Mapping the Influence of the COVID-19 Pandemic on the Indian Economy : Insights from the Smart PLS-SEM Approach with IPMA

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Abstract

This research paper aimed to empirically evaluate the impact of the COVID-19 pandemic on the economies of India and Himachal Pradesh. The purpose of the study was to measure the pandemic's economic severity and learn lessons for formulating policies to manage future crises. Utilizing secondary data, the study employed a descriptive research technique based on macroeconomic indicators to assess the pandemic's effect on the Indian economy. A multivariate research technique based on the Smart PLS-SEM version 4.0 approach with IPMA was used to determine the effect of COVID-19 on the economy of Himachal Pradesh. Primary data were collected from 400 respondents using random sampling techniques for the analysis. The findings demonstrated that, with the exception of agriculture and related fields, the pandemic had a negative effect on every sector of the Indian economy. Additionally, the results revealed that various horticultural activities, such as production, finance, marketing, and human resources, had a positive and significant impact on the horticulture business, which in turn positively and significantly influenced the economy of Himachal Pradesh. Mediation research validated the importance of government initiatives in strengthening the connection between the horticulture business and the state's economy. The IPMA analysis confirmed that the horticulture sector, in combination with government policies, had the potential to boost Himachal Pradesh's economy. By presenting a conceptual model, this study contributed to the existing literature, enabling replication to analyze the effects of other disasters or crises. Moreover, it is one of the few studies that explicitly examined the relationship between business and the economy in the context of the pandemic.

Keywords : **Covid-19 pandemic, Indian economy, horticulture business, horticulture economy**

JEL Classification Codes : C11, C83, O11, O13, O47, R11

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The COVID-19 pandemic has triggered widespread destruction across the globe and has had a significant impact on all facets of human life. This pandemic is not the first major incident that has caused an economic crisis to arise on a global scale. However, similar circumstances have resulted from epidemics, wars, recessions, natural catastrophes, and other crises. The pandemic has caused significant disorders in the global economic system, resulting in a downfall across all sectors (Kaur, 2022). The United Nations has

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characterized it as the most severe human and economic disaster in our lifetimes (Alam et al., 2021; Dominguez & Broom, 2020). It has caused an incredible blow to the world economy, comparable to both the financial crisis of 2008–2009 and the Great Depression of the 1930s. In 2020, the world economy experienced a decline of 4.6% as a result of the COVID-19 distractions (Sahoo & Ashwani, 2020). The COVID-19 outbreak in Wuhan, China, began in December 2019 (Almaghaslah et al., 2020). On March 30, 2020, the WHO declared this a global pandemic and an emergency pertaining to community health (Unni, 2020). This has affected almost every country in the globe (Jribi et al., 2020) and has caused a substantial number of deaths (Debata et al., 2020). The pandemic and subsequent lockdowns had extensive consequences in multiple domains, including health, the economy, politics, geography, social stability, education, and technical progress (Zyoud, 2023). Junuguru and Singh (2023) argued that the impact of the epidemic on the global economy was severe enough that it would likely take almost a decade to fully recover worldwide. However, the global ecosystem observed positive outcomes, such as reduced air pollution and emissions of greenhouse gases (Alam et al., 2021; Chakraborty & Maity, 2020).

The first COVID-19 case in India was reported on January 30, 2020, in the Thrissur District of Kerala, while in Himachal Pradesh, the first case of COVID-19 was confirmed on March 20, 2020. Subsequently, India experienced a sharp rise in COVID-19 cases, making it the most affected country in Asia and the second most affected worldwide after the USA (Alok et al., 2021). Multiple sectors of the Indian economy, such as tourism, hospitality, transportation, aviation, textiles, agriculture, gems and jewelry, manufacturing, automobiles, smartphone development, consumer electronics, external trade, startups, and retail, experienced significant financial losses during the pandemic and the successive lockdowns (Debata et al., 2020). India was already experiencing slower economic growth as a result of demonetization and the implementation of the GST system before the outbreak struck. The pandemic further intensified these concerns, underscoring a distinct connection between COVID-19 and India's economic decline (Poddar & Yadav, 2020). Consequently, this crisis caused disruptions in supply chain networks and eroded demand around the globe. Thus, at the first stage, the current study assessed the impact of COVID-19 on the Indian economy.

The coronavirus pandemic had an extensive effect on almost all sectors of Himachal Pradesh's economy. However, the government took aggressive measures to combat the epidemic by utilizing its established healthcare and decentralized governance institutions. In addition, several measures were implemented to alleviate the economic consequences of COVID-19, including financial infusion, provision of food and shelter for the needy, job creation, boosting agricultural and industrial production, offering relief to affected sectors, and supporting public sector undertakings (PSUs). A significant portion of the economy was affected, including the primary sector's mining and quarrying operations, the secondary sector's manufacturing and construction operations, and the tertiary sector's tourism operations. On the other hand, agriculture and horticulture faced minimal disruption since they had an ample supply of labor, easy access to markets, a reliable financial system, strong internet connectivity, and effective state government policies. Agriculture and horticulture play a vital role in Himachal Pradesh, providing direct employment to about 70% of the population and contributing 13.62% to the state's GDP (Government of Himachal Pradesh, 2021). Himachal Pradesh, referred to as the apple state of India, allocates about half of its fruit-growing land to apple farming, which contributes to around 85% of the state's overall fruit output. Thus, it is crucial to analyze the repercussions of COVID-19 on the horticultural sector and the general economy of Himachal Pradesh, considering its substantial economic significance.

Literature Review

Examining the impacts of pandemics, epidemics, recessions, wars, crises, and natural disasters on the economy and society is a well-established area of research. Exploratory research methods are often utilized to elucidate uncertainties and provide insights into the problem. Numerous studies have examined the effects of COVID-19 on

the economy. Nevertheless, there is a shortage of sector-specific research using the Smart PLS-SEM to investigate the several facets of the pandemic's impact on policymaking.

This subsection provides a review of several important existing studies in this domain. Osterholm (2005) suggested a series of strategies to address pandemics at several levels, including local, regional, national, and international. These techniques are essential in responding to a pandemic: collecting surveillance data, prioritizing border security, establishing survival policies, promoting collaboration between public and commercial sectors for emergency preparation, and utilizing antiviral medications. Prior to effectively combating pandemics, it is crucial to evaluate the state of the global economy, accumulate necessary resources, and guarantee the accessibility of vaccinations and medical equipment. Keogh-Brown et al. (2010) discovered that as disease severity increases, the impact on GDP losses is relatively small. However, industries that rely heavily on manual labor suffer substantial declines in domestic production, while agriculture is relatively less impacted. Dev and Sengupta (2020) argued that lockdowns were enforced to buy time to strengthen the healthcare system. However, the pandemic had the unintended consequence of causing an economic blow, impacting both the organized and unorganized sectors' growth. In India, the tourism, aviation, and hospitality sectors suffered setbacks, but the agricultural sector fared better than manufacturing and services. It was suggested that strategies be implemented that target both the supply and demand sides in order to stabilize the economy and reduce the negative effects of the pandemic.

