity (PPP) refers to the rate at which a single nation's currency must be converted in order enable other countries to purchase the same amount of products and services. We use it to compare the standard of living and economic output of different nations. According to Cassel (1918), when two nations engage in complete and free commerce, the real exchange rate cannot deviate significantly from PPP. Exchange rates and local and international pricing must be considered while examining the validity of PPP. The real exchange rate results from adjusting the nominal exchange rate to a comparable price. The nominal exchange rate is the price of one currency in terms of another (Sarno & Taylor, 2002; MacDonald, 2007). If we allow non-stationarity, we can additionally employ the real exchange rate for assessing PPP. If a real exchange rate is nonstationary (has unit root), it would imply that in theory too much time would have to pass before long term consequences of relevant shocks would lead to the movement of variable away from its long-run equilibrium. In contrast if real exchange rate has constant value without any unit roots ultimately diseases will vanish which will make it capable of attaining balanced position after some time (Cuestas & Regis, 2013). In exchange rate economics, one of the most hotly contested problems is the divergence of the real exchange rate over short and long terms (Dornbusch & Krugman, 1976; Rogoff, 1996).

According to the principle known as "Purchasing Power Parity," when two currencies' exchange rates are balanced, their buying power is equal in both nations. In order to go back to PPP contagion model states that country facing inflation will have higher internal prices which mean devaluation should take place on currency. In other words under this setting commodities that are alike irrespective of their price differences across borders have same costs provided there are no trade barriers or geographical distances between nations. Under situations where there is no arbitrage, there would be no excessive requirement of foreign money hence no fluctuations in its rate; thus, PPP might fail to work well for nations less openly trading and countries that are far apart from each other (Alba & Papell 2005). Absolute up means that the purchasing power of a single unit of foreign currency remains the same as in the local economy (Saeed et al., 2012). On the other hand, relative PPP shows how variations in nominal exchange rates between two or more currencies can offset variations in national price levels, including inflationary trends or deflationary tendencies (Arize, 2011). Researchers have conducted numerous studies to assess the effectiveness of PPP, especially following the 1973 Brettonwood system disaster. Investigations into why relative PPP does not hold up in both the short and long term are currently ongoing (Nusair, 2003).

Primary objective of this research study is to examine the consequence of NEER and CPI on PPP, and also check whether there is any structural break in the data of South Asian countries (Bhutan, Bangladesh, China, Maldives, Nepal, Pakistan, Sri Lanka).

2. LITERATURE REVIEW

Different countries have looked into PPP hypothesis by employing different statistical techniques, sample lengths and data frequencies. ADF unit root test as well as Johansen’s co-integration test were used by Kasem and Al-Gasaymeh (2022) to analyze quarterly data for Qatar, Iraq, Turkey, Saudi Arabia and United Arab Emirates from 2000 to 2020 located in Middle East region. The co-integration linked between the exchange rate and the levels of local and international prices for the chosen nations was present. As a result, exchange rates interacted dynamically to correct deviations from the equilibrium co-integrating relationship and return the system to long-term equilibrium. To the Jordan Economy, these countries are related, and this proves the PPP model has a long-run validity.

The study by Choji and Manga (2017) employed time series tests to determine if PPP holds for a number of five Asian countries from 1996 to 2016 using monthly data. They used co-integration and time series

unit root techniques to determine PPP. Their initial evaluation of the variables' stationarity revealed that they are unit root at levels, but becomes stationary when taking first difference. They then used the co-integration test to determine the stationary nature of our variables over the long term. Four out of five countries' co-integration test results rejected the null hypothesis, implying that there is enough evidence to support public-private partnerships in these Asian nations in a long-run between the years 1996 to 2016. In different wording, rejecting null hypothesis means that relative prices and nominal exchange rates have a long-lasting relationship.

Raza et al. (2022) determined if Asian and developed economies have long-term buying power parity. They observed that these nations determined their long-term exchange rates facilitated the creation of efficient monetary policies. Further, they examined the long-term PPP connections between the UK, the US, and the Asian economies (China, Japan, and Singapore). It was crucial to use time-series analysis to examine whether PPP holds between the economies of the UK, the US, and those of Asia. By analyzing the complete samples before global financial crisis and subsamples after, they utilized Johansen co-integration test to investigate relative PPP between these nations. In the full sample and in subsamples, they found that relative PPP shares Asian economies (Japan, China and Singapore) with US and UK respectively. The study provided strong evidence in favor of PPP hypothesis arguing that the US and UK prices have effects on domestic pricing in Asian countries as well as contributing greatly to the variance of such prices and inflation levels.

Khan and Ahamad (2005) examined the short-term behavior of the exchange rate and comparable prices for four Asian nations to assess PPP as a long-term equilibrium condition. The study examined data for three different price indices from 1976 to 2001 using a co-integration technique. The study showed empirical evidence for the absence of a co-integrated connection in the collected data. Most of the time, the study's findings contradict the PPP hypothesis. Ahmad et al. (2006) looked at PPP for four South Asian countries using monthly data on nominal exchange rates, CPI, and WPI from 1984 to 2002 by using the mean reversion hypothesis and the Engle-Granger co-integrating relationship. PPP does not hold in any of the nations, according to the mean reversion hypothesis findings. The results of the co-integration investigation specify that PPP is only applicable in a weakened form in Pakistan. There is substantial evidence that PPP does not exist in Bangladesh, while the data for India and Sri Lanka is limited.

She et al. (2021) empirically investigated the validity of PPP in Pakistan. The study employed the Fourier ADF (FADF) and Fourier KPSS (FKPSS) unit root tests to analyze the unit root qualities of Pakistan's real exchange rates (RERs) against its 21 main trade partners from 1983Q1 to 2014Q4. They used Fourier unit root tests because they account for the nonlinearity of the data and numerous transient structural breaks. By means of three RER series, the FADF test rejects the non-stationary null hypothesis. Conversely, nine RER series are rejected at stationary null by the FKPSS test. Therefore, according to FKPSS test; PPP theory is supported in 12 exchange rate series while its support in 3 exchange rate series is confirmed through FADF unit root test. Robust analysis also employed regression analysis to estimate the PPP equation. For nine exchange rate series, the regression findings demonstrated the validity of the PPP hypothesis. These results implied that Pakistan's PPP hypothesis partly holds.

Muhammad et al. (2009) aimed to investigate the buying power parity theory in Pakistan. The research used the mean reversion hypothesis to explain the variation in the CPI, WPI, and NEER during the years 1980–2008. They tested the PPP using the Engle-Granger co-integration and error correction mechanisms. The results of the study revealed that the mean reversion hypothesis does not substantiate PPP, whilst the co-integration analysis asserted that PPP is applicable but not persuasive on the part of Pakistan. Furthermore, an evaluation of error correction mechanism (ECM) bolstered short-run dynamics of the model.

Sher and Khan (2019) using annual exchange rate data from 1980 to 2012, research investigated to revalidate the PPP hypothesis in Pakistan. They verified the long-run PPP hypothesis using the Zivot-Andrews unit root test and the ADF test. According to the findings, there was no evidence supporting the PPP hypothesis for Pakistan in the ADF test. In contrast, PPP theory was found to be supported by Zivot-Andrews unit root test for some structural breaks. The conclusion contradicted previous studies that reported no evidence in favor of PPP. Future research applied to elaborate time-series models to analyze the PPP theory in other emerging economies.

Madhavikas (2021) studied the strong and weak correlations between macroeconomic factors and PPP between Pakistan and Sri Lanka. Similar products from both countries were compared to get the value for PPP based on yearly macroeconomic statistics for 20 years, spanning from 1997 to 2016. They examined the data using descriptive statistics, reliability tests, and time series multiple regression. The real exchange rate was not constant in either the Sri Lankan or Pakistani economies. In contrast, Pakistan exhibited a strong correlation between the PPP and the selected macroeconomic variables, while Sri Lanka had a weak correlation with the inflation, interest rate, money supply, exchange rate, foreign direct investment, and gross domestic product. The study added to the existing literature on the relationship between economic growth and PPP.

3. DATA AND ITS SOURCES

In this research an analysis of the PPP hypothesis is done for the South Asian countries (Bhutan, Bangladesh, China, Maldives, Nepal, Pakistan, Sri Lanka) through yearly data covering the period from 1991 to 2023. The information was obtained from International Financial Statistics (IFS).

3.1 Unit Root Test for Examining the PPP Hypothesis with Structural Breaks

The PPP hypothesis is tested by checking whether the real exchange rate is mean-reverting, which means that deviations from the equilibrium level are only temporary and will revert back to the mean in the long run. Traditional tests for unit root such as ADF and KPSS often fail to reject the null hypothesis of unit root in presence of structural breaks. In this case, a structural break unit root test could offer a better way to deal with the PPP hypothesis.

Financial time series data, such as exchange rates tend to experience sudden changes due to major market events, policy shifts or other factors. As a result, there might be structural changes that require proper consideration in order not to produce misleading conclusions. Structural break unit root tests including Zivot-Andrews test or Perron test allow for one or more endogenously determined breaks in the series thereby providing an accurate detection of unit roots under changing circumstances.

3.2 Zivot-Andrews Unit Root Test

This particular examination enables the occurrence of only one structural break in both the intercept and slope or either of them alone. It is particularly useful when the timing of the break is unknown and needs to be determined endogenously.
Theoretical framework

$$\Delta y_t = \mu + \beta t + \theta y_{t-1} + \sum_{i=1}^{k} \gamma_i \Delta y_{t-i} + \delta D_t + \alpha DU_t + \epsilon_t \quad (1)$$

Where D_t is a dummy variable for the break in the intercept, andDU_t is a dummy variable for the break in the trend.

3.3 Perron Unit Root Test

This test incorporates many structural fractures and can be used in contrasting situations such as change of mean level, trend or both.

$$\Delta y_t = \mu + \beta t + \theta y_{t-1} + \sum_{i=1}^{k} \gamma_i \Delta y_{t-i} + \delta_1 D_{t,1} + \delta_2 D_{t,2} + \alpha_1 DU_{t,1} + \alpha_2 DU_{t,2} + \epsilon_t \quad (2)$$

Where $D_{t,1}$ and $D_{t,2}$ are intercept break dummy variables, $DU_{t,1}$ and $DU_{t,2}$ are trend break dummy variables.

3.4 Application to PPP

When real exchange rate data is subjected to unit root tests with structural breaks, it becomes easy to assess if PPP hypothesis is applicable despite structural adjustments. This is because by determining when breaks occur you will have an idea about the dynamics of currency rates and the extent to which PPP holds over different time spans.

In circumstance where structure breaks exist it is advisable to follow structural break root tests rather than conventional unit root tests when testing for PPP hypothesis. This approach reflects structural shifts in the data and yields more precise and trustworthy results. The findings from these tests could greatly increase our knowledge on how currency rates behave; consequently improving finance strategies as well as risk management techniques in global commerce.

4. RESULTS AND DISCUSSION

For conducting assorted tests, this section applies first the one with intercept alone and also on the trend and intercept ADF test, KPSS Test.

Table 1: Augmented Dickey-Fuller (ADF) Test Results with Intercept Only (Level)

Variables	Lags	With Intercept Only (Level) Test Statistic (Critical Value At 5%)	Results
REER_BHU	7	-1.69 (-2.96)	Significant
REER_BNG	7	-1.00 (-2.96)	Non-Stationarity
REER_CH	7	-1.13 (-2.96)	Non-Stationarity
REER_IND	7	-1.01 (-2.96)	Non-Stationarity
REER_MALD	7	-1.81 (-2.96)	Non-Stationarity
REER_NEP	7	-0.72 (-2.97)	Non-Stationarity
REER_PAK	7	0.19 (-2.96)	Non-Stationarity
REER_SL	7	-1.69 (-2.96)	Non-Stationarity

Source: Author's own calculations

The ADF test checks whether or not time series have unit roots which implies non-stationarity. If the test statistic exceeds the critical value, the null hypothesis of a unit root is rejected, demonstrating stationarity and showing that the PPP hypothesis exists. In this investigation, the ADF test findings for numerous nations are given. The ADF test of Real Effective Exchange Rate (REER) reveals that not one of the series is stable at the level of intercept alone. For Bhutan (REER_BHU), the test statistic is -1.69 greater than the critical value of -2.96 causing a non-rejection of null hypothesis and thus non-stationarity indicating that PPP hypothesis does not hold true. Bangladesh (REER_BNG) has -1.00 test statistic which is higher than -2.96 indicating failure to accept the PPP hypothesis. In a similar way the test results for China (REER_CH: -1.13), India (REER_IND: -1.01), Maldives (REER_MALD: -1.81), Nepal (REER_NEP: -0.72), Pakistan (REER_PAK: 0.19), and Sri Lanka (REER_SL: -1.69) all demonstrate test statistics exceeding the critical value of -2.96 (or -2.97 for Nepal), showing that PPP hypothesis does not hold for none of them.

Table 2: KPSS Test Results with Intercept Only

Variables	Bandwidth	With Intercept Only (Level) Test Statistic (Critical Value At 5%)	Results
REER_BHU	4	0.359 (0.463)	Stationarity
REER_BNG	4	0.405 (0.463)	Stationarity
REER_CH	4	0.527 (0.463)	Non-Stationarity
REER_IND	4	0.538 (0.463)	Non-Stationarity
REER_MALD	4	0.082 (0.463)	Stationarity
REER_NEP	4	0.530 (0.463)	Non-Stationarity
REER_PAK	4	0.755 (0.463)	Non-Stationarity
REER_SL	4	0.500 (0.463)	Non-Stationarity

Source: Author's own calculations

KPSS tests are used for determining whether certain series is stationary or not; if the test statistic is lesser than its critical value then null hypothesis of stationarity fails to be rejected meaning the series is stationary implying PPP hypothesis holds true. As for Bhutan (REER_BHU), the test statistic is 0.359, lower than the critical value of 0.463 hence null-hypothesis cannot be rejected implying that REER_BHU is a stationary process. Similarly, Bangladesh (REER_BNG) has a test statistic of 0.405 which is also less than its critical value indicating stationarity. On the other hand, China (REER_CH) and India (REER_IND) have null-hypothesis rejecting test statistics of 0.527 and 0.538 respectively both greater than their critical values suggesting non-stationarity. With a value of 0.082, the Maldives (REER_MALD) is much lower than the critical value, hence the test indicates that it is stationary. In contrast, Nepal (REER_NEP), Pakistan (REER_PAK) and Sri Lanka (REER_SL) have test statistics that exceed the critical values in their respective cases, namely 0.530, 0.755 and 0.500. Hence, we reject the null hypothesis for these nations, implying that their REER series are non-stationary.

Table 3: Unit Root with Break Test (Intercept Only)

Variables	Lags	Break Date		Intercept only, test statistic (critical value at 5%)	
		IO*	AO*	Innovational outlier	Additive outlier
REER_BHU	7	2006	2006	-3.67(-4.44)	-3.73 (-4.44)
REER_BNG	7	2014	2008	-3.98 (-4.44)	-6.13 (-4.44)
REER_CH	7	2007	2007	-3.92 (-4.44)	-3.98 (-4.44)
REER_IND	7	2006	2006	-4.62 (-4.44)	-4.59 (-4.44)
REER_MALD	7	2011	2007	-3.29 (-4.44)	-3.96 (-4.44)
REER_NEP	7	2006	2009	-3.47 (-4.44)	-3.49 (-4.44)
REER_PAK	7	2007	2016	-2.30 (-4.44)	-1.16 (-4.44)
REER_SL	7	2010	2007	-3.47 (-4.44)	-3.47 (-4.44)

Source: Author's own calculations

This test assesses the presence of unit roots while accounting for structural breakdowns. For Bhutan (REER_BHU), with a break date of 2006, both the IO test statistic (-3.67) and AO test statistic (-3.73) are more than the critical value of -4.44, suggesting that we fail to reject the null hypothesis, implying non-stationarity despite the structural break. In Bangladesh (REER_BNG), the break dates are 2014 (IO) and 2008 (AO). The IO test statistic (-3.98) is more than the critical value, indicating non-stationarity, but the AO test statistic (-6.13) is less than the critical value, implying stationarity at the structural break. The break date for China (REER_CH) in this instance is 2007 and both test statistics (–3.92 IO and –3.98 AO respectively) surpass the critical value implying failure to reject null hypothesis suggesting non-stationarity post-break.

