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IMPACT OF COVID-19 ON THE PERFORMANCE OF IT COMPANIES OF SOUTH ASIA

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ABSTRACT

Since January 2020, COVID-19 has impacted numerous nations and areas worldwide. During the pandemic, many companies and institutions started an online working system, due to which it is considered that the profitability of IT companies increased. As we saw in the literature, no study was conducted that provided information regarding the performance of the IT sector before and after COVID-19. Now, we have decided to add to the existing literature about the impact of COVID-19 on IT companies in South Asia. This research was important because it helped identify the performance of IT companies during the pandemic. The main objective of this study was to analyze the performance of the IT sector, both pre and during/post COVID-19, in selected South Asian countries: Pakistan, India, and Sri Lanka. The study included three periods: pre-COVID-19 from 2010 to 2018, during COVID-19, and post-COVID-19 from 2019 to 2021. To determine whether there was a significant difference between the Key Performance Indicators (KPIs) for the IT sector before and during/after COVID-19, we employed a one-sample T-test. Additionally, to compare the performance of countries with each other and to compare the means of the pre-COVID-19 and during/post-COVID-19 periods, we used the Univariate Variance Analysis test. The null hypothesis was that there was no significant difference in ratios of the IT sector in South Asia between the pre and during/post COVID-19 periods. Through the application of one sample T-test and Univariate test, this study concluded that due to COVID-19, there was a significant difference in profitability, solvency, liquidity, and sales ratios, except for the quick ratio, between the periods of pre and during/post COVID-19.

Keywords: COVID-19; IT; South Asia; IT companies; Pakistan; India and Sri Lanka; Ratios. * Email: danial.imran12345@gmail.com © The Author(s) 2023. https://doi.org/10.52223/jess.2023.4208 Received: May 26, 2023; Revised: August 11, 2023; Accepted: August 16, 2023 This is an open-access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

INTRODUCTION

Information technology (IT) is a system of gathering, processing, and reporting the information associated with enterprises. As such, it consists of all of the bodily hardware and, on the alternative, the software, databases, networks, and different associated additives that can be used to build data systems (Shelly et al., 2010). A novel coronavirus named by World Health Organization (WHO) as 'COVID-19' began at the start of December 2019 in Wuhan, a city in China. According to Funket al. (2021), On 11th January 2020, China announced the 1st death from COVID-19. On 30th January, the World Health Organization (WHO) declared an emergency because this virus caused illness, infections, and pneumonia on a large scale. According to Harapan et al. (2020), the outbreak spread rapidly and was difficult to control. Due to COVID-19, communities, businesses, and consumers were affected and faced economic hardship (Bo et al., 2021). According to Sari & Yuhendri (2021), the lockdown was imposed by every country to control the rapid spread of the virus. This policy and restriction on citizens' mobility has weakened the economy. According to Mpungose (2023), some sectors were negatively affected, like food, tourism and aviation. During the lockdown, many institutions the 'work from home' policy, due to which the use of technologies has

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increased. Due to the adaption of innovative ways of dealing with the pandemic, some businesses remain strong and profitable. The telecommunication sector becomes profitable because the shares are considered worth buying during COVID. A study by Ariantika & Davianti (2021)shows that 90 percent of all businesses indicated that COVID-19 had a negative impact on sales, with only a mere 2 percent reporting a boom. Similarly, medium-sized corporations, non-GVC (global value chain) exporting companies (which are also generally medium-sized), and those with medium low-technology manufacturing lines have been hit harder than big or extremely small organizations. According to Ariantika & Davianti (2021) the news of the country's first instance elicits a positive but minimal response from Indonesia's telecommunications companies. Results indicate aberrant returns both before and after the first case in Indonesia was reported. Since January 2020, the COVID-19 has impacted numerous nations and areas worldwide. During the pandemic many companies has been increased. The goal of this research is to look into the impact of COVID-19 on the performance of South Asian IT companies.