Kumra (2020) highlighted the deep-rooted impact of the pandemic on India's economy, affecting GDP, employment, MSMEs, trade, financial markets, government budgets, inflation, and other macroeconomic factors, while agriculture remains the only sector that saw an increase. Chaudhary et al. (2020) conducted a study about the effects of the pandemic on various sectors, including GDP, aviation, tourism, retail, capital markets, MSMEs, and oil. Their findings revealed a substantial decline in these sectors. The COVID-19 epidemic has emphasized the need for policymakers to implement sustainable development strategies that prioritize self-sufficiency, inclusiveness, and environmental sustainability. Gregosz et al. (2020) emphasized the economic repercussions of the pandemic on the world economy. They noted that the shock was far more systematic, severe, and extensive compared to the 2008 financial crisis.

Agarwal and Singh (2020) found that transportation, aviation, hospitality, tourism, and manufacturing were severely affected by the pandemic disorder, while industries such as medicines, chemicals, and the digital economy enjoyed growth. Ozili and Arun (2020) revealed that the growing duration of lockdowns, monetary policy determinations, and limitations on overseas travel had a profound impact on the overall level of economic activity. The research work illustrated that COVID-19 has created a sense of urgency for officials to swiftly implement policies that could prevent the nation from experiencing a recession. Maital and Barzani (2020) contended that pandemics mostly affect the supply side of the international economy, whereas the measures taken to address them primarily target the demand side. The study examined the past occurrences of four pandemics in order to evaluate the overall economic effects of COVID-19 on the global economy: The H2N2 virus in 1889, the 1918 Spanish flu, the 1957 Asian flu, and the 1968 Hong Kong flu.

According to Sarkar (2020), restrictions on people's mobility and a labor shortage have had a significant negative influence on the agricultural industry. The closing of hotels and restaurants presents a risk to the agriculture and poultry industries in terms of reduced demand. Tougeron and Hance (2021) argued that the pandemic has posed many difficulties for apple orchards, encompassing production, trade chains, monitoring, and logistics. Bulgari et al. (2021) described a concise overview of the effects of the pandemic on horticulture. They determined that countries will encounter challenges such as market vulnerability, a decline in available labor, and the necessity for governments to establish emergency response strategies to bolster their economic assistance.

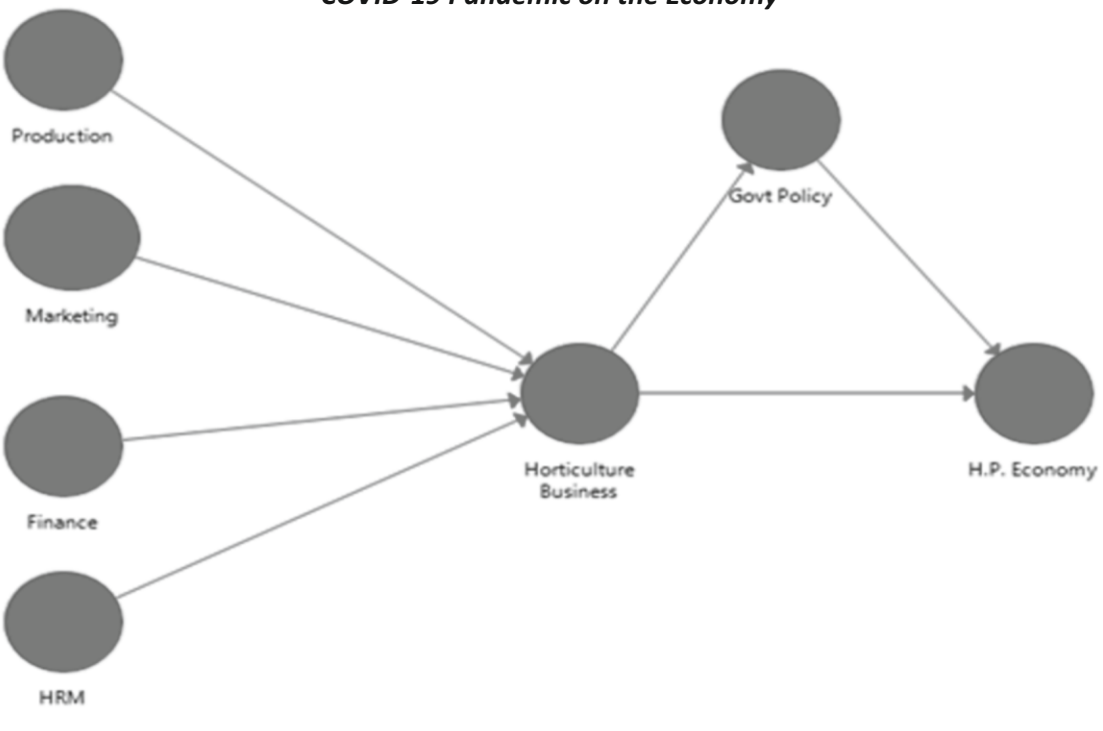
Indu et al. (2022) examined the state of affairs of rural-urban networking systems in terms of internet accessibility during a pandemic, specifically focusing on the period from June 2019 to June 2020 by analyzing two

sets of data—one collected in June 2019 prior to the epidemic and the other in June 2020 during the pandemic—it looked at how the pandemic affected the reduction of the digital gap. Proportional and trend analysis techniques were used in the analysis. The survey's findings attested to the fact that, in the COVID-19 period, the digital divide between rural and urban areas has shrunk. Junuguru and Singh (2023) stated that due to COVID-19, many international firms in China are planning to relocate their operations to a different place. The report suggested that in the new global scenario, India might attract multinational firms as an investment destination, provided it manages its internal and external issues well.

Model Specification

The creation of a structural equation model is predicated on previous research, the goals and theories of the study, and the observations of the investigator. The impact of the pandemic on the Himachal Pradesh economy is examined in detail using the suggested model. As seen in Figure 1, the model has seven suggested pathways. The model has four exogenous variables pertaining to economic activities, namely production, marketing, finance, and human resources, together with one endogenous variable, specifically the horticulture industry. The horticultural sector is viewed as the exogenous construct in the following stage, and the horticultural economy of Himachal Pradesh is viewed as the endogenous factor. Government policy intervention serves as the intermediary factor in these interactions. In order to accomplish the study objectives and examine the structural connections between constructs, the Smart PLS-SEM version 4.0, a multivariate statistical technique, is utilized. The present research presents a theoretical framework, specifically a structural equation model, that is suggested to evaluate the COVID-19 pandemic's effects on the economy. This model is shown in the following Figure 1.