Meanwhile, India's (REER_IND) break date is in 2006 with both test statistics (–4.62 IO and –4.59 AO respectively) being lower than the critical value indicating that there is stationarity with structural breakage. For the Maldives (REER_MALD), this means two break dates; one being 2011 for (IO), while the other is

2007 for (AO). Therefore, both test statistics (-3.29IO, -3.96 AO) surpass the limit showing it is not stationary. In Nepal (REER_NEP), the break dates are 2006 (IO) and 2009 (AO) giving their score of both are greater than critical value (-3.47 IO, -3.49AO) by indicating non-stationarity despite structural breakage being evident through both symptoms exhibited currently.

Finally, Pakistan (REER_PAK) has break dates in 2007 (IO) and 2016 (AO) whose test statistics (-2.30 IO, -1.16 AO) also exceed those limits meaning that we accept this hypothesis hence declining stationarity. Similarly Sri Lanka (REER_SL) which has two moments out of 2010 (IO) for the first one but then support with 2007(AO) second concerning tests whose figures (-3.47 IO, -3.47AO) do not attain critical measuring thus indicating lack of stability even though they experience structural break altogether.

Table 4: Augmented Dickey-Fuller (ADF) Test Results with Intercept & Trend (Level)

Variables	Lags	With Intercept & Trend (Level) Test Statistic (Critical Value At 5%)	Results
REER_BHU	7	-2.206 (-3.563)	Non-Stationarity
REER_BNG	7	-1.670 (-3.563)	Non-Stationarity
REER_CH	7	-1.501 (-3.563)	Non-Stationarity
REER_IND	7	-2.318 (-3.588)	Non-Stationarity
REER_MALD	7	-1.767 (-3.588)	Non-Stationarity
REER_NEP	7	-2.009 (-3.588)	Non-Stationarity
REER_PAK	7	-4.086 (-3.563)	Stationarity
REER_SL	7	-3.305 (-3.588)	Non-Stationarity

Source: Author's own calculations

The ADF test was performed using both an intercept and a trend. This emphasizes on the fact that there is critical value which is -3.563, thus this suggest a conclusion of non-stationarity by failing to reject the null hypothesis in case of Bhutan (REER_BHU) with a test statistic equal to -2.206. Moreover, regarding Bangladesh (REER_BNG), a test statistic measuring -1.670 shows that it possesses a non-stationarity property because it surpasses its crucial value. Therefore, on China (REER_CH), the results tell that there exists a non-stationarity because its test statistic measuring -1.501 surpasses its critical value.

Besides, India's (REER_IND) test statistic measuring -2.318 surpasses its critical value of -3.588 indicating non-stationarity. The result in the Maldives (REER_MALD) is similar, with a test statistic of -1.767, indicating non-stationarity since we fail to reject the null hypothesis. Nepal's (REER_NEP) test statistic of -2.009 is greater than the critical value of -3.588, indicating non-stationarity. On the other hand, Pakistan (REER_PAK) has a test statistic of -4.086, which is less than the threshold value and leads to rejection of the null hypothesis thus indicating stationarity Finally, Sri Lanka (REER_SL) also has a test statistic at -3.305 which is greater than the threshold at -3.588 indicating that it is impossible to reject this hypothesis so it has non-stationary behavior.

Table 5: Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Test Results with Intercept & Trend

Variables	Bandwidth	With Intercept Only (Level) Test Statistic (Critical Value At 5%)	Results
REER_BHU	4	0.105 (0.146)	Stationarity
REER_BNG	4	0.179 (0.146)	Non-Stationarity
REER_CH	4	0.098 (0.146)	Stationarity
REER_IND	4	0.109 (0.146)	Stationarity
REER_MALD	4	0.072 (0.146)	Stationarity
REER_NEP	4	0.128 (0.146)	Stationarity
REER_PAK	4	0.055 (0.146)	Stationarity
REER_SL	4	0.499 (0.146)	Non-Stationarity

Source: Author's own calculations

The KPSS test, which takes into account both an intercept and a trend, yields the following results. For Bhutan (REER_BHU), the test statistic of 0.105 is less than the critical value of 0.146, indicating that we cannot reject the null hypothesis, implying stationarity. Nonetheless, in Bangladesh (REER_BNG), the test statistic being 0.179 has been found out to be higher than the critical value thus we reject our initial assumption; this shows lack of constancy in the system. For China (REER_CH), since its test statistic is 0.098 which is lower than the critical value then it indicates stability. In case of India (REER_IND) since its test statistic value is 0.109 below the critical threshold; it demonstrates stable condition. Likewise, when we look at Maldives (REER_MALD), it has got a test score of 0.072 which means that there is stationarity in it. Furthermore for Nepal (REER_NEP), its testing figure of 0.128 which is less than the critical point also points to constancy within it. Pakistan (REER_PAK) has a test statistic equal to 0.055 being lower than the defined limit thus depicting constant behavior. Lastly this paper looks at Sri Lanka where these conditions hold with a value equal to 0.499 underpinned by right critical number 0.146 implying instability since such numbers exceed stipulated margins.

Table 6: Unit Root with Break Test (Intercept & Trend)

Variables	Lags	Break Date		Intercept & Trend, test statistic (critical value at 5%)	
		IO*	AO*	Innovational outlier	Additive outlier
REER_BHU	7	2006	2006	-3.67(-4.44)	-3.73 (-4.44)
REER_BNG	7	2014	2008	-3.98 (-4.44)	-6.13 (-4.44)
REER_CH	7	2007	2007	-3.92 (-4.44)	-3.98 (-4.44)
REER_IND	7	2006	2006	-4.62 (-4.44)	-4.59 (-4.44)
REER_MALD	7	2011	2007	-3.29 (-4.44)	-3.96 (-4.44)
REER_NEP	7	2006	2009	-3.47 (-4.44)	-3.49 (-4.44)
REER_PAK	7	2007	2016	-2.30 (-4.44)	-1.16 (-4.44)
REER_SL	7	2010	2007	-3.47 (-4.44)	-3.47 (-4.44)

Source: Author's own calculations

This test accounts for structural breaks with both an intercept and a trend that results in the following outcomes. The test statistics for both the IO and AO in Bhutan (REER_BHU) are (-3.67 and -3.73) which are greater than the critical value of -4.44 suggesting that the null hypothesis cannot be rejected showing that there is non-stationarity although there was a structural break in 2006. In Bangladesh (REER_BNG), however; the IO test statistic (-3.98) surpasses the critical value thus indicating that it is non-stationary while AO test statistic (-6.13) is less than the critical value implying it's stationary when we consider its structural break (2008). China's (REER_CH) IO and AO test statistics (-3.92 and -3.98) are both more than the critical value, showing non-stationarity despite the structural rupture in 2007. For India (REER_IND), both test statistics (-4.62 and -4.59) are less than the critical value, indicating that we reject the null hypothesis and confirm stationarity after accounting for the break in 2006. In the Maldives (REER_MALD), both the IO and AO test statistics (-3.29 and -3.96) surpass the critical value, indicating non-stationarity despite the 2011 and 2007 breaks. Nepal's (REER_NEP) test results (-3.47 and -3.49) are likewise over the critical level, showing non-stationarity despite structural breakdowns in 2006 and 2009. In Pakistan (REER_PAK), the IO and AO values (-2.30 and -1.16) are both greater than the critical value which indicates non-stationarity in spite of interruptions in 2007 and 2016. Finally, Sri Lanka (REER_SL) has test statistics (-3.47) that are above the critical value, indicating non-stationarity in spite of structural breaks in 2010 and 2007.

5. CONCLUSION AND POLICY IMPLICATIONS

The unit root tests with structural breaks show that for Bhutan, China, Maldives, Nepal, Pakistan, and Sri Lanka, at 5% significance level null hypothesis of unit root can't be rejected for any model (IO or AO). This means that real exchange rates for these countries behave like random walks and thus do not conform

to the Purchasing Power Parity (PPP) hypothesis. However, in case of Bangladesh; from AO model the null hypothesis is rejected indicating stationarity which confirms PPP. For India; under both models null hypothesis gets rejected indicating stationarity thereby confirming PPP during entire sample period.

The results of the unit root tests with structural breaks clearly show that real exchange rates for Bhutan, China, the Maldives, Nepal, Pakistan, and Sri Lanka show a random walk behavior, suggesting that Purchasing Power Parity (PPP) deviations are erratic and persistent. The assertion that PPP may persist over time is however supported by unchanging real exchange rates in Bangladesh. On the other hand, stagnant real exchange rates in India is a factor that also supports PPP. In light of these findings, the policy makers of Bhutan, China, Maldives, Nepal, Pakistan and Sri Lanka are advised to initiate economic policies that will address structural issues affecting exchange rates as well seek to better stabilize currency movements. Meanwhile, for Bangladesh and India to strengthen the conditions for possible enduring PPP, they need to consider price stability and competitiveness enhancing measures. Therefore this will help ensure a more stable exchange rate booting international trade relations thereby enhancing its stability.

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Disability and Employment: Evidence from Pakistan

ABSTRACT

Employment provides financial stability, fosters personal development, and enhances overall well-being. Various factors, such as level of education, skills, gender, and others, have been identified as critical determinants of an individual's employability. This study investigates the impact of disability on employment outcomes, utilizing data from the Labor Force Survey (LFS) 2020-21.The analysis reveals that a higher proportion of disabled individuals in rural areas are employed compared to their counterparts in urban regions. Gender-wise analysis shows that the proportion of employed disabled males relative to unemployed males is significantly higher than the corresponding proportion for disabled females. Using a logit model, the results indicate that disability significantly reduces the likelihood of employment. However, positive and significant impacts are observed for vocational training, educational attainment, and being the head of a household. Additionally, provincial disparities are evident, with individuals in Balochistan being less likely to be employed compared to those in Punjab, Sindh, and KPK. The study offers policy recommendations to overcome the employment gap for disabled people in Pakistan, focusing on the significance of targeted interventions to overcome regional differences, educational initiatives, and vocational training.

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1. INTRODUCTION

Employment plays an important role in personal development, well-being, and financial stability. It enables individuals to support their families to meet their needs of necessities like food, healthcare, education and housing. It also enables individuals to make contributions to their retirement fund which guarantees financial security after retirement. Moreover, employment promotes career and personal development, provides opportunities for continues learning and promotes the social networks, cooperation, and a sense of belonging. A better quality of life, self-image, and mental health can result from pursuing professional and personal goals through work (Hussain et al., 2016) and a feeling of contentment and fulfillment can result from doing a meaningful job.

A variety of socioeconomic, demographic, and regional factors influence a person's decision to enter the labor market, based on his assessment of the expected benefits of working versus not working. Disability is a major factor among these, that hindering participation in the labor force and decreasing the chances of finding and keeping a job. Disability reduces the likelihood of educational attainment, professional training, productivity, all of which exacerbate labor force participation and employment. Disability is a wide concept encompassing a variety of elements, such as limitations in activities, participation restrictions, and impairments.

The 2030 Agenda for Sustainable Development emphasizes the importance of inclusive employment policies around the globe. According to Sustainable Development Goal (SDG) Target 8.5, all people, including those with disabilities, should have full and productive employment. The right of persons with disabilities to work on an equal basis with others is enshrined in Article 27 of the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD), which places a strong emphasis on access to accessible work environments and an inclusive labor market.

As a part of these international agreements, governments around the world are working together to integrate person with disabilities into society in all its facets. Pakistan has also made important steps to encourage the inclusion of disables and has committed to eradicate poverty and hunger by 2030 after ratifying the UNCRPD in 2011 and approving the SDGs. All Pakistani citizens, including persons with disabilities, are guaranteed social and economic well-being under the constitution. Article 38 (d) requires the State to provide basic necessities such as food, clothing, education, and shelter to citizens who cannot support themselves due to disability, illness, or unemployment, without discrimination based on their gender, caste, religion, or ethnicity. This constitutional provision lays the foundation for protection of human rights and upholding social justice for people with disabilities. In order to enhance employment possibilities and rehabilitation services, the Disabled Persons' Ordinance of 1981 introduced a mandatory one percent, later raised to two percent, employment quota for disables in both the public and private sectors. Additionally, the law penalizes organizations—including levying additional taxes—for not meeting these quotas.

Following the 18th Amendment to the Constitution of Pakistan, the provinces are given responsibility to look after issues related to persons with disability. The primary reporting agency for the Convention on the Rights of Persons with Disabilities' implementation is the Ministry of Human Rights, working with relevant Federal and Provincial Departments. As a result, provinces have implemented legislation consistent with international commitments, including the Punjab Disabled Persons' (Employment and Rehabilitation) Amendment Act (2015), the Baluchistan Persons with Disabilities Act (2017), the Sindh Empowerment of Persons with Disabilities Act (2018), the ICT Rights of Persons with Disability Act (2020), and the Gilgit-Baltistan Persons with Disabilities Act (2019). This highlights the dedication of Pakistan's to uphold the rights of disable persons across civil, political, social, and economic domains (Khalid & Yaseen, 2023).

Despite these initiatives, individuals with disabilities in Pakistan continue to confront major barriers to access equitable employment opportunities. According to Pakistan Bureau of Statistics (2023), 3.1% of the population reported disability and 9.64% reported experiencing functional limitations. They are underrepresented in the labor market and are more likely to be unemployed, hold low-paying occupations, and have limited chances for professional development (Wahab & Ayub, 2017). This marginalized group is highly vulnerable and deserves increased rights, access to justice, economic opportunities, and better living standards. The dearth of targeted educational and vocational training programs compounds their disadvantage. Handling these issues is both a matter of social justice and an economic imperative. Global GDP could be increased by 3% to 7% if employment rate for disables is raised to the level of those without disability (Buckup, 2009).

This study aims to investigate the employment status of persons with disabilities in Pakistan. The study also aims to examine the impacts of disability on employment of individuals along with other socio-economic, demographic and geographic variables. A limited empirical work, related to disability and employment, has been done so for in Pakistan. The current study fills this gap by investigation the impact of disability on employment in Pakistan. The study employs a logit model to identify factors determine employment by utilizing data from the Labor Force Survey 2020–21 and provides guidance to policymakers on how to increase inclusion and empowerment of the persons with disabilities.

2. LITERATURE REVIEW

A plethora of the researches have examined the relationship between disability and employment outcomes and have found that regardless of different definitions and methodologies disability significantly reduces both employment rates and earnings (Jones, 2008). Insufficient legal frameworks, hurdles in workplaces, a lack of targeted interventions, and the complexity of the work environment are the challenges that disabled individuals often face (Vornholt et al., 2018; Jurado-Caraballo et al., 2022).

Stern (1989) found that different measures of disability significantly impact labor force participation. Comparative studies highlight lower employment rates and earnings for disabled individuals in the UK and Germany (Kidd et al., 2000; Lechner & Vazquez-Alvarez, 2003). In Australia, Wilkins (2004) demonstrated that the negative impact of disability on labor force participation intensifies with the severity of the disability and is more pronounced among those with multiple impairments or those who develop disabilities later in life. Jensen et al. (2005) observed that all six types of disabilities negatively affect employment, although hearing disabilities have a relatively smaller impact. In India, employment among individuals with disabilities is influenced more by personal and household characteristics than by human capital factors (Mitra & Sambamoorthi, 2006). Similarly, Mitra (2008) identified that disability grant programs in South Africa reduced labor force participation among disabled individuals. Hogan et al. (2012) explored in Australia that gender, age, education and accommodations at workplace had important roles on the employment status of disabled persons.

Besides above, studies related to other countries also reveal important insights. Addabbo and Sarti (2016) found that investment in the education of persons with disabilities significantly increases their chances of employment in Italy. In Indonesia, inadequate infrastructure, scarce educational facilities, and a lack of relevant skills are substantial barriers to labor market entry for disabled persons (Alin et al., 2015). In the U.S., Webber and Bjelland (2015) observed that work-limiting disabilities reduced labor productivity by 3% and 2% for men and women, respectively. Barnay et al. (2015) found that in France, disability significantly affects private-sector employment but has no notable impact on public-sector employment within five years of disability onset. Education emerges as a facilitating factor for labor force participation for both disabled and non-disabled individuals in Norway (Bliksvaer, 2018). Caron (2021) found that

disability in Indonesia not only reduces employment rates but also leads to lower wages, exacerbating poverty and income inequality. Even after controlling for variables such as age, marital status, and education, disabled individuals in Lebanon have a lower likelihood of participating in the labor force (Boutros & Fakih, 2023).

Research on disability in Pakistan primarily addresses demographic patterns, policy challenges, and socio-economic barriers. Early studies such as Afzal (1992) provided a demographic analysis of disability patterns, highlighting inconsistencies in data collection. Ahmed (1993) identified a higher prevalence of disability among women and in rural populations compared to men and urban populations. Arsh et al. (2019) found that the number of disabled individuals employed in government departments in Khyber Pakhtunkhwa (KPK) remains significantly lower than their non-disabled counterparts, with many departments failing to adhere to the mandated 2% job quota for disabled individuals. Similarly, Fazeelat et al. (2020) revealed that prejudicial attitudes, familial and employer discrimination, and transportation challenges limit the labor market participation of disabled individuals. According to Khalid et al. (2022) inadequate infrastructure, lack of vocational training, weak execution of policies, and negative attitudes of the employers are the main obstacles to employment for persons with disabilities in Pakistan. Ayub and Babar (2022) emphasized that concerns regarding productivity, safety, coworker acceptance, work performance, accommodation, and a lack of requisite job skills negatively influence the labor force participation of disabled individuals.

Although the existing literature provides valuable insights into the challenges faced by disabled individuals, most studies focus on policy frameworks, employment challenges, education, and social protection programs. Limited empirical research has analyzed the direct impact of disability on employment in Pakistan. This study seeks to address this gap by examining the effects of disability on employment outcomes, along with other socio-economic, demographic, and geographic variables, using data from the Labor Force Survey (LFS 2020-21). This will help to provide recommendations based on evidence in order to increase the opportunities of employment and reduce barriers for disabled persons in Pakistan.

3. THEORETICAL FRAME WORK AND METHODOLOGY

According to International Classification of Functioning, Disability, and Health (ICF) disability is the outcome of a health condition that causes impairments, leading to limitations in activities and participation. It categories functioning and disability as multidimensional concepts where functioning includes structures and functions of the body, activities, and participation; and disability refers to impairments, limitations on activity, and restrictions on participation. In order to understand labor force participation decisions of the individuals, the Rational Choice Theory provides a robust framework. The theory assumes that individuals act rationally to achieve their goals and maximize benefits subject to constraints. The needs and goals that shape preferences affect their decisions where decision-making occurs within specified constraints.

Along with disability, the Rational Choice Theory also rationalizes the inclusion of gender, age, education, region, and marital as factors affecting decision making. Disability is negatively related to educational attainment and labor force participation rates and increases unemployment (Greve, 2009). Disabled individuals face systemic disadvantages, including reduced access to paid employment, when compared to their non-disabled counterparts (Coleman et al., 2013).

Gender is another factor that could influence the participation of individuals in the labor force (Boutros & Fakih, 2023). Historical barriers and gender norms limit the women's participation rates and job choices. The rate of unemployment among females exceeds males partly due to their tendency to remain out of

work for longer periods. This is often a result of their household responsibilities, such as raising children, as well as potential personal traits and prejudice. Additionally, some employers may discriminate against females based on the nature of the work.

Age is a crucial factor, with younger individuals entering the workforce upon completing education, while older individuals may reduce participation due to retirement. Age serves as an indicator of the life stage when individuals are more prone to actively engage in the workforce, reflecting their capacity for work-related activities. To capture non-linear relationship of the age and actively participating in labor market we introduce the Age square variable in our model. Squaring the age variable enables us to encapsulate situations in which the impact of age on an outcome either diminishes or accelerates as individual's age increases.

Being head of household can influence the decision of labor force participation as head of a household places considerable pressure on the household leader to meet the financial requirements of its members, consequently increasing the probability of actively engaging in the labor force (Hussain, et al. 2016). Moreover, marital status also influences labor force participation, as married individuals may have different financial support structures impacting their decisions to participate in the workforce compared to single individuals. It is assumed that married individuals tend to participate more actively in the labor force. This assumption stems from the significance of the relationship between respondents' characteristics and their familial associations (Boutros& Faikh, 2023; Zamo-Akono, 2013). Higher levels of education typically correlate with the increased labor force participation as educated individuals often possess skills that are in demand and have better access to job opportunities. Vocational training can enhance employability, contributing to labor force participation by equipping individuals with industry-relevant skills.

Regional factors such as job availability and economic development also affect labor force participation rates, with individuals in more economically developed regions often having better access to employment opportunities. The inclusion of this variable in our study is indispensable, considering the profound connection between location and employment opportunities (Zamo-akono, 2013). Urban areas, for instance, often present a myriad of employment prospects. However, in developing country due to dominance role of the agriculture sector, rural areas provide more opportunities of employment.

Based on the above discussion our general mathematical equation takes the form:

$$Y_i = f(DA_i, EDU_i, GEN_i, MS_i, HH_i, VT_i, \ AGE_i, AGS_i, R_i, Provinces) \quad (1)$$

Where "Y_i" is dependent variable showing the labor force participation of an i^{th} individual and "DA_i" shows his/her disability status. EDU_i, GEN_i, MS_i, R_i, HH_i, $VT_i AG_i$, and AGS_i are level of education, gender, Marital Status, Location, head of household, Vocational training, Age, and Age square of an i^{th} individual. In stochastic form equation (1) can be written as:

$$Y_i = \beta_0 + \beta_1 DA_i + \beta_2 EDU_i + \beta_3 GEN_i + \beta_4 MS_i + \beta_5 R_i + \beta_6 HH_i + \beta_7 VT_i + \beta_8 AGE_i + \beta_9 AGS_i + \beta_{10} P_P + \beta_{11} P_S + \beta_{12} P_B + u_i \quad (2)$$

In equation (2), dependent variable is a binary. Therefore, we will use logistic regression for estimation. The probability that an i^{th} individual is employed is given as:

$$\text{Prob}(Y_i = 1) = e^{zi}/(1 + e^{zi}) = P_i \quad (3)$$

and the probability that an i^{th} individual is not employed is:

$$\text{Prob}(Y_i = 0) = e^{-zi}/(1 + e^{-zi}) = 1 - P_i \quad (4)$$

Dividing (3) by (4) we get the odd ratio in favor of being employed as:

$$\frac{P_i}{1-P_i} = \frac{\frac{e^{zi}}{1+e^{zi}}}{\frac{e^{-zi}}{1+e^{-zi}}} = e^{zi} \tag{5}$$

Take log on both sides to linearize equation (5) and get log-odd ratio:

$$l_i = ln\left(\frac{P_i}{1-P_i}\right) = Z_i \tag{6}$$

$$Z_i = \beta_0 + \beta_1 DA_i + \beta_2 EDU_i + \beta_3 GEN_i + \beta_4 MS_i + \beta_5 R_i + \beta_6 HH_i + \beta_7 VT_i + \beta_8 AGE_i + \beta_9 AGS_i + \beta_{10} P_P + \beta_{11} P_S + \beta_{12} P_B + u_i \tag{7}$$

Putting values of Z_i in equation (6), our final stochastic equation is:

$$l_i = \ln\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \beta_1 DA_i + \beta_2 EDU_i + \beta_3 GEN_i + \beta_4 MS_i + \beta_5 R_i + \beta_6 HH_i + \beta_7 VT_i + \beta_8 AGE_i + \beta_9 AGS_i + \beta_{10} P_P + \beta_{11} P_S + \beta_{12} P_B + u_i \tag{8}$$

4. DATA SOURCE AND VARIABLE CONSTRUCTION

The study seeks to examine the impact of disability status, along with various socio-demographic factors, on an individual's employment status. For the empirical analysis, data from the Labor Force Survey (LFS 2020-21) is utilized. The LFS is a nationally representative dataset that provides detailed micro-level information on variables central to our model. Notably, the 36th round of the survey includes a new module on disability, offering unique insights into this dimension. To ensure clarity, conciseness, and reliability in the analysis, certain restrictions have been applied to the data. Individuals currently enrolled in educational institutions are excluded from the sample, as their employment patterns may differ significantly from the general population. Additionally, the study focuses on individuals aged 15 to 65, excluding those below 15 years of age (who are likely to be students) and those above 65 years (who are more likely to be retired or inactive in the labor market). After applying these restrictions, the final dataset consists of 291,479 individuals**.** A detailed description of the variables used in the study is provided in Table 1.

Table 1: Descriptions of Variables

Variable	Type	Description
Employment (Y)	Categorical	Y = 1 if an individual is employed[1], = 0 otherwise
Disability (DA)	Categorical	DA = 1 if an individual is Disable[2], = 0 otherwise
Level of Education (EDU)	Continuous	Years of Schooling
Gender (GEN)	Categorical	Gender = 1 if Male, = 0 otherwise
Marital Status (MS)	Categorical	MS =1 if married, = 0 otherwise
Region (R)	Categorical	R = 1 if rural region, = 0 otherwise
Age (AGE)	Continuous	Complete years between 15 and 65
Vocational Training (VT)	Categorical	VT = 1 if vocational training, = 0 otherwise
Head of household (HH)	Categorical	HH= 1 if head of household, = 0 otherwise
Province	Categorical	PP = 1 if Punjab, = 0 otherwise PS = 1 if Sindh, = 0 otherwise PB = 1 if Balochistan, = 0 otherwise KPK is the base category

[1]"Employed" includes both "Self-employ" and "Regular Paid-employ".

[2]Questions about six distinct disabilities, vision, hearing, mobility, memory and concentration, personal care, and comprehension of communication are asked in the survey. An individual is categorized as "Disable" if he/she reports any form of disability.

5. RESULTS AND DISCUSSION

Empirical analysis comprises on descriptive statistics and regression analysis. Table 2 illustrates the difference in employment status of disable and non-disable individuals across provinces, regions, marital status, head of household, vocational training, gender etc.

Table 2: Employment Status of Disabled and Non-Disabled Individuals

Variables	**Categories**	**Not Disabled**		**Disabled**	
		Employed	**Unemployed**	**Employed**	**Unemployed**
Province	KPK	40.06%	59.94%	28.18%	71.82%
		(*20,915*)	(*31,297*)	(*1,248*)	(*3,181*)
	Punjab	46.19%	53.81%	35.13%	64.87%
		(*53,478*)	(*62,301*)	(*3,999*)	(*7,385*)
	Sindh	45.85%	54.15%	32.07%	67.93%
		(*30,419*)	(*35,923*)	(*1,561*)	(*3,306*)
	Balochistan	40.52%	59.48%	37.27%	62.73%
		(*14,148*)	(*20,767*)	(*578*)	(*973*)
Region	Urban	45.47%	54.53%	29.60%	70.40%
		(*31,953*)	(*38,314)*	(*1,677*)	(*3,988*)
	Rural	43.73%	56.27%	34.46%	65.54%
		(*87,007*)	(*111,974*)	(*5,709*)	(*10,857*)
Gender	Male	79.96%	20.04%	58.23%	41.77%
		(*105,032*)	(*26,323*)	(*6,681*)	(*4,793*)
	Female	10.10%	89.90%	6.55%	93.45%
		(*13,928*)	(*123,965*)	(*705*)	(*10,052)*
Marital Status	Married	45.83%	54.17%	34.99%	65.01%
		(*94,929*)	(*112,205*)	(*6,635*)	(*12,325*)
	Un-Married	38.69%	61.31%	22.96%	77.04%
		(*24,031*)	(*38,083*)	(*751*)	(*2,520*)
Vocational Training	Yes	54.45%	45.55%	48.72%	51.28%
		(*15,384*)	(*12,869*)	(*853*)	(*898*)
	No	42.98%	57.02%	31.90%	68.10%
		(*103,576*)	(*137,419*)	(*6,533*)	(*13,974*)
Head of household	Yes	89.40%	10.60%	64.61%	35.39%
		(*72,933*)	(*8,645*)	(*5,645*)	(*3,092*)
	No	24.53%	75.47%	12.90%	87.10%
		(46,027)	(*141,643*)	(*1,741*)	(*11,753*)

Note: Figures in parenthesis are absolute number of individuals in different categories

The data reveals that individuals with disabilities have significantly lower employment rates compared to non-disabled individuals, highlighting the substantial impact of disability on labor force participation. The most pronounced disparity in labor force participation between disabled and non-disabled individuals is observed in Khyber Pakhtunkhwa (KPK). Among disabled individuals, the highest employment rate is found in Balochistan (37.27%), followed by Punjab (35.13%), Sindh (32.07%), and KPK (28.18%)[3]. Employment rates also vary by region, with 34.46% of disabled individuals employed in rural areas, compared to only 29.60% in urban areas. A notable gender disparity is evident, as 93.45% of disabled females are unemployed, compared to 41.77% of disabled males, underscoring the significant barriers faced by women with disabilities in accessing employment opportunities. Tailored interventions are

[3] However, the percentage of disabled employed out of total labor force is the highest in Punjab (3.15%), followed by KPK (2.20%), Sindh (2.19%), and Balochistan (1.59%).

essential to address these disparities, particularly for disabled women, who face compounded challenges in the labor market.

In addition, the data shows that employment rates are higher among disabled individuals who have received vocational training, are married, or are heads of their households, compared to those without vocational training, unmarried, or not serving as heads of households. This highlights the importance of factors such as skills development, marital status, and household responsibilities in shaping employment outcomes for disabled individuals.

The sector, status, and occupation wise employment distribution of disabled individuals is presented below in Table 3.

Table 3: Sector, Status, and Occupation Wise Employment Distribution of Disabled Persons

Employment Sector	Public	02.35%
	Private	97.65%
Employment status	Regular Employees	12.10%
	Self- Employees	87.90%
Occupations	Managers	01.76%
	Professionals	03.67%
	Technicians and Associate professionals	02.54%
	Clerical support workers	00.87%
	Service and sales workers	14.26%
	Skilled agricultural, forestry and fishery workers	47.43%
	Craft and related trades workers	10.15%
	Plant and machine operators, and assemblers	05.36%
	Elementary occupations	13.97%

A significant majority of employed individuals with disabilities are engaged in the private sector (97.65%), with only a small proportion working in the public sector (2.35%). Majority (87.90%) are self-employed, while a smaller share (12.10%) is engaged as regular paid employees. Occupational distribution indicates that most disabled individuals are employed in low-status occupations, such as elementary jobs, agricultural work, and sales workers. Conversely, only 7.97% of employed disabled individuals are found in high-status occupations, including managers, professionals, and technical or associate professionals. This highlights the significant barriers faced by disabled individuals in accessing higher-status and more secure employment opportunities.

The results of the logit model estimation in Table 4 provide key insights into the determinants of employment in Pakistan. The coefficient for disability (-0.867) indicates that disability significantly reduces the log-odds of being employed. This aligns with Zamo-Akono (2013), highlighting the obstacles that functional limitations pose to labor market participation. The negative impact is stronger in urban areas (-0.980) than in rural areas (-0.831), reflecting additional challenges in urban labor markets, such as higher competition and structural barriers for disabled individuals.

Gender has a significant positive effect on employment, with the coefficient of 3.1 for males indicating they are much more likely to be employed compared to females. This disparity is consistent across rural and urban areas, though the effect is somewhat weaker among disabled individuals (2.396) compared to non-disabled individuals (3.136). These findings corroborate the work of Hussain et al. (2016) and Boutros and Fakih (2023), reflecting persistent gender-based barriers in accessing employment opportunities, particularly for women with disabilities.

The positive coefficient for age (0.224) and the negative coefficient for age squared (-0.0023) suggest a non-linear relationship between age and employment. Employment likelihood increases with age but peaks at a certain threshold, after which it declines, consistent with life-cycle theories of labor market participation[4]. Younger individuals are still integrating into the labor market, while older individuals may exit due to retirement or health issues. This pattern aligns with findings by (Hussain et al., 2016; Boutros & Fakih, 2023).

Table 4: Results of Logit Model (Dependent Variable: Employment)

Variables	Overall	Rural	Urban	Disabled	Non-Disabled
Disability	-0.867*	-0.831*	-0.980*	-	-
	(0.023)	(0.026)	(0.045)		
Gender	3.100*	3.014*	3.374*	2.396*	3.136*
	(0.014)	(0.016)	(0.030)	(0.057)	(0.014
Age	0.224*	0.210*	0.253*	0.186*	0.225*
	(0.003)	(0.003)	(0.006)	(0.010)	(0.003)
Age squared	-0.0023*	-0.002*	-0.003*	-0.002*	-0.003*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Head of household	1.811*	1.840*	1.734*	1.468*	1.860*
	(0.016)	(0.019)	(0.035)	(0.053)	(0.017)
Marital status	0.009	0.079*	-0.128*	0.699*	-0.140*
	(0.018)	(0.021)	(0.038)	(0.083)	(0.019)
Education	0.018*	0.017*	0.024*	0.037*	0.015*
	(0.001)	(0.002)	(0.003)	(0.007)	(0.002)
Vocational Training	0.536*	0.543*	0.514*	0.552*	0.533*
	(0.018)	(0.021)	(0.037)	(0.068)	(0.019)
Rural	0.182*	-	-	0.524*	0.152*
	(0.013)			(0.046)	(0.014)
Punjab	0.337*	0.337*	0.382*	0.263*	0.347*
	(0.015)	(0.016)	(0.040)	(0.051)	(0.016)
Sindh	0.285*	0.283*	0.362*	0.358*	0.277*
	(0.017)	(0.020)	(0.041)	(0.061)	(0.018)
Balochistan	-0.235*	-0.275*	0.039*	0.269*	-0.264*
	(0.020)	(0.022)	(0.054)	(0.082)	(0.021)
Constant	-6.908*	-6.143*	-7.027*	-6.636*	-6.524*
	(0.055)	(0.060)	(0.116)	(0.218)	(0.059)

Note: *p < 0.01, **p < 0.05, and *** p < 0.1 standard error are in parentheses

Being the head of a household significantly increases the log-odds of being employed as shown by the positive coefficient. This reflects the financial responsibility associated with household leadership in Pakistan, where heads of households are expected to manage expenses and support their families. This finding is consistent with Hussain et al. (2016).

The coefficient for marital status is insignificant in overall Pakistan data, but disaggregated results reveal interesting patterns. In rural areas, being married increases the likelihood of employment, likely due to early marriages and the associated sense of financial responsibility to support their family. Conversely, in urban areas, marriage appears to reduce employment likelihood, possibly reflecting shifting societal norms, such as urban married women opting out of the workforce. Among disabled individuals, contrary

[4] The threshold age for overall Pakistan is 48.7 years, for rural, urban, disabled and non-disabled samples are 52.5 years, 42.17years, 46.5years, and 37.5 years, respectively.

to the findings of Boutros and Fakih (2023), marriage increases employment likelihood, potentially due to increasing trend of participation by the disables alongside their partners to attain more sophisticated and upscale lifestyle - a feat that might be deemed challenging without their joint involvement in the workforce.

Education has a positive impact on employment, with a stronger effect for disabled individuals (0.037) compared to non-disabled individuals (0.015). This aligns with Addabbo and Sarti (2016) and Bliksvaer (2018), emphasizing education's role in enhancing human capital and employability. Similarly, vocational training significantly boosts employment prospects, with a larger impact for disabled individuals. These results highlight the critical role of human capital development, especially for marginalized groups, in improving labor market outcomes.

Residing in rural areas increases employment likelihood, likely due to the dominance of the agriculture sector in Pakistan's economy. However, urban areas in Punjab and Sindh offer better employment prospects compared to rural regions, likely reflecting greater industrialization and economic activity. Moreover, compared to urban (rural) KPK the chance of individual to be employed is higher (lower) in urban (rural) Balochistan.

Provincial analysis reveals that individuals in Punjab and Sindh have a higher likelihood of employment compared to those in KPK and Balochistan. Urban areas in these provinces offer relatively better opportunities. Notably, individuals in urban Balochistan have higher employment chances than their rural counterparts, which may be attributed to localized development initiatives.

6. CONCLUSION AND POLICY IMPLICATIONS

The study analyzed the impact of disability and other socio-demographic factors on employment in Pakistan using data from the Labor Force Survey 2020-21. The findings provide valuable insights into the barriers faced by disabled individuals in accessing employment opportunities and the broader implications for labor market efficiency. Besides being a humanitarian issue, the exclusion of persons with disability from the workforce is also an inefficient allocation of financial and human resources that decreases economic productivity.

The results of the logit model show that disability significantly lowers the chance of employment, mainly due to functional limitations that hinder participation in the labor market. Moreover, results also reveal gender disparities. Females, particularly those with disability, face significantly smaller chance of employment prospects due to societal norms, household responsibilities, and limited access to opportunities. Additionally, male are more likely to participate in labor market due to their more physical strength compared with female. The human capital development variable including education and vocational training were found as key determinants of employment. The chance of employment was found to be larger in the rural region may be due to agricultural sector opportunities. Similarly disparities among the provinces were also were observed.

To cope with the challenges and issues related to the employment persons with disabilities and thereby enhance inclusive growth, the following policy measures are recommended:

- Encourage collaborations among government, private, and non-governmental sectors to establish comprehensive pathways for persons with disabilities. These collaborations should emphasis on providing smooth transitions through education, training, and career opportunities across different life stages.
- Update the Special Education Needs (SEN) system to make sure that it is in line with the mainstream curricula and promote equal intellectual development of disables. By removing the

physical, attitudinal, and systemic obstacles the mainstream education systems can be strengthen to accommodate persons with disabilities.

- For persons with disabilities the opportunities of education and training often mismatch to the demands of labor market. Skill gaps hinder their employability, as employers perceive them as under qualified. Develop curricula and training programs relevant to the demands of labor market. Invest in skills development programs to address employer concerns about under qualification among disabled job seekers.
- Enhance enforcement measures, such as fines for non-compliance and rewards for organizations that meet or exceed quota requirements of employment and education for individuals with disabilities.
- Develop programs specifically designed to empower women with disabilities to deal with their intersectional challenges through financial literacy, entrepreneurship training, and skill development.
- Develop tailored policies to address regional disparities in employment opportunities. For instance, encourage small-scale entrepreneurship in underdeveloped regions like Balochistan and KPK and promote employment opportunities, other than agricultural, in rural areas.

Properly implementing these policies can create an inclusive labor market that will uphold the rights of persons with disabilities and will harnesses their potential to contribute to economic growth and social development.

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Impact of Agriculture Technology Adoption on Productivity and Efficiency: Primary Panel Data Analysis

ABSTRACT

Agricultural technologies have been promoted by the government to increase productivity and efficiency. However, adoption of new technology is very low because of lack of knowledge and awareness. The study estimates the impact of agriculture technology adoption on productivity and efficiency. The current study uses primary panel data of base year (2006-07) and end year (2018-19). Further, it has also explored the socioeconomic indicators responsible for productivity and efficiency in the area. A propensity score matching approach has been used to identify the factors responsible for productivity and efficiency. The ordinary least square (OLS) and frontier production functions are used to estimate parameters of agriculture technologies. The seven technologies have significant impact on various levels and positively affect productivity in the area. The positive factors influencing efficiency are farmers age, education of farmer and farmer operational area while during 2018-19, the factors increase technical efficiency are family size, household family member employment, livestock ownership and operational area respectively. The study recommends some policy implementation that improves the technological adoption to increase productivity and efficiency in the region.

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1. INTRODUCTION

Agriculture sector growth is an important sector in fostering economic development and feeding the growing population specific to developing countries. The previous studies show that area expansion and irrigation have already become a minimal source of output growth at a world level. The agriculture sector's growth depends on new and improved technologies adoption. Empirical findings indicate that the advantages of modern agricultural technology benefit the poor both directly by increasing farm households' earnings and indirectly through expanding employment options with rising wages (Nguezet et al., 2011).

Productivity is the combination of output to input (ratio of output to input). At its most central level, productivity measures the amount produced by a target group at a given set of resources and inputs. Productivity may be measured as a single entity or group of farms at any geographical location. Micro-based actions are required for the comparison of productivity between farms. Productivity is taken as a measure of performance. It is defined as the ratio of outputs to inputs. The ratio shows the performance level. Productivity is considered an economic concept because it measures the amount of output produced from available resources. It also indicates a good measure of sustainability over time (OECD, 2001).

In keeping with international initiatives like the 2030 agenda for sustainable development, several nations have implemented programmes to increase agricultural output. Where this sector is a significant economic sector, the agriculture sector is of highest concern. Because it successfully reduces poverty through improved food security and higher farmer income, increasing agriculture production is crucial. According to empirical studies, this will eradicate hunger. In order to embrace and enhance production techniques and technologies, productivity can be increased. Agriculture productivity measurement dates back to the traditional theory of economic growth and is not a recent development. Various scholars' most significant contribution is to improve our understanding, measurement, and analysis of agricultural productivity (Solow, 1957).

Most developing nations must make increasing overall production and productivity a top priority in their policies; it is not a choice. It is possible to increase output and productivity in two different ways. The first is accomplished by improved input utilization and/or technology advance at the level of input. Enhancing the effectiveness of producers or businesses that have shown a fixed level of inputs and technologies is the second strategy to increase productivity. Research on efficiency assessment is still important, especially in developing nations where resources are limited and possibilities to advance their economies by creating or using superior technologies are disappearing. The most common economics concept is efficiency (Tadesse et al., 1997).

The current study’s primary objective is to assess how adopting new agricultural technologies affects production and efficiency. Adoption of agricultural technology is essential for increasing production and efficiency. In order to determine how these technologies, contribute to productivity and what factors affect efficiency levels in the Faisalabad district, Punjab (Pakistan) by using seven technologies. The objective of the current study is the evaluation of agricultural technologies and associated factors. It also explores the factors responsible for boosting technological efficiency.

The main objectives of this study are:

- To examine the role of agriculture technology adoption on productivity and efficiency in the area for both periods (2006-07, 2018-19).
- To explore socioeconomic and other factors responsible for technical efficiency in the area for both periods (2006-07, 2018-19) and to assess the change during the study period.

Based upon the study's research as mentioned above questions and objectives, the following hypotheses are formulated for the present essay.

- H_1: Agriculture Technologies Adoption is responsible for agriculture productivity in the district Faisalabad, Punjab, Pakistan.
- H_2: Agriculture Technologies Adoption has the same impact for both periods; base period 2006-07 and end period 2018-19.
- H_3: The socioeconomic, demographic, and assets variables are influencing factors of technical efficiency in the Faisalabad district, Punjab (Pakistan)

The empirical studies conducted in developed and developing countries to investigate the factors responsible for productivity and efficiency. The previous studies used production, cost, etc., functions to determine factors responsible for productivity and identify efficiency factors. A few or no studies were conducted to assess the impact of technological adoption on productivity by using panel primary data. The current study fills this gap by using seven various technologies' adoption roles in productivity, and further investigated factors accountable for efficiency in the area.

Additionally, the previous studies used cross-sectional data for one year or secondary data to assess the productivity and efficiency factors. But the current study identifies the technology adoption role in productivity and efficiency factors by using micro panel data collected from field surveys (farmer interviews) from the district for two time periods (2006-07 base period & 2018-19 end line period). A separate analysis has been done for a comparative analysis of both periods.

So, the current study has an outstanding contribution to literature and future policy option to assess the technology adoption role in productivity and efficiency. The study opens a new horizon to evaluate the province, Punjab, to conduct investigations in a broader perspective by using more than two time periods to assess the actual change of this technology adoption for future policy analysis.

2. LITERATURE REVIEW

Improved agriculture technology adoption can increase productivity, farmer income, and food security issues. There is an expanding trend of literature review considering the impact evaluation of agriculture technology on productivity.

The study finds the impact of technology adoption on productivity for Bangladesh during 2015 by taking data from rice-growing farmers. The results show that farmers have used a high level of technology in seed variety and irrigation technology, medium level in land preparation, pest management, and fertilizer usage during the low level in weeding and harvesting. Education and landholding have a significant positive impact on technology adoption and productivity (Khatun & Haider, 2016).

The study has focused on Asian countries to cater to food security in the region by considering rice crops in Bangladesh. The study also highlights the share of rice in Asian economies and household food consumption reducing over time. Rice is the largest basis of calories for a significant majority of poor consumers. A strategy has been presented at the international forum for price control and sustainability over time (Timmer, 2010).

The study examines and evaluates the productivity development in French agriculture from 2002 to 2015 by taking into account total factor productivity as well as changes in technology and efficiency. Field crop farms, dairy farms, beef farms, sheep and goat farms, and mixed farms are the five forms of farming. The study assessed technological change and efficiency by using various factors. The most productive factor is cropping farm (Adom & Adams, 2020).

The study examines the productivity change in five different forms of farming in France between the years of 2002 and 2015: field crop farms, dairy farms, beef farms, sheep and goat farms, and mixed farms. The study also assessed TFP change, together with its technical and efficiency components, as well as additional efficiency change components, for each of the five sub-samples. In order to compare technological evolution, Fare Primont has also been used as a meta-frontier framework. TFP advancement was seen in all forms of farming. The technology used by field crop farms is the most productive of all the agricultural types, according to the meta frontier study (Dakpo et al., 2019).

The low production and productivity are due to inefficient application of modern farm technologies. Adoption and efficient use of improved farm inputs are required to reduce food security. 231 samples are used in the study. The stochastic frontier, Cobb-Douglas production function and logistic approach used to determine the effects of adopting better farm inputs. The outcome demonstrates that yield is favorably and considerably impacted by the amount of land, labour, seed, chemical fertilizer, and oxen allocated. According to the logit model, market distance and crop diversity have a negative impact on the likelihood of adopting improved inputs, while extension service, information access, and cooperative membership have a positive impact (Beyene et al., 2020).

Improved seed adoption technology is positively correlated with productivity and efficiency. Differences in efficiency are responsible for some of the diversity in productivity. Efficiency is impacted by the increased seed usage since farmers frequently do not use the best amount of inputs. Its adoption has an impact on production both directly and through efficiency. Compared to recycled maize seeds, improved seeds increase productivity and efficiency, by using panel data. The findings imply that the increases in production (efficiency) that would arise from ignoring one of the two would significantly outweigh the advantages of better seeds. Although the improved seeds are more productive than conventional seeds, there are trade-offs between productivity and efficiency since farmers use the better seeds less efficiently than they do conventional seeds. It urged decision-makers to develop plans for boosting output and efficiency (Ayalew & Debela, 2019).

The household level data of 1989-2009 used to find out the impact of improved agricultural technologies on smallholders' crop productivity and welfare. The endogenous treatment effect model was applied to account for the selection bias on household technology adoption decisions. The study finds out the positive and significant impact of improved technology on crop productivity and welfare. The major factors responsible for productivity and welfare are education level, farm size, credit access, labor use, an extension program, expenditure for modern input, and asset holding. The study recommends that investment in research and development is necessary to improve productivity, food security, and the welfare of smallholder farmers (Mekonnen & Tigist, 2017).

Tetteh Anang et al., (2020) examined the farmers technological choice affects by using maize farmers data in Ghana based upon 340 sample. The probit model used for adoption decisions while double bootstrap data envelopment analysis carried out TE (Technical Efficiency) truncated regression to assess inefficiency sources. The findings shows that the farmer decision to adopt technology increases technical efficiency.

Precision agriculture technologies have a positive and significant impact on sustainable agriculture growth. These technologies included optimization of crop management, soil and resource, GPS guided machinery, remote sensing and drone delivering positive and significant impact on productivity. The study finds out that by enhancing precision agricultural technologies may lead toward increased crop yield and profitability (Mohd Javaid et al., 2022).

This study provides valuable insights into the adoption of agricultural green production technology among smallholders in China, particularly in Shaanxi Province, and its impact on rice production efficiency. The adoption rate of AGPT among the 582 rice farmers surveyed was relatively low at 15.1%. The average technical efficiency (TE) of rice production was found to be 0.312, indicating substantial room for improvement in production efficiency. A range of factors significantly influenced the adoption of AGPT by smallholders including household characteristics, family characteristics and social characteristics. Adopting AGPT significantly improved the TE of rice production, with a reported increase in TE of 18.8% to 24.5%. The study highlighted specific farmer characteristics that were associated with higher improvements in TE from AGPT adoption (Li et al., 2021).

3. METHODOLOGY

The current study will use the stochastic frontier method to estimate farmers' technical efficiency who used agriculture technology and innovation in panel data (2006-07 and 2017-18). The core element of modern economic theory is the assumption that behaviour may be optimized from either a producer or consumer perspective. According to economic theory, producers should maximize their output from both a technical and economic perspective:

- From a technical perspective, producers optimize by not wasting any productive resources.
- From an economic perspective, producers optimize by considering allocation problems involving prices.

Not all producers, meanwhile, are always able to solve both varieties of optimization problems. Performance at the firm or industry level, defined as the ratio of output to inputs used by production units, yielding a relative measure of performance applied to factors of production, may depend on a) production technology differences; b) production process efficiency differences; or c) production environment differences. Even though technology and the production environment are "basically the same," firms or industries may display varying productivity levels at a given time due to variations in their production efficiency.

The current study describes technology adoption efficiency, productivity, its measurement and role of technology in productivity and efficiency. The first we have calculated technology adoption efficiency that is the effects of technology adoption on farmers' technology adoption efficiency. There are two major approaches to measuring efficiency. These are SFA (Stochastic Frontier Analysis) and DEA (Data Envelopment Analysis).

The other is productivity that is defined as the relationship between the volume of output and the volume of input used to achieve a particular output. It measures the ratio of output to input. It is the center of both macroeconomic (agricultural) and microeconomic growth (economy). Increased productivity leads to increased output and income in the form of profits. Productivity indicators often fall into one of two categories: "single productivity indicators" used in combination with "multifactor productivity."

Single-factor productivity refers to the amount of output produced by a single input, such as the productivity of labour, land, or capital. The single factor productivity indicators are straightforward to interpret, comprehend, and compute since both the numerator and denominator can be stated in physical units that can be computed using a single data source. Total Factor Productivity (TFP) quantifies how effectively all the primary production inputs are distributed throughout the production process and specifies the contribution of each one. In contrast to partial productivity indicators, it gives a picture of productivity and is directly related to unit production costs and market prices.

In order to estimate the impact of agriculture technologies on productivity and efficiency, firstly the study will evaluate the average effect of the technology on farmers' productivity who adopted this technology. The impact of technology on productivity is:

$$E(Y_1 - Y_0|Z, DV = 1) = (Y_1|Z, DV = 1) - E(Y_0|Z, DV = 1) \quad (1)$$

Where E (.) is the expectation operator; Y_1 the yield of farmer adopted technology; Y_0 the yield of farmers not adopted technology while observable covariates is measured by vector Z that shows farmers personal and resource characteristics under both situations; DV is a dummy variable taking value 1 for adopted technology and 0 otherwise; To remove the biasedness, propensity score to match adopters and non-adopters have been proposed. So $E\ (Y_0|Z, DV = 1) = (Y_0|p(Z), DV = 0) = E(Y_0|p(Z))$ where p (.) is the propensity or likelihood of adopting technology based upon farmers' characteristics (Rosenbaum & Rubin, 1983).

The three-step estimation method is used to assess the impact of agriculture technology on productivity and efficiency of the farmers. Step I, a probability likelihood model is estimated for the technology adopters to generate the propensity of being an adopter. At step II, the predicted propensity score will be estimated. In the last step, the stochastic frontier model will be used for the efficiency score.

The probability that farmer i is adopting technology is a function of farmers' personal and farm factors.

$$P_i(adoption) = f(farmers\ personal\ characteristics, farm\ characteristics) \quad (2)$$

For predicted probabilities scores of being adopters of technology, the following probit model will be used:

$$p(Z) = Prob(\theta_i = 1|Z) = Z_i\,\alpha + \epsilon_i \quad (3)$$

Where p indicate the probability function while θ is the binary variable having characteristics of 1 if technology adopters 0 otherwise; Z is a set of farmer's personal and resource factors; $\boldsymbol{\epsilon}$ random error distributed with mean zero and variance one $\epsilon \sim N(0,1)$.

A firm is considered technically inefficient if it doesn't generate as much as is reasonable given the resources at its disposal. Technical inefficiency can either enhance or decrease production since more can be produced with the same amount of resources. Technical efficiency is merely one factor that contributes to increased productivity and should not be mistaken with productivity (Farrell, 1957; Nishimizu & Page, 1982; Grosskopf, 2003). On the other hand, technical efficiency denotes to "how efficiently" a farm can combine the many inputs and components of production to produce a maximum amount of output. Productivity measures the amount of production that can be generated from a given set of resources. A farm is more productive if it can produce the same amount of output with fewer resources or more output with the same amount of resources. Although the availability of superior inputs may have contributed to the increase in output, this does not necessarily imply that it is more technically efficient.

The notion of technological efficiency is based on the idea of the production frontier, which indicates the maximum output made possible by the technology. The border between distinct countries, regions, and agro-climatic zones varies as a result of technological differences.

It is a different method for estimating the frontier using parametric models. The anticipated production from this method can be seen as an expansion of productivity analysis in the conventional method and is consistent with neoclassical econometric theory. The efficiency is determined in relation to the stochastic

frontier once it has been econometrically assessed for each observation. Efficiency establishes the greatest production level for production. The distance between the observed point and the frontier is used to quantify inefficiency when the firm's output is below the frontier. The cost actually exceeds the minimum frontier due to inefficiency, and the frontier indicates the possible least cost in terms of cost efficiency. The composite error term with two-sided symmetric and one-sided components is included in this method to account for statistical noise and the sensitivity issue. This method distinguishes the efficiency estimates from the standard white noise stochastic term (Lovell, 1995).

The Stochastic Frontier Analysis (SFA) for technical efficiency can be written as:

$$Q_{it} = f\,(x_{it};\beta) * \exp(\epsilon_{it}) \qquad \text{For } i = 1,2,\dots,n \text{ and } t = 1,2,\dots,T \tag{4}$$

Where the composed error is:

$$\epsilon_{it} = v_{it} - u_{it} \tag{5}$$
$$Q_{it} = f\,(x_{it};\beta) * \exp(v_{it} - u_{it}) \tag{6}$$
$$Q_{it} = f\,(x_{it};\beta) * \exp(v_{it}) * \exp(-u_{it}) \tag{6}$$

Deterministic Component, Noise Component, Inefficiency Component

The inefficiency effects u_{it} is separate from the statistical noise v_{it} in the composed error term ϵ_{it} for each farmer. The inefficiency results u_{it} in equation (5) can be expressed as:

$$u_{it} = z_{it}\delta + w_{it} \tag{7}$$

Where z_{it} is a (1x m) vector of independent variables. It affects a farmer's level of efficiency that fluctuates over time. δ is a (m x 1) vector of parameters to be estimated that are associated with a set of explanatory variables in the inefficiency model. w_{it} is error term distributed independently truncated at $-z_{it}\delta$ with mean zero and variance σu^2. Farmers specific technical efficiency (TE) is a combination of ratio of observed output to efficient output on frontier production function:

$$TE_{it} = \frac{Q_{it}}{Q_{it}^{*}} = \frac{Q_{it}}{f(x_{it};\beta) * \exp(v_{it})} = \frac{E[Q_{it}/u_{it}, x_{it}]}{E[Q_{it}/u_{it} = 0, x_{it}]}$$
$$= \exp(-u_{it}) = \exp(-z_{it}\,\delta - w_{it}) \tag{8}$$

The specification of (7) allows for TE to vary across farmers and over time. The level of efficiency is in the form of zero to one.

In empirical form, the logit model can be written as:

$$p(Z) = Prob(\theta_i = 1|Z) = \alpha_0 + \sum_{k=1}^{8}\alpha_k Z_k + \in_i = \alpha_0 + \alpha_1 ISA + \alpha_2 FMA + \alpha_3 WITA + \alpha_4 FUA + \alpha_5 AIEA + \alpha_6 ISMAA + \alpha_7 MPAA + \in_i \tag{9}$$

The Cobb-Douglas function for the stochastic frontier model is written in the form:

$$logY_i = \beta_O + \beta_1 \log(IS) + \beta_2 \log(FM) + \beta_3 \log(WIT) + \beta_4 \log(FU) + \beta_5 \log(AIE) + \beta_6 \log(ISMA) + \beta_7 \log(MP) + v_i - u_i \tag{10}$$

The inefficiency model can be written as follows:

$$V_i = \delta_0 + \delta_1 AG + \delta_2 FZ + \delta_3 EDUF + \delta_4 FS + \delta_5 FE + \delta_6 EMP + \delta_7 LO + \delta_8 OA \tag{11}$$

Where Y_i represents the yield produced by the ith farmer; IS represents the Improved/Hybrid Seed; FM represents the Farm Mechanization; WIT denotes the Water Irrigation Technologies; FU denotes the Fertilizer Usage; AIE represents Access to Improved Electricity; ISMA represents the Internet/Social Media Access; MPA represents the Mobile Phone Access; AG denotes the Age of Farmer; FZ represents the Family Size (Number); EDUF represents the Education of Farmer (years of schooling); FS represents

the Farmer Specialization; FE represents the Experience of Farming; EMP represents the Household Employment Status; LO represents the Livestock Ownership; OA represents the Operational Area (Acres).

4. RESULTS AND DISCUSSION

This section represents results of productivity and efficiency models estimated for productivity and efficiency impact for base period and end line. The maximum likelihood estimates of the stochastic frontier production and efficiency model parameters are estimated using Stata 16.0 version and applied a two-stage approach in our analysis. We have estimated the stochastic half-normal frontier production function at the first stage, while we have estimated f0arm-specific efficiency determinants at the second stage. For comparison, both Ordinary Least Square (OLS) and Frontier Production Function have been estimated to determine the agriculture technologies adoption effects on productivity in the area.

The farm mechanization and fertilizer usage having positive significant impact on productivity during base period 200607. In comparison, the frontier production function indicates that only fertilizer adoption technology has a positive and significant role in productivity. It means if there is any change in fertilizer usage, then productivity positively changes by 0.017. The access to improved electricity adoption technology has a significant (5% level of significance) negative impact on productivity during 2006-07. The results are presented in Table 1.

Table 1: Parameter Estimates of the Stochastic Frontier Production

Agriculture Technologies	2006-07		2018-19	
	OLS	Frontier Function	OLS	Frontier Function
	Coefficients			
Improved/Hybrid Seed (IS)	0.040	0.015	0.051***	0.051***
	(0.035)	(0.024)	(0.012)	(0.012)
Farm Mechanization (FM)	0.048***	0.002	0.065***	0.065***
	(0.015)	(0.011)	(0.012)	(0.012)
Water Irrigation Technologies (WIT)	-	-	0.062***	0.062***
	-	-	(0.012)	(0.012)
Fertilizer Usage (FU)	0.029*	0.017*	0.090***	0.090***
	(0.013)	(0.010)	(0.016)	(0.016)
Access to Improved Electricity (AIE)	0.017	-0.038**	0.035**	0.035**
	(0.022)	(0.017)	(0.015)	(0.015)
Internet/Social Media Access (ISMA)	0.037	0.034	0.030**	0.030**
	(0.036)	(0.025)	(0.013)	(0.013)
Mobile Phone Access (MP)	0.057	0.022	0.055***	0.055***
	(0.038)	(0.027)	(0.018)	(0.018)
Constant	3.413***	3.673***	3.191***	3.195***
	(0.010)	(0.012)	(0.026)	(0.091)
		-6.351***		-3.706***
		(0.344)		(0.055)
		-2.509***		-10.743
		(0.075)		(47.29)

Source: Authors own Estimation using data set of 2006-07 & 2018-19. The values in parentheses presents the standard errors, while asterisks describe significance level (10%, 5%, 1%) respectively.

The seven technologies utilized in the study; however, all play positive and important roles in productivity during the end line (follow-up survey) of 2018–19 for OLS and frontier production function. It suggests that the adoption of certain agricultural technologies plays a positive impact in determining productivity. According to the OLS estimations, adoption of improved/hybrid seeds, farm mechanization,

water irrigation technologies, fertilizer use, and mobile phone access all have a positive and substantial impact on productivity. The area's productivity in 2018–19 is positively and significantly impacted by access to improved electricity adoption and internet/social media access adoption technologies (5% level of significant).

Results from the stochastic frontier production function between 2018–19 reveal that adoption of better or hybrid seeds, agricultural mechanization, water irrigation technologies, fertilizer use, and mobile phone availability all play a significant influence in productivity. While the adoption of greater access to electricity and the internet/social media are significant at a 5 percent level, all of these technologies are positive and significant at a 1 percent level of significance.

The stochastic frontier production results show that if there is a change in improved/hybrid seed technology, there is a positive change of productivity of 0.051 while farm mechanization has 0.065, respectively. Water irrigation technologies and fertilizer usage have a positive and significant impact of 0.062 and 0.090, respectively. Access to improved electricity, internet/social media access, and mobile phone access also positively and significantly impact productivity. These technologies positively affect productivity by 0.035, 0.30, and 0.55, respectively.

The technical efficiency of the sampled farmers of the local area has been assessed by applying the technical efficiency equation. We have estimated technical efficiency for both periods; 2006-07 base and 2018-19 end-line respectively. Technical inefficiency exists in both periods, but the level of technical inefficiency is higher during the base period 2006-07. On the other hand, it has reduced during the end line period 2018-19. There is a change of adopters from 2006-07 to 2018-19 due to which there are positive effects of technical efficiency level in the district Faisalabad, Pakistan.

The parameter estimates of variables used in technical efficiency are presented in Table 2. The technical efficiency results show that during the base year (2006-07), the age of the farmer, education of the farmer, and operational area have a positive and significant role in technical efficiency. It indicates that these variables increase technical efficiency. The farmer education and farmer operational area have a positive and significant role in technical efficiency. The previous studies confirm the results of farmer education's positive effect on technical efficiency (Jamison & Moock, 1984; Mechri et al., 2017).

On the other hand, the significant negative factors responsible for technical inefficiency are farmer specialization, farming experience, household employment status, and livestock ownership in the area during the base period (2006-07). The results show that farmer specialization does not have any role in technical efficiency during 2006-07 as it reduces technical efficiency like the experience of farming, household employment, and livestock ownership.

The end-line survey (2018-19) results show that family size, household member employment, and livestock ownership have a positive and significant role in technical efficiency determination in the district Faisalabad, Pakistan. The family size variable indicates that as farmer family size increases, there is an increase in its technical efficiency level due to increasing usage of new/improved technology adoption to increase agriculture productivity (Boru et al., 2015).