The motivation behind this study was that while Pakistan and other countries' information and communications technology industry was a new contributor to the nation's Gross Domestic Product (GDP), according to The Current.PK (Note link of current. PK website mentioned in the references section). Pakistan's IT sector contributed 2.7 percent to the GDP, while India's information technology (IT) sector, according to Unacademy, had a share of 9.3% in the country's GDP, and Sri Lanka's IT sector, according to Information and Communication Technology Agency (ICTA), contributed 4.37% to the GDP. Therefore, the IT sector quickly established itself as an essential part of the economy, playing crucial roles in the industrial, service, and agricultural sectors. The Information and Communications Technology (ICT) zone contributed to the national economy through the following channels: (I) greater productivity and efficiency in associated sectors (on a broad scale, industry and agriculture); and (ii) improved governance and transparency (iii) in the export of IT and IT-related offerings. Because Pakistan's and other South Asian countries' ICT sectors were still relatively new, the impact of a pandemic on IT and IT-related services had sparked attention.

Research Significance

Since January 2020, COVID-19 impacted numerous nations and areas worldwide. During the pandemic, many companies and institutions started an online working system, due to which it was considered that the profitability of IT companies had increased. As we saw in the literature, no study was conducted that provided information regarding the performance of the IT sector before and after COVID-19. Now, we decided to add to the existing literature about the impact of COVID-19 on IT companies in South Asia. This research was important because it helped to identify the performance of IT companies during the pandemic. As IT companies played an important role in GDP and had the potential to grow vastly in the future, the comparison of pre and post-pandemic periods would give a clear result about their performance. This study was also beneficial for people who wanted to know the performance of IT companies before and after COVID-19 because some people thought that the IT sector was more profitable during COVID-19. Still, in our study, we clearly explained that the IT sector performed well in some ratios due to COVID-19 and did not perform well according to some ratios, as discussed below.

The purpose of this research was to investigate the effect of COVID-19 on the performance of South Asian IT companies. The present research objective was to determine the difference between the profitability, liquidity, solvency, and sales ratios of IT companies in South Asia between the pre and post-COVID-19 period and also to compare the performance of countries with each other with respect to the Information Technology (IT) sector.

LITERATURE REVIEW

Alsamhi et al. (2022) conducted a study to investigate the effect of the pandemic on the performance of Indian sectors. Results show that the food and construction sectors were unaffected by the pandemic as they reduced their expenses. The most affected sectors are the customer sector, hospitality and tourism. Hassija et al. (2020) conducted a study in which they concluded that the use of technologies such as Unmanned Aerial Vehicles and Artificial Intelligence has reduced the impact of a pandemic., Internet of Things, 5G, and blockchain. Gunanta (2021) examined the impact of covid-19 on Earning per share (EPS)and Return on Asset (ROA). The results showed that in telecommunications companies, values are affected by profitability. There is a fluctuation in the growth of earnings per share and return on assets during the 3 quarters of 2020.