Figure 1. ***Proposed Structural Equation Model for Assessing the Impact of the COVID-19 Pandemic on the Economy***



Statement of the Problem

Many studies have examined the consequences of pandemics, such as COVID-19, on the global economic system and, in particular, on the Indian economy, according to a review of the literature that is currently available. However, none of these studies have empirically examined the impact of COVID-19 on India's economy, focusing specifically on the horticulture sector in Himachal Pradesh. Therefore, using both primary and secondary data, the current research project aims to close this gap by examining "Mapping the Impact of COVID-19 Pandemic on Indian Economy: Insights from the Smart PLS-SEM Approach with IPMA."

Research Methodology

The research methodology utilized to conduct the current study is described as follows:

Objectives and Hypotheses of the Study

The following objectives are developed on the basis of the literature review and proposed model:

- To assess the effect of the COVID-19 pandemic on the Indian economy.
- To investigate the influence of horticulture economic operations on the horticulture business during COVID-19.
- To examine the influence of the horticultural industry on the Himachal Pradesh economy in the context of COVID-19.
- To investigate how government policies affect the relationship between the Himachal Pradesh economy and the horticultural industry.
- Utilizing importance-performance map analysis (IPMA), determine the primary policy factors with high importance but low performance.

Corresponding to the model and the objectives of the study, the following alternative hypotheses are formulated:

- **Ha1 :** Production practices have a significant effect on the horticulture business.
- **Ha2 :** Marketing practices have a significant impact on the horticulture business.
- **Ha3 :** Financial practices have a significant impact on the horticulture business.
- **Ha4 :** Human resource practices have a significant impact on the horticulture business.
- **Ha5 :** The horticulture business has a significant impact on the economy of Himachal Pradesh.
- **Ha6 :** The horticulture business has a significant impact on government policy intervention.
- **Ha7 :** Government policies have a significant impact on the economy of Himachal Pradesh.
- **Ha8 :** Government policies have a significant mediating effect on the economy of Himachal Pradesh.

Scope of the Study

This research adopts a descriptive and causal approach, utilizing both primary and secondary data.

Macroeconomic indicators are chosen to assess the pandemic's impact on the Indian economy. At the same time, the Smart PLS-SEM technique version 4.0 is applied to analyze its effects on the economy of Himachal Pradesh. Himachal Pradesh, with its 12 districts, is administratively and geographically segmented, with four districts prominently focused on apple farming. The sampling techniques, such as cluster sampling, stratified sampling, and random sampling techniques, are used to gather the responses from respondents. Cluster sampling involves selecting the top three apple production-dominant districts – Shimla, Mandi, and Kullu – within Himachal Pradesh. Stratified sampling further divides these districts into blocks, panchayats, and villages. Family-level respondents are selected by the lottery technique inside random sampling, with a particular focus on the amount of farmers' land holdings. Data collection took place between September and November of 2021, with the study period spanning the fiscal years 2020–2021.

Sample Size

The sample size comprised of 400 respondents distributed across three districts based on their apple cultivation area. Shimla accounts for 48% of the apple cultivation area, Kullu for 32%, and Mandi for 20%. The sample distribution across these districts is 192, 128, and 80 respondents, respectively. The sample unit for data collection is families of apple growers residing in the respective districts in Himachal Pradesh.

Instrument Design

A structured questionnaire was developed to align with the study's objectives and hypotheses, focusing on the perceived impact of the pandemic on several aspects of the horticulture economy and economy of Himachal Pradesh. The questionnaire utilized a 5-point Likert scale, ranging from 1 = "*strongly disagree"* to 5 = "*strongly agree*," to evaluate the influence of COVID-19 on the horticulture sector and economy of Himachal Pradesh, with a focus on the mediating effect of government intervention policies. To ensure thorough data collection, a pilot study involving 40 apple grower families was conducted to spot any irregularities and address any questions left unanswered in the survey.

Analysis and Results

Evaluation of COVID-19's Effect on the Indian Economy

The pandemic had a noteworthy influence on the worldwide economy and stock markets, particularly in transitional economies like India (Poddar & Yadav, 2020). The virus arrived and spread, prompting the Indian government to implement a lockdown from March 25, 2020, until May 31, 2020. There were 68 days in all while the lockdown was in place. Additionally, certain states implemented complete or partial lockdown measures to handle the crisis effectively. The data presented in Table 1 demonstrates that the budget deficit indicators stayed at

Table 1. ***Fiscal Deficit Indicators (as % of GDP)***

Items	2015–16	2016–17	2017–18	2018–19	2019–20	2020–21 PA	2021–22 BE
Fiscal Deficit	3.9	3.5	3.5	3.4	4.6	9.2	6.8
Revenue Deficit	2.5	2.1	2.6	2.4	3.3	7.4	5.1
Primary Deficit	0.7	0.4	0.4	0.4	1.6	5.8	3.1

Table 2. ***Growth of GVA and Sector-wise Share in GVA (2011–2012 Prices)***

Sectors	Growth of GVA (%)				Sector-wise Share in GVA (%)			
	2018–19	2019–20	2020–21	2021–22	2018–19	2019–20	2020–21	2021–22
Agriculture and Allied Sector	2.9	4.3	3.6	3.9	16.1	18.4	20.2	18.8
Industry	6.9	1.2	–7.0	11.8	29.6	26.7	25.9	28.2
Mining and Quarrying	1.3	–2.5	–8.5	14.3	2.4	1.9	1.6	22.3
Manufacturing	6.9	–2.4	–7.2	12.5	16.4	14.7	14.4	15.4
Electricity, Gas, Water Supply, and Utility Services	7.0	2.1	1.9	8.5	2.8	2.6	2.7	2.5
Construction	8.7	1.0	–8.6	10.7	8.0	7.4	7.2	8.0
Services	7.5	7.2	–8.4	8.2	54.3	55.0	53.9	53.0
Trade, Hotel, Transport, Communication and Services Related to Broadcasting	6.9	6.4	–18.2	11.9	18.3	18.9	16.4	16.9
Financial, Real Estate, and Professional Services	7.4	7.3	–1.5	4.0	21.3	21.2	22.1	20.9
Public Administration, Defence, and Other Services	8.6	8.3	–4.6	10.7	14.7	14.9	15.1	15.2
GVA at a Basic Price	6.6	4.1	–6.2	8.6	100	100	100.0	100.0

manageable levels over the years 2015–2016 and 2018–2019. However, the fiscal deficit indicators, including the fiscal deficit (9.2%), revenue deficit (7.4%), and primary deficit (5.8%), saw a substantial rise in 2020–2021 due to the impact of the pandemic. The government was forced to take significant action and provide assistance as a result. The metrics began to show improvement in 2021–2022, according to the indicators.