Table 2: Parameters Estimates of Efficiency Effects Model

Variables	2006-07	2018-19
	Coefficients	
Age of Farmer	0.002***	0.0003
	(0.001)	(0.0004)
Family Size (Number)	-0.004	0.0041**
	(0.004)	(0.002)
Education of Farmer (Years of Schooling)	0.003**	0.0012
	(0.001)	(0.001)
Farmer Specialization	-0.021**	-0.0044
	(0.010)	(0.006)
Experience of Farming	-0.002**	-0.0005
	(0.001)	(0.0004)
Household Employment Status (1,0)	-0.046***	0.0255***
	(0.010)	(0.006)
Livestock Ownership	-0.026**	0.0126**
	(0.014)	(0.006)
Operational Area (Acre)	0.005***	0.0013***
	(0.001)	(0.0004)
Constant	0.739***	3.3967****
	(0.025)	(0.012)

Source: Authors own Estimation using data set of 2006-07 & 2018-19. The values in parentheses presents the standard errors, while asterisks describe significance level (10%, 5%, 1%) respectively

The financial strength of farmers also has a positive and significant role in technical efficiency determination. The farmer's financial stability is shown by the farmer's family members' employment status and livestock ownership. These variables (family member employment, livestock ownership) have a positive and significant role in technical efficiency during 2018-19. Farmer agriculture operational area (acres) also has a positive and significant role in technical efficiency determination. The stochastic frontier production function's overall findings indicate that the new and better agricultural technology used in the study has a favorable and significant impact on productivity. In the district of Faisalabad, Pakistan, during the 2018–19 academic year, the technical efficiency result reveals that family size, employment of household members, livestock ownership, and farmer operational area have a positive and substantial effect in enhancing technical efficiency.

5. CONCLUSION AND POLICY IMPLICATIONS

The study describes the role of agriculture technologies adoption in the district on productivity and efficiency during 2006-07 (base year) and 2018-19 (end-line), respectively. A very few studies conducted in Pakistan catering technologies adoption impact on productivity and efficiency. Some studies investigated single or two technologies' impact on productivity and efficiency. In contrast, this study includes seven types of technologies being used in the sector and announced by the government to assess the effects of this technology on productivity and efficiency in the district. The sample for the survey is 720 farmers from two tehsils for each survey (base year & end line) collected through field survey during wheat harvesting season from the district.

Agriculture productivity and efficiency have an important role in the agriculture sector and in meeting food security. Various factors are responsible for their determination to boost productivity. Technical efficiency measures the influencing factors accountable for its determination in the area.

The fertilizer usage technology adoption during 2006-07 has only a positive and significant role in productivity using the stochastic frontier production model. The low or less impact being observed during

this period because of the low technology adoption rate in the area and other factors beyond this study may prevail for its low impact. The technologies used in this study showed a significant impact on dependent variables i.e. productivity during 2018-19. These seven technologies have significance at various levels and positively affect productivity in the Faisalabad district (Pakistan). The technologies that have positive and significant impacts on productivity are improved/hybrid seed, farm mechanization, water irrigation technologies, fertilizer usage, access to improved electricity, internet/social media, and mobile phone access.

The technical efficiency positive influencing factors during 2006-07 are the farmer's age, education of farmer and farmer agriculture operational area while some negatively impacting efficiency are farmer specialization, the experience of farming, household family member employment and livestock ownership. While on the other hand, during 2018-19, family size, household family member employment, livestock ownership, and operational area increase technical efficiency.

The current study as overall recommends the following policy recommendations for future agriculture productivity and growth:

- The agriculture extension officer must be in contact with farmers and conduct awareness campaign for new and improved agriculture technologies.
- The farmer income and welfare are strongly linked with these technologies' adoption. The adopters have higher income level as compared to non-adopters.
- The government must introduce new and improved agricultural technologies at subsidized to increase adoption level to increase productivity.

The current study is limited to only one district dealing with two tehsils sample data, in future, the research may extend to more districts with more variables. In addition, in future, the same kind of analysis could be extended for four provinces of Pakistan and a comparison can be done on the basis of results.

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Tapping into Economic Opportunities: Economic Renaissance through Tourism in AJK

ABSTRACT

Tourism is a crucial factor in economic development, especially in areas with strong cultural traditions and scenic beauty. Situated in the foothills of the Himalayas, Azad Jammu & Kashmir (AJK) has a great deal of unexplored potential for tourism growth. In addition to outlining sound tactics for developing a vibrant tourist and hospitality industry, this study seeks to assess tourism's economic influence in AJK. This dissertation weighs the economic assistance of tourism in AJK over the span of three years. The study employs a Triangulation approach e. This particular study was designed through the use of surveys, official reports, and academic literature. The study highlights the economic benefits of tourism in AJK, including the establishment of infrastructure and opening the way for SMEs (Small and medium enterprises). However, the hurdles faced by AJK are scarce marketing, geopolitical instability, and environmental issues that hamper its realization. This study also uncovers the ground realities of tourist destinations. The results suggest proactive interventions regarding investment policies, sustainable environmental management, and upgrading the skills to crack tourism potential and promote economic development. This study also analyzes that the implementation of capital-intensive projects can bolster the tourism infrastructure and emphasize the sophisticated econometric modeling techniques to analyze tourist preferences and spending patterns, thereby informing the design and implementation of targeted marketing strategies. This approach involves deploying predictive analytics algorithms to segment tourist markets based on socio-economic factors, which can be used for developing evidence-based policies for tourism's transformative capacity as a catalyst for equitable economic growth in the region.

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Author's contribution in the article: 1- Conceived and designed the analysis, 2- Reviewed and compiled the literature, 3- Collected the data, 4- Contributed data or analysis tools, 5- Performed the analysis, 6- Wrote the paper, 7- Financial support for the conduct of the study, 8-Other

1. INTRODUCTION

Tourism, the way it interacts with different socio-economic and environmental aspects, is a complex phenomenon that has attracted a lot of interest from researchers. Tourists are engrossed in a wide range of activities, from business travel to leisure travel, cultural exchanges, and ecotourism projects (Baloch et al., 2023). Tourism is a fundamental component of worldwide economic development. Examining this industry's many facets, researchers investigate how it affects regional economies, labor markets, cultural preservation, environmental sustainability, and legislative frameworks (Li et al., 2023). The academic quest to comprehend tourism is still relevant and active in light of the constantly changing traveler landscape, developments in technology, and growing consumer tastes (Ali et al., 2021).

Globally, the tourism industry accounts for 7.7 trillion US dollars of world GDP, is rise of 22.3% from last year. About 1.3 million tourists travel across the globe by 2023 (UNWTO, 2023). Analyzing the contribution of tourism in Pakistan is approximately 5.9% to its GDP. According to the research reports, it has been determined that Pakistan's tourism sector is expected to grow significantly and make a big economic contribution (Khan et al., 2020). Due to its varied landscapes, rich cultural legacy, and friendly populace, Pakistan has been named one of the best places to go on adventure travel by several international publications in recent years (Leading Travel Magazine, 2020). Consistent with Baloch et al. (2023), Azad Kashmir is an administrative territory in northern Pakistan, stands out for hiking, mountaineering, rock climbing, and white-water sports are just a few of the many leisure hunts that Azad Kashmir has to offer with its stunning valleys, cultural richness, verdant forests, and towering mountains and historical significance. Despite all of its beauty, this area remains underdeveloped which limits its ability to contribute to the growth of the economy.

AJK, with a total area of about 13297 square kilometers, is renowned for its unparalleled beauty of iconic landmarks like Peechanasi, Ratti Gali, Ramkot Fort, and Lepa Valley. Annually AJK domestically attracts 1.5 million tourists. Tourism tends to flourish local businesses, including transporters, hotels, retailer's guesthouse operators, and even horse breeders, have seen a twelve percent increase in employment. (Akram et al., 2021). Additionally, the tourist sector has improved employment prospects in the area, especially during the tourist season, giving the locals a vital source of income (Nabi et al., 2022). It has a significant potential to contribute to the GDP of AJK as it resulted in the $1.20 generated in the allied sector by spending $1 on tourism.

Different economic behaviors and attitudes toward tourism are displayed by the people of Azad Kashmir (Raza et al., 2023; Anwer et al., 2023). Some studies see tourism as a means of fostering cultural interchange and producing revenue, as well as a potential for economic development (Akram et al., 2021; Nabi et al., 2022). Nevertheless, several studies are concerned about the negative consequences of tourism, which include the commoditization of cultural treasures, the disruption of customary economic activities, and environmental deterioration (Rasham et al., 2020; Ahmed et al., 2022; Sohrab & Shah, 2023).

This particular study attempts to examine the impact of tourism on economic development and also focuses on the factors that influenced the travelers' inclination to return and how they perceive the reasons for returning to visit this place. It also explored the unique attributes of the AJK landscape. This study also attempts to investigate how robust tourism can contribute to the GDP of Pakistan. The analysis study uses the triangulation approach to promote long-term resilience and growth, it is recommended to diversify tourism products, improve marketing, and handle security issues. Improved local well-being and sustainable growth can result from striking a balance between environmental protection and economic development. The results of this study can help Azad Jammu and Kashmir formulate sensible policies and plans for the growth of tourism there. Enhancing infrastructure, encouraging sustainable practices, and involving local

people are the three main things stakeholders and authorities should concentrate on if they want to fully capitalize on tourism in AJK.

2. LITERATURE REVIEW

In this section, we provide a review of selected literature about the nexus of tourism and economic development. In the literature of economics, there has been debate on tourism growth nexus for a long. Many multi-country and country-specific studies have been conducted by using various methodologies to solve this puzzle. However, researchers are unclear about the positive or negative effects of tourism on economic growth.

Apart from that some studies show the positive impact of tourism on growth. Fayissa et al. (2008) by using a panel of 42 African countries from 1995 to 2004 stated that tourism positively contributes to economic growth and that African economies can boost their growth by strengthening tourism. For Turkey, Akan et al. (2007) conducted a study to examine the causal relationship between tourism industry and growth and confirmed favorable effects of tourism on economic growth. Furthermore, Selimi et al. (2017) conducted an empirical analysis of Western Balkan countries for 17 years and stated that tourism has a momentous impact on economic growth. For the Middle East region, Saleh et al. (2015) checked the contribution of tourism towards economic growth for the period 1981-2008 confirming the long-term relation between tourism and economic growth, and stated that tourism has a strong impact on the economy (mixed results). Another study concluded that reduces poverty and hampers industrialization in the local regions. This study attempts to explore the tourism conditions of the Vaal- triangle in South Africa (Meyer & Mayer, 2015).

Similarly, a study takes into account the Tourism Satellite Account (TSA) and Computable General Equilibrium (CGE) models to explore the hypothesis in the case of Spain, Cyprus, and Greece. Results indicate that the tourism industry has a stronger impact on these economies. The hotel also plays a crucial role in boosting economic development (Lvanov & Webster, 2007). Both on the macro and micro levels, tourism is theoretically able to have an optimistic impact on economic growth. Tourism serves as a catalyst for economic diversification from a macro perspective, enabling nations to transition away from core industry-based economic activities like export revenue to a focus on services rather than agriculture (Signe, 2018).

According to Ren et al. (2022), in eight Mediterranean nations, the study uses quantile regression, ARDL models, and heterogeneity causality tests to experimentally investigate the relationship between a nation's income level for tourist arrivals and increased growth patterns as well as environmental degradation. The findings indicate that while the amount of money received by tourists encourages economic growth in all quantiles, its effects on environmental degradation differ, having a positive influence in lower quantiles and a negative effect in higher quantiles. To investigate the connection between tourism and economic growth, the tourism literature uses four methods: The theories that explain tourism growth are the tourism-led growth hypothesis, the conservation hypothesis, the bidirectional causality hypothesis, the feedback hypothesis, and the neutrality hypothesis, which states that there is no substantial causal relationship. On the impact of tourism on economic expansion, there remains disagreement, nevertheless (Song et al., 2012). Seetanah (2011) has studied the impact of tourism on economic growth using data from 19 island nations between 1990 and 2007. Based on the GMM, the empirical results demonstrate that tourism has a beneficial impact on growth.

According to Frent (2016), tourism has a dualistic impact on the economies which includes both positive outcomes like generating cash, jobs, and cultural preservation as well as negative outcomes like traffic jams, price increases, and environmental degradation. To maximize tourism's effectiveness as a sustainable tool for economic advancement at the local, regional, and national levels, stakeholders must understand and

mitigate the negative economic, environmental, and social effects of tourism development. In the BRICS countries, the study explores the connection between tourism-related income, economic expansion, and environmental effects. This supports the 'tourist-led growth hypothesis' by demonstrating that increased tourism has a favorable effect on economic growth. But it also exposes detrimental impacts on the environment, emphasizing the necessity of government intervention for sustainable economic development (Banday & Ismail, 2017).

Moreover, Kumar et al. (2015) acknowledge the important role that tourism plays as a vital economic sector in many global regions and offer a thorough examination of the both optimistic and adverse economic repercussions associated with tourism development. A significant portion of the gross domestic product (GDP) of emerging nations is derived from tourism. As this paper points out, there are significant negative effects of tourism that should not be disregarded, even as it acknowledges the well-recognized economic benefits. A few of these are inflation in land values, economic leakage, potential increases in demand for imported commodities following the flood of tourists, and over-reliance on tourism. In addition, the paper addresses several approaches for evaluating both positive and negative economic consequences and highlights the significance of economic impact research.

Following up the above debate, the study led by Nyasha et al. (2021) shows the mixed results of SSA regions by using panel data models (GMM) by splitting the region into different income groups. The analysis explores that tourism receipts have positive but on the other end tourism expenditure has a negative effect on economic growth.

However, similar mixed results have been found in the case of Pakistan and Azad Kashmir by numerous studies (Manzoor et al., 2019; Wongsanun, 2022; Azam et al., 2022; Sharif et al., 2017; Oad et al., 2022). According to Bhatti et al. (2023), globalization owns the political, social, and cultural spheres of the world. The tourist industry's global expansion has been significantly impacted by globalization. The goal of our research is to examine the short- and long-term effects of globalization and tourism on Pakistan's economic development. The study also demonstrates the connections both immediate and long-term between tourism, and economic expansion globalization. Several studies like Fauzel et al., 2021; Jan et al., 2023; Imran & Ali, 2024 emphasize that Tourism and globalization both can subsidize Pakistan's economic growth, as per the statistics. Therefore, to draw tourists' attention, policymakers must create sustainable environmental regulations that provide a safe environment and promote popular tourist spots around the world.

Altaf and Shabir (2022), critically analyzed how tourism and hydropower plants contribute to economic development. This study also identifies several challenges like infrastructure constraints, low tax to GDP, low tax base, and tourism potential. The study suggested that public and private patterns ship, inviting foreign investors can foster economic growth. Similarly, data was derived from 380 respondents to analyze how rural tourism plays an important role in the context of sustainable economic development. Results show that rural tourism can unlock these development opportunities (Bhat et al., 2024).

Furthermore, the literature on tourism in Pakistan and Azad Jammu and Kashmir (AJK) highlights the complex dynamics of tourism, economic growth, environmental concerns, disaster management, and primary education in the region. The analysis points out the optimistic economic effects of tourism, like the development of jobs and income, while also recognizing its drawbacks, like traffic jams and pollution. The results also highlight the social and historical background of AJK, providing insight into the organization and evolution of the organization after partition. A critical review of the economy and an examination of disaster management strategies highlight the region's infrastructure, quality, and access issues and the need for long-term resolutions to improve both standards of educational and economic development. In a nutshell, all these studies support the use of targeted interventions to solve environmental issues and advance sustainable economic growth.

This study extracted the following research gaps which this paper contributes significantly. Firstly, previous studies only discuss the scenic beauty of AJK. There is a lack of primary data that highlights the tourist behavior and preferences secondly, there is a smaller number of studies that identified the tourist destination and correlated their popularity with factors like infrastructure, telecommunication, accessibility of basic needs, and market efforts. Furthermore, the current study bridges these gaps by using the survey data and the secondary data to make a significant contribution. It also conducts the destination-specific analysis for analyzing the tourist trends in the economy. And provide impactful insights for the policymakers.