Siriwardhana et al. (2020) conducted a study to see the advantages of technologies during the fight against the pandemic. This paper shows how efficiently 5G and the Internet of Things (IOT) helped during the fight against the pandemic. 5G and the Internet of Things (IOT)can provide innovative solutions to education, Telehealth, retail, tourism, and e-government. Ben-Ahmed et al. (2022) analysed the impact of the pandemic on the digital sector. The findings indicate that a pandemic has a favourable effect on the stock returns of online businesses. The study found that the performance of the digital sector is better than the other sectors. Nguyen (2022) conducted a study on the pandemic that has affected the economy and the performance of all enterprises. The study found that profitability and efficiency ratios decreased while leverage ratio increased during the pandemic. On the liquidity ratio, there is no discernible difference. Furthermore, returns on assets, receivable turnover, and leverage have also decreased. Shen et al. (2020) investigated the effect of covid-19 on the corporate efficiency of Chinese businesses. The findings show that pandemics have a negative impact on high-impact regions and areas. Achim et al.(2021) analyzed the efficiency of business during the covid-19. Findings conclude that the size of the company, liquidity, and financing increased ROA and ROE and made the economic performance of enterprises better. Ariantika & Davianti (2021) observed that Due to the pandemic, the stock market responded dramatically. This study analyzes the impact of COVID-19 on the Indonesian stock market. The results show abnormal returns before and after the announcement of 1st case in Indonesia. Khatib & Nour (2021) observed the effect of COVID-19 on firm performance and corporate governance. The results show that firm performance shows a positive impact due to board size. Amnim et al. (2021) identified the impact of COVID-19 on the profitability and liquidity of Nigerian firms. The results show that there is a positive significant difference in profitability and liquidity of firms due to the pandemic. Due to the lockdown, imports and exports were affected, due to which the profitability and liquidity of firms have decreased. Fu & Shen (2020) studied that the Covid-19 has badly affected the global economy. This study examines the effect of the pandemic on the performance of the energy industry. The results show that the performance of companies with stronger goodwill impairment is less affected by the pandemic. Lesi (2020) conducted a study on small and medium enterprises in Indonesia. The results showed that the impact of information technology on the business activities and the financial statement of the company is considerable. Just & Echaust (2020) examined the relationship between COVID-19 and stock market return and liquidity. The results found that correlation and volatility are closely dependent on each other but not on liquidity. Lin & Zhang (2020) observed the impact of COVID-19 on the exports of agriculture businesses of China. The study reveals that pandemic has adversely affected the smaller firms as compared to the larger businesses. Shafi et al. (2020) analysed the impact of COVID-19 on micro, small, and medium enterprises and helped them reduce business loss and survive during crises. The results show that most of them are facing various issues like financing, decrease in demand, sales, and profit. 83% of them were not ready and didn't have any plan for how to handle this situation. Many of them reported that they could not survive if the lockdown lasts for more than two months. Engidaw (2022) identified the challenges of small businesses during the covid-19. In this study

both quantitative and qualitative approaches used. The results of secondary data show that pandemic has caused destruction for many businesses and many small and large businesses facing challenges. Kumaravel et al. (2020) said that corona virus has spread too many countries. The technologies were being helpful to tackle the responsibility during the pandemic. Apart from negative effects, it is important to understand that pandemic has also given some positive effects to society.

Previous studies focused on the performance of firms and stocks. Studies were conducted on the logistic, tourism, healthcare, and food sectors. However, no one had ever compared the IT sectors' pre and post-pandemic performance. This study aimed to be the first of its kind, determining the impact of COVID-19 on IT companies in South Asia. The research paper conducted a comparative study of pre and post-pandemic performance of IT companies, collecting data from 18 companies in South Asia from 2010 to 2021. The third advantage of this study was the use of ratios to identify the performance of IT sectors. The foundation of this research study was the performance evaluation theory, which explained that the performance of any organization depended on key performance indicators (KPIs), which might vary for each industry. As the objective of this research paper was to determine the financial performance of IT companies in South Asia before and after COVID-19, the instrument used to measure financial performance indicators (KPIs) were accounting ratios. used ratio analysis for performance evaluation of companies (Gunanta, 2021; Nguyen, 2022; Amnim et al., 2021; Ben-Ahmed et al., 2022). We now proceed to delve into the conceptual framework as depicted in Figure 1.



Figure 1. Conceptual framework.

Hypothesis Information

Referring to our study, the null hypotheses stated that ratios of two sub-periods, pre, and during-post-COVID-19, were not significantly different based on our research objective. The following alternative hypotheses were stated.

Ha 1: There was a significant difference in the average (Return on Asset) ROA ratio of IT companies in South Asia between the pre and post-COVID-19 period.

Ha 2: There was a significant difference in the average (Return on Equity) ROE ratio of IT companies in South Asia between the pre and post COVID-19 period.

Ha 3: There was a significant difference in the average operating margin ratio of IT companies in South Asia between the pre and post COVID-19 period.

Ha 4: There was a significant difference in the average net margin ratio of IT companies in South Asia between the pre and post COVID-19 period.