Table 2 analysis shows that the GDP growth rate declined significantly in the fiscal year 2020–2021, by a significant –6.2%. This downturn was primarily attributed to decreased growth in both the secondary sector (–7.0%) and the service sector (–8.4%). On the other hand, the primary sector showed a 3.6% positive growth rate, which lessened the negative effects of the epidemic. The trade, hotels, transportation, communication, and broadcasting-related services within the services sector experienced a significant decline of 18.5%. The industry sector saw substantial decreases in mining, quarrying, and manufacturing. An examination of several sectors reveals that the proportion of agricultural and related sectors in the overall gross value added (GVA) of the economy grew in 2020–2021, while the proportion of the industry and service sectors decreased during the same time frame. The services sector remains the largest in the economy, accounting for over 50% of GVA, despite the setback imposed by COVID-19. Services continue to be the primary engine of economic activity, as evidenced by the structural features of the Indian economy.

Table 3 demonstrates India's trade and investment position from 2018 to 2022. India's external sector also faced substantial setbacks due to the economic downturn caused by the COVID-19 scenario. These failures were mostly due to disruptions in both domestic and foreign supply chains. India had a decline in trade in 2020, with total trade figures falling to US$ 276.41 billion, US$ 373.20 billion, and US$ 649.61 billion, respectively. However, starting from 2021, these numbers began to rise. The slowdown also had a beneficial impact on India's balance of trade, which decreased to US $ −96.79 billion.

Additionally, in 2020 and 2021, the analysis revealed a negative association between global foreign direct investment (FDI) inflows and India's FDI inflows. In 2021, the global FDI inflows declined to a total of US$ 958.21 billion, while India experienced a growth in FDI inflows, reaching US$ 64.07 billion. India's FDI inflows decreased in 2021; whereas, FDI globally increased throughout the rest of the world. FDI outflows decreased in

Table 3. ***Trade and Foreign Direct Investment Flow of India (Value in US$ Billions)***

Years	Exports	Imports	Trade	BOT	FDI Inflow		FDI Outflow	
					India	World	India	World
2018	324.78	514.46	839.24	−189.69	42.16	1383.33	11.45	1014.75
2019	324.34	486.06	810.40	−161.72	50.56	1706.35	13.14	1400.77
2020	276.41	373.20	649.61	− 96.79	64.07	958.21	11.11	731.85
2021	395.43	573.09	968.52	−177.67	44.76	1481.96	17.25	1729.08
2022	453.42	720.44	1173.86	−267.03	49.36	1314.91	14.54	1489.76

Source : *Uncomtrade, **UNCTADstat.

Table 4. ***Summary of Fiscal Indicators (%) of the Government of India***

Items	2016–17	2017–18	2018–19	2019–20	2020–21	2021–22
Revenue Receipts	15.00	4.40	8.20	8.40	-3.10	9.60
Gross Tax Revenue	17.90	11.80	8.40	-3.40	0.70	9.50
Net Tax Revenue	16.70	12.80	6.00	3.00	4.90	8.50
Non-tax Revenue	8.60	-29.40	22.30	38.80	-36.40	16.80
Non-debt Capital Receipts	3.80	77.00	-2.50	-39.20	-16.00	226.20
Total Non-debt Receipt	14.40	7.70	7.40	5.20	-3.60	17.00
Total Expenditure	10.30	8.40	8.10	16.00	30.70	-0.80
Revenue Expenditure	9.90	11.10	6.80	17.10	31.30	-5.10
Capital Expenditure	12.50	-7.50	16.90	9.10	26.50	30.50

2020 in both India and the rest of the world. In 2020, the outflows from India totaled US $11.11 billion, while the outflows worldwide reached US $731.85 billion.

Table 4 presents the summary of fiscal indicators of the Government of India from 2016–2017 to 2021–2022. The pandemic in 2020–2021 generated disruptions that led to a decrease in tax and non-tax revenue and an increase in spending (Alok et al., 2021). The overall revenue collections had a reduction of −3.10%. Within this, the net tax revenue increased by 4.90%, but both non-tax revenue and non-debt capital receipts plummeted by −36.40% and −16.00%, respectively. In the fiscal year 2019–2020, total spending increased by 30.70%, with capital spending increasing by a higher 26.50% than revenue spending, which increased by 31.30%.

Evaluation of COVID-19's Effect on the Economy of Himachal Pradesh

The empirical data were analyzed in three stages: measurement model, structural model, and IPMA, to examine the impact of a pandemic on the economy of Himachal Pradesh. The detailed discussion is expounded as follows.

Measurement Model

Figure 2 represents the reflective measurement model, illustrating the link between the constructs and their respective indicator variables. The reliability of this measurement model is confirmed by testing both convergent and discriminant validity. Table 5 illustrates estimates for the model's reliability and convergent validity, while Table 6 outlines the results of discriminant validity.