3. METHODOLOGY

Pakistan administrated Kashmir (AJK), tourism's miscellaneous socio-economic and environmental effects are examined in this study by applying a triangulation approach proposed by Ivankova and Creswell, (2009). It involves different theories, data sources, and different methods to examine a single study. This approach enhances the accuracy, reliability, and credibility of the findings of research. It also verifies the research from different perspectives. This particular study uses methodological triangulation that includes the quantitative and qualitative aspects of the data. It also uses different theories to interpret the same results.

A current structured study was conducted at several hotel businesses in the area to assess the attitudes and behavior of tourists visiting Azad Kashmir. A sample of fifty tourist was selected through a random sampling technique and asked to answer a series of detailed questions on their demographic characteristics, travel preferences, their spending patterns, and their impressions of the native environment and culture. Statistical regression modeling and descriptive analysis were used to identify key factors affecting visitor behavior and how they affected the local economy and environment.

To scrutinize the patterns and directions of tourism in AJK, secondary data sources were used in addition to the primary survey data. These included statistical data regarding the number of visitors, the number of cars that arrive in the area, and the overall impact of tourism on the development of the area. Time-series analysis and econometric modeling were employed to examine the data composed by the Pakistan Bureau of Statistics and the Azad Jammu and Kashmir Tourism Department to determine the relationship between tourism, economic development, and environmental indicators in the area (Fauzel et al., 2021; Jan et al., 2023; Imran & Ali, 2024).

AJK's tourism scene was well understood through the integration of secondary statistical data with primary survey data. The survey's findings were crucial in placing the broad patterns seen in the secondary data corpus into context and providing clarification. We propose a thorough understanding of the multifaceted connections between tourism economic development, and environmental integrity in Azad Jammu and Kashmir by combining primary data collection and secondary data analysis with the integration of quantitative and qualitative methodologies.

4. RESULTS AND DISCUSSION

To explore the impact of tourism on the economy of Azad Jammu & Kashmir. Firstly, we examine the tourist destinations available at AJK. Then we highlight the main tourist destination in AJK and the services available there for further continuing the analysis. Furthermore, this section provides insight into the multifaceted interactions that exist between visitor experiences, economic indicators, and tourist behavior in the context of Azad Kashmir. On the base of these analyses, this study suggests some policy recommendations for future initiatives.

The following table 1 contains the complete details regarding tourist attractions, such as accessibility, amenities, and facilities, are provided in the table. By highlighting available modes of transportation, it helps people make appropriate travel plans, the possibility to using own vehicle, and the local mean of traveling, restaurants and the hotel's availability during traveling, availability of public utilities and the means of connectivity. These all are the facilities which leads toward the further tourism in the economy.

Table 1: Tourist destination in AJK: Famous Tourist Destinations in Azad Jammu & Kashmir

Tourist Destination	Public Transport Available to the destination	Possible to Travel on own normal vehicle	Restaurants available on Destination	Hotels available on Destination	Public utilities (toilets) available	Own sim card is functional
Peer Chinasi	No	Yes	No	No	No	Yes
Kashmir Waterfall (MZD)	No	Yes	No	No	No	Yes
Ramkot Fort (Mirpur)	Yes	Yes	Yes	Yes	No	Yes
Neelum Valley	Yes	Yes	Yes	Yes	No	No
Nergola Waterfall	No	Yes	Yes	No	No	Yes
Ratti Gali	No	Yes	No	No	No	No
Sharda	Yes	Yes	Yes	Yes	No	No
Keran	Yes	Yes	Yes	Yes	No	No
Kail	Yes	Yes	Yes	Yes		
Gurez valley	Yes	Yes	Yes	Yes	Yes	No
Ganga Choti	Yes	Yes	Yes	Yes	Yes	Yes
Banjosa Lake	Yes	Yes	Yes	Yes	Yes	Yes
Toli Peer (Ponch)	Yes	Yes	Yes	Yes	No	No
Taobat	Yes	Yes	No	Yes	No	No
Leepa valley	Yes	Yes	No	No	No	No
Baradari	Yes	Yes	No	No	No	No
LoC Chakothi	Yes	Yes	No	No	No	Yes
Dao Khan	Yes	Yes	No	Yes	No	Yes
Nakyal Kotli	Yes	Yes	Yes	Yes	No	Yes

Note: Author's own work

In addition, the chart lists necessary amenities including places to eat, lodging, utilities, and phone service. A more comfortable travel experience and better trip planning are made possible by this information. The table prioritizes destinations according to tourists' needs and interests, assisting in the creation of well-informed itineraries and lodging choices by evaluating infrastructure and amenities. The table also shows that the ground realities of these places are different. Ground realities refer to the exact situation of these destinations, like accessibility, and affordability of the basic services. Results mention that these places don't provide the essential services to the tourist.

Moreover, to encourage cultural interchange and sustainable practices, tourist attractions stimulate economic growth by bringing in money, providing jobs, and encouraging infrastructure investment. But to maintain long-term survival, issues like seasonality and outside influences need to be controlled (Fauzel et al., 2021). Many studies emphasize the lack of basic enmities like lack of basic infrastructure, transport, and basic communication networks (Altaf & Shabir, 2022). By bridging these gaps economy of AJK can flourish and contribute to GDP. The results stark the contradictions between the ground realities and the potential of these destinations (Amritsari, 2024).

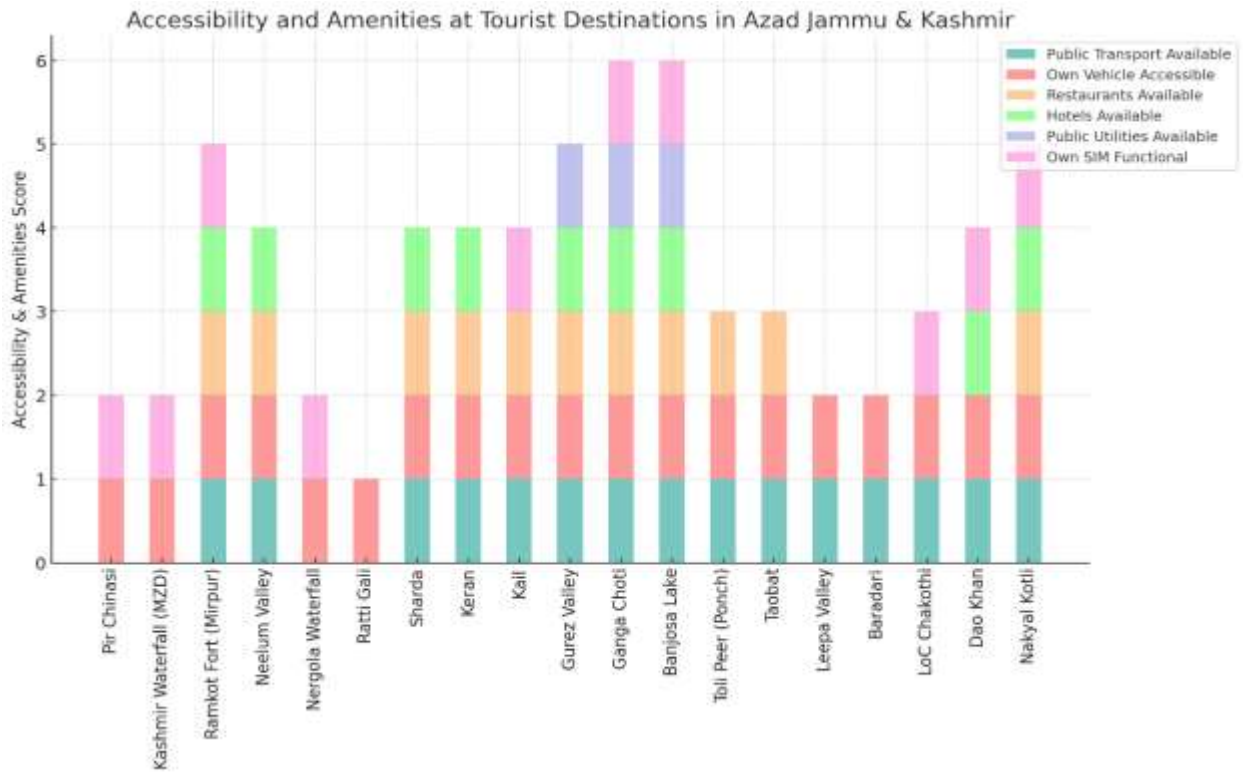

Figure 1: Accessibilities and Amenities at Tourist destination

In addition, the chart lists necessary amenities including places to eat, lodging, utilities, and phone service. A more comfortable travel experience and better trip planning are made possible by this information. The table prioritizes destinations according to tourists' needs and interests, assisting in the creation of well-informed itineraries and lodging choices by evaluating infrastructure and amenities. The table also shows that the ground realities of these places are different. Results mention that these places don't provide the essential services to the tourists who come to visit these places. Jan et al. (2023) also extract the same results that lack of basic services like transportation, accommodations, and other basic amenities had a significant impact on the tourist willingness to visit specific locations. Moreover, the same results have been produced by Bhatti et al. (2023), that people prefer comfort and reliable places for trips.

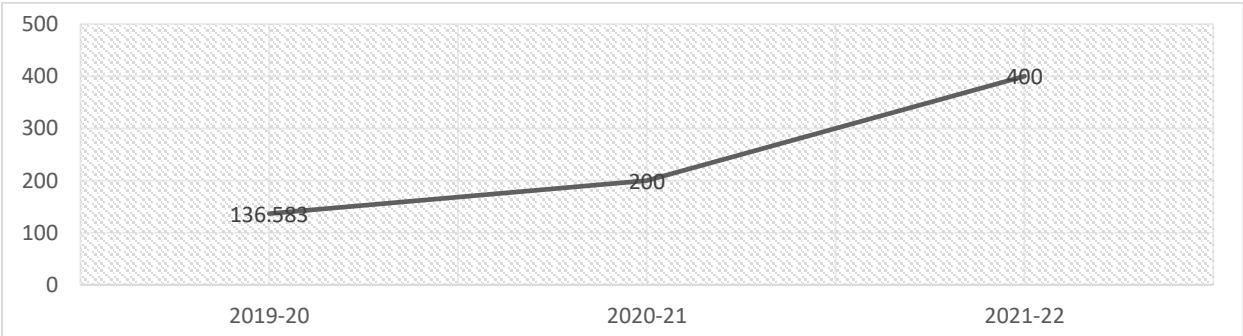

Figure 2: Total Expenditure in millions incurred on Tourism by AJK Government

Source: Data based on year book of P&DAJK 2022

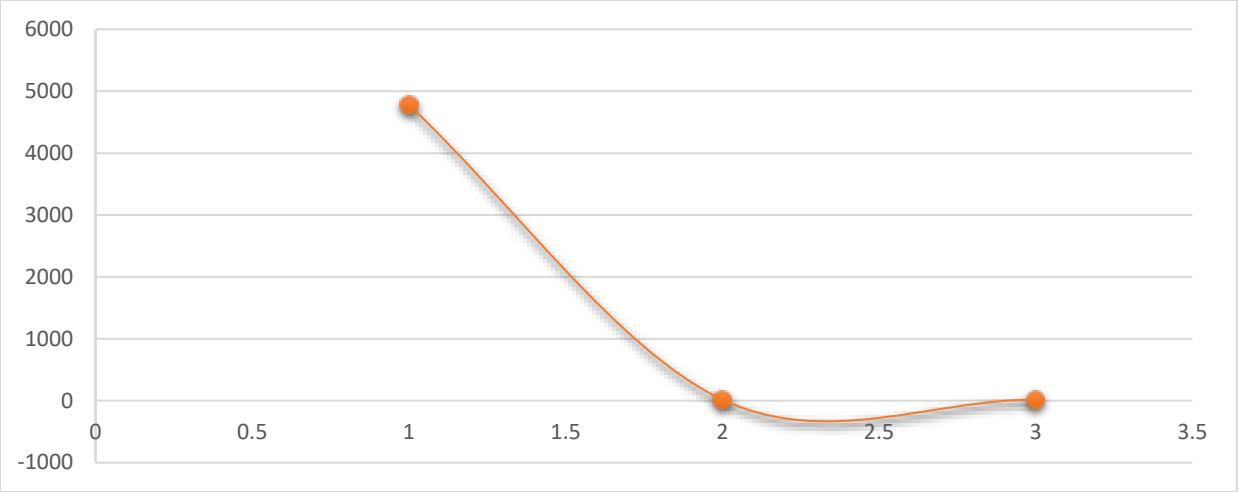

Figure 3: Total receipts of Tourism

Source: Data based on year book of P&DAJK 2022

The 2019–20, 2020–21, and 2021–22 tourist expenditures and receipts are displayed in the table. Revenues were 4781 million and expenses were 136.583 PKR in 2019–20. While receipts dropped to 20 million PKR. But expenses increased to 200,000 PKR in 2020–21. While receipts stayed at 20 million PKR it quadrupled to 400 million PKR 2021–2022. Worldwide travel restrictions, border closures, lockdowns, and the fear of getting the virus caused by the COVID-19 pandemic impacted tourism and international travel. The tourism industry saw a dramatic fall in revenue as a result of quarantine restrictions, travel bans, and attraction closures. Travel-related consumer confidence remained low because of uncertainties and health concerns. The decline in domestic travel and the absence of foreign visitors also affected tourism spending.

Table 2: District Wise tourist entered in AJK 2019-22

District	2019 (In million)	2020 (In million)	2021 (In million)
Muzaffarabad	0.040	0.025	0.025
Neelum	0.095	0.065	0.170
Jhelum Valley	0.045	0.020	0.025
Bagh	0.150	0.075	0.080
Haveli	0.015	0.010	0.010
Poonch	0.150	0.065	0.070
Sudhnoti	0.040	0.025	0.020
Kotli	0.065	0.025	0.025
Mirpur	0.030	0.020	0.020
Bhimber	0.030	0.025	0.025

Source: AJK statistical year book 2022

Table 2 presents information on the number of visitors that visited different districts in Azad Jammu and Kashmir (AJK) in 2019, 2020, and 2021. In comparison, 21.1 million tourists visited the valley in 2023, 18.8 million in 2022, 11.3 million in 2021. This information makes it easier to understand the dynamics of tourism in the area by illuminating the patterns of visitor influx across various districts. First, the number of visitors entering each area varies, which is indicative of variations in AJK's infrastructure, accessibility, and tourism attractions. When compared to other districts, Neelum, Bagh, and Poonch routinely register larger amounts of visitor entries, indicating the presence of major tourist destinations or attractions within these areas.

Within several districts, the number of visitors varies over time. An example of this may be seen in the Neelum district, where visitor numbers increased significantly between 2019 and 2021, suggesting that the area's tourist attractions are becoming more well-known or easier to access. On the other hand, localities such as Jhelum Valley and Sudhnoti exhibit comparatively constant numbers of tourist arrivals throughout time, indicating normal levels of tourism in these regions. Moreover, external factors including seasonal variations, infrastructural development, and marketing campaigns must be taken into account when analyzing patterns of visitor entry. In particular, travel limitations and safety concerns may have had an impact on the number of tourists admitted during the 2020–2021 COVID-19 epidemic. To examine what kind of variables, influence travelers' inclinations to return and how they perceive the reasons for returning. This research attempts a short survey by randomly choosing the visitors. Details are given below:

The all-inclusive dataset of 50 examples pertaining to different aspects of tourism behavior and economic effect indicators, all of which have no missing values. A unique mix of characteristics, such as the purpose for returning, the level of respect received from staff, and the perceived worth of hotels or refreshment centers, are represented by each row. These factors intersect with the amount of money spent on food consumption or the intention to return.