Ha 5: There was a significant difference in the average current ratio of IT companies in South Asia between the pre and post COVID-19 period.

Ha 6: There was a significant difference in the average Asset turnover ratio of IT companies in South Asia between the pre and post COVID-19 period.

Ha 7: There was a significant difference in the average interest coverage ratio of IT companies in South Asia between the pre and post COVID-19 period.

Ha 8: There was a significant difference in the average quick ratio of IT companies in South Asia between the pre and post COVID-19 period.

Ha 9: There was a significant difference in the average long-term debt-to-equity ratio of IT companies in South Asia between the pre and post COVID-19 period.

Ha 10: There was a significant difference in the average long-term debt to Asset ratio of IT companies in South Asia between the pre and post COVID-19 period.

Ha 11: There was a significant difference in the average total debt to asset ratio of IT companies in South Asia between the pre and post COVID-19 period.

Ha 12: There was a significant difference in the average total debt to equity ratio of IT companies in South Asia between the pre and post COVID-19 period.

Ha 13: There was a significant difference in the average sales margin ratio of IT companies in South Asia between the pre and post COVID-19 period.

METHODOLOGY

Population Sample and Time Period

This empirical research studied the impact of COVID-19 on IT companies in South Asia. The selected sample consisted of 13 companies from three countries in South Asia, representing the target population of all companies in the region. We sampled Pakistan, Sri Lanka, and India and selected 5 Information Technology (IT) companies as a sample from each country, but we found only three IT companies in Sri Lanka, so our total sample size was 13 companies. The data source was annual financial reports from the respective company websites for the time period of pre-COVID-19 (2010-2018) and during & after COVID-19 (2019-2021). The companies selected for our study are listed in Table A in the appendix.

Concept, Construct, and Variable

The concept in this study was to measure the performance of companies using ratio analysis. The variables derived from these ratios were described in the appendix section.

Methods

Shen et al. (2020) applied the Wilcoxon Signed Rank method to identify the performance of 114 logistic companies on ratios. Many other authors in their studies utilized ratio analysis for the performance evaluation of companies, for instance (Gunanta, 2021; Ben-Ahmed et al., 2022; Nguyen, 2022; Amnim et al.,

2021). In this study, we applied Univariate variance analysis for country comparisons and assessed the changes in performance ratios. Additionally, we employed a T-test model with a 5% alpha level on IT companies in South Asia, which aided in determining the impact of COVID-19. The websites of companies were helpful as all financial data was available in a standard format in the form of financial statements. As a first step, the ratios were calculated for sampled companies using MS EXCEL. Secondly, SPSS software was used for hypothesis testing. The tests applied here were one sample t-test and Univariate variance analysis. The ratios calculated included profitability, liquidity, solvency, and sales ratios. The variables were discussed along with their formulas in Table B in the appendix.

RESULTS AND DISCUSSION

In this study, we analyzed the performance of the IT sector, both pre and during-post COVID-19, in selected South Asian countries: Pakistan, India, and Sri Lanka. This study included two study periods, pre-COVID-19 from 2010 to 2018 and during & post-COVID-19 from 2019 to 2021. In order to test the significant difference in Key Performance Indicators (KPIs) before and during-post COVID-19 in the IT sector, we used a one-sample T-test. For comparing countries' performance with each other and comparing means of the pre and during-post-COVID-19 period, we used the Univariate Variance Analysis test.

Table 1 showed T-test results to check whether there was a significant difference in the average ratio of IT businesses in South Asia between the pre and post-COVID-19 period. By applying the T-test on the ratios of the IT sector in South Asia, we indicated that due to COVID-19, there was a significant difference in average ratios, including (Return on Asset, Return on Equity, Net Margin, Operating Margin, Current Ratio, Asset Turnover, Interest Coverage, Long-term debt to Asset, Long-term debt to Equity, Total debt to Asset, Total Debt to Equity, and Sales Margin). We rejected the null hypothesis (ratios of two sub-periods, pre, and during-post COVID-19 are not significantly different) by using a significance level of 0.05, except for the Quick Ratio because this ratio showed an insignificant value of 0.321. Therefore, we accepted the null hypothesis that there is a significant difference in the ratios of the two sub-periods, pre, and during-Post COVID-19.