Figure 2. ***Reflective Measurement Model***

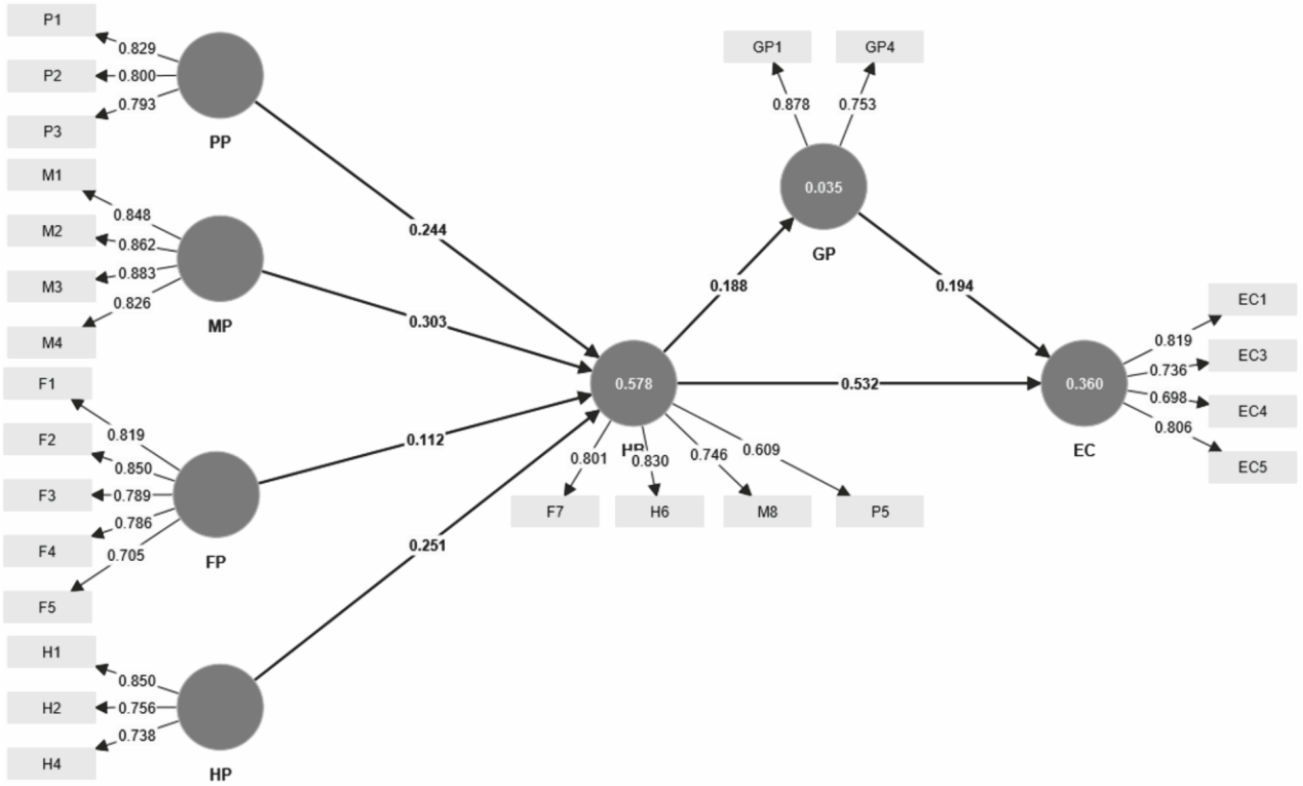


Table 5. ***Assessment of Reliability and Convergent Validity for the Constructs***

Construct	Indicators	Factor Loadings	Croanbach's Alpha	Composite Reliability	AVE	VIF
PP	Horticulture input shortages restricted productivity.	0.829	0.735	0.849	0.652	1.419
	Labor shortages hampered productivity.	0.8				1.482
	Impact on production management practices.	0.793				1.463
MP	The problem of access to the market.	0.848	0.878	0.916	0.731	1.94
	Problem-related to packaging/grading/etc.	0.862				2.313
	Encountered a transportation-related issue.	0.883				2.72
	Faced warehousing/storage-related problem.	0.826				2.144
FP	Faced any financial/capital issues meeting basic needs.	0.819	0.849	0.893	0.626	1.979
	Banking-related issues hampered transactions.	0.85				2.312
	Problems with credit or loans.	0.789				1.878
	Experienced a liquidity issue.	0.786				1.765
	Problem/risk in receiving payments from intermediaries.	0.705				1.415
HP	The problem of skilled and semi-skilled labor availability.	0.85	0.685	0.826	0.614	1.502
	Increase in labor remuneration and additional perks.	0.756				1.417
	Problem building a safe SOP-compliant workplace.	0.738				1.224
HB	Affected the overall product quality and quantity.	0.801	0.736	0.837	0.565	1.697

	Impacted the overall marketing system.	0.83				1.747
	Affected the overall financial system.	0.746				1.514
	Impacted the overall human resource system.	0.609				1.131
GP	Lifting lockdown limits boosted market access.	0.878	0.613	0.8	0.669	1.135
	Allowing out-of-state goods carriers made apple shipment easier.	0.753				1.135
EC	A decline in the income from the sale of apples.	0.819	0.768	0.85	0.587	1.557
	Lockdown/COVID-19 increased economic hardships.	0.736				1.467
	Decrease in the overall production in your area.	0.698				1.414
	Decrease in the savings.	0.806				1.647

Note. *PP* = Production Practices ; *MP* = Marketing Practices ; *FP* = Financial Practices ; *HP* = Human Resource Practices ; *GP* = Government Polices ; *EC* = Economy.

Table 5 illustrates the results of a measurement model utilized in SEM, where latent constructs are evaluated through their observed indicators. The factor loading values 0.708 and higher reveal the robustness of the connection between the latent construct and its observed variables (Hair Jr. et al., 2017). Initially, 38 indicators were considered in the present study. However, a total of 25 indicators were included in the final model after removing indicators with weak factor loading values. The results revealed that Cronbach's alpha and CR values for all constructs fall in the threshold limit between 0.6 and 0.70 (Hair Jr. et al., 2017), denoting a strong internal consistency and composite reliability of the model.

Furthermore, convergent validity was evaluated using the AVE, which should ideally exceed 0.50 in a well-defined model (Chin, 1998; Hair Jr. et al., 2017). The study's findings demonstrate that the AVE values exceed the threshold limit for all constructs, affirming the commendable convergent validity. The variance inflation factor (VIF) values of all indicators are less than the acceptable limit of 5 (Hair Jr. et al., 2017), confirming the absence of multicollinearity. The results suggest that most constructs have high reliability and validity, with strong indicator loadings and acceptable Cronbach's alpha CR, AVE, and VIF values.

Table 6 displays the assessment of discriminant validity for various constructs using the Fornell–Larcker criterion. Discriminant validity is established when the square root of the AVE for each pair of constructs exceeds the correlation with any other construct. In the analysis, the bold diagonal values signify square roots of AVE for each construct like EC (0.766), FP (0.791), GP (0.818), HB (0.751), HP (0.783), MP (0.855), and PP (0.808) are

Table 6. ***Assessment of Discriminant Validity for the Constructs (Fornell–Larker Criterion)***

	EC	***FP***	***GP***	***HB***	***HP***	***MP***	***PP***
EC	**0.766**						
FP	0.441	**0.791**					
GP	0.294	0.196	**0.818**				
HB	0.569	0.618	0.188	**0.751**			
HP	0.455	0.556	0.183	0.615	**0.783**		
MP	0.374	0.699	0.132	0.652	0.512	**0.855**	
PP	0.473	0.632	0.171	0.642	0.6	0.584	**0.808**

Note. *PP* = Production Practices ; *MP* = Marketing Practices ; *FP* = Financial Practices ; *HP* = Human Resource Practices ; *GP* = Government Polices ; *EC* = Economy.

greater than off-diagonal values, reporting strong validity. Thus, the findings confirm that the constructs used in the study are distinct from each other and measure different underlying concepts.

Structural Model

Figure 3 presents the path coefficient output for the hypothesized model, derived using 5,000 bootstrap samples. The predictive relevance of the model is reported in Table 7, while the findings of path coefficients and hypotheses testing are presented in Table 5.

