

THE ORGANISATIONAL RESILIENCE AND ADAPTIVE STRATEGIES IN THE GIG ECONOMY: A SYSTEMATIC ANALYSIS OF PLATFORM-MEDIATED LABOUR MARKETS DURING THE COVID-19 PANDEMIC

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ABSTRACT

The COVID-19 pandemic precipitated an unprecedented disruption of global labour markets, simultaneously intensifying structural vulnerabilities and accelerating digital labour transformations. Among the most profound outcomes has been the rapid expansion of platform-mediated gig work, which emerged as both a survival mechanism for displaced workers and a critical infrastructure sustaining essential services during mobility restrictions. This study critically examines the intersection of the gig economy and the COVID-19 crisis, with particular attention to resilience mechanisms, adaptive strategies, and post-pandemic sustainability within platform-based labour markets. Adopting a multi-method research design, the study integrates a systematic literature review, thematic synthesis, and comparative analysis of secondary empirical evidence drawn from peer-reviewed scholarship, institutional reports, and policy documents. Analytical attention is directed towards employment dynamics, income stability, organisational resilience, business-model innovation, digitalisation, and regulatory responses across developed and developing contexts, with a focused examination of India's gig workforce expansion and emerging social-protection frameworks. The findings reveal that while gig platforms demonstrated considerable adaptive capacity through technological innovation, operational reconfiguration, and network-based resource mobilisation, gig workers experienced heightened precarity, income volatility, and limited access to social security. Pandemic-induced transformations have thus produced a paradoxical landscape wherein flexibility and opportunity coexist with intensified insecurity. The study further identifies persistent policy-implementation gaps, regulatory ambiguities, and unequal digital access as critical constraints on inclusive resilience. The paper concludes by proposing evidence-based policy recommendations aimed at strengthening social protection

architectures, enhancing platform accountability, and fostering sustainable, equitable growth in the gig economy in future crisis contexts.

Keywords: *Gig Economy; COVID-19 Pandemic; Organisational Resilience; Platform Workers; Business Model Innovation; Digital Transformation; Labour Precarity; Social Protection*

INTRODUCTION

"The gig economy is not just about flexibility—it's about fundamental questions of worker rights, social protection, and economic security in the 21st century."

— International Labour Organization (ILO)

The gig economy has emerged as one of the most transformative phenomena in contemporary labour markets, fundamentally altering traditional employment structures through platform-mediated, task-based work arrangements. Characterised by short-term contracts, flexible schedules, and digital intermediation, the gig economy represents a substantial departure from conventional employer–employee relationships towards on-demand labour facilitated by technological platforms. In recent years, this transformation has accelerated globally due to widespread smartphone adoption, enhanced internet penetration, and the proliferation of digital platforms across transportation, food delivery, freelance services, and home-based service provision. The COVID-19 pandemic constituted an unprecedented systemic shock that simultaneously disrupted public health systems, economic activity, and labour markets worldwide. Government-imposed lockdowns, mobility restrictions, and social distancing measures brought large segments of economic life to an abrupt halt, creating severe challenges for both formal and informal workers. However, the pandemic also accelerated digital transformation and reconfigured consumer behaviour, thereby creating paradoxical opportunities for gig economy expansion. Platform-based work emerged as both a survival mechanism for displaced workers and a critical infrastructure enabling essential services during periods of restricted physical mobility. The intersection of the gig economy and the COVID-19 crisis presents a complex and multifaceted research landscape. On one hand, gig platforms demonstrated remarkable adaptability, absorbing surplus labour from sectors experiencing severe contractions whilst facilitating contactless service delivery. On the other hand, the crisis intensified pre-existing vulnerabilities inherent in platform-mediated work, including income volatility, absence of social protection, algorithmic control, and regulatory ambiguity. The pandemic exposed gig workers to heightened health risks, economic insecurity, and social marginalisation, whilst simultaneously revealing their indispensability to urban economies and essential supply chains. Existing scholarship on the gig economy has largely focused on labour precarity, platform governance, regulatory challenges, and income dynamics under stable conditions. Similarly, COVID-19-

related research has examined crisis impacts on traditional employment, small businesses, supply chains, and entrepreneurship. However, comprehensive analyses integrating gig economy dynamics with pandemic-induced disruptions, adaptive strategies, and resilience mechanisms remain limited. This gap is particularly pronounced in developing-country contexts, where informal labour dominates and digital infrastructure remains uneven. Understanding how gig workers and platforms navigated the pandemic—through resilience strategies, business model innovation, digitalisation, and institutional adaptation—is essential for shaping inclusive and sustainable labour policies in the post-pandemic era. Against this backdrop, the present study situates itself within the broader discourse on digital labour, crisis entrepreneurship, and organisational resilience. It examines the transformative impact of the COVID-19 pandemic on the gig economy, analysing both the challenges faced by gig workers and platforms, and the adaptive strategies employed to ensure survival, continuity, and growth during unprecedented uncertainty.

PURPOSE (OBJECTIVES)

The primary purpose of this study is to critically analyse the intersection of the gig economy and the COVID-19 pandemic, with particular emphasis on resilience, transformation, and sustainability in platform-mediated labour markets. Specifically, the study seeks to:

- To Examine the impact of the COVID-19 pandemic on gig workers' employment opportunities, income stability, working conditions, and social protection across diverse geographic and sectoral contexts.
- To Analyse the resilience strategies adopted by gig economy platforms and workers in response to pandemic-induced disruptions, including business model innovation, digitalisation, operational adaptation, and crisis management.
- To Evaluate the role of organisational resilience and adaptive capacity in determining the survival and performance of gig platforms and workers during the crisis.
- To Assess the sustainability implications of pandemic-driven transformations in the gig economy across economic, social, and environmental dimensions.
- To Identify structural, technological, regulatory, and socio-economic barriers that constrained resilience and adaptation within platform-mediated labour markets during the pandemic.
- To Propose evidence-based policy recommendations aimed at strengthening social protection, enhancing labour rights, and promoting inclusive growth within the gig economy in post-pandemic and future crisis contexts.

METHODOLOGY

The study adopts a comprehensive, multi-method research design combining systematic literature review (SLR), thematic synthesis, and comparative analytical approaches. Given the study's integrative and theory-building orientation, it relies primarily on secondary data sources to synthesise existing empirical evidence, theoretical frameworks, and policy analyses.

Data Collection and Sources

Data have been systematically collected from peer-reviewed journal articles, edited volumes, conference proceedings, policy reports, institutional publications, and authoritative international organisation documents. Major academic databases utilised include Scopus, Web of Science, ScienceDirect, EBSCOhost, ProQuest, Google Scholar, and the World Health Organization's Global Research on Coronavirus Disease (COVID-19) database. Search strategies employed combinations of keywords such as "gig economy," "platform workers," "COVID-19," "pandemic," "resilience," "business model innovation," "digitalisation," "employment," and "social protection." The inclusion criteria prioritised empirical studies, conceptual analyses, and policy evaluations published in English between March 2019 and the present, ensuring coverage of pre-pandemic, mid-pandemic, and post-pandemic perspectives. Studies addressing gig workers, digital labour platforms, informal employment, crisis entrepreneurship, organisational resilience, and supply chain disruptions were systematically reviewed. Non-peer-reviewed materials, opinion pieces, and studies lacking methodological transparency were excluded to ensure analytical rigour.

Analytical Framework

The study employs thematic synthesis to identify recurring patterns, resilience mechanisms, and adaptive strategies across diverse contexts. Comparative analysis is utilised to examine variations between developed and developing economies, urban and rural settings, and different platform sectors (transportation, food delivery, freelance services, home services). Key analytical dimensions include employment dynamics, income stability, digital transformation, business model innovation, organisational resilience, regulatory responses, and sustainability outcomes. The analysis integrates multiple theoretical perspectives, including organisational resilience theory, crisis entrepreneurship frameworks, platform capitalism scholarship, and labour precarity literature. Particular attention is given to processual and dynamic conceptualisations of resilience, which view resilience not as a static attribute but as an evolving capability shaped by anticipation, absorption, adaptation, and recovery stages.

Quality Assessment

To ensure credibility and methodological robustness, quality assessment criteria were applied to evaluate the relevance, methodological rigour, theoretical grounding, and empirical validity of reviewed studies. Triangulation across multiple

data sources, geographic contexts, and methodological approaches enhances the reliability of synthesised findings.