Ratio	Significance value Pre covid	Significance value during & aftercovid-19	Null Hypothesis	Significant difference due to covid-19
ROE	0.000	.002	Rejected	Present
ROA	0.000	0.001	Rejected	Present
NM	0.108	0.000	Rejected	Present
ОМ	0.115	0.000	Rejected	Present
CR	0.000	0.024	Rejected	Present
AT	0.000	0.000	Rejected	Present
IC	0.035	0.002	Rejected	Present
QR	0.000	0.321	Accepted	Absent
LTDA	0.001	0.001	Rejected	Present
LTDE	0.000	0.007	Rejected	Present
TDTA	0.000	0.000	Rejected	Present
TDTE	0.000	0.019	Rejected	Present
SM	0.000	0.000	Rejected	Present

Table 1. T-Test Results.

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After explaining the T-test results in Table 1, we now present the Univariate test results in Table 2, showing the country-wise performance of the IT sector for the pre and during-post COVID-19 period. For ROA, we saw that Pakistan's ROA during and post COVID-19, on average, was 16.413% higher compared to Sri Lanka and 16.610% higher compared to India. If we talk about Sri Lanka, its ROA was, on average, 0.198% higher compared to India. Overall, Pakistan's ROA was better during and post COVID-19 period. In the case of ROE, we saw that Pakistan's ROE during and post COVID-19, on average, was 7.905% higher compared to Sri Lanka and 13.540% higher compared to India. If we talk about Sri Lanka, its ROE was, on average, 5.635% higher compared to India. Overall, Pakistan's ROE was better during and post COVID-19 period.

Regarding OM, QR, NM, LTDA, LTDE, CR, TDTA, and TDTE, we saw that Pakistan during and post COVID-19, on average, was higher compared to Sri Lanka and India. However, in terms of Asset turnover, longterm debt to equity, and sales margin, Sri Lanka performed well compared to Pakistan and India during and post COVID-19 period. The interest coverage ratio showed that India performed well during and post COVID-19 period and paid their interest timely. Overall, the Indian IT sector was hit more by COVID-19, and the Indian economy was very scattered compared to Pakistan and Sri Lanka. India recorded a total of 44.6M cases, out of which 529k people died, so they imposed a very strict lockdown, and that's the reason Indian IT companies were also hit like other sectors. Results from Alsamhi et al. (2022) were similar to our study. Their study also showed that consumer sectors, hospitality, and tourism showed a significant difference between the pre and post COVID-19 period, with net sales and net profit of these sectors decreasing. However, Gunanta (2021) provided opposite results to our study. He analyzed the profitability of the telecommunication market and stated that there was a significant difference between the pre and post COVID-19 period in terms of ROA, which went downwards.

Achim et al. (2021) analyzed the performance of businesses during COVID-19 and provided similar results to our study. Their study also showed that small businesses, due to liquidity and financing, saw ROA go upward. Amnim et al. (2021) checked the profitability and liquidity of Nigerian companies, and their study also provided some ratios results similar to ours, where liquidity and profitability were positive but sometimes decreased due to lockdown. In our case, our IT sector's ROA and current ratio increased, while others decreased. Achim et al. (2021) conducted research on Romanian companies, and their study also stated that net sales were going downward during COVID-19, which is similar to our study.

Ratios	South Asia	Mean difference
Return on asset		
Pakistan	Sri Lanka	16.413*
	India	16.610*
Sri Lanka	Pakistan	-16.413*
	India	.198
India	Pakistan	-16.610*
	Sri Lanka	198
Return on equity		
Pakistan	Sri Lanka	7.905*
	India	13.540*
Sri Lanka	Pakistan	-7.905*
	India	5.635
India	Pakistan	-13.540*
	Sri Lanka	-5.635
Net margin		
Pakistan	Sri lanka	29.897
	India	18.909

Table 2. Univariate test result.