Table 7 elucidates a thorough evaluation of the model's explanatory power, predictive relevance for various constructs and overall model fit. The values of coefficients of determination (R^2) indicate the proportion of variance in endogenous constructs by exogenous constructs. A significant (over 0.26) explanatory power is indicated by the higher values of EC (0.36) and HB (0.578), although GP has a relatively low value of 0.0356, indicating a weak (0.02–0.13) explanatory power (Cohen, 1988). The f^2 values emphasized the significance of exogenous constructs in explaining the endogenous constructs, with higher values denoting the greater effect size. The benchmarks for f^2 values are 0.02, 0.15, and 0.35 for small, medium, and high effects, respectively (Hair Jr. et al., 2017). The analysis depicts that f^2 values for all constructs fall in the category of small, medium, and high effects except FP. Furthermore, the model fit measure SRMR is 0.08, matching the prescribed value of 0.08 and indicating a good model fit. The Q^2 values for EC, GP, and HB are 0.252, 0.028, and 0.564, respectively, which is more than zero for all endogenous constructs, validating the predictive relevance of the model.

Figure 3. ***Structural Model***

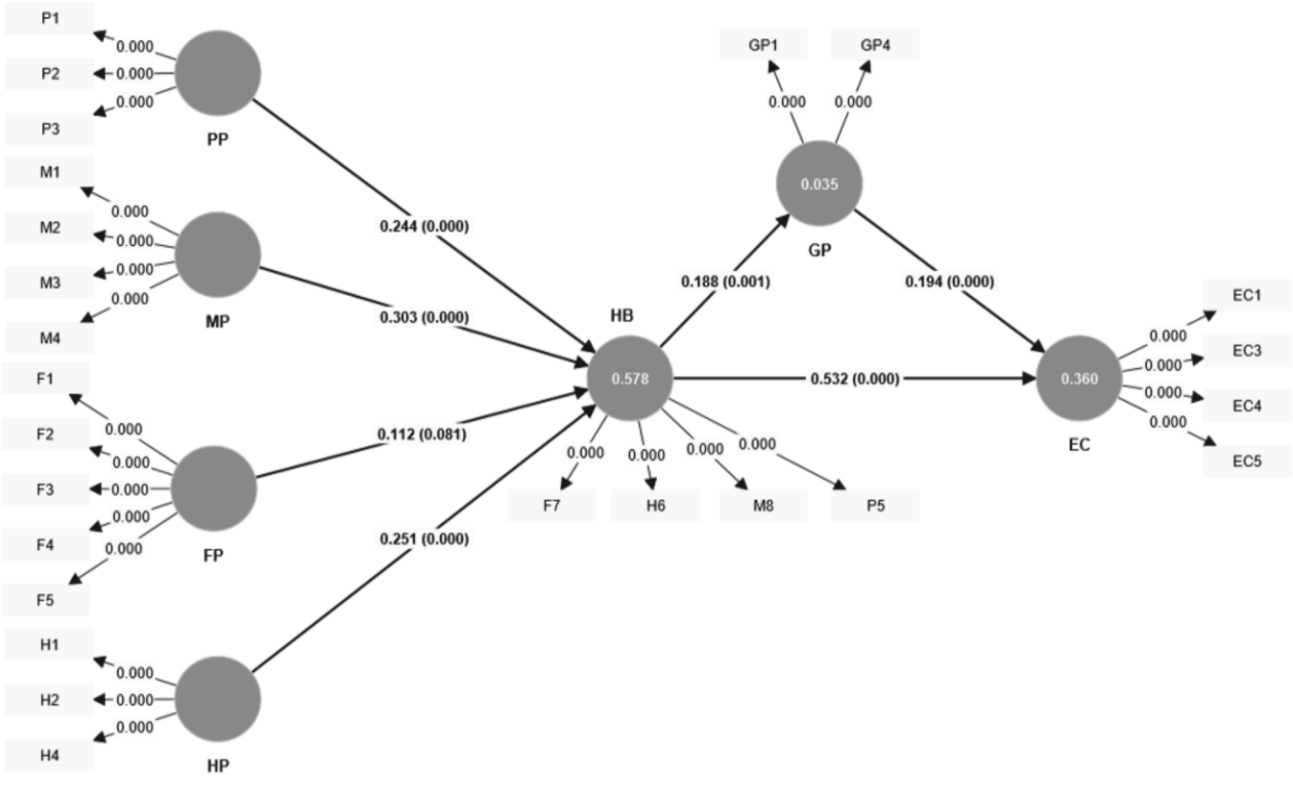


Table 7. *Predictive Relevance of the Model*

Constructs	R^2	Q^2	f^2							Model Fit
			EC	*FP*	*GP*	*HB*	*HP*	*MP*	*PP*	
EC	0.36	0.252	-------	-------	-------	-------	-------	-------	-------	-------
FP	-------	-------	-------	-------	-------	0.012	-------	-------	-------	-------
GP	0.035	0.028	0.057	-------	-------	-------	-------	-------	-------	-------
HB	0.578	0.564	0.426	-------	0.037	-------	-------	-------	-------	-------
HP	-------	-------	-------	-------	-------	0.087	-------	-------	-------	-------
MP	-------	-------	-------	-------	-------	0.102	-------	-------	-------	-------
PP	-------	-------	-------	-------	-------	0.069	-------	-------	-------	-------
SRMR	-------	-------	-------	-------	-------	-------	-------	-------	-------	0.08

Note. *PP* = Production Practices ; *MP* = Marketing Practices ; *FP* = Financial Practices ; *HP* = Human Resource Practices ; *GP* = Government Polices ; *EC* = Economy ; SRMR = Standardized Root Mean Square Residual.

Table 8. *Path Coefficients*

Construct Relation	Original Sample	Sample Mean	Std. Dev.	*t*-statistics (|O/STDEV|)	*p*-values	Decision
PP –> HB	0.244	0.244	0.054	4.527	0.000	Accepted
MP –> HB	0.303	0.301	0.053	5.67	0.000	Accepted
FP –> HB	0.112	0.113	0.064	1.743	0.081	Accepted
HRP –> HB	0.251	0.253	0.05	5.057	0.000	Accepted
HB –> EC	0.532	0.532	0.045	11.924	0.000	Accepted
HB –> GP	0.188	0.193	0.057	3.304	0.001	Accepted
GP –> EC	0.194	0.197	0.049	3.984	0.000	Accepted
HB –> GP –> EC	0.037	0.038	0.016	2.329	0.020	Accepted

Table 8 provides an estimate of the path coefficients representing the links between various constructs in the structural model. The production practices employed by horticulturists have a positive and significant ($\beta_1 = 0.244$, $t = 4.527$, p-value = 0.001) impact on the horticulture business, supporting the hypothesis Ha1. The findings suggest that during COVID-19, production activities were not significantly affected by shortages of agricultural inputs, labor supply, and production management practices like scheduling, monitoring, coordination, and supervision. This stability resulted from the migration of people from urban to rural areas and government intervention policies. The analysis depicts a positive and significant ($\beta_2 = 0.244$, $t = 4.527$, p-value = 0.001) relationship between marketing practices and the horticulture business, which is significant at a 5% level, supporting the hypothesis Ha2. The results reveal that the horticultural business may not have been adversely affected by challenges such as market access, packaging and grading, transportation, and warehousing/storage during COVID-19. The study's findings indicate a statistically significant and positive direct link ($\beta_3 = 0.112$, $t = 1.743$, p-value = 0.081) between financial practices and the horticulture business. This relationship is statistically significant at the 0.10 level, leading to the acceptance of Ha3.

This implies that horticulturists did not face significant financial issues, such as difficulties with capital, banking, credits/loans, and liquidity during the pandemic due to their solid financial standing, access to online banking, and a resilient banking system in the state. The human resource practices demonstrate a positive and significant ($\beta_4 = 0.251$, $t = 5.057$, p-value = 0.000) relationship with the horticulture business, reinforcing the

acceptance of Ha4. The conclusion is that the migration of individuals from cities to rural areas did not cause problems for horticulturists in terms of labor availability or pay. In addition, the horticultural sector in Himachal Pradesh benefited from the adoption of uniform procedures and the emphasis placed on health and safety precautions in the workplace during the COVID-19 epidemic.

The horticulture business exerts a positive and significant ($\beta_5 = 0.532$, $t = 11.924$, p-value = 0.000) influence on the economy of Himachal Pradesh, thus endorsing the acceptance of Ha5. The horticulture business is found to have a positive and significant ($\beta_6 = 0.188$, $t = 3.304$, p-value = 0.001) impact on government policy intervention, validating the Ha6. The conclusion indicates that the government's attention has been called to the horticulture industry since it is a sizable economic sector and needs governmental involvement during the pandemic to secure the industry's smooth functioning. Furthermore, affirming the Ha7, government policy action has a favorable and significant ($\beta_7 = 0.194$, $t = 3.304$, p-value = 0.001) influence on the economy during the epidemic. According to the results, the state's business environment has successfully improved as a result of government efforts. The study finds that government policy intervention in the economy of Himachal Pradesh during the pandemic has a positive and significant mediating impact ($\beta_8 = 0.037$, $t = 2.329$, p-value = 0.020) on the relationship between the horticulture business and the economy of Himachal Pradesh during the COVID-19 pandemic. Thus, the Ha8 is supported at a 5% level of significance.

Analysis of Importance — Performance Map (IPMA)

The IPMA is used to extend the PLS-SEM results by analyzing the importance and performance of constructs used in the study. The analysis identifies policy factors that are highly important but have low performance, highlighting areas that require managerial action for better outcomes. Table 9 outlines exogenous constructs' direct, indirect, and total effects on endogenous constructs in the IPMA-Path model. The study finds that financial practices and human resource practices do not have a direct effect on the economy. Government involvement, on the other hand, has no indirect impact on the economy. The horticulture business demonstrates the highest total effect (0.569) on the economy, followed by government policy intervention (0.194) and human resource practices (0.143), which is significant at a 5% level. The total effect of financial practices is 0.064, which is statistically significant at a 10% level.

Table 10 provides the summary of importance and performance estimates for various constructs in the model. The analysis reveals that the most important construct is HB, followed by GP, MP, HP, PP, and FP. GP is ranked top in terms of performance, followed by HB, HP, PP, MP, and FP. The average importance and performance values for all constructs are 62.154 and 0.2135, respectively, which show the constructions' overall performance and importance. The research indicates areas where managerial involvement can increase performance, as well as the relative importance and performance of each dimension.

Table 9. ***Summary of Direct, Indirect, and Total Effects of Exogenous Constructs on Endogenous Constructs in the IPMA–Path Model***

Predecessor Construct	Direct Effects	Indirect Effects	Total Effects	Sig. of Total Effects
FP	-------	0.064	0.064	0.081
GP	0.194	-------	0.194	0.000
HB	0.532	0.037	0.569	0.000
HP	-------	0.143	0.143	0.000

Table 10. ***Summary of Importance-Performance Map Analysis Estimates***

Constructs	Importance	Performance
FP	0.064	55.169
GP	0.194	69.415
HB	0.569	68.501
HP	0.143	61.696
MP	0.172	58.164
PP	0.139	59.981
Mean value	0.2135	62.15433

Figure 4. ***Importance-Performance Map Analysis (IPMA)***

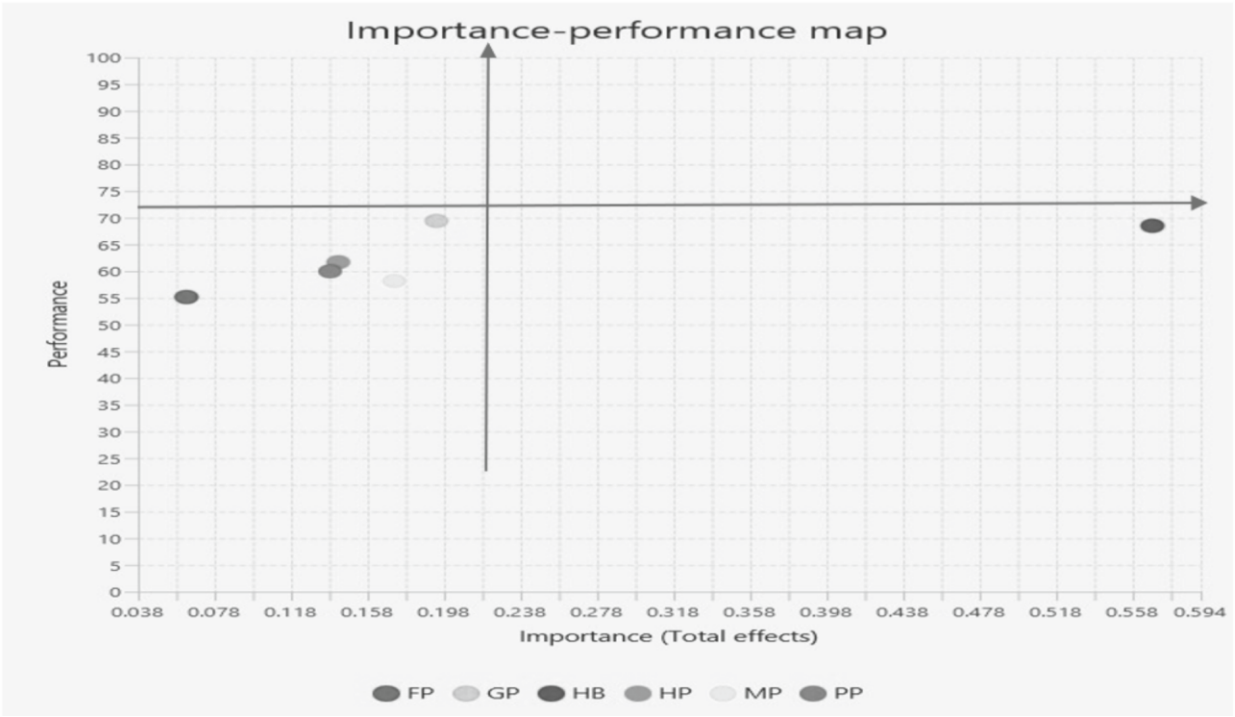


Figure 4 depicts the results of IPMA on a two-dimensional graph. The horizontal axis represents the "importance" of constructs, evaluated on a scale from 0 to 1. In contrast, the vertical axis reflects the performance of the respective constructs, measured on a scale from 0 to 100. The graph is partitioned into four quadrants based on the average values of importance and performance, signifying areas with low importance-high performance, low importance-low performance, high importance-low performance, and high significance-high performance. According to the analysis, the horticulture industry is the most important aspect and has a big influence on the economy. The results indicate that a one-unit increase in the performance of HB, from 68.501 to 69.501, results in an economic improvement with a total effect of 0.569, ceteris paribus. The GP intervention is another important concept that indicates, while all other factors remain unchanged, that a one-unit improvement in performance, from 69.415 to 70.415, would have a cumulative impact of 0.194 on the economy.

Similarly, a one-unit increase in the performance of MP, HP, PP, and FP is predicted to result in an improvement in economic performance by 0.172, 0.143, 0.139, and 0.064, respectively, assuming other factors remain constant. Based on its great importance and performance, the IPMA findings show that HB is the most crucial construct for enhancing the economy of Himachal Pradesh. However, HB's performance is not commensurate with its significance, indicating room for performance improvement. Another important component with good performance but very low relevance is the GP. There are plenty of chances to improve performance in both cases. Therefore, in order to enhance the economic performance in these sectors, managerial attention and action are necessary.

Conclusions and Policy Implications

This research explores how COVID-19 has affected the economies of India and Himachal Pradesh, with particular emphasis on the horticultural sector. The evidence about the Indian economy reveals significant fluctuations in most macroeconomic indicators during the financial year 2020–2021. The results confirm a notable increase in fiscal deficit indicators, specifically fiscal deficit (9.2%), revenue deficit (7.4%), and primary deficit (5.8) compared to pre-COVID pandemic levels. The growth rates of all industries and subsectors have decreased, with the exception of agriculture and related sectors (3.9%) and electricity, gas, water supply, and utility services (1.9%). In addition, India's external sector has witnessed a fall in exports, imports, trade, and balance of trade, reaching US$ 276.41 billion, US$ 373.20 billion, and US$ 649.61 billion, respectively, in 2020. India experienced a rise in FDI inflows, reaching a total of $64.07 billion, while outward FDI declined to $11.11 billion. In addition, there is a decline of 3.10% in total revenue receipts, while total spending climbed by 30.70%. Consequently, the pandemic had a detrimental impact on India's overall economy.

COVID-19 has severely impacted every dimension of the Indian economy, except for the agriculture sector. Similarly, findings reveal that horticultural activities in Himachal Pradesh reflect resilience across various sectors. The study demonstrates that many economic activities associated with horticulture, such as production techniques, marketing methods, financial practices, and human resource activities, significantly and positively affect the horticulture sector, as supported by the acceptance of hypotheses Ha1, Ha2, Ha3, and Ha4. This positive and significant effect subsequently influenced the state's economy and captured the government's attention for policy initiatives, which further energized the industry, as confirmed by the acceptance of Ha5 and Ha6. This states that the horticultural sector has a beneficial impact on the state's economy, prompting government intervention through policies. The state's economy is directly impacted by government policy decisions, as confirmed by the affirmation of Ha7. The results of the mediation analysis confirm that the state's economy and the horticultural industry are better connected as a result of government initiatives. The findings underscore the horticultural sector's ability to withstand and adjust to challenges, as well as the efficacy of government policy measures implemented during the epidemic. The IPMA analysis confirms that the horticulture sector, in combination with government policies, has the potential to boost Himachal Pradesh's economy.

The paper provides a theoretical framework to examine and elucidate the effects of unexpected disasters on both the economy and society. This research enhances the current understanding by developing a conceptual model and employing Smart PLS-SEM to evaluate SEM and assess the pandemic's economic effects. This model can be replicated to evaluate the impact of any disasters or crises that may arise on a worldwide, national, or local scale in the future. Furthermore, this study is one of the few that have been done in the field of business and economics. The study provides significant implications that can be valuable for various stakeholders, such as farmers, non-governmental organizations (NGOs), business owners, the banking sector, investors, marketing agencies, the labor market, academics, professionals, and the government. These implications can help in formulating policies to sustain operational effectiveness and mitigate the repercussions of a disaster of this kind.

Limitations of the Study and Scope for Future Research

This research work presents new insights and also acknowledges certain limitations that pave the way for future research endeavors. It utilizes both secondary and primary data, emphasizing specifically the financial year 2020–2021. To assess the effect of a pandemic on the economy of Himachal Pradesh, primary data was gathered from three districts in apple-dominated areas consisting of 400 respondents. Data covered various aspects of horticulture economic activities such as production, finance, marketing, human resources, horticulture businesses, government policy intervention, and the economy of Himachal Pradesh. The study's exclusive emphasis on a single economic sector may restrict the generalizability of the findings from the structural equation modeling. One way to get around this restriction is to conduct a thorough investigation into how the pandemic has affected different economic sectors. In order to comprehend the impact of COVID-19 on the economies of India and Himachal Pradesh, a comparative study across many sectors, including the primary, secondary, and service sectors, can also be conducted. However, despite these drawbacks, the study's findings provide insightful viewpoints for stakeholders and policymakers as they create and implement practical plans to lessen the negative impacts of potential catastrophic catastrophes.

Authors' Contribution

Dr. Raj Kumar Singh identified the idea of pursuing the study on mapping the influence of the COVID-19 pandemic on the economy through the lens of government policies as a mediating variable: Insight from the smart PLS-SEM approach with IPMA. He conducted the analysis, developed the questionnaire, and prepared the final draft. Yashvardhan Singh and Dr. Ajay Kumar collected the data, prepared the Excel sheet and tables of the study, and prepared the first draft of the paper. Both the co-authors contributed to the discussion at various levels during the preparation of the manuscript.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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