This comprehensive dataset offers an abundance of information to comprehend the economic behaviors and preferences of travelers, making it essential for economic analysis. Economists can also learn a great deal about consumer preferences, spending patterns, and overall economic impact by looking at the correlations between economic indicators like expenditure on food consumption or the intention to return, and reasons for revisiting, as well as perceived value from establishments and respect from staff.

Its usefulness for economic analysis is further increased by the lack of missing numbers, which highlights the dataset's accuracy and completeness. This comprehensiveness facilitates the comprehensive and precise evaluation of the economic consequences of many elements influencing the behavior of tourists by economists, hence assisting in the creation of policies and strategic decision-making targeted at optimizing the economic gains from tourism.

Table 3: Reason behind Revisit of Tourist

		Expenditure on food consumption			
		<5000	<10000	>10000	None
reason of revisit	excellent service	24%	2%	0%	0%
	effective management and customer service	8%	6%	4%	2%
	good food & hygienic environment	18%	8%	4%	8%
	cost factor	4%	4%	6%	2%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.181[a]	9	.086
Likelihood Ratio	17.264	9	.045*
Linear-by-Linear Association	8.066	1	.005**
N of Valid Cases	50		

Note: *p < .05, **p < .01

The above table 3 shows a cross-tabulation of the amount of money spent on food consumption and the reasons given by visitors to return to Azad Kashmir. The Chi-square test findings indicate that there is a significant correlation between these variables. Results reveal that it is evident that tourists who spend less than 5000 on food primarily revisit due to "excellent service" or "good food & hygienic environment." Conversely, those spending over 10000 tend to revisit for similar reasons, indicating a consistency in preferences across income brackets. The p-values of.086 for Pearson Chi-Square,.045 for Likelihood Ratio,

and.005 for Linear-by-Linear Association illustrate that the Chi-square tests show statistically significant relationships between revenue spent on food and reasons for revisiting. It appears from this that the amount of money spent on food has a big impact on why travelers decide to go back to Azad Kashmir.

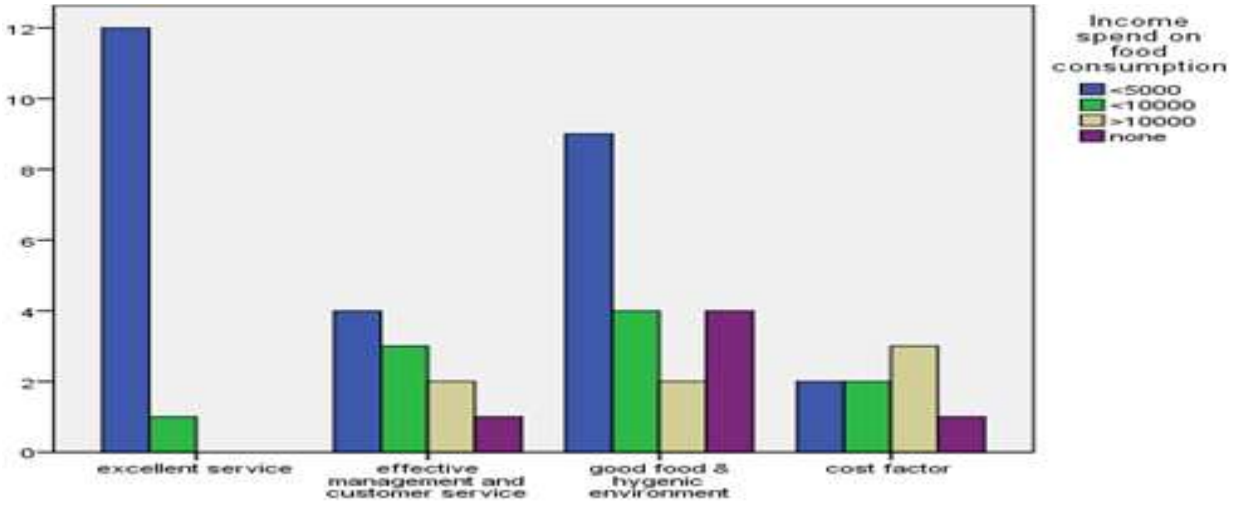

Figure 4: How much do visitors spend on food consumption

Note: The author's work based on survey data.

Figure 4 shows the result of the survey data designating how different income groups allocate their spending patterns on food consumption. Different colors represent different levels of consumption. No matter how much money visitors have to spend, the results emphasize how crucial it is to provide top-notch service and keep hygienic surroundings to draw and keep them. By using this data, the tourism industry can better plan and allocate resources, which would ultimately increase visitor pleasure and boost Azad Kashmir's economy.

Table 4: Reason behind the Revisit

		respect feeling from staff	
		No	Yes
reason of revisit	excellent service	2%	24%
	effective management and customer service	6%	14%
	good food & hygienic environment	6%	32%
	cost factor	2%	12%

Chi-Square Tests

	Value	d.f.	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.501[a]	6	.277
Likelihood Ratio	5.806	6	.445
Linear-by-Linear Association	.131	1	.717
N of Valid Cases	50		

Note: No values are significant at the 10%, 5%, or 1% levels.

The table 4 explores the travelers' opinions of staff members' respect and the reasons behind their return visits to a certain area are examined in the table. Out of 50, 41 percent of respondents feel that there is respect, and the main factors that lead them to return are superb food, a clean and well-maintained atmosphere, efficient management, and exceptional service. It is possible that revisit intents are qualitatively influenced by service quality perception, but the direct economic impact of this impression

may not be statistically significant, as statistical analysis fails to find a meaningful correlation between staff respect and revisiting motives.

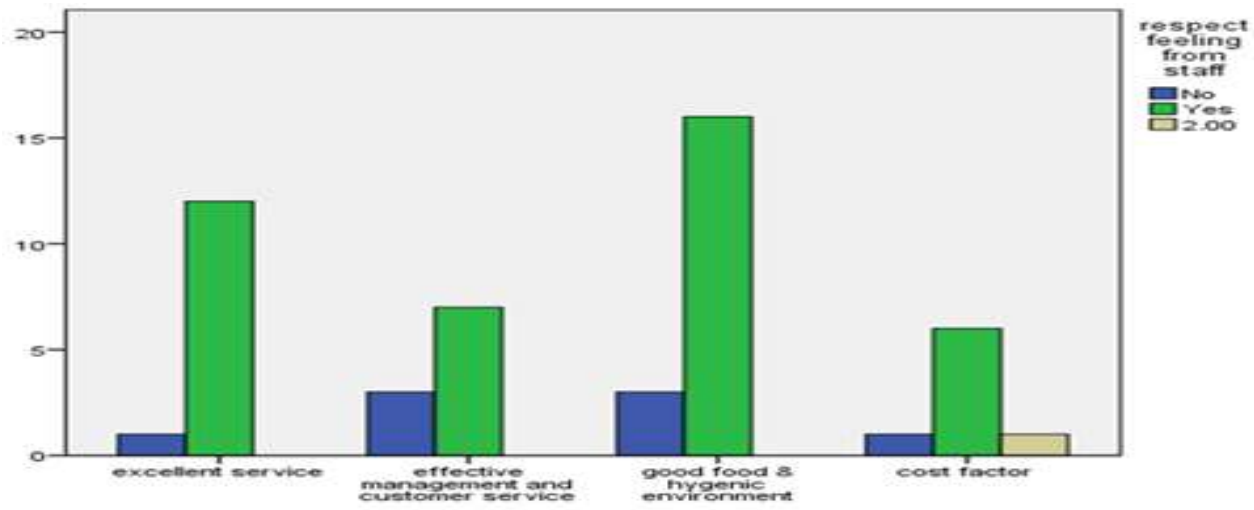

Figure 5: Reason behind the Revisit of Tourist

Source: The author's work based on survey data.

However, these results provide useful information for anyone involved in the tourism sector's economy. To improve the entire visitor experience and possibly entice return visits, they emphasize how crucial it is to cultivate a culture of professionalism and respect among staff members. The intricate relationship between the perception of service quality and economic consequences is also highlighted, emphasizing the necessity for deeper investigation and analysis to provide more focused tactics for optimizing financial gains in the tourism industry.

Table 06: Why Hotels Value You

		Why do refreshment centers value you?			
		regular customer	Income	Behavior	Other
Visit again	No	2%	4%	0%	6%
	Yes	24%	20%	20%	22%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.629[a]	6	.466
Likelihood Ratio	6.620	6	.357
Linear-by-Linear Association	1.427	1	.232
N of Valid Cases	50		

Note: No values are significant at the 10%, 5%, or 1% levels.

Table 06 examines the People's motivations for appreciating refreshment centers and their propensity to return are examined in the cross-tabulation table that is included in the analysis. Numerous people who value refreshment centers tend to revisit them, according to trends, but statistical tests show no meaningful correlation between the reasons for this activity and the value. This suggests that variables like service quality and convenience that go beyond personal preferences could affect decisions to revisit. A comparable result has been derived by (Thommandru et al., 2023). To draw and keep consumers, businesses in the beverage sector may need to employ a variety of tactics. To comprehend underlying motives and create

practical plans for boosting consumer loyalty and financial sustainability, further research including qualitative approaches is required.

Customer satisfaction is highly valued in the hotel sector because it understands that maintaining a competitive edge and long-term profitability depends on having happy and loyal customers. In an extremely competitive market, providing excellent customer service increases client retention rates, promotes repeat business, and generates favorable word-of-mouth recommendations (Lovelock & Wirtz, 2006).

To increase client loyalty, the hotel sector depends on providing outstanding service in order to establish trust and cultivate positive relationships (Kandampully et al., 2018). Additionally, it has been demonstrated that customer-focused initiatives increase market share and perception of the brand since happy customers are more likely to post reviews on online review sites, which further influences potential customers (Zeithaml et al., 2018; Duglio et al., 2019).

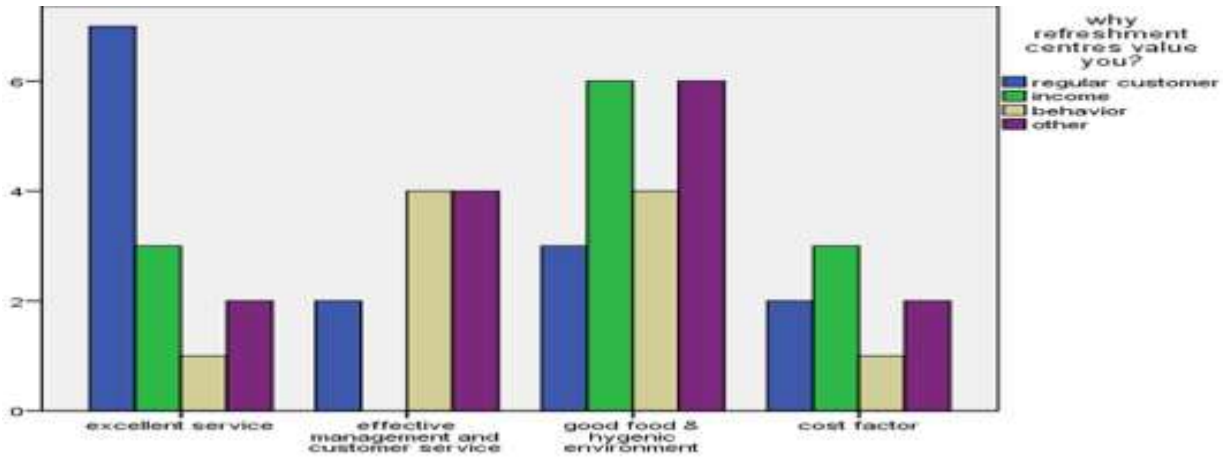

Figure 6: Why hotel industry values his customer

Source: Author's work based on survey data.

Above figure reflects that on average the behavior of the selected population towards the services that hotel industry provides you and what is the reason behind those preferences of values his customers. Because consumers in the beverage business make complex decisions, a thorough client retention strategy is required. Prioritizing cost, availability, and service quality over personal preferences can increase customer loyalty and ensure long-term financial success. More research into the factors that influence consumer behavior will help target initiatives for better customer satisfaction.

The results of the study explained that tourism derives the economic development in AJK. Tourism takes both challenges and the opportunities of the region's landscape. The survey data clearly states that the tourism of AJK has potential to boost the area's economic development. However, to fully enjoy the benefits regions has to deal some critical issues like geopolitical instability, imperfect infrastructure and network communication (Jan et al., 2023). Several studies derive that appropriate transportation and adequate infrastructure is the key enabler of the tourism. AJK's inadequate infrastructure limits the tourism and growth patterns of the region (Zeithaml et al., 2018). Several studies derive the same results for the similar regions that inadequate facilities less attract the tourist (Bhatti et al., 2023).

Furthermore, cultural barriers and environmental degradation is critical concern for the tourism of AJK. The overexploitation of resources, improper construction and improper waste management leads towards

environmental degradation. Cultural commercialization is another arising issue in the AJK's economy, tourism also effect the cultural authenticity (Abbas & Khaliq, 2024). Eco friendly practices, shifting towards the renewable energy and the effective waste management practices can mitigate the harm effects and preserve the economy from Cultural heritage and environmental deterioration (Shah & Shah, 2024).

Another rising concern regarding tourism is the security issues and the border stress negatively affect the tourism despites much of the tourist area is safe to travel but it still discouraged international tourist to visit AJK (Sajid et al., 2024). It can be tackled through the promotion of safe tourist destination on media and a collaboration with law enforcement departments can increase the inflow of the tourist (Lovelock & Wirtz, 2006). Regardless of all these issues, there are promising opportunities for the tourism development in the region and can contribute in economic growth by bridging these gaps. Researchers propose that by including local communities in tourism planning can leverage the economic development (Ishtiaq et al., 2024).

5. CONCLUSION AND POLICY IMPLICATIONS

Azad Jammu and Kashmir's (AJK) stunning scenery, rich cultural history, and array of recreational options have all contributed to the region's tourism industry's notable growth in recent years. But opinions on tourism are divided in the area; some see it as a chance for economic growth, while others voice worries about possible harm to customs, deterioration of the environment, and commercialization of culture. Over exploitation of resources, improper construction and improper waste management leads towards environmental degradation. Cultural commercialization is another arising issue in the AJK's economy, tourism also effect the cultural authenticity (Abbas & Khaliq, 2024). Eco friendly practices, shifting towards the renewable energy and the effective waste management practices can mitigate the harm effects and preserve the economy from Cultural heritage and environmental deterioration (Shah & Shah, 2024).

The hospitality industry has experienced a rise in employment due to the increase in tourists; nevertheless, there are still issues to be addressed, such as maintaining cultural assets, managing environmental resources, and building better infrastructure. There has been a notable decrease in both spending and revenue in the tourism industry as a result of the COVID-19 outbreak.

Advanced econometric modeling methods provide insightful information about the examination of visitor preferences and spending patterns, which makes it easier to create and implement customized marketing campaigns. Academic studies, for example, have shown that travelers who travel shorter distances prefer to spend a greater percentage of their budget on lodging, food, and shopping, while those who return to the destination favor lodging, transportation, and shopping facilities.

To summarize, future policies should leverage behavioral insights, segmentation techniques, and modern data analytics to develop strong, focused marketing plans that adjust to the changing spending habits and tastes of various traveler groups. Enhancing infrastructure, encouraging sustainable practices, and involving local people are the three main things stakeholders and authorities should concentrate on if they want to fully capitalize on tourism in AJK. In order to promote long-term resilience and growth, it is recommended to diversify tourism products, improve marketing, and handle security issues. By promoting community-based tourism can provide a platform for local businessmen to flourish and it also improved local well-being and sustainable growth can result from striking a balance between environmental protection and economic development. The results of this study can help Azad Jammu and Kashmir formulate sensible policies and plans for the growth of tourism there.

The current study has some limitations. The sample size relies on less respondents, which may not be representative of the whole population. Secondly the data availability is not comprehensive which limits

the analysis. Thirdly, the current study only spans over 2029-2022, which is unable to capture the long run growth.

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