Sri Lanka	Pakistan	-29.897
	India	-10.988
India	Pakistan	-18.909
	Sri Lanka	10.988
Operating margin		
Pakistan	Sri Lanka	27.446
	India	11.914
Sri Lanka	Pakistan	-27.446
	India	-15.532
India	Pakistan	-11.914
	Sri Lanka	15.532
Current ratio		
Pakistan	Sri Lanka	3.348*
	India	2.487
Sri Lanka	Pakistan	-3.348*
	India	861
India	Pakistan	-2.487
	Sri lanka	.861
Asset turnover		
Pakistan	Sri Lanka	-48.019*
	India	40.241*
Sri Lanka	Pakistan	48.019*
	India	88.260*
India	Pakistan	-40.241*
	Sri Lanka	-88.260*
Interest covering		
Pakistan	Sri Lanka	27.016
	India	-597.746
Sri Lanka	Pakistan	-27.016
	India	-624.762
India	Pakistan	597.746
	Sri Lanka	624.762
Quick ratio		
Pakistan	Sri Lanka	3.278*
	India	2.366
Sri Lanka	Pakistan	-3.278*
	India	912
India	Pakistan	-2.366
	Sri Lanka	.912
Long term debt to asset		
Pakistan	Sri Lanka	-130.323*
	India	7.665
Sri Lanka	Pakistan	130.323*
	India	137.989*
India	Pakistan	-7.665
	Sri Lanka	-137.989*
Long term debt to equity		
Pakistan	Sri Lanka	-237.322*
	India	18.825
Sri Lanka	Pakistan	237.322*
	India	256.147*

India	Pakistan	-18.825
	Sri Lanka	-256.147*
Total debt to asset		
Pakistan	Sri Lanka	28.026*
	India	28.321*
Sri Lanka	Pakistan	-28.026*
	India	.295
India	Pakistan	-28.321*
	Sri Lanka	295
Total debt to equity		
Pakistan	Sri Lanka	60.234*
	India	64.073*
Sri Lanka	Pakistan	-60.234*
	India	3.839
India	Pakistan	-64.073*
	Sri Lanka	-3.839
Sales margin		
Pakistan	Sri Lanka	-30.728*
	India	11.573
Sri Lanka	Pakistan	30.728*
	India	42.301*
India	Pakistan	-11.573
	Sri Lanka	-42.301*

After discussing the country-wise Univariate results in Table 2, we now present Table 3, which also shows the Univariate test results to analyze the overall performance of the IT sector in South Asia for the pre and during-after COVID-19 period. If we talk about ROA, the ROA of the pre-COVID-19 period was 1.699% less compared to the during-after COVID-19 period. It means the ROA of the IT sector in South Asia performed well during and after COVID-19. The reason for the increase in ROA in the post-COVID-19 period is that companies generated more of their income from sources of Asset financing. Regarding ROE, the ROE of the pre-COVID-19 period was 1.757% better compared to the during-after COVID-19 period. It means the ROE of the IT sector in South Asia did not perform well during and after the COVID period. The reason for the decrease in ROE in the post-COVID-19 period is that IT companies generated more of their income from sources of debt financing as compared to Equity Financing. The net margin showed a 12.821% on average decrease in the during-after COVID-19 period. This decrease in net margin is due to IT companies in South Asia using debt financing, and as a result of interest payment on that debt, the net margin during-after COVID-19 decreased. The operating margin showed a 12.136% on average decrease in the during-after COVID-19 period. The reason for the decrease in operating margin after COVID-19 is that operating costs were too high due to inflation. The current ratio showed a 0.020% on average decrease in the during-after COVID-19 period, but it was on average better. The asset turnover showed a 12.136% on average decrease in the during-after COVID-19 period. The drop in ATO after COVID-19 is because IT companies were more invested in fixed assets. During the pandemic, the IT sector heavily invested in technology infrastructure to fulfill the world's demand, which is why the above table shows a decrease in ATO after COVID-19. The interest coverage ratio showed a 382.812% on average decrease in the during-after COVID-19 period. It means that after COVID-19, the IT sector was unable to pay its interest on debt, which is why IC goes down. The quick ratio showed a 0.194% on average decrease in the during-after COVID-19 period. The long-term debt to assets (LTDA) showed a 63.266% on average decrease in the during-after COVID-19 period, which is better because a lower LTDA means better performance. The reason for the better performance is that, on average, IT companies had more long-term assets during and after COVID-19 to pay their liabilities. The

long-term debt to equity (LTDE) showed a 13.399% on average increase in the during-after COVID-19 period, which is not better because a lower LTDE means better performance. The reason for the bad performance of IT companies in terms of LTDE after COVID-19 is that they had more long-term borrowed capital instead of owned capital. Both total debt to assets (TDTA) and total debt to equity (TDTE) increased by 1.503% and 6.536% on average in the during-after COVID-19 period. These two ratios were high because IT companies were financed using borrowed money instead of their own total assets and equity.

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Covid-1	Mean difference in %		
ROA			
Pre Covid-19 (2010to2018)	During & post Covid-19 (2019To2021)	-1.669	
During and post Covid-19 (2019To2021)	Pre Covid-19 (2010to2018)	1.669	
ROE			
Pre Covid-19 (2010to2018)	During &post Covid-19 (2019To2021)	1.757	
During and post Covid-19 (2019To2021)	Pre Covid-19 (2010to2018)	-1.757	
NET margin			
Pre Covid-19 (2010to2018)	During & post Covid-19 (2019To2021)	12.821	
During and post Covid-19 (2019To2021)	Pre Covid-19 (2010to2018)	-12.821	
Operating margin			
Pre Covid-19 (2010to2018)	During &post Covid-19 (2019To2021)	12.136	
During and post Covid-19 (2019To2021)	Pre Covid-19 (2010to2018)	-12.136	
Current Ratio			
Pre Covid-19 (2010to2018)	During & post Covid-19 (2019To2021)	.020	
During and post Covid-19 (2019To2021)	Pre Covid-19 (2010to2018)	020	
Asset turnover			
Pre Covid-19 (2010to2018)	During & post Covid-19 (2019To2021)	12.212	
During and post Covid-19 (2019To2021)	Pre Covid-19 (2010to2018)	-12.212	
Interest covering			
Pre Covid-19 (2010to2018)	During & post Covid-19 (2019To2021)	382.120	
During and post Covid-19 (2019To2021)	Pre Covid-19 (2010to2018)	-382.120	
Quick ratio			
Pre Covid-19 (2010to2018)	During & post Covid-19 (2019To2021)	.194	
During and post Covid-19 (2019To2021)	Pre Covid-19 (2010to2018)	194	
Long term debt to asset			
Pre Covid-19 (2010to2018)	During & post Covid-19 (2019To2021)	63.266*	
During and post Covid-19 (2019To2021)	Pre Covid-19 (2010to2018)	-63.266*	
Long term debt to equity			
Pre Covid-19 (2010to2018)	During &post Covid-19 (2019To2021)	-13.399	
During and post Covid-19 (2019To2021)	Pre Covid-19 (2010to2018)	13.399	
Total debt to Asset			
Pre Covid-19 (2010to2018)	During & post Covid-19 (2019To2021)	-1.503	
During and post Covid-19 (2019To2021)	Pre Covid-19 (2010to2018)	1.503	
Total debt to equity			
Pre Covid-19 (2010to2018)	During & post Covid-19 (2019To2021)	-6.536	
During and post Covid-19 (2019To2021)	Pre Covid-19 (2010to2018)	6.536	
Sales margin			
Pre Covid-19 (2010to2018)	During & post Covid-19 (2019To2021)	7.918	
During and post Covid-19 (2019To2021)	Pre Covid-19 (2010to2018)	-7.918	

The sales margin showed a 7.918% on average decrease in the during-after COVID period. The reason for the decrease in sales margin is due to increases in the cost of goods sold, and the reason for the increase in CGS is overall inflation in the world.

CONCLUSION AND POLICY IMPLICATIONS

In this study, we analyzed the performance of the IT sector, both pre and during-post COVID-19, in selected South Asian countries: Pakistan, India, and Sri Lanka. This study included two study periods, pre-COVID-19 from 2010 to 2018, and during & post COVID-19 from 2019 to 2021. In order to test the significance difference of Key Performance Indicators (KPIs) before and during-post COVID-19 of the IT sector, we used one-sample T-test. For comparing countries' performance with each other and comparing means of the pre and during-post COVID-19 period, we used the Univariate Variance Analysis test. The application of the one-way T-test and Univariate Variance analysis on ratios of the two sub-periods, including pre-COVID-19 (2012 to 2018) and during-post COVID-19 (2019 – 2021), showed mixed results related to the COVID-19 impact on South Asia. Our results showed that there was a significant difference in all ratios of the IT sector in South Asia between pre and post COVID-19, except for the quick ratio, where our test indicated no significant difference due to COVID-19. If we compare the three countries in terms of their IT performance, Pakistan performed well in most of the ratios, Sri Lanka's IT companies stood second in their performance, and India's IT sector was in the worst position. Based on our results, the overall performance of the IT sector in South Asia increased in terms of ROA, CURRENT RATIO, and LONG TERM DEBT TO ASSET, but the performance of the IT sector decreased in terms of Net margin, Operating margin, ROE, Asset turnover, LTDE, Interest cover, Quick ratio, total debt to asset, total debt to equity, and sales margin.

Digitalization, in addition to the use of statistics and the electronic age, not only secured us during the COVID-19 but will also help manage the post-pandemic world. This study is important because investors can use this study to make decisions as the IT sector survived during the pandemic to improve people's lives and economies. Artificial Intelligence (AI), Big Data, 5G communications, and cloud computing are examples of modern technology, and due to these reasons, investors are more focused on making investments in this sector. Technology and engineering managers will have to deal with difficult scenarios and fulfill complicated managerial obligations such as cost, scope, satisfaction, usable resource control, and risk management in order to put the promising answers in place and grasp their benefits. We are just focusing on South Asia, but in the future, the sample size may be extended to add more countries in Western Asia and Northern Asia in the analysis. This will be particularly helpful as it will highlight the country-wise impact pattern of COVID-19 on the IT sector.

In this study, we selected Pakistan, India, and Sri Lanka as a sample and left out Bangladesh and Nepal because Nepal has 1 to 2 IT companies, while most of the companies in Bangladesh can't provide financial statements in their annual reports, so we don't have access to data that are necessary to calculate ratios. That's why we left out other countries in South Asia.

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Appendix

Table A. Selected companies.

PAKISTAN	INDIA	SRI LANKA
 NESTOL TRG AVN SYS TELE 	 Hex aware Tech Mahindra Horton communication (HCL) Mind tree TATA consultancy services 	IBMSOFTLOGICVIRTUSA

Table B. Description of variables.

Ratio Group	Proxy	Abbreviation Used	Operational Definition
	Return on assets	ROA	net profit
lity			total assets
abi	Return on equity	ROE	net profit
ofite Rat			total equity
Pro	Net Margin	PM	net income
			revenue
	Operating margin	ОМ	operatingprofit
			sales
s It	Current ratio	CR	currentasset
tio			currentliablities
iqu ra	Asset turnover	ATO	net sales
y L			total assets
	Interest covering	IC	profitbeforeintrestandtaxes
			interestexpence
	Quick ratio	QR	C.A – inventories – prepaidexpences
			currentliablities
	Long term debt to asset	LTDA	longtermdebt
, c			totalasset
Solven ratios	Long term debt to equity	LTDE	longtermdebt
			totalequity
	Total debt to asset	TDA	totaldebt
			totalasset
	Total debt to equity	TDE	totaldebt
			totalequity
Sales	Sales margin	SM	sales
			profitaftertax