LITERATURE REVIEW:

The organizational literature offers various definitions of resilience, reflecting its multifaceted nature. Caralli and colleagues defined resilience as an organization's capacity to achieve its objectives even under disruptive conditions. Luthans and colleagues viewed it as effectively navigating and managing difficulties and hardships. Azusa and Hiroyuki focused on the organisation's strength and capacity to recover swiftly from events or shocks. Similarly, Hosseini and Barker defined resilience as an organisation's ability to absorb and withstand the adverse effects of disturbances whilst rapidly restoring performance. Seville and colleagues emphasised resilience as the ability to endure, sustain, and grow during crises. The concept of organisational resilience initially emerged to address the need for organisations to adapt to rapidly evolving business environments. Resilient organisations are characterised by flexible workforces, adaptable supply chains that meet diverse customer needs, and agile organisational structures. In recent years, the focus of organisational resilience has expanded beyond the private sector to include public organisations, redefining the scope and scale of the threats they may encounter. Seville and colleagues emphasised that a resilient organisation can achieve its core objectives despite disasters. This involves minimising the frequency and severity of crises and vulnerabilities whilst effectively enhancing the organisation's capability and responsiveness in managing such challenges. In recent years, numerous studies have explored resilience and the factors influencing it. Sethi and colleagues analysed the critical enablers of organisational resilience using the TISM and MICMAC methods, identifying twelve antecedents of resilience. Their research provided insights into organisational behaviour before, during, and after crises, demonstrating how resilience mitigates negative spirals. Similarly, Sreenivasan and colleagues categorised resilience factors for start-ups during the COVID-19 pandemic using TISM and MICMAC, identifying ten key resilience elements from the literature. Expanding on this, Sreenivasan and Suresh assessed start-up preparedness for financial resilience through TISM. Their study identified ten financial factors, highlighting digital financial innovation, liquidity planning, going concern consideration, CFO financial strategies, and cyber threat management as the most critical. Chowdhury and colleagues investigated the role of technology in implementing resilience and sustainability strategies within supply chain management during the pandemic. Their comprehensive review emphasised strategies to mitigate supply chain disruptions caused by COVID-19. In a study entitled 'What Companies Can Learn from Unicorn Startups to Overcome the COVID-19 Crisis', Rodrigues and de Noronha revealed that unicorn start-ups impacted by the pandemic achieved positive outcomes by innovating their digital business models. Similarly, Capodistrias and

colleagues examined the impact of the pandemic on European food banks, showing that despite pandemic-related challenges, the food distribution in 2020 significantly surpassed 2019 levels. Krammer, analysing over 11,000 companies across 28 countries, reported that innovative organisations, particularly start-ups, outperformed non-innovative counterparts, showcasing greater adaptability and resilience during the COVID-19 crisis.

Despite increased interest in resilience within family businesses, Conz and colleagues observed that the role of owners and managers in promoting resilience has been underexplored. Their phenomenological study examined the experiences and practices of resilient owners and managers in family-run factories, shedding light on their contributions to resilience practices. In the healthcare domain, Pilevari and Valeh studied national health system resilience during the COVID-19 pandemic. Using a mixed soft system methodology (SSM) and TISM approach, they identified crisis sensing, opportunity seizing, and reconfiguration as foundational elements of health system resilience. In a study by Engidaw examining the impact of the COVID-19 pandemic on small businesses in Ethiopia, effective communication with employees, suppliers, banks, and customers was identified as a critical factor for managing expectations during the crisis. The findings emphasised the importance of transparency regarding financial conditions, continued product marketing, and exploring alternative marketing methods to ensure business survival. Roque Júnior and colleagues employed interpretive structural modelling (ISM) to categorise the resilience factors necessary for start-ups during the COVID-19 pandemic. Their study identified ten distinct resilience elements and utilised a TISM diagram to illustrate how flexibility components are interconnected, demonstrating the sequential relationships that enable start-ups to build resilience effectively. Mokline and Ben Abdallah investigated individual resilience during the COVID-19 pandemic, emphasising that organisations must prioritise the strengthening of employees' psychological protective factors. This focus enhanced organisational resilience by improving individuals' defence mechanisms against trauma, supporting psychological reconstruction, and facilitating post-resilience learning. Kuckertz and colleagues have examined start-up performance during the COVID-19 pandemic, highlighting that whilst start-ups initially leverage their existing resources to respond to crises, their long-term growth and innovation potential remain vulnerable. The study highlights the need for policy measures that provide immediate support to start-ups and sustained assistance from the broader entrepreneurial ecosystem to enable rapid recovery and future growth.

Despite the variety of studies dedicated to start-ups' resilience during crises, including TISM-based studies, this research offers several advantages over prior work, as follows:

Gig workers in India

Estimates of gig workers in India:

Estimates for the 'gig' employment in India have been made by different researchers. According to a report by ASSOCHAM and Primus Partners (2021) India is currently estimated to have more than 15 million freelance workers engaged in projects in different fields of the gig economy. The report by consultancy firm BCG and Michael & Susan Dell Foundation (2021) said that the gig economy can serve up to 90 million jobs in the non-farm sectors in India with a potential to add 1.25 percent to the GDP in about 8-10 years. It finds potential of 35 million skilled and semi-skilled jobs within industry sectors, 5 million in shared services role, around 12 million in the demand for services, and 37 million of unskilled jobs across various sectors of the economy. According to the report, a majority 70 million 'gigable jobs' are in the construction, manufacturing, transportation & logistics, and personal services sectors. The report also added that these jobs will primarily be driven by small business and household demand. The report said its estimates are based on a detailed mapping of jobtypes across industry sectors to identify opportunity areas and barriers to unlocking demand for gig-based services. A study by Team Lease estimates that gig workers in India increased from 8.5 million in 2016 to 11.7 million in 2017, and 15 million in 2018 (Tiwari, Ram & Roy, 2019). The report further notes that 56 percent of new employment in India is being generated by gig economy companies across both blue- and white-collar workforce. The Taskmo Gig Index report (2022) finds that not only the gig work and employment is expanding rapidly, but it is spreading now to smaller, tier 2 and tier3, towns. It also notes that Millennials and Gen Z (19-25 years) make up to 48 percent of the workforce today. Women, which consist of 28 percent of the gig-force finds it to be a flexible model of work for India's working women who are able to pick their jobs based on their area of interest, location, availability and experience. Women have been majorly employed in roles related to Customer support, content monitoring & moderation, Tele-sales, and Audits & Surveys. However, unequal access to digital technologies is a significant hurdle to women's participation in gig work. According to the GSMA Mobile Gender Gap Report 2019, only 16 percent of women in India are mobile internet users. Also, many women are disinterested in joining the gig economy due to the lack of job security and uncertain employment status (Kasliwal, 2020, p.3). Based on the characteristics of gig workers identified by BCG and Michael & Susan Dell Foundation (2021) report, the Niti Aayog (2022) has also now estimated the number of gig workers in India for the period 2011-12 to 2019-2020. The Aayog has also projected the numbers for the period 2021-2030. The Aayog has mainly used the supply side and demand side proximate features of the gig workers and has used the employment estimates obtained from the EUS and PLFS. The estimates along with some basic features are summarized in Figure 1. Figure 1 shows that the total number of gig workers were only 25 lacs in 2011-12 when the gig economy had started taking the present shape and constituted just 0.54 percent of the total employment of 46.99 crores. Of these gig workers, only 26 percent were working in the organised sector and the share was only 16.3 percent

of the formal workers. The picture has changed since then and in 2019-20, the number of gig workers by UPSS has increased to 68 lacs (6.8 million) with a share of 1.33 percent. Simultaneously, the share of gig workers in organised sector and as formal workers has also gone up, indicating that the speed of increase in the number of gig workers is faster in the organised sector as compared to the unorganised sector. It is however noticed that while the absolute number of gig workers has increased continuously in all the three years from 2017-18 to 2019-20, the share of gig workers as formal workers has declined between 2018-19 and 2019-2020. The projected numbers for 2020-21 and 2021-2 are also provided in Figure 1 and are useful in understanding the impact of COVID-19. The Aayog has also projected the number of gig workers to increase to 23.5 million by 2030.

Table 1 Industrial Classification of Gig workers and the percentage share (2017-18 to 2019-20)

NIC-2008	Gig workers in lacs			Change 2017- 18 to 2019-20	The share of Gig workers		
	2017- 18	2018- 19	2019- 20		2017- 18	2018- 19	2019- 20
Manufacturing	5.5	5.4	6.2	0.7	10.50	10.03	9.17
Electricity, gas, steam and air conditioning supplies	0.4	0.4	0.2	-0.2	0.67	0.73	0.33
Water supply, sewage, waste management, etc.	0.3	0.3	0.3	0	0.59	0.49	0.47
Construction	1.2	1.4	2.1	0.9	2.31	2.58	3.06
Retail trade except motor vehicles and motor cycles	19.2	21.7	26.5	7.3	36.48	40.30	38.95
Transportation and Storage	11	9.4	13	2	20.86	17.40	19.18
Accommodation and food service activities	3.2	2.8	4	0.8	6.05	5.20	5.94
Information and Communication	4.2	4.2	5	0.8	7.91	7.74	7.39
Financial and insurance activities	4.1	4.8	6.3	2.2	7.78	8.98	9.21
Real estate activities	2	1.5	2.4	0.4	3.77	2.84	3.53
Administrative and support service activities	0.2	0.4	0.4	0.2	0.36	0.68	0.55
Other education group	0.2	0.3	0.5	0.3	0.38	0.58	0.67
Educational support services	1.2	1.3	1.1	-0.1	2.34	2.44	1.56
Total	52.6	53.9	68	15.4	100	100	100

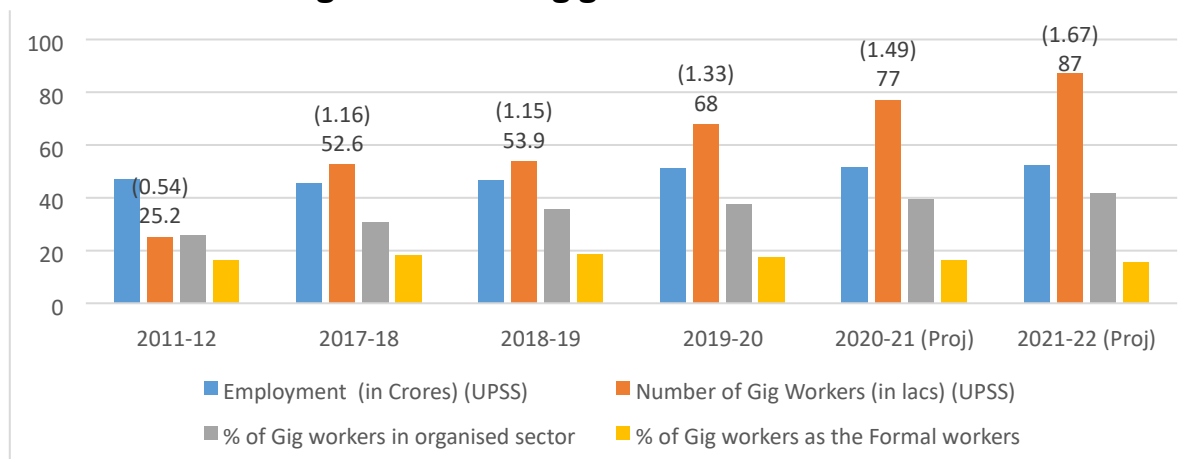
Source: Niti Aayog (2022)

Table 2 Occupational Classification of Gig Workers in Numbers and the percentage share (2017-18 to 2019- 20)

National Classification of Occupations (2004)	Gig workers (lacs)			Change 2017-18 to 2019-20	Share of Gig workers		
	2017-18	2018-19	2019-20		2017-18	2018-19	2019-20
Computing Professionals	1.8	2.2	2.7	0.9	3.44	4.15	3.96
Architects, Engineers and Related Professionals	1	1.6	1.7	0.7	1.88	2.91	2.43
Business Professionals	2.6	3	3.8	1.2	5.00	5.53	5.63
Computer Associate Professionals & Optical and Electronic Equipment Operators	2.6	1.7	1.6	-1	4.92	3.16	2.33
Finance and Sales Associate Professionals & Business Services Agents and Trade Brokers	3.3	3.4	5.2	1.9	6.31	6.32	7.6
Secretaries and Keyboard Operating Clerks & Numerical Clerks & Material Recording & Transport Clerks	3.4	2.8	6.2	2.8	6.53	5.11	9.05
Cashiers, Tellers and Related Clerks & Client Information Clerks	1.6	1.7	2	0.4	2.97	3.18	3.01
Travel Attendants, Guides and Related Workers	0.7	0.3	0.9	0.2	1.27	0.57	1.27
Housekeeping and Restaurant Services Workers & Personal Care Workers	2.6	3	3.9	1.3	4.99	5.63	5.68
Shop Salespersons and Demonstrators & Stall and Market Salespersons	18.9	22	22.8	3.9	35.98	40.8	33.53
Motor Vehicle Drivers	10.9	9.2	13	2.1	20.80	17.12	19.06
Street Vendors and Related Workers	1.5	1.7	2.6	1.1	2.78	3.19	3.86
Domestic and Related Helpers, Cleaners and Launderers	1.4	1	1.7	0.3	2.68	1.92	2.43
Building Caretakers, Window and Related Cleaners	0.2	0.2	0.1	-0.1	0.44	0.41	0.17
Total	52.6	53.9	68	15.4	100	100	100

Source: Niti Aayog (2022)

Figure 1 Profile of gig workers in India-2011-2019

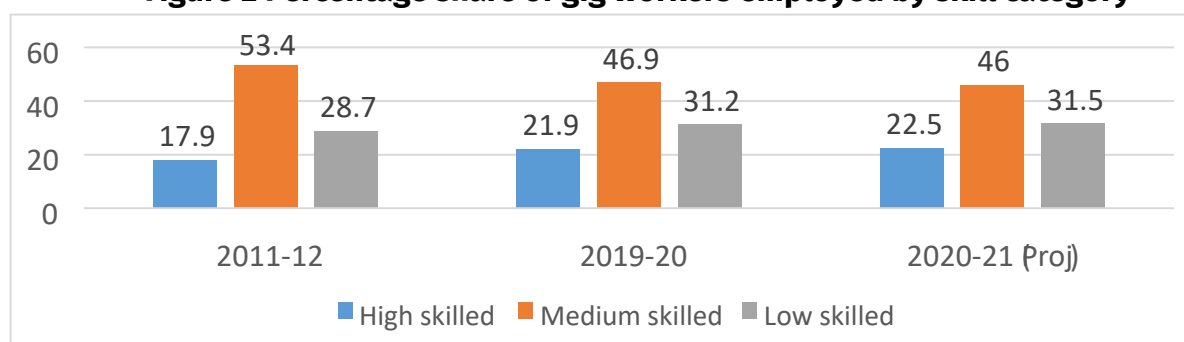


Sources: Niti Aayog (2022), and projections by the author based on the previous trend.

Note: The label shows the share of gig workers in total employment and the number of gig workers in lacs

The Niti Aayog report has also estimated and projected the distribution of gig workers by skill category, and it is summarized in Figure 2. The Figure shows that between 2011-12 and 2019-20, the share of low skill and high skill gig workers has increased and that of the medium skill has reduced (by 7 percentage points). It reflects the changing nature of work and the skill requirement. While the trend show that the concentration of middle skill workers may continue for few more years but gradually, because of the changing nature of work which is becoming more technology based, the demand and share of the high skill work may increase faster. The trend may also be accentuated because of the changing importance of industries and the occupations where the gig workers are employed.

Figure 2 Percentage share of gig workers employed by skill category



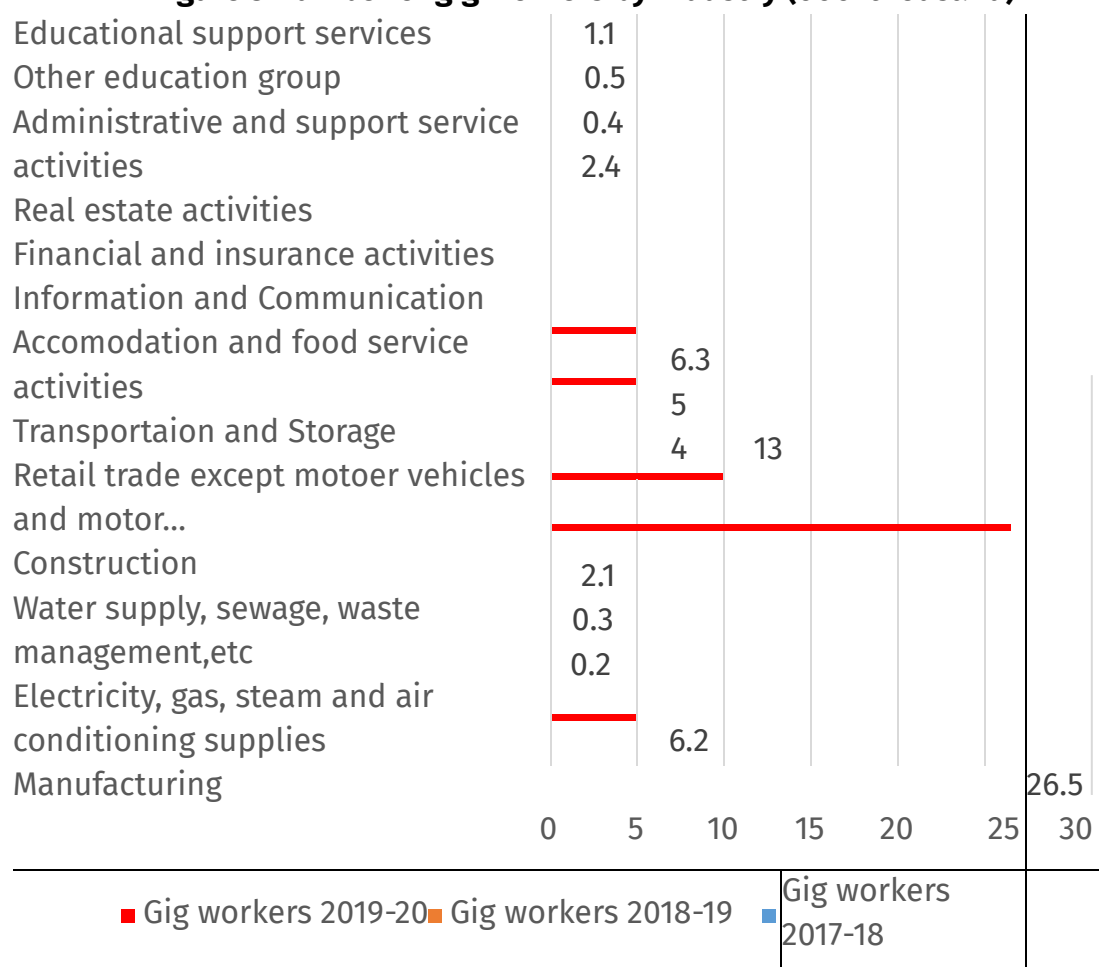
Source: Niti Aayog (2022)

Distribution of gig workers by industry and occupation

The summary of the industries and the occupations where the gig workers are employed is presented in Figures 3, 4 and 5. It is evident from Figure 3 and 4 that the maximum number of gig workers- more than 26 lacs in 2019-20 with a 40

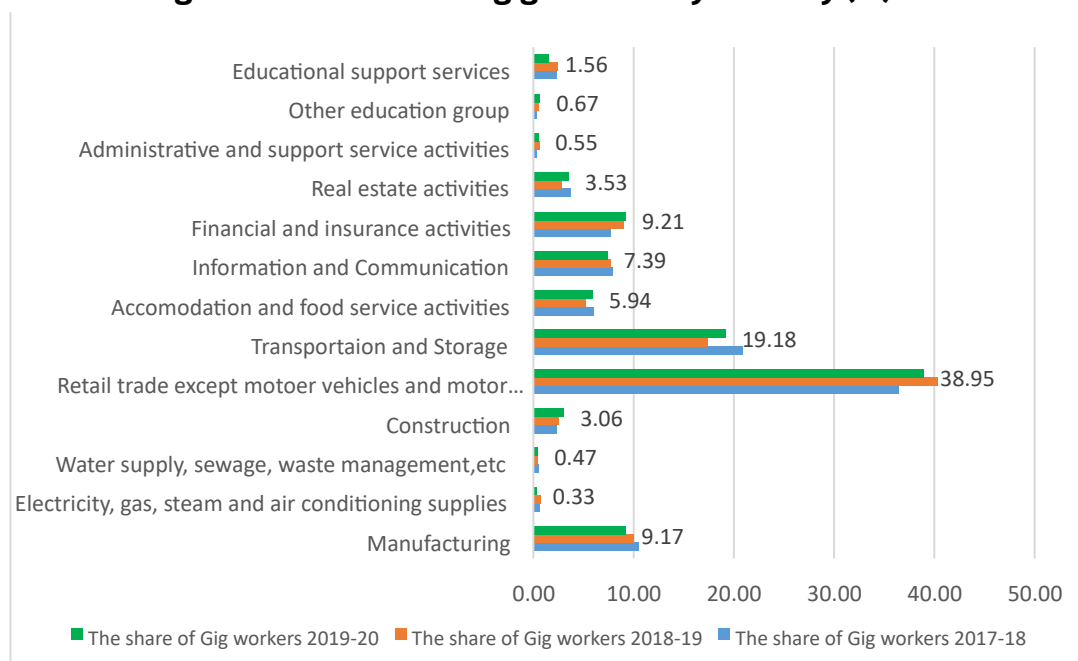
percent share are employed in retail trade, followed by 13 lacs in transportation and storage with a share of 19 percent, and in both manufacturing sector, and financial & insurance sectors with around 6 lacs workers and a share of 9 percent in each. Out of all the four sectors, the maximum increase in the number of gig workers over the year 2017-18 has been in retail trade, financial & insurance activities, and transport & storage. There is however, an expansion in almost all industrial sectors despite the changing sectoral concentration. From the expansion in different industries and the projections made, it is expected that the gig workers are here to stay and would expand further.

Figure 3 Number of gig workers by industry (000' thousand)



Source: Appendix Table A1

Figure 4 Distribution of gig workers by industry (%)



Source: Appendix Table A1

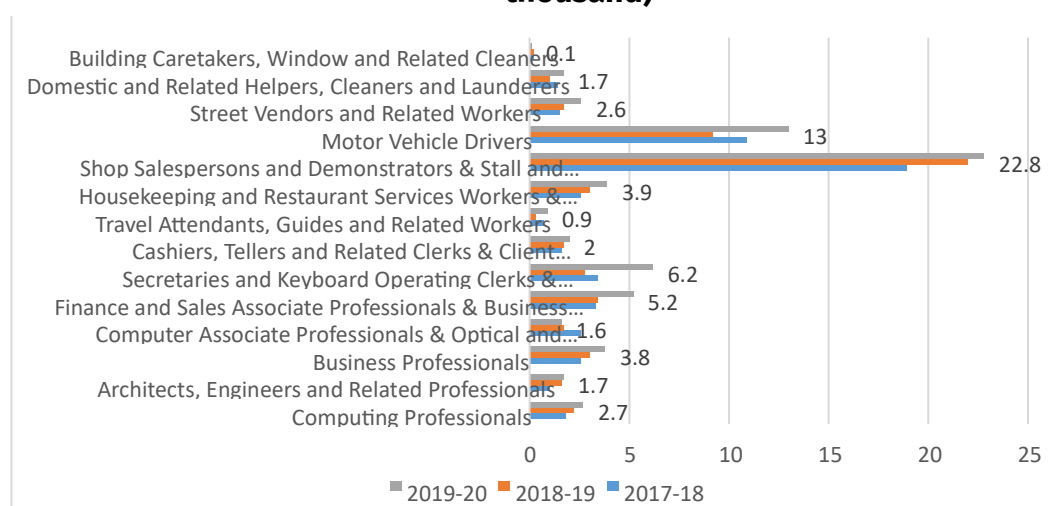
In Figure 5, the occupational distribution of the gig workers highlights the occupations in which the gig workers are broadly engaged. It indicates that some occupations are growing and becoming more important from the perspective of employment of gig workers and one can map the skill requirements of these occupations and accordingly upskill or reskill the existing labour. In terms of occupation, as defined by the National classification of occupation (NOC-2004), out of the total 68 lac Gig workers in 2019-20 about 23 lacs gig workers (one-third of the total) are employed as sales and marketing personnel, 13 lacs as motor vehicle drivers (about one-fifth), 6 lacs as secretary and clerks, and sales & finance associates are 5 lacs. These four categories together account for around 80 percent of the total gig workers and there has been only a small change in the shares. Out of a total increase of 15 lacs gig workers between 2017 and 2019, the maximum increase of 3.9 lacs has been for shop salespersons etc., followed by an increase of 2.8 lacs for Secretaries & clerks, and 2.1 lacs for motor vehicle drivers. From the discussion on the gig workers it is clear that the estimates are a first major attempt by Niti Aayog, India to find the exact number of gig workers in India across industries and occupations. The estimates in the report are therefore based on certain notions about who are the gig workers and the likely industries and occupations where the gig workers may be working. The estimates may therefore suffer from inaccuracies and may have rendered it difficult to have the exact estimates because of use of certain restrictive assumptions related to the growth in population, employment, etc. at the economy level and the industry level. However, the report does provide ample idea of the magnitude and distribution of

the gig workers in India, starting from 2011-12, 2017-18 up to 2019-20 and also makes some projections for 2020-21, 2021-22, and 2030-31.

The limitation of the current discussion is that in the absence of any other official source of information on gig workers, it is solely based the report by Niti Aayog, but it is hoped that with the availability of more data revisions could be made.

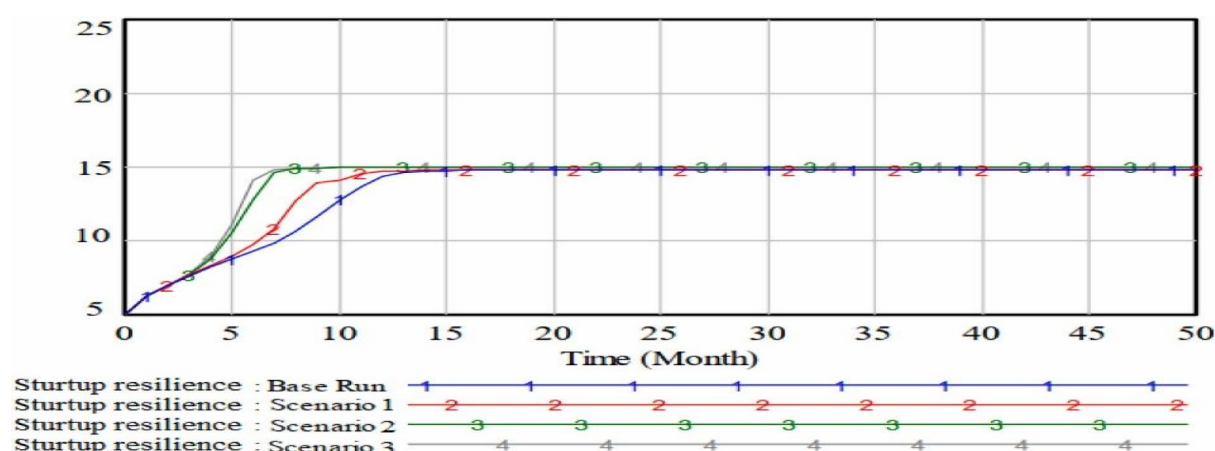
From the previous discussion of the self-employed, casual, and gig workers it is evident that while the share of self-employed and gig workers has increased in the recent period since 2017-18, the share of casual workers has marginally declined. It is also observed that the social security which is expected to be available to the regular wage/salaried employees, is also not available to more than 50 percent in 2021-22 and the overall status of labour in 2021-22.

Figure 5 Occupational classification of gig workers -2017-18 to 2019-20 (000' thousand)



Source: Appendix Table A2

Figure 6 The model implemented in Vensim software



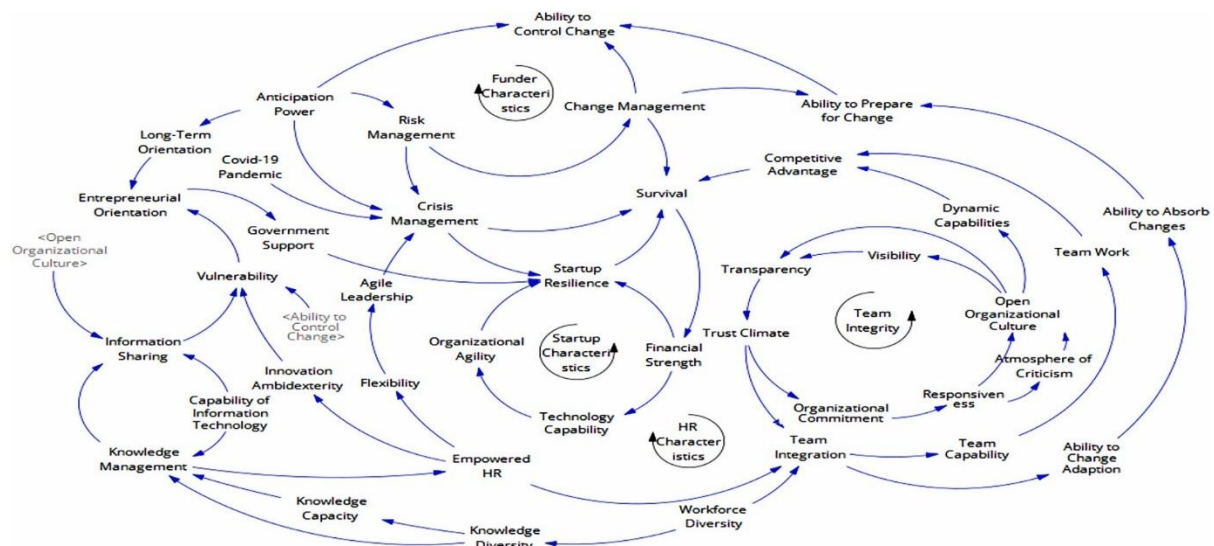


Table 3 Scenarios for improving resilience.

Scenario name	Financial strength	Government support	Crisis management
Base scenario	Primary level	Primary level	Primary level
Scenario 1	0.05 ↑	0.05 ↑	0.05 ↑
Scenario 2	0.05 ↑	0.10 ↑	0.05 ↑
Scenario 3	0.05 ↑	0.05 ↑	0.10 ↑

Evaluation of Resilience Improvement Scenarios

This section evaluates variations in the key variables of the stock and flow framework, which are essential for assessing the overall condition of the system. A baseline scenario and three alternative scenarios were developed to examine the resilience of the system, acknowledging that the range of possible scenarios may vary according to the policies and resources available within the system under consideration. The scenarios are constructed on assumed levels of policy intervention and infrastructural support and are primarily determined by three central variables, namely financial strength, government support, and crisis management. These variables serve as crucial determinants in establishing resilience objectives and shaping appropriate policy responses. In the baseline scenario, financial strength, government support, and crisis management remain at their initial simulation levels. The first alternative scenario assumes moderate improvements across all three variables. The second scenario incorporates a greater enhancement in government support while maintaining moderate improvements in financial strength and crisis management. The third scenario considers a greater enhancement in crisis management alongside moderate improvements in financial strength and government support. The simulation outcomes indicate that the third

scenario proves most effective, as it enables the system to attain stability within a shorter period compared to the other scenarios. Although multiple alternative scenarios could be explored, the selected set provides meaningful insight into the dynamics of resilience within the system. The analysis ultimately underscores the critical role of targeted policy measures and institutional support in strengthening the resilience of startups.

Table 4 Profile of Sampled Businesses and Interview Methods

Samples	Type of business	Size of business	Established from	Type of interview	New business/ business model during pandemic	Number of interviews
1	Restaurant	Micro	2017	Face-to-face	Expanded to include non-food business	2
2	Traditional drink	Small	2015	Face-to-face	Selling their product direct to customers in some government offices	2
3	Traditional food	Small	2018	Face-to-face	–	1
4	Beverage/drink	Micro	2018	Face-to-face	Selling food in their stall	2
5	Snack	Small	2017	Face-to-face	Selling drink in their stall	2
6	Snack	Small	2018	Face-to-face	–	2
7	Korean snack	Medium-sized	2019	Face-to-face	Releasing new menus	2
8	Beverage/drink	Small	2019	Face-to-face	–	2
9	Restaurant	Small	2015	Telephone	Adding to the menu	2
10	Traditional food	Micro	2016	Face-to-face	Providing delivery service	2
11	Japanese food	Micro	2019	Face-to-face	Providing fusion snack	1
12	Beverage/drink	Medium-sized	2018	Telephone	Adding more drink varieties	3
13	Snack	Medium-sized	2018	Telephone	Selling rice bowls	2

Table 5 Research gaps and study contributions.

Research Gap	Supporting literature	Key findings	Contribution
Limited knowledge of pandemic adaptation among SMEs	[29–32]	Large businesses that were technologically inclined and resourced were better positioned to cope with the crisis through digital platforms and innovations. Technological adaptation and innovation helped large enterprises endure the pandemic crisis better. For example, adopting digital platforms such as Zoom, Google Meet, and Skype allowed large enterprises to operate remotely during the lockdown period. More studies are required to examine the nexus between SMEs and pandemic coping strategies	This systematic review offers insights into SMEs' technological capacities within the pandemic risk- coping strategy nexus framework. This highlights how digital technologies now offer agilities to business models that enable them to 'sense and response' to uninformed external/environmental changes.
Existing literature remains inconsistent and fragmented.	[9,33–36]	Study findings on SMEs' adaptive capacities against pandemic risk remain inconclusive and mixed. Absence of comprehensive taxonomy of COVID-19 risk impacts and coping strategies.	This study offers a holistic perspective on the matter and presents a comprehensive pandemic risk-coping strategy taxonomy. This is because systematic reviews are exhaustive and systematically collate available but fragmented or patchy results that cannot be leveraged for any conclusive decision-making at practice and policy-making levels.

Limited systematic review on SMEs and pandemic coping strategies	[27,37–40]	Majority of existing studies on SMEs and pandemic risks have a health focus, with a limited number considering the issue from a business lens. Most studies conducted on SMEs and pandemic coping strategies have been empirical and conceptual review	This study synthesises existing findings and consolidates discussions on pandemic risk-coping strategy. The findings of this study provide policymakers and practitioners with a ‘one-stop shop’ for reliable results and informed decision-making.
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Following PRISMA, relevant databases (Scopus, EBSCOhost, ScienceDirect and ProQuest) were thoroughly searched to establish evidence-based knowledge for articles that focused on SMEs and the COVID-19 pandemic and general unexpected disruption and shocks to economies and SMEs published from March 2019–February 2022. Specifically, this systematic review identified and collated all studies related to the COVID-19 pandemic and how SMEs responded. The Scopus, EBSCOhost, ScienceDirect and ProQuest databases were used because they are known to contain high-quality peer-reviewed journals and are linked with a significant number of publishers.

Given the above objective, only articles that reported on the impact of COVID-19 on SMEs and how they responded to them were considered to meet the inclusion criteria. The following keywords and phrases were combined in the search: “Pandemic risks in SMEs”, “Digital transformation among SMEs in pandemics”, “SMEs in pandemics”, “SMEs response to pandemics”, “Coping strategies for SMEs during pandemics”, “SME resilience”. The search strategy returned 2430 records. The initial result for the search encompasses 931 in ScienceDirect, 608 in Scopus, 453 in EBSCOhost, and 430 in ProQuest.

Pandemic Risk Impacts on Small and Medium Enterprises

Unlike start-up models, small and medium-sized enterprises (SMEs) are generally structured and designed by local businesses, which depend on locals for their sustainability. The following discussion presents the pandemic risk impacts identified in the reviewed articles for this study.

With limited resources and smaller supply chain facilities, SMEs operate on marginal profit, mainly for in-person buyers. As a result, when locals cannot move around due to lockdowns and other restrictions—such as travel limitations, social distancing, and self-isolation—poor business-to-business relationships and weaker supply chain services become prevalent. These conditions result in cash flow pressure, including poor sales from shutdowns, cancellations of various events,

accommodations, and travel bookings, revenue decline, and defaults on various payment contributions for service industries. This leads to operational difficulties and logistical challenges. A significant portion of the reviewed papers highlights the vital role that the local environment within which SMEs operate, such as lockdowns and restrictions on the movement of people, plays in their survival and resilience. Logistics in organizations focus on managing the flow of goods between production and consumption points to meet consumer and business requirements. Pandemic risks exacerbate employee layoffs, compound productivity challenges, and delay the reopening of closed businesses.

One of the most salient pandemic risk factors for SMEs is the short-term government support measures in the context of policy directives. These support measures, among others, were hasty and heuristic in the early stages, focusing on immediate effects rather than structural and long-term considerations. While these short-term focused policies have been criticized, their direct impact was positive. For example, in developing countries, the absence of government support would have increased the failure rate of SMEs substantially, representing a notable portion of private-sector employment.

According to the United Nations Conference on Trade and Development (UNCTAD), the COVID-19 pandemic has brought catastrophic consequences across the globe. The very nature of SMEs, with their limited resources, implies that they lacked the agility to transform their operations at the speed the pandemic progressed, due to a lack of adoption of digital technologies. However, the “new normal” requires businesses to undergo significant changes, including business and operational innovation, such as online transformation. For example, SMEs in the manufacturing industry generally lacked the adoption of digital technologies associated with Industry 4.0, despite the high usage of digital channels, mainly social media. This is primarily due to a lack of advanced technologies, insufficient finance for investment, poor management vision, unclear returns on investment, and, overarching, a shortage of knowledge workers. The few that adopted Industry 4.0 were driven by expected benefits, market opportunities, labor problems, customer requirements, competition, and quality image.

As a result, most SMEs in the production and manufacturing industry employed a “just-in-time” approach instead of any proactive risk management innovation and risk mitigation. For example, the agri-food business compromised its resilience to the realities of the pandemic. This prevented SMEs from tapping into the benefits of digital technologies, leading to logistical challenges and fluctuations in demand.

What are the coping strategies of SMEs for pandemic risk impacts?

The principal concern for businesses during a pandemic is developing effective strategies to cope with and respond to evolving situations, now commonly referred to as the “new normal”. The concepts of coping and resilience, originally rooted in human psychology, have been increasingly applied to organizational contexts. Coping refers to cognitive and behavioural approaches for managing traumatic or

stressful situations, while resilience denotes the capacity to recover from adversity or disruption. These concepts are closely interrelated and are often used interchangeably, reflecting their strong conceptual overlap. For instance, some scholars describe resilience as the ability of a firm to remain alert, adapt, and respond swiftly to supply chain disruptions or other changes induced by crises.

To address the rapid economic downturns, health risks, and social consequences of pandemics, small and medium-sized enterprises (SMEs) must adopt purposeful behavioural changes, often termed organisational adaptation or transformation. A substantial body of literature identifies several factors associated with successful coping and adaptation among SMEs in turbulent environments. Prominent among these is the adoption and adaptation of digital and technological solutions, including mobile applications, online platforms, and e-commerce tools. Such digital integration enables SMEs to maintain competitiveness and agility despite limited knowledge and technological resources. The pathway to digital adoption typically progresses through stages of awareness, inquiry, collaboration, and full transformation. Initiatives in various regions, such as programs demonstrating smart factory solutions and designing digital roadmaps, illustrate how structured support can facilitate this process for SMEs.

While many studies emphasize specific tactical responses, fewer adopt a broader strategy-as-practice perspective that examines how strategies are formulated, planned, and implemented as core business functions. This approach highlights the need for in-depth analysis of dynamic capabilities, which allow SMEs to sense opportunities, seize them, and reconfigure resources effectively in response to disruptions. Dynamic capabilities emerge as a critical element in building long-term resilience beyond immediate crisis management.

Additional coping strategies frequently documented in the literature include access to government financial support and relief packages, which provide essential liquidity and stability during acute phases of disruption. SMEs also pursue modifications to business operations and the development of new business models, such as pivoting to online sales, diversifying product or service offerings, or altering delivery methods. Improvements in internal operational competence, realignment of business strategies with overall firm objectives, enhancement of supply chain and business agility, and comprehensive business transformation further support survival in volatile conditions. Effective business transformation entails the capacity to endure and thrive amid high uncertainty by fostering adaptability and innovation.

Overall, these strategies underscore the importance of proactive adaptation, resource reconfiguration, and external support in enabling SMEs to mitigate pandemic-induced risks and build enduring resilience for future challenges.

How do coping strategies reduce SMEs' vulnerability and increase their resilience to pandemic risk impacts? And Discussion

Coping strategies play a pivotal role in reducing small and medium-sized enterprises' (SMEs) vulnerability to pandemic risk impacts while simultaneously enhancing their resilience. Resilience in the business context refers to the capacity of SMEs to withstand external shocks, adapt to adverse conditions, and continue operations or even thrive amid disruption. It emerges as a collective outcome of an SME's inherent weaknesses, adopted coping approaches, and available capacities when confronted with hostile business environments.

Effective coping strategies mitigate vulnerability by addressing immediate threats, such as cash flow disruptions, supply chain interruptions, and demand fluctuations caused by lockdowns, restrictions, and economic downturns. For instance, digital and technological adoption—encompassing mobile applications, e-commerce platforms, and online communication tools—enables SMEs to maintain customer engagement, diversify revenue streams, and sustain operations remotely. This reduces exposure to physical movement restrictions and in-person dependencies, thereby lowering short-term vulnerability. Similarly, access to government financial supports provides liquidity buffers, preventing asset liquidation or forced closures that could otherwise exacerbate financial distress and operational collapse.

Resilience is further strengthened through proactive and adaptive mechanisms that extend beyond reactive responses. Collaboration with stakeholders, including suppliers, customers, and networks, fosters risk-sharing and resource mobilization, allowing SMEs to leverage external knowledge and support for sustained recovery. Openness and transparency, facilitated by digital channels such as social media, build trust and maintain relationships, enhancing active competencies in uncertain environments. Innovation—investing in transferable skills, circular economy practices, and new business models—enables SMEs to reconfigure resources, address customer pain points more effectively, and create competitive advantages. Dynamic capabilities, encompassing sensing emerging threats, seizing opportunities, and transforming operations, prove essential in volatile settings. These capabilities support flexible adaptation, strategic agility, and conscious resource reconfiguration, driving value creation and long-term performance.

Participatory and collaborative interventions that incorporate local knowledge and culturally appropriate measures optimize resilience by increasing stakeholder buy-in and contextual relevance. Supply chain agility, risk management cultures, and employee training further contribute by building internal competence and preparedness for future disruptions.

However, many SME coping strategies remain predominantly autonomous and reactive, focusing on immediate behavioural adjustments and operational fixes rather than long-term structural resilience. Such approaches may effectively handle short-term challenges but can inadvertently reduce resilience if they deplete resources, such as through asset sales or savings exhaustion. Moreover, overemphasis on direct, tangible impacts (e.g., digital disruptions) often neglects indirect effects, such as organizational culture shifts. Reliance on hard-engineered

solutions, despite their limitations, and insufficient attention to sustainability, longevity, or context-specific suitability further constrain effectiveness. The diversity of coping responses reflects SMEs' historical adaptability, yet the lack of longitudinal evaluation leaves questions about their enduring impact.

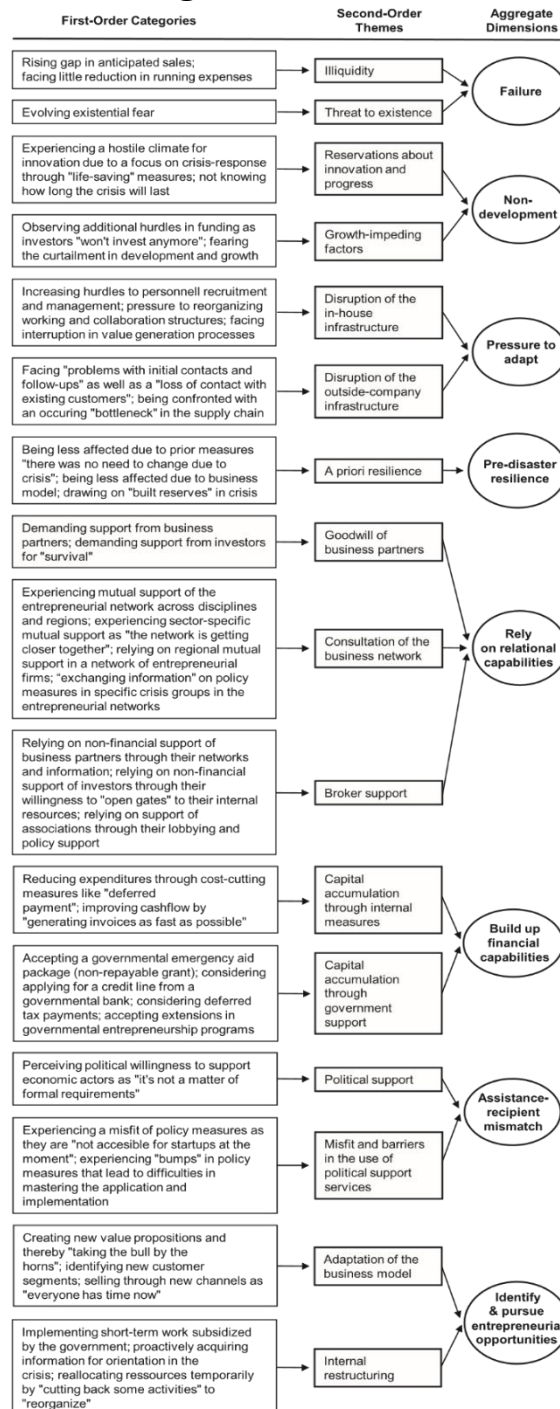
In essence, well-designed coping strategies—particularly those integrating digital transformation, dynamic capabilities, innovation, and collaborative networks—substantially reduce vulnerability by buffering immediate shocks and increase resilience by fostering adaptability, resourcefulness, and proactive transformation. To maximize these benefits, SMEs must shift toward more strategic, forward-looking interventions, supported by ongoing monitoring and context-sensitive evaluation, ensuring not merely survival but sustained competitiveness in the post-pandemic landscape.

Entrepreneurial Crisis Management of Innovative Startups During COVID-19 in the Republic of India

The qualitative findings of this study by analysing how innovative startups in the Republic of India navigated the COVID-19 crisis. The findings indicate that startups primarily relied on relational capabilities to endure the severe disruptions caused by the pandemic. Their crisis response was rooted in purposeful bricolage, wherein founders strategically combined existing internal resources with external assets accessed through professional and community networks. This included leveraging goodwill from business partners, reciprocal assistance within startup ecosystems, and social capital facilitated by intermediaries and mentors. Alongside relational strategies, founders sought to reinforce financial resilience through internal cost-optimisation measures and efforts to obtain external funding. However, a perceived misalignment emerged between government support schemes and the structural realities of startups, as several enterprises were rendered ineligible due to limited bankability, while others were discouraged by procedural complexities that outweighed the practical benefits of such programmes.

Consequently, immediate governmental support did not form the foundation of crisis response for most startups. Furthermore, founders exhibited heightened sensitivity to shifting consumer needs arising from pandemic-induced market transformations, enabling them to recognise emerging opportunities. Under these conditions, startups adopted bricolage-driven adaptive strategies to address new challenges, reconfigure business models, and pursue innovative directions to ensure organisational survival and sustained growth.

Figure 7 Data structure



International Policy Responses to the COVID-19 Pandemic

To address, a quantitative analysis of international media discourse was undertaken for the methodological framework). The analysis examined English-language media reports covering policy measures proposed or implemented to support small and medium-sized enterprises (SMEs) and startups across 40 countries, including nations such as Namibia and Nepal, which had reported fewer than 100 COVID-19 cases at the time of data collection. The study distinguishes

between measures advocated by stakeholders—such as entrepreneurs, academic scholars, and industry lobbyists—which constituted 40.98% of all coded measures, and policy actions formally announced by governments or central banks, accounting for 59.02%. The predominance of government-led initiatives indicates that most states responded promptly and decisively to the crisis.

The findings reveal a wide range of immediate policy responses designed to protect SMEs from declining revenues, rising operational costs, and liquidity constraints. Globally, the most frequently adopted measure involved enhancing firms' financial capital by reducing loan interest rates and improving access to credit. Due to the rapid escalation and spread of the pandemic, 87.80% of countries focused primarily on short-term relief measures, while only 17.07% advanced discussions on long-term structural interventions. For instance, China initiated proposals to secure sustained financial accessibility for innovative startups. Similarly, policy advocates in the United States called for aligning economic relief packages with sustainable development objectives, urging governments to integrate climate action commitments into recovery strategies.

Across nations, most policy measures were made available to businesses in general (82.93%), while 63.41% of countries introduced schemes specifically tailored to SMEs. However, policy initiatives explicitly targeting startups remained limited, appearing in only 26.83% of the countries studied. In the context of the Republic of India, this global trend reflects the broader policy pattern where immediate financial relief dominated governmental responses, while long-term and startup-specific structural support remained comparatively underdeveloped.

The COVID-19 Catalyst: Accelerating Gig Economy Growth in India

The COVID-19 pandemic served as an unprecedented catalyst for the expansion of India's gig economy, fundamentally altering labor market dynamics and workforce composition. The imposition of nationwide lockdowns, initially complete and subsequently partial, generated rapid demand for gig workers, particularly in sales and marketing roles. This surge was most pronounced across commerce, healthtech, fintech, and e-commerce sectors, with quick commerce segments—encompassing grocery and essential item delivery—demonstrating particularly steep demand trajectories as established players scaled their operations in metropolitan areas.

The pandemic-induced transformation extended beyond mere quantitative growth to encompass qualitative shifts in recruitment patterns and geographic distribution. Companies actively sought gig workers for diverse functions including business development, field sales, last-mile delivery, digital promotion, brand promotion, and micro-influencer roles, with demand for marketing and sales positions experiencing triple-digit growth. The post-pandemic period witnessed the gig economy's penetration into Tier 2 and Tier 3 markets, driven by corporate expansion beyond metropolitan centers and the establishment of secondary offices in smaller towns. This geographic diversification was facilitated by technology-

driven recruitment approaches featuring multi-language support, job tracking and monitoring solutions, and streamlined payment mechanisms. The normalization of remote work further eliminated location as a constraining factor, aligning organizational needs with worker preferences for flexible arrangements.

Projections by the Boston Consulting Group, Michael & Susan Dell Foundation, and NITI Aayog collectively indicate that gig workers represent not merely a temporary phenomenon but a permanent fixture of India's evolving labor landscape. The NITI Aayog report of 2022 established that employment elasticity of gig workers relative to GDP growth exceeded unity throughout the period from 2011-12 to 2019-20, signaling robust future demand across economic sectors. The McKinsey Global Institute similarly anticipates accelerated adoption of automation and artificial intelligence, particularly in high-physical-proximity sectors, which is expected to further expand the gig workforce. The proliferation of technologies enabling remote and flexible workspaces, including virtual meeting platforms and collaborative tools, is projected to accelerate the 'gigisation' of economies globally, with India positioned at the forefront of this transformation.

Policy Responses: Addressing Social Security Gaps in the Gig Economy

The expansion of gig work occurs against the backdrop of India's predominantly informal labor market, where approximately 92.5 percent of the workforce operates without formal protections. The gradual informalization of traditionally organized sectors has exacerbated this trend, with informal workers typically lacking written contracts and social security provisions. Data from 2020-21 reveals that over half of regular wage and salaried workers remain ineligible for any form of social security benefit, highlighting systemic vulnerabilities that the gig economy threatens to perpetuate and expand. The International Labour Organization's Centenary Declaration for the Future of Work has emphasized universal social security coverage, establishing international normative frameworks that inform domestic policy responses.

In response to these challenges, the Indian Parliament enacted the Code on Social Security 2020 in September 2020, consolidating nine existing central labor legislations into a comprehensive framework designed to extend social protection to previously excluded categories of workers. The Code explicitly recognizes gig and platform workers as distinct categories operating outside traditional employer-employee arrangements, while acknowledging their entitlement to social security benefits as determined by the central government. These provisions potentially encompass life and disability coverage, accident insurance, health and maternity benefits, old-age protection, childcare services, and other benefits to be financed through a dedicated Social Security Fund. The Union Budget 2021-22 further strengthened these commitments by announcing the extension of minimum wages to all worker categories, including gig and platform workers, and their coverage under the Employee State Insurance Corporation.

The operationalization of these policy commitments has proceeded through multiple institutional mechanisms. The e-Shram portal, launched in August 2021 by the Ministry of Labour and Employment, established a centralized database of unorganized workers linked to their Aadhaar identification numbers. The portal achieved remarkable uptake, registering 270 million informal workers within six months and subsequently expanding to 280 million registrants, including workers from agriculture (52 percent), domestic and household work (9.9 percent), and construction (9.1 percent). Registered workers receive accidental insurance coverage of INR 200,000 under the Pradhan Mantri Suraksha Bima Yojana, with first-year premiums subsidized by the Ministry of Labour and Employment. The government has subsequently announced plans to integrate domicile and ration card details from state governments, enabling benefit portability for migrant workers, and to extend pension and health benefits through existing schemes including the Pradhan Mantri Shram Yogi Maandhan Yojana, National Pension Scheme for traders and self-employed persons, Atal Pension Yojana, and Ayushman Bharat Pradhan Mantri Jan Arogya Yojana.

Implementation Challenges and the Gap Between Policy and Practice

Despite these legislative and administrative advances, substantial implementation deficits persist between formal policy commitments and actual working conditions experienced by platform workers. The 2022 Fairwork survey evaluation found minimal platform compliance with fair labor standards, with few platforms willing to commit to minimum hourly wages or provide adequate working conditions. Critically, no platforms demonstrated willingness to recognize or engage in collective bargaining with worker organizations, undermining fundamental labor rights. Key regulatory instruments including the Code on Social Security and Motor Vehicle Aggregator Guidelines remain unenforced, while the Digital Personal Data Protection Bill 2022, designed to safeguard platform worker data, has yet to receive parliamentary approval. Public interest litigation seeking reclassification of platform workers as unorganized workers or employees continues to await judicial determination by the Supreme Court, leaving fundamental questions of worker status unresolved.

These implementation gaps raise substantive concerns about the efficacy of India's policy framework in protecting vulnerable workers engaged in gig employment. While the Code on Social Security represents a significant normative advancement in extending social protection to previously excluded categories, critics have questioned its capacity to deliver meaningful protections absent rigorous enforcement mechanisms and resolution of existing legislative ambiguities. The challenge of transitioning from policy pronouncement to substantive improvement in worker welfare remains central to India's labor market governance as the gig economy continues its rapid expansion across sectors and geographies.

The Distinctive Nature of COVID-19 as an Economic Crisis

The COVID-19 pandemic represents a fundamentally different form of economic disruption compared to previous market-driven crises, with implications that extend beyond conventional cyclical downturns. Unlike the dotcom collapse at the turn of the millennium, which can be characterized as a market correction eliminating unviable business models built on speculative valuations, the COVID-19 crisis threatens the survival of potentially viable innovative ventures that would have succeeded under normal market conditions. This distinction is critical for understanding appropriate policy responses. The dotcom bust functioned as a sectoral shake-out, wherein excessive capital allocation to internet-based ventures without sustainable revenue models resulted in a necessary market recalibration. In contrast, the COVID-19 crisis imposed exogenous constraints on economic activity through public health interventions—lockdowns, social distancing mandates, and mobility restrictions—that disrupted otherwise functional business models regardless of their underlying viability or innovation potential.

This fundamental difference necessitates a reconceptualization of crisis response mechanisms. When market failures drive economic downturns, allowing natural selection processes to eliminate weaker competitors may enhance long-term sectoral health by reallocating resources to more efficient uses. However, when government-mandated infection control measures precipitate economic disruption, the casualties include innovative startups whose failure represents a permanent loss of innovation capacity rather than efficient market clearing. The preservation of these ventures therefore constitutes not merely economic stabilization but the protection of future productive capacity and technological advancement. This research explicitly acknowledges that human life remains unquestionably more valuable than economic activity, and the analysis should not be construed as criticism of necessary public health measures. Rather, it examines how infection control policies, while essential for population health, create specific vulnerabilities for innovative startups that require targeted mitigation strategies to prevent the permanent destruction of innovation potential.

A Taxonomy of Crisis-Induced Challenges and Adaptive Responses

The secondary data investigation reveals a structured taxonomy of challenges confronting startups during the COVID-19 crisis, organized across three hierarchical levels of severity and temporal urgency. At the most immediate level, startups face existential threats characterized by precipitous sales declines coupled with mounting operating costs, generating acute liquidity crises that entrepreneurs experience as existential fear. This first-order challenge demands immediate intervention to prevent organizational dissolution before any adaptive strategies can be implemented. The second level encompasses disruptions to core startup infrastructure, including interruptions in value generation processes, supply chain fragmentations, and escalating barriers to personnel recruitment and management. These operational disruptions compromise the fundamental mechanisms through

which startups create and capture value, requiring substantive internal restructuring to maintain organizational viability. The third level addresses growth impediments, manifesting as a hostile climate for innovative products and services unrelated to immediate crisis response, compounded by increased obstacles in securing startup funding as investors retreat to defensive positions and reassess risk profiles.

The research identifies corresponding adaptive strategies that startups employ at each challenge level, drawing upon organizational capabilities that distinguish entrepreneurial ventures from established firms. To address immediate liquidity crises, startups engage in creative resource recombination, leveraging existing technological capabilities and human capital to develop solutions addressing pandemic-induced problems. This bricolage approach—making do with resources at hand—represents a fundamental entrepreneurial competency that becomes particularly valuable under resource constraints. Simultaneously, startups activate network resources to secure flexible payment arrangements, establish joint sales initiatives with complementary ventures, and implement flexible staff rotation systems that preserve human capital while managing cost structures. These network-based responses exploit the relational embeddedness of entrepreneurial ecosystems, converting social capital into economic resources during periods of financial constraint.

For infrastructure-level disruptions, startups pursue strategic downsizing that maintains organizational flexibility for future expansion. This involves channeling scarce resources exclusively toward recently viable and value-generating activities while temporarily scaling back peripheral operations. The critical distinction from conventional downsizing lies in preserving the organizational capacity to upsize rapidly when conditions normalize, maintaining core competencies and relationships that enable swift recovery. To address growth impediments, startups adopt a dual temporal strategy. In the immediate term, they discover opportunities in crisis-response solutions, developing hygiene products, digital collaboration tools, and contactless service delivery mechanisms that address pandemic-induced demand. More strategically, they position themselves to exploit broader opportunities anticipated in the crisis aftermath, including accelerated digitalization trends, shifted consumer behaviors, and restructured market dynamics that create openings for innovative solutions to emerge.

The Strategic Role of Entrepreneurial Bricolage in Crisis Response

The qualitative evidence suggests that some entrepreneurs within the ecosystem perceive crisis-induced disruption not merely as adversity requiring defensive responses but as opportunity for value creation through entrepreneurial action. This perspective aligns with theoretical frameworks emphasizing bricolage as a fundamental entrepreneurial competency—the ability to recombine available resources in novel configurations to address emergent problems. The research identifies seven factors related to adversity and coping strategies, constituting an

initial framework for understanding startup crisis responses. However, this represents only a preliminary step toward comprehensive understanding of how these factors interact and how adverse situations can be managed to produce positive consequences rather than merely mitigating negative outcomes.

The key dynamics model developed through this research positions bricolage as the central mechanism through which entrepreneurs convert crisis-induced adversity into organizational resilience. Organizational resilience in crisis contexts depends fundamentally on capacities for improvisation, coordination, flexibility, and endurance—qualities that constitute routine operational characteristics of innovative startups rather than exceptional capabilities requiring special development. This suggests that startups possess inherent structural advantages in crisis response compared to larger, more established firms with bureaucratic structures, formalized decision-making processes, and resource allocation systems optimized for stable environments. Smaller businesses frequently demonstrate greater creativity than large firms, and this creative capacity proves particularly valuable in ensuring viability when confronting adverse conditions that render conventional approaches ineffective.

Entrepreneurs adopting the bricoleur role leverage available resources to spur change and create opportunities, demonstrating that crises can nurture the development of new opportunities, stimulate innovation, and generate alternative products and services. The empirical evidence indicates that crises encourage exploitation of new opportunities, prompting innovation and development of solutions that would not emerge under normal competitive conditions. In the short term, the COVID-19 crisis generates identifiable opportunities including hygiene solutions, remote work technologies, and contactless service delivery systems. The long-term consequences remain uncertain, but historical precedent suggests that major disruptions create broader structural opportunities as societies reorganize economic activity, consumer preferences shift, and technological adoption accelerates in response to demonstrated needs.

Policy Architecture: Designing Interventions for Startup-Specific Vulnerabilities

The research reveals a critical mismatch between initial policy responses and startup-specific needs, manifesting as programs designed primarily for established SMEs that fail to accommodate the distinctive characteristics of innovative ventures. Entrepreneurs consistently report experiencing first-wave support services as "not being meant for startups," describing themselves as "stuck in the middle"—too large or sophisticated for programs targeting micro-enterprises, yet unable to meet eligibility criteria designed around revenue history and asset holdings that favor established businesses. Additional barriers emerge in application processes and implementation procedures that assume organizational structures, financial documentation systems, and operational patterns characteristic of conventional businesses rather than innovative startups operating with negative cash flows while pursuing growth trajectories.

Effective policy architecture must address startup vulnerabilities across multiple temporal horizons and intervention levels. At the immediate survival level, policies should provide payment delays, wage subsidies, and direct payments that address acute liquidity constraints without requiring extensive documentation or demonstrated revenue history. These interventions prevent organizational dissolution and preserve innovation capacity during the acute crisis phase. Critically, policy communication should emphasize community solidarity and mutual assistance, recognizing that entrepreneurial ecosystems function through reciprocal support networks that can be activated through appropriate framing and incentive structures. At the operational adaptation level, policies should support employee development programs facilitating digital skill acquisition and enable temporal downsizing through wage subsidies that preserve employment relationships while accommodating reduced work hours or temporary furloughs. Most strategically, policies must secure future innovativeness through medium and long-term measures linked to broader policy objectives including sustainability transitions and digital transformation agendas. These interventions lay foundations for post-crisis recovery by incentivizing investors to provide growth capital despite elevated risk perceptions, ensuring that viable startups can access funding to capitalize on emerging opportunities rather than merely surviving until conditions normalize. This requires designing support programs that consider future growth trajectories rather than exclusively examining past revenues, recognizing that innovative startups typically demonstrate hockey-stick growth patterns with extended periods of negative profitability followed by rapid scaling once product-market fit is achieved.

Policy effectiveness depends fundamentally on reducing startup-specific barriers in application processes and implementation procedures. This includes establishing dedicated information channels such as startup-focused hotlines, communicating intentions for startup-specific support early in crisis response to reduce uncertainty, and minimizing bureaucratic requirements that impose disproportionate burdens on ventures with limited administrative capacity. Perhaps most importantly, policymakers must avoid the error of assuming that measures targeting SMEs generally will adequately address startup needs. The organizational characteristics, growth dynamics, funding structures, and risk profiles of innovative startups differ fundamentally from conventional small businesses, requiring specifically tailored interventions rather than generic small business support programs.

Ecosystem Resilience and the Determinants of Entrepreneurial Responsiveness

The interview evidence demonstrates that startups rely extensively on entrepreneurial ecosystem support to navigate crisis conditions, suggesting that policy interventions achieve maximum effectiveness when complemented by robust ecosystem attributes rather than functioning as standalone governmental programs. Entrepreneurial responsiveness to crises is determined by factors

including entrepreneurial culture—the normative acceptance of risk-taking, experimentation, and failure as legitimate aspects of economic activity—and knowledge diversity, encompassing the variety of technical competencies, market insights, and problem-solving approaches available within the ecosystem. These ecosystem characteristics cannot be established through short-term emergency measures but emerge from consistent long-term policies fostering entrepreneurship as a valued social activity and economic development strategy. The resilience of different national health systems has proven central to their ability to respond to the COVID-19 pandemic, with countries that maintained excess capacity, diversified supply chains, and invested in public health infrastructure demonstrating superior crisis response capabilities compared to those optimizing for efficiency under normal conditions. Analogously, countries that have cultivated resilient entrepreneurial ecosystems through sustained policy commitment, institutional development, and cultural support for entrepreneurship will resume pre-crisis activity levels more rapidly than those lacking such ecosystem foundations. Resilient ecosystems provide the relational infrastructure, knowledge resources, and institutional support that enable startups to access critical inputs, identify emerging opportunities, and mobilize resources during disruption periods when formal markets and conventional channels function poorly.

A particularly promising policy approach involves incentivizing investors to provide growth capital despite crisis conditions, as advocated by venture capitalists in Great Britain who argued for measures that simultaneously address immediate liquidity needs while positioning ventures for post-crisis growth. This dual-purpose intervention combines short-term stabilization—providing capital to meet payroll and operational expenses—with long-term capacity building by maintaining the investment relationships and growth trajectories that enable rapid scaling when conditions normalize. Such measures recognize that startup viability depends not merely on survival through the crisis but on emerging with intact capabilities, market positions, and stