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Impact of Covid 19 on Agri-startups in India

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Abstract:

The study assesses the impact of the Covid 19 pandemic on over 137 Agri-startups in India for four phases of 2020-21 (first phase: April to June, Second: July to September, Third: October to December and fourth: January to March 2021). The results reveal that as a result of pandemic and restriction of economic activities startups have lost 19.15 percent of income, 17.59 percent of turnover and at the same, they also face time inflated cost of 9.21 percent in their cost of production compared to previous year (2019-20). The number of startups whose face labor cost of more than 10 percent was significantly higher than the input cost and thus it implies that the cost of labor for the startups during the pandemic is more than the input costs. After the normalization of the pandemic disorder and phased opening of economy startups have added 20 percent employment to the economy that were lost owing to COVID-19. Nearly one-third of startups would be failed to run their business with existing financial resources if the pandemic continues and most of them able to run their business not more than twelve months. At this junction, it's high time to move away from business as usual approach and to leverage real-time data to insulate startups from an adverse crisis with strategic policy repose while promoting entrepreneurship in the agriculture allied sector.

Keywords: Agri-startup, Covid 19, Pandemic, Investment, Income, Turnover, Employment

A. Introduction:

Covid 19 pandemic has brought unprecedented impact on economy, society, business performance, people welfare and their social behavior across the nations (GDA, 2020, Di Vaio et al., 2020, Boin, 2009, Pinillos 2021 and Quarantelli, 1988) and performance of the global economy severely affected. As a result, the cloud of uncertainty hovered on growth of startups and Small-Scale Business (SSB) which further accentuated by trade restriction and stringent lockdowns (Gregurec et al., 2021, Roy et al., 2020). For developing country startups have been regarded as the

most essential driving force of economic growth (Kalogiannidis and Chatzitheodoridis, 2021). The severity of Covid 19 affected startup business due to lack of adequate availability of resources (Mainly on labor, capital, market etc.) and increased vulnerability during the crisis. As per Beatrice 2020, the vulnerability arises as most of startups rely on personal investors, friends and financial institution which a step back from investment during the crisis. However, the studies (Kuckertz, et al., 2020) suggest that the startups are successfully leveraging their available resources as a first response to crisis but their growth and innovation are at risk. Further startups are widely recognized for an efficient resource handler, their role in fight against Covid 19 is indispensable (Almeida 2020, Bhooshan and Kumar, 2020) and also are unsung heroes during the Covid 19 crisis (Maritz et al., 2020). Many startups amid liquidity crunch, lack of investor funds and poor market demand have found to tailor their products, modified their technologies and invested in their long-term growth potential (Bhooshan and Kumar 2020, Sedláček and Sterk, 2020). Certainly, for startups business the crisis is expected to bring in upward economic flow (Evans and Bahrani, 2020 and Kuckertz et al., 2020). Thus, it is clear startups have adopted resilient crisis management strategies and now require a better coping mechanism and government policy measures to reinvigorate the spirit of entrepreneurship.

Further Covid 19 is viewed as a once in century crisis (Economic Survey 2020-21), metaphorical black swan event in effect a surprising, unpredictable and evolving (Winston 2020, Haematology, 2020 and Whitworth 2020) which has greater significant in changing the global political economic environment. While many studies (Kuckertz, et al., 2020 and Ebersberger and Kuckertz) marked this as the opportunity to overhaul policy levers and is also a blessing in the disguise for entrepreneurship in India (Verma and Kumar, 2021). In fact, for agriculture, pandemic comes as an opportunity (Apostolopoulos et al., 2021) to move away from business as usual approach while promoting startups and sustainable agri-food system to accelerate green innovations (Galanakis et al., 2020) powering Atmnirbhar Abhiyan and also achieving \$ 5 trillion economy (Singh et al., 2020) as agriculture shares nearly 20 percent (with present GDP share). Amid Covid 19 disruption in 2020, the sector is inspiration and is the only sector with positive growth rate (3.4%) in the pandemic year 2020-21 and contributed about 19.9 percent after 17 years to country's GDP (Economic Survey 2020-21) and 44% of workforce still directly or indirectly depend on agriculture. With their innovation, agriculture startups expected contribute and sustain the growth while creating adequate employment opportunities to the youth. There is dearth of empirical studies to contemplating the impact of covid 19 on agri-startups. In addition, the comprehensive study to understand the various functional and executional challenges of the startups is also missing from the discourse. Keeping all these factors into consideration the study tries to address this important research gap and give rapid insights into the impact of Covid 19 on startups and entrepreneurial

activity with the survey of 137 startups from 19 states and to draw valuable policy implications. The study was conducted to know the impact of covid 19 on startups business, identify the strategies adopted to cope-up with it and to know the major government policy initiatives adopted by the startups to overcome the covid 19 crisis.

Research limitation: *First the paper has instances of analysis is compared with startups beyond country border and sectors owing to limited studies. Second survey elicit information on cost, price, employment investment, income, turnover based on details available with startups there is a possible chance some have used past memories to fill the details. Third although results obtained from the studies comparable in relative terms and not in absolute terms.*

B. Methodology:

The study taken the time period of the impact starting from April 2020 to March 2021 for span of twelve months and year succeeded (2019). The year 2020-21 was divide into four phases with three months in each phase. In fact, these phases are in consonance with the opening of Indian economy that was on strict lockdown announced on 24th March 2020. While the first phase covers April to June, Second July to September, and third October to December and fourth January to March 2021. Over 137 startups that were surveyed online using well-constructed questionnaire. The sampling framework thus falls under purposive sampling with selected 137 startups. The questionnaire comprises a standard matrix (7x8) which is adopted to identify sector wise distribution of startups and their principle focus areas (Chart 2). For finding range of age group of founders and members of the startups, the mean and standard deviation was used and thus standard age groups interval formed each for founders and members (Table 1).

Impact on business activities was gauged based on eight high frequency indicators that were sourced from literatures, reports, print media and expert opinions in the field. For the precise estimation, these indicators were further drop down to micro level estimates so as to gauge comprehensive impact on business activities of the selected startups. The eight macro level indicators are income, Turnover, Cost of production, labor, input, Manufacturing facility, Market, Distributions, and Transportation (Table 2). Further for cost of labor, input, manufacturing facility and others the base year was taken as the 2019-20 and the startups were asked to give their response assuming each cost at 2019-20 (before pandemic) as a base year and subsequent range were provided.

C. Results and discussion:

I. Demographic profile of surveyed startups:

The demographic profile of the surveyed startups has over 75.56 percent of male members and 24.44 percent of female members. 90 percent of the startup's founders are Graduation and above and a 9.5 percent are higher secondary. Two third of the founders were in the age group of 27-44

years and over 18.64 are above 45 and 20 percent below 27 years. 74.58 percent of the members are male and 25.42 percent are females, more than two third of the members were in the age group of 23-33 while 18.64 and 12.43 percent of them are at the age group of more than 43 and less than 23 years. The average workers in the startups are 5 while their members were 4 per startups, thus the cumulative workforce/ strength of the startups is around 10. It is pertinent to note here that in few of the startups the number of members is as much as 11 and the employment/ workers is more than 23. This shows the startups are not merely of average size, while members and workers/ employees aren't limited to 4 and 5 respectively. Some startups were also run / lead by single individual and few members (Table 1).

Table 1: Demographic profile of Agri-startups

Sl.	Particulars		Percentage/ numbers	
1.	Founder	Gender	Male	75.56
			Female	24.44
		Education	Higher secondary	9.5
			Graduation	44.4
			Post-Graduation	41.3
			Doctorate	4.8
		Age	<27	20
			27-36	30.4
			36-45	35.2
			>45	14.4
2.	Members	Gender	Male	74.58
			Female	25.42
		Age	>23	12.43
			23-33	37.85
			33-43	31.07
			>43	18.64

On state wise distribution, the majority of respondent startups were from Maharashtra, followed by Uttar Pradesh, Madhya Pradesh, Karnataka and Assam. While very few are from Bihar, Gujarat and Delhi (Chart1).

Chart 1: State-wise number of surveyed startups

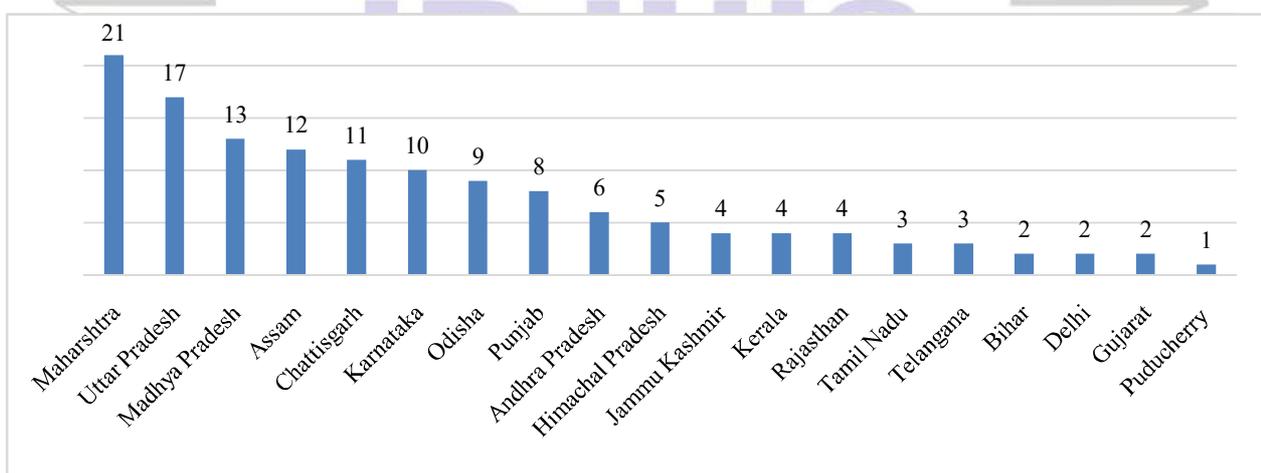
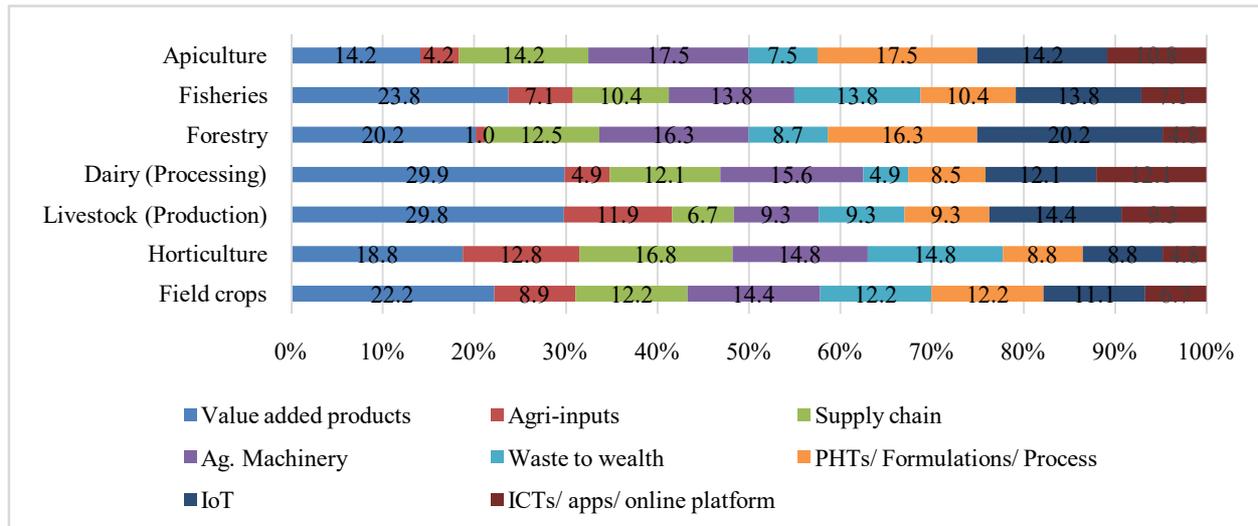


Chart 2: Sector wise distribution of startups and their focus areas

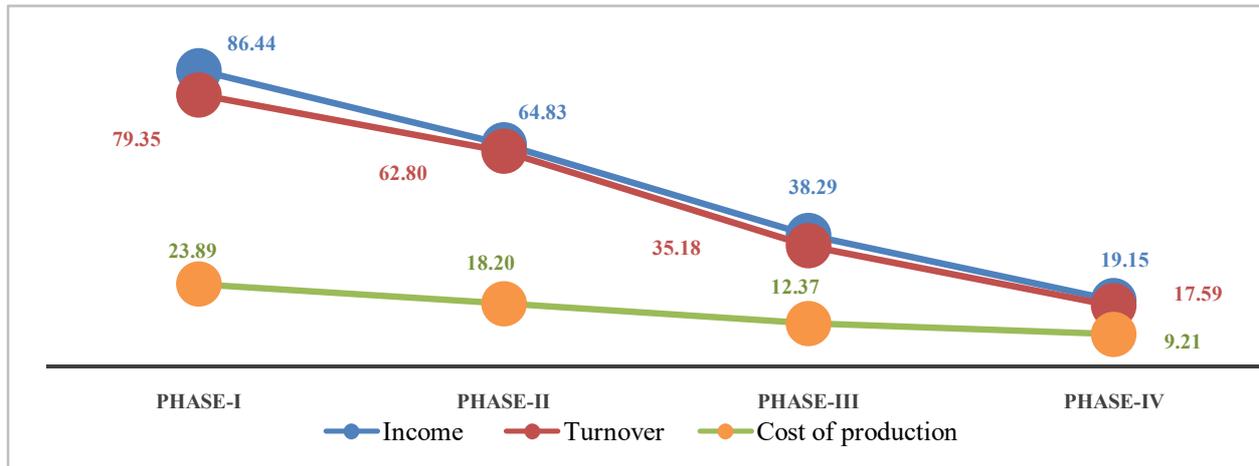


In sectoral and focus area wise distribution of the startups most of them were from value addition, followed by agri machinery, post-harvest and Agri inputs. However significant number of startups has also found to focus on other key areas viz., waste wealth, Supply chain and logistics, ICTs and IoTs (Chart 2). Majority of the startups found to engage in value addition under livestock and dairy sector. While the focus on agri. machinery and supply chain amongst the startups was almost uniformly distributed across the sectors. The startups focusing on Agri. Inputs and waste to wealth have limited presence in dairy, forestry and apiculture sector. With significant push from government to digitalization and ICT use in agriculture, the number of startups were limited to diary, livestock, filed crop and apiculture sector.

II. Impact of CLOVID 19 on business activities:

As stated earlier the impact on business activities was determined based on the set of eight high frequency indicators (Table 2). At first to ascertain the impact on three principle metrics viz., income, turnover and cost of production that indicate business scenarios of the startups during the pandemic were plotted. The reference year for defining the change in these metrics were assumed be 2019-20 on quarterly basis to match each phase pandemic of in the preceding year (2020-21). Thus, the change in principle metrics presented in chart 3 assumes 2019-20 as the base year and the average quarterly turnover, income and cost of production of the startups during 2019-20 were taken as base to calculate change during 2020-21. In the phase -I change in income was as much as 86.44 percent and change in turnover was 79.35 percent. While the cost of production was found to vary less compared to income and turnover (Chart 3).

Chart 3: Percentage change in income, Turnover and Cost of production of startups*



*Note: Percentage Change in Income, Turnover and Cost of Production is calculated using average of base year (2019-20)

There is steady decrease in the change in all the metrics was witnessed from phase I to phase IV. The gap between the change income and turnover is significantly high during the first and third phase. The results held that even after one year of the pandemic and economic activities are under full swing and complete opening of the economy, most of the startups still fall short of 19.15 percent of income and 19.59 percent of turnover to the previous fiscal and they still incur 9.21 percent of more cost for production. In other words, as result of pandemic the startups have lost a 19.15 percent of income and 17.59 percent of turnover and at the same, they also face time inflated cost of 9.21 percent in their cost of production.

For 88.13 percent of the startups labor was fully availability and their wages were almost constant before the pandemic was set in. The period saw a maximum wage increase of 0-10 percent/ less than 10 percent to the previous year. While after pandemic and subsequent lockdown in the first phase, majority of startups (63.11%) reported partial availability of labor and for 12.98 percent of startups labors were not-available as a result about 62.53 percent of the startups reported an increase in wages owing to lockdown restriction and reverse migration. Two third of the startups stated the wage increase was 11-30 percent while quarter of them saw wage increase to 0-10%. In the later phases majority of the startups saw significant increase in labor availability was near to pre-pandemic levels in the fourth phase. However, the wage increases for majority of the startups hovered 0-20% in the second and third phase and it was only in the fourth phase labor wages saw significant down trend of less than for majority of startups. Yet, the wages were fairly higher for few startups in the fourth phase (Table 2).

Input availability for the startups pre-pandemic and post pandemic did not much affected as very less of them reported non-availability. However, in the first phase just after the lock down and restriction of economic activities, 3.04 percent of the startups have reported non-availability of required raw materials / inputs. And in the later phases the inputs were almost fully available to the

startups as and when the economy reopened and restriction were gradually lifted. In the last phase the input availability was almost similar to pre-pandemic level. While for most of the startups rise in the cost of input was less than 10 percent. It is pertinent to note that the number of startups whose labor cost more than 10 percent were significantly higher than the input cost and thus it implies that the cost of labor for the startups during the pandemic is a bit more than the input cost (Table 2).

In the pre-pandemic year the manufacturing facility was almost available for the startups and their utilization was fairly significant with mere 2.85 percent stated their non-availability and 3.85 percent could not properly utilize. The cost of utilization in the pre-pandemic year was apparently more and majority have stated the extent of increase was less than 10 percent. After the onset of pandemic, the availability and utilization reduced steeply and only 27.14 percent stated that the manufacturing facility was fully available and 17.74 percent were able to utilize fully. While cost have also soared and more than 90 percent of them who stated an increased cost (61.23) have incurred more than 10 percent of the pre-pandemic levels and one third have reported an increased cost of more than 30 percent. However, a significant number of startups have also stated the costs in all the three phases remains constant and their number saw a continuous increase from phase-I to Phase IV. In the later phases both availability and utilization sharply increased and in the fourth phase the percentage of startups utilizing manufacturing facility was more than the pre-pandemic levels (Table 2). The capacity utilization of industry is less than 70 percent (NITI Aayog, 2021) and the study findings are in conformity with NITI Aayog. Also, the capacity utilization threshold as identified by the Aayog is 80 percent and above and pre and post pandemic levels the study finds capacity utilization were even less.

About 7.12 percent of the startups have reported decrease in subscription/ sales of product/ service before the pandemic could set a stage. However, for over 87.50 percent of the startups the decrease of subscription was less than 10 percent. After the announcement of nationwide lockdown and subsequent restriction in economic activities there was a sharp reduction in in subscription/ sales of product / service and nearly 80 percent of the startups reported decrease, while the extent of decrease was considerably large as 43.75 percent of startups stated more than 30 percent decrease in subscription/ sales of product / service. While in the later stages on obvious note subscription/ sales of product/ service have increased while the pace of increase was swift. Although about 13.83 percent of the startups have indicated decrease in subscription / sales of product / service compared to pre-pandemic levels and more than two third stated the extent of decrease to less than 10 percent (Table 2).

In the pre-pandemic year about 68.97 percent of the startups expanded their market and two third of the expansion happen to be in Urban and Rural areas and after the nationwide lockdown in the first phase only 17.24 percent of the startups endeavor for market expansion and majority of

expansion (57.14%) limited to Rural areas owing to untapped market potential and comparatively less restriction for the people movement and economic activities. In the later stages the market expansion shifted to semi-urban areas, while in the third phase there has been steep increase in the market expansion to overseas as and when the global market reopened for trading and pandemic disruption started to poise, but the same expansion failed to hold for long time and overseas expansion in fourth phase saw a considerable down trend (10.51%) and is slightly more than the pre pandemic level (7.14). After the steep reduction (91.30%) in existing region expansion in the first phase, nevertheless continues increase has been observed in later phases and was in fact more than the pre pandemic level (93.73%). Further the in the pre-pandemic year nearly two third of the startups have made new entry to the market and majority of them entered Urban and Rural areas, while after the pandemic in the first stage a mere 4.55 percent could able to enter new market and the region of entry largely confined to Urban and Rural areas. In the later phases there was a gradual increase in the new market entry and most of these entries made by the startups were to Rural and Semi urban areas (Table 2).

Over 13.64 percent of the startups have indicated market contraction during the pre-pandemic year and in the first phase the about 77.27 percent have experience market contraction while the majority of region of contraction was from urban and overseas areas. In the later stages a smaller number of startups reported market contraction and those who experienced market contraction were in rural and urban areas. While number of startups encounter contraction in the pre-pandemic level (13.64%) were slightly more than the post pandemic phase four (8.79%) (Table 2).

Most of the startups in the pre-pandemic year have been using both online and offline mode of distribution. While pertaining to the online and offline modes of distribution the study assumes that the orders received online are essentially from e-commerce platforms, their own website or subsidiary and partner sites and other various online platforms where the startups have listed their products. In the first phase nearly half of the startups have made online distribution and at the same time the offline distribution through whole sale and retail outlet saw significant reduction. However online mode of distribution saw a decrease after second phase and gradual increase in the number of startups using both the mode for distribution except in the fourth phase. Further in both pre and post pandemic year the more than half of the startups have not changed their distribution mode. The majority of startups who have changed distribution mode are from offline to online and few yet significant numbers have turned offline to online (Table 2). The reason as expressed by the most startups in survey are the higher commission and transportation / courier charges by e-commerce giants/ companies.

On an average order received by the startups before the pandemic was 1286.36 mostly dominated by offline mode. It is pertinent to note here that the survey counts the whole lot of order

into one unit and the average number of orders here refers to average units of orders in particular time. For instance, if a startup receives 100 orders for particular time it is counted as one unit of order and ensuing orders were added for that period/ phase. The average orders received to the startups in the first phase have steeply reduced on account of pandemic and online orders were more than offline. While the order fulfillment has also reduced and only 20.83 percent could fulfill all the orders received during the period. In the later phases the orders received and fulfillment have gradually increased and in the fourth period orders received from the both modes outnumbered pre-pandemic levels (Table 2).

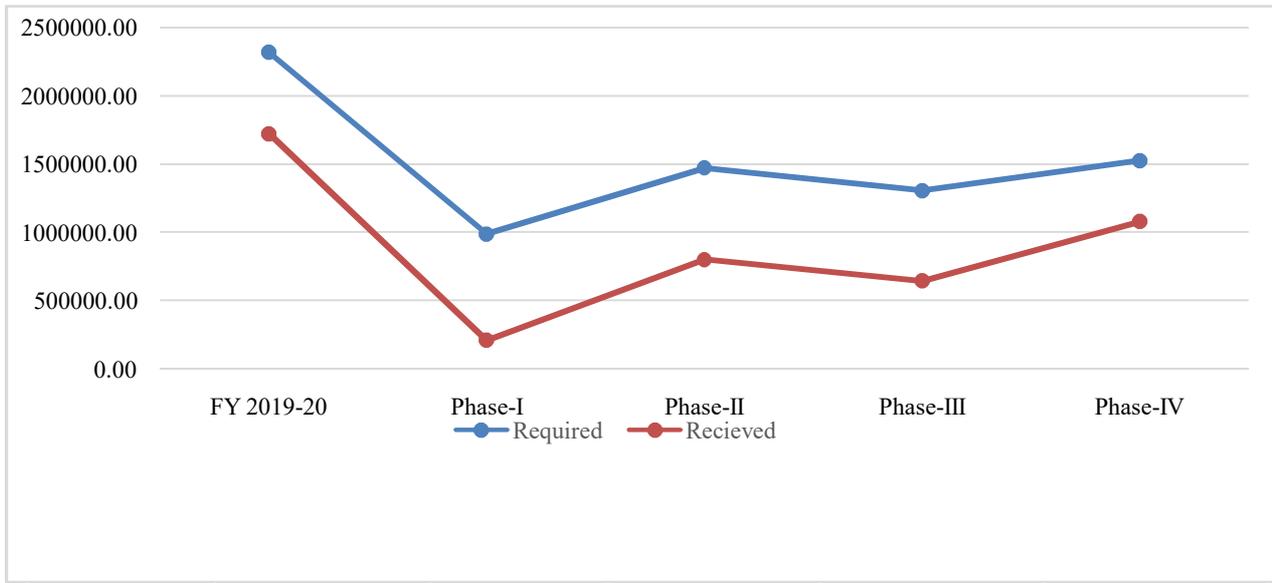
During the pre-pandemic level the transportation facility was available for all the startups. After the imposition of nationwide lockdown and economic restriction two third of the startups stated non-availability and in the second phase there was improvement in availability of transportation facility however about 16.67 percent still did not find transportation facility. Transportation facility available for all the startups in the third and fourth phases. Further over for 95.65 percent of the startups have indicated the cost of transportation increased less than 10 percent before the pandemic and in the first phase for nearly 40 percent each of the startups the cost of transportation was 11-20 and more than 30 percent. In the later phases the costs saw significant reduction but 9 percent of the startups still pays higher cost (majority less than 10 percent) for transportation than the pre-pandemic levels. Before the pandemic, over 90 percent of the transportation made by startups were inter and intra state level with mere 3.57 percent on overseas. After the pandemic in the first stage there is surge in intra state transportation and sharp reduction inter and overseas transportation; however in the succeeding phase there was gradual increase in interstate and overseas transportation by the startups (Table 2).

III. Impact of COVID 19 on investment:

Investment plays crucial role in technological innovation, strengthening capacity and creating entrepreneurial wealth of the startups (Deeds 2001, Almeida et al., 2003). It is found to enhance the entrepreneurial spirit and adds to national income and wealth. In the times of disaster or crisis investment essentially cushions the loss and have immense potential to drive entrepreneurship in the developing countries. In India, Covid 19 and subsequent measure to curtail the spread have significantly disrupted the entrepreneurial strength, income and investment in the year 2020. In the pre-pandemic, the average investment sought by the startups nearly Rs. 2.3 million and they receive only Rs. 1.7 million and investment gap of nearly Rs. 0.60 million. Post pandemic in the first phase the gap between investments required and received has increased (Rs. 0.78 million), while in the later stages the investment gap reduced significantly with rise investment requirements and receivables. While in the fourth phase the investment gap is slightly lower (Rs. 0.52 million) than the pre-pandemic level. By the end FY 2020-21, startups have received only 40 percent of the average

investment they have received in FY 2019-20 while the period also saw reduction in investment requirement sought by the startups to nearly 42 percent. Further it is relevant to highlight that in the third phase few startups have received investment more than the required, however they failed to receive same quantum/ retain momentum in the subsequent phase (Chart 4).

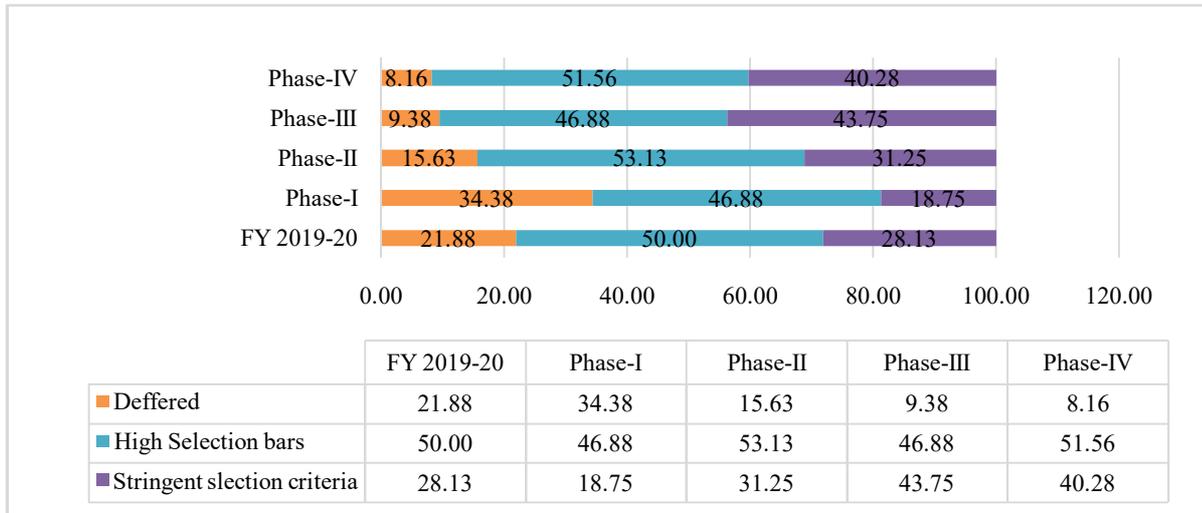
Chart 4: Comparison of average investments required v/s received(R&R) for startups before and after the pandemic*



**Note: The average investment required in FY 2019-20 is for the respective quarters and in FY 2020-21 phase wise investment has been indicated, the rise in investment (R&R) from phase I to Phase IV is due to business disruption and inevitable fixed cost for the startups sought for expansion. Thus, cumulative of investment (R&R) of four phase exceeded average investment (R&R) in FY 2019-20.*

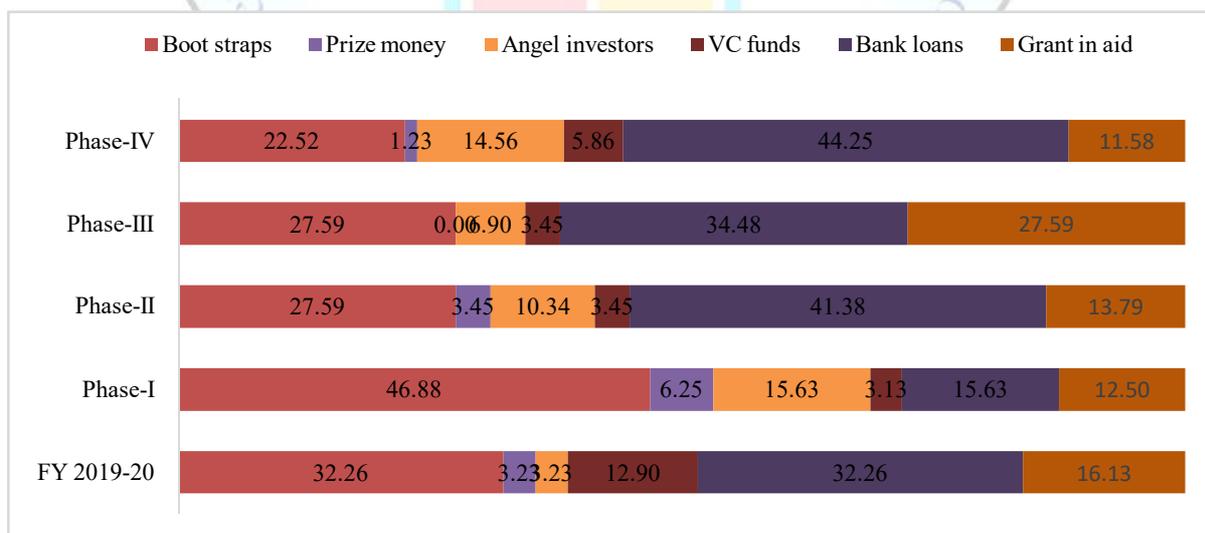
As for not receiving the required investment three most crucial reasons were enumerated from the literatures and expert opinion viz., deferred, high selection bars and stringent selection criteria. Insofar some respondent startups stated other reasons viz., Covid 19 induced market disruption, newly incorporated, lack of experience in mobilizing during uncertain times, disapproval of grants, ego problem and also few of them also stated their investment was not on priority for the first two phases owing to dark cloud of Covid 19 uncertainty hovering on their business expansion. Moreover, for few startups the shift in priority in the first two phases from seeking investment to saving their business to was conspicuous. While in the pre-pandemic year the half of the startups weren't able receive desired/ required investment owing to high selection bars followed by stringent criteria and deferment. In the first phase although most of the startups have not received required investment due to high selection bars (46.88%), there was a significant increase in the investment deferment (34.38 %) by the startups. In the later phase investment flow was significantly hindered by stringent selection criteria and investment deferment has been limited influence over investment flow. To highlight in the fourth phase over 90 percent of the startups have stated their investment flow was stalled due to high selection bars and stringent selection criteria (Chart 5).

Chart 5: Major reasons for not receiving the desired/ required investment by startups



For the startups bank loans and boot straps were the major sources of investment before the onset of pandemic and stringent lockdown followed by Grant in aid and venture capital (VC) funds. After the pandemic in the first phase boot straps (46.88%) dominated as the major source of investment and the decrease bank loans which was apparent during crisis (Brown and Lee, 2019; Demirgüç-Kunt et al., 2020). In the subsequent phase the boot straps investment saw a gradual reduction and there was surge in bank loans, the similar effect Brown et al., (2020). It is pertinent to note that Grand in aid were also a significant source of investment for the startups and prize money covers a least source for startup investment. Also, the VC funds, grant in aid, and boot straps have seen significant reduction in the fourth phase as other sources started gradual increase from pre-pandemic levels (Chart 6). Reduction in VCs funds during the crisis (Block and Sandner, 2009; Conti et al., 2019) was earlier highlighted owing to uncertainty hovering on normalcy.

Chart 6: Major sources of investment for the startups during the pandemic



IV. Cope-up Strategies:

On broader scale five the cope-up strategies (plus allied sub-divisions) were identified viz.,

Employment, switching focus area, change in market position, change in business mode and Government measures and facilities form incubator and were asked to startups. These are among the most common strategies adopted by the startups heading for crisis. Same were asked for the startups to elicit their response know the extent of adoption of strategies and the response were recorded phase wise for employment strategy while for others strategies adopted for whole year (2020-21) was appropriate to elucidate and so.

Under employment strategy most of the startups (73.67%) have not layoff their employees in the first phase and some startups (30.30%) have also hired new employees unlike European startups stropped hiring (Kalogiannidis and Chatzitheodoridis, 2021) and layoff in Silicon Valley (Barrero et al., 2020). As per CMIE (Centre for Monitoring Indian Economy) in April 2020 (First phase) agriculture was the only sector to add jobs to the economy and the nascent shift was from formal jobs to farm jobs. In the later phases there was gradual increase in hiring and reduction in layoff of workers and one of the keys for business expansion and recovery (Merkl and Weber 2020). In order to better represent the employment status during the pandemic hiring and layoff ratios were calculated by keeping total paid employment as the base (Wen et al., 2016 and Ministry of Finance, 2017). In the first phase the layoff and hiring ratios were almost constant (Chart 7). Later layoff saw a gradual decrease while the hiring saw a steep increase after the first a phase increase however the layoff ratio (7.14%) was slightly more than the first phase. Further in the fourth phase on an average 20 percent (difference between hiring and layoff) of the more workers were hired. In other words, after the normalization of the pandemic disorder and economic activities startups have added 20 percent employment to the economy (Chart7) and thus happened to be positive net job creator (Sedlacek and Sterk, 2020). The most of the employment comes as activities under the focus area supply chain, value addition and Agri machinery.



Chart 7: Hiring and layoff ratio among the startups during the pandemic

Note1: Percentage of total paid employment

Note2: the layoff covered by the study involves are those out of employment due to pandemic as a result of startup went out of business, business slowdown occurred or employee dismissed. While the layoff rate is the ratio of permanent layoffs from full-time jobs to total full-time jobs held for one year (April 2020-March 2021) excluding self-employed persons (Members of startups).

Pay cut was one of the important strategies to sail through economic disruption triggered by pandemic and lockdown (Tromberg et al., 2020). Most of the startups have to follow pay cut for the employers in all the three phases however the extent of pay cut followed by most of the startups was less than 5 percent and the startups adopting pay cut option decreased in the second phase while slight increase and decrease in third and fourth phase, respectively (Table 3).

To retain the workforce most of the startups trailed a strategy of flexibility in work time followed by option for partial employment in the first phase while from the third phases remote working become most adopted subsequent strategy to retain the workforce. A significant number of startups have also adopted the strategy of offering premium/ bonus and rewarding benefits. However, offering sufficient leave/ leisure was amongst the least preferred strategy to retain the workforce. As offering extra leave/ leisure have significant cost to working of the startups most of them did not adopt mostly to retain the workforce (Table 3).

It was quite common that some startups tend to shift the focus areas owing to low profit, avoid risk/ loss and to overcome adverse impact on income and investment. Across the seven-sub sector and their respective focus areas of agriculture identified to seek startup response, over 29.23 percent have shifted their focus areas. Majority of the startups have shifted from agri input followed by agri machinery and ICTs. Whereas most of them shifted to Value addition followed by waste to wealth and IoTs. It is relevant to highlight the fact that the sectoral shift was negligible across the startups and hence same has not been included (Table 3).

Change in market position normally adopted to protect and enhance and insulate the flow of income, investment and turnover of the startups. About 35.38 percent of the startups have changed their market position and nearly half of them targeted both the consumer and producer to secure market position and supply chains. Among the strategies adopted capture market share for their product/ service over 51.85 percent stated to be made their product/ service attractive with added benefits/ discounts and 39.13 percent by lowering price. Also, 13.04 percent have also moved their price to higher level in order to secure market position. Further 59.38 percent of the startups have changed their business model, while most of them changed their model to B2C followed by B2B and B2G in order to cope-up with disruption caused by pandemic (Table 3).

Among the various measures offered to startups by the government to sail through the pandemic most of them availed low interest rate followed by regulatory changes and wage subsidy. While the measure of tax relief was least affected measure to protect and promote the startups during the pandemic. Further startups have been almost equally distributed in terms of the running their business with the available financial resources at the onset of pandemic to the period of less than

three months to twelve months. Although over one third stated they could not run their business with available resources beyond three months if the pandemic and restriction of the economic activities continues to persist (Table 3).

V. Conclusion and policy implications:

From the above analysis it was held that for the startups pandemic induced restriction in economic activities resulted in loss of 19.15 percent of income, 17.59 percent of turnover and also, they face 9.21 percent of higher cost production owing to significant increase in cost of labor, input, reduction in product/ service subscription and unit orders, higher cost of transportation among others. Although normalization occurred in the fourth phase less has been affected to bring startup operation to pre-pandemic level. Hence measures needed to regain the lost vigor for the startups at this time. As a result of pandemic startups have lost rupees half million investment in the FY 2020-21 and most pressing reason found to be high selection bars and investment deferment. Thus, investment forms the boot straps become the major source during the pandemic and gradual increase in institutional investment by the end of fourth phase. While the employment creation/ hiring was in consonance with increase in income and investment after the second phase while the layoff of employees continues to persist till the third phase and sharp reduction in fourth phase. Further most of the startups have adopted flexibility in work time to retain the workforce and in the later phases remote working was also offered. Although most of the startups have availed government measures to sail through pandemic, one third of them have stated they could not survive with the existing resources for more than three months.

Startups have enormous potential create employment and economic growth with their innovative products and customized services. The onset of the second wave of Covid 19 and its subsequent impact are yet to fully contemplate. Thus, the policy measures should move away from myopic sight instead of offering first aid must involve long-term measures. Besides it is desirable to create all-round support system for startups to access capita, market and key resources, in lieu creation of dedicated fast-track agri-startup development fund is appropriate in providing easy term loans/ debt funding/ collateral free loan. Further the enterprise policy must be data driven and policy makers and their team need to be attuned at monitoring real-time data sources to mitigate chronic entrepreneurial uncertainty via strategic policy responses. In light of this, the institutional framework and government support's role is crucial in securing the key changes and insulating startups from the adverse crisis while promoting entrepreneurial activities agriculture and allied sector.

References:

1. Almeida, F. (2020). The role of tech startups in the fight against COVID-19. *World Journal of Science, Technology and Sustainable Development*.
2. Almeida, P., Dokko, G., & Rosenkopf, L. (2003). Startup size and the mechanisms of external

- learning: increasing opportunity and decreasing ability?. *Research Policy*, 32(2), 301-315.
3. Apostolopoulos, N., Ratten, V., Petropoulos, D., Liargovas, P., & Anastasopoulou, E. (2021). Agri-food sector and entrepreneurship during the COVID-19 crisis: A systematic literature review and research agenda. *Strategic Change*, 30 (2), 159-167.
 4. Baker, S., Bloom, N., Davis, S., Terry, S., Baldwin, R., di Mauro, B. W., ... & Robinson, D. (2020). Startups and employment following the COVID-19 pandemic: A calculator
 5. Barrero, J. M., Bloom, N., & Davis, S. J. (2020). *Covid-19 is also a reallocation shock* (No. w27137). National Bureau of Economic Research.
 6. Bell, B., Bloom, N., Blundell, J., Pistaferri, L., Vandenbroucke, F., Andor, L., ... & Postel-Vinay, F. (2020). Rescuing the labour market in times of COVID-19: Don't forget new hires!.
 7. Bhooshan, N., & Kumar, A. (2020). How Did Agri-start-ups Fare during the COVID-19 Pandemic?. *Economic & Political Weekly*, 55(50), 13.
 8. Block, J., & Sandner, P. (2009). What is the effect of the financial crisis on venture capital financing? Empirical evidence from US Internet start-ups. *Venture Capital*, 11(4), 295-309.
 9. Boin, A. (2009). The new world of crises and crisis management: Implications for policymaking and research. *Review of Policy research*, 26(4), 367-377.
 10. Brown, R., & Lee, N. (2019). Strapped for cash? Funding for UK high growth SMEs since the global financial crisis. *Journal of Business Research*, 99, 37-45.
 11. Brown, R., & Rocha, A. (2020). Entrepreneurial uncertainty during the Covid-19 crisis: Mapping the temporal dynamics of entrepreneurial finance. *Journal of Business Venturing Insights*, 14, e00174.
 12. Brown, R., Rocha, A., & Cowling, M. (2020). <? covid19?> Financing entrepreneurship in times of crisis: Exploring the impact of COVID-19 on the market for entrepreneurial finance in the United Kingdom. *International Small Business Journal*, 38(5), 380-390.
 13. Ci, W., Morissette, R., & Schellenberg, G. (2016). Hires and Layoffs in Canada's Economic Regions: Experimental Estimates, 2003 to 2013.
 14. Conti, A., Dass, N., Di Lorenzo, F., & Graham, S. J. (2019). Venture capital investment strategies under financing constraints: Evidence from the 2008 financial crisis. *Research Policy*, 48(3), 799-812.
 15. Deeds, D. L. (2001). The role of R&D intensity, technical development and absorptive capacity in creating entrepreneurial wealth in high technology start-ups. *Journal of engineering and technology management*, 18(1), 29-47.
 16. Demirgüç-Kunt, A., Peria, M. S. M., & Tressel, T. (2020). The global financial crisis and the capital structure of firms: Was the impact more severe among SMEs and non-listed firms?, *Journal of Corporate Finance*, 60, 101514.

17. Di Vaio, A., Boccia, F., Landriani, L., & Palladino, R. (2020). Artificial intelligence in the agri-food system: Rethinking sustainable business models in the COVID-19 scenario. *Sustainability*, 12(12), 4851.
18. Economic Survey (2020), Economic Survey of India, Vol 1, Ministry of Finance, Government of India.
19. Evans, S., & Bahrami, H. (2020). Super-flexibility in practice: Insights from a crisis. *Global Journal of Flexible Systems Management*, 21(3), 207-214.
20. Galanakis, C. M., Rizou, M., Aldawoud, T. M., Ucak, I., & Rowan, N. J. (2021). Innovations and technology disruptions in the food sector within the COVID-19 pandemic and post-lockdown era. *Trends in Food Science & Technology*.
21. GDA (2020) (Global Data Analysis) **Coronavirus (COVID-19) Executive Briefing** Global Data (2020)
22. Gregurec, I., Tomičić-Furjan, M., & Tomičić-Pupek, K. (2021). The impact of COVID-19 on sustainable business models in SMEs. *Sustainability*, 13(3), 1098.
23. Haematology, T. L. (2020). COVID-19 coagulopathy: an evolving story. *The Lancet Haematology*, 7(6), e425.
24. Kalogiannidis, S., & Chatzitheodoridis, F. (2021). Impact of Covid-19 in the European Start-ups Business and the Idea to Reenergise the Economy. *International Journal of Financial Research*, 12(2), 56-61.
25. Kapila, U. (Ed.). (2008). *Indian Economy since independence*. Academic Foundation.
26. Kessler, Beatrice (2020): "COVID-19 Impact: Most Vulnerable Are Startups in the Early Phase (seed)," Startup Spider, 18 March, [https:// www.startupspider.com/assets/files/EN_Tips Tricks4Startups_COVID19_StartupImpact.pdf](https://www.startupspider.com/assets/files/EN_Tips_Tricks4Startups_COVID19_StartupImpact.pdf).
27. Kuckertz, A., Brändle, L., Gaudig, A., Hinderer, S., Reyes, C. A. M., Prochotta, A., ... & Berger, E. S. (2020). Startups in times of crisis—A rapid response to the COVID-19 pandemic. *Journal of Business Venturing Insights*, 13, e00169.
28. Kumar, A., Padhee, A. K., & Kumar, S. (2020). How Indian agriculture should change after COVID-19. *Food Security*, 12(4), 837-840.
29. Maritz, A., Perenyi, A., de Waal, G., & Buck, C. (2020). Entrepreneurship as the unsung hero during the current COVID-19 economic crisis: Australian perspectives. *Sustainability*, 12(11), 4612.
30. Ministry of Finance (2017) ONTARIO'S LONG-TERM REPORT ON THE ECONOMY, Ontario, Canada. <https://www.fin.gov.on.ca/en/economy/ltr/2017/ltr2017.pdf>
31. NITI Aayog (2021) <https://timesofindia.indiatimes.com/blogs/toi-edit-page/a-case-for-lives-livelihoods-safely-continuing-the-infrastructure-projects-will-help-return-our-economy-to-health/>

32. Pinillos, R. G. (2021). One welfare impacts of COVID-19—A summary of key highlights within the one welfare framework. *Applied Animal Behaviour Science*, 236, 105262

33. Quarantelli, E. L. (1988). Disaster crisis management: A summary of research findings. *Journal of management studies*, 25(4), 373-385.

34. Rowan, N. J., & Galanakis, C. M. (2020). Unlocking challenges and opportunities presented by COVID-19 pandemic for cross-cutting disruption in agri-food and green deal innovations: Quo Vadis?. *Science of the Total Environment*, 141362.

35. Roy, A., Patnaik, B. C. M., & Satpathy, I. (2020). Impact of Covid-19 crisis on Indian MSME sector: A study on remedial measures. *Eurasian Chemical Communications*, 2(9), 991-1000.

36. Sedlacek, P., & Sterk, V. (2020). Startups and employment following the COVID-19 pandemic: A calculator. https://voxeu.org/article/startup-employment-calculator-covid-19?qt-quicktabs_cepr_policy_research=1

37. Singh, A. K., Upadhyaya, A., Kumari, S., Sundaram, P. K., & Jeet, P. (2020). Role of Agriculture in making India \$5 trillion Economy under Corona Pandemic Circumstance. *Journal of AgriSearch*, 7(2), 54-58.

38. Verma, A., & Kumar, S. (2021). *ENTREPRENEURSHIP AMIDST PANDEMIC COVID19*. Book Rivers.

39. Whitworth, J. (2020). COVID-19: a fast-evolving pandemic. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 114(4), 241.

Appendix

A1:Table 2: Comparison of disruption in business activities of Agri-startups during pandemic

Indicators	Phases							
	FY 2019-20	Phase I	Phase II	Phase III	Phase IV			
Labor	Availability	Fully available	88.13	23.81	40.73	66.67	81.56	
		Partially available	11.56	63.21	51.53	23.43	16.31	
		Not available	0.31	12.98	7.74	9.9	2.13	
	Wages*	Increased	7.53	62.53	46.92	27.89	5.21	
		Extent of increase	0-10%	83.82	25.93	50	62.5	74.36
			11-20%	10.03	37.04	30	28.13	16.37
			21-30%	5.06	33.33	16.67	6.25	6.73
			>30%	1.09	3.7	3.33	3.12	2.54
		Decrease	1.24	2.63	1.56	4.69	11.23	
		Constant	91.23	34.84	51.52	67.42	83.56	
Input/ raw materials	Availability	Fully available	94.56	78.52	84.26	89.61	91.33	
		Partially available	4.71	18.44	15.38	9.56	8.03	
		Not Available	0.73	3.04	0.36	0.83	0.64	
	Cost*	Increased	4.53	41.25	33.45	21.56	6.53	
		Extent of increase	0-10%	81.82	25.82	46.17	62.49	82.13
			11-20%	9.09	22.32	36.23	28.13	12.26
			21-30%	6.06	48.15	15.27	6.25	3.28
			>30%	3.03	3.71	2.33	3.13	2.33
		Decrease	3.18	1.12	1.15	3.13	4.55	
		Constant	92.29	57.63	65.4	75.31	88.92	
Ma nuf act	Availability	Fully available	73.53	27.69	11.54	76.92	79.32	
		Partially available	22.62	30.77	69.23	15.39	15.17	

Utilization	Not Available		3.85	41.54	19.23	7.69	5.51	
	Fully available		71.38	17.74	42.54	72.77	84.37	
	Partially available		24.77	23.72	38.23	18.54	10.12	
	Not Available		3.85	58.54	19.23	8.69	5.51	
	Increased		17.54	61.23	47.36	21.59	13.66	
	Cost*	0-10%		81.48	7.41	23.81	65.27	85.32
		11-20%		14.81	37.04	46.1	25.64	12.33
		21-30%		3.71	22.22	25.33	9.09	2.35
		>30%		0	33.33	4.76	0	0
	Decrease		5.1	6.21	8.27	7.27	3.05	
Constant		77.36	32.56	44.37	71.14	83.29		
Product/ service	Decrease		7.12	59.81	43.23	23.21	13.83	
	Subscription/ sale*	0-10%		87.5	6.25	15.61	53.13	71.21
		11-20%		9.38	12.5	40.63	37.49	25.36
		21-30%		3.13	37.5	28.13	9.38	3.43
		>30%		0	43.75	15.63	0	0
	Increased		12.94	1.23	21.61	44.15	57.14	
	Constant		79.94	38.96	35.16	32.64	29.03	
Territorial/ Market expansion	Expanded		68.97	17.24	55.17	79.31	82.14	
	Not expanded		31.03	82.76	44.83	20.69	17.86	
	Major areas of expansion	Urban		32.14	35.72	17.86	7.14	16.23
		Rural		39.29	57.14	53.57	28.58	32.14
		Semi urban		21.43	7.14	21.43	35.71	41.12
		Overseas		7.14	0	7.14	28.57	10.51
	Expansion in existing region	Yes		73.91	8.7	73.91	82.61	93.73
		No		26.09	91.3	26.09	17.39	6.27
	New entry	Yes		68.18	4.55	22.73	54.55	51.23
		No		31.82	95.45	77.27	45.45	48.77
	Region of entry	Urban		32.14	35.71	17.86	7.14	16.23
		Rural		39.29	57.14	53.57	28.58	32.14
		Semi urban		21.43	7.15	21.43	35.71	41.12
Overseas		7.14	0	7.14	28.57	10.51		
Market contraction	Yes		13.64	77.27	36.36	26.09	8.79	
	No		86.36	22.73	63.64	73.91	91.21	
	Major region of Contraction	Urban		34.62	30.79	26.92	23.08	13.25
		Rural		30.77	7.69	42.31	46.15	61.63
		Semi urban		15.38	15.38	11.54	19.23	9.56
		Overseas		19.23	46.14	19.23	11.54	15.56
Distribution/ Supply chain	Online		7.41	48.15	11.11	7.41	12.47	
	Offline		25.92	7.41	40.74	22.22	31.27	
	Both		66.67	44.44	48.15	70.37	56.26	
	Change in mode of distribution	Yes		39.13	34.78	39.13	47.83	27.24
		No		60.87	65.22	60.87	52.17	72.76
		Online to offline		29.41	17.65	23.53	11.76	7.78
		Offline to online		70.59	82.35	76.47	88.24	92.22
Orders details	Ave. orders received (No's)		280	244	354	509	623	
	Online		1006.36	197	335.45	677.73	1026.36	
	Offline		91.67	20.83	54.17	70.83	85.69	
	Fulfilment of orders		8.33	79.17	45.83	29.17	14.31	
Transportation	Fully available		83.33	12.5	25	70.83	87.78	
	Partially available		16.67	20.83	58.33	29.17	12.22	
	Not Available		0	66.67	16.67	0	0	
	Increased		6.37	67.52	42.35	11.99	8.99	
	Cost*	0-10%		95.65	8.7	52.17	73.91	89.78
		11-20%		0	39.13	26.09	21.74	7.79
		21-30%		4.35	13.04	13.04	4.35	2.43
		>30%		0	39.13	8.7	0	0
Decreased		2.13	1.23	18.48	36.56	43.87		

	Constant	91.5	31.25	39.17	51.45	47.14
Majority of product/ service movement	Intra-state	53.57	76.42	61.27	21.43	14.25
	Inter-state	42.86	21.43	32.11	71.43	66.15
	Overseas	3.57	2.15	6.62	7.14	19.6

*Here the increase, decrease, and constant of cost, wages, sale/ subscription in each phase is reference to average of base year (2019-20).

Table 3: Strategies adopted by startups to cope up with impact of pandemic

Strategies		Phases					
		Phase-I	Phase-II	Phase-III	Phase-IV		
a. Employment strategies	Layoff	Yes	26.32	21.05	28.95	8.71	
		No	73.68	78.95	71.05	91.29	
	Hiring	Yes	30.30	51.52	66.67	79.13	
		No	69.70	48.48	33.33	20.87	
	Pay cut	Extent of pay cut	>5%	93.12	87.37	92.45	89.66
			5-10%	6.88	12.63	7.55	10.34
			>10%	93.15	89.71	91.45	90.15
		Flexibility in work time		5.14	9.13	5.66	9.85
				1.71	1.16	2.89	0
	Strategy to retain workforce	Option for partial employment	36.59	40.48	41.03	37.14	
		Sufficient leave/ leisure	24.39	14.29	12.82	15.67	
		Rewarding benefits, they sought for longtime	4.88	4.76	2.56	3.14	
		Opportunity to work remotely	7.32	9.52	10.26	9.78	
		Offer premium/ bonus	14.63	21.43	28.21	23.74	
	b. Switching focus area	Yes	12.20	9.52	5.13	10.53	
No							
c. Change in market position	Target element	Producer			29.23		
		Consumer			70.77		
		Both			35.38		
	Measure to capture market	Lowering the price of product/ service				64.62	
		High price of product/ service				39.13	
		Making product/ service attractive with added benefits/ discounts				13.04	
						47.83	
d. Change in Business mode	Change in model	Yes				33.33	
		No				14.81	
		B2B				51.85	
		B2C				51.85	
		B2G				51.85	
e. Government measures adopted	Low interest loans					40.63	
		Delay in repayment to commercial banks/ cooperatives				59.38	
		Wage subsidies				38.24	
		Tax relief				52.94	
		Regulatory changes				8.82	
f. Business can be run with available financial resources	Regulatory changes					37.66	
		<3 months				12.99	
		3-6 months				16.88	
		6-12 months				10.39	
		>12 months				22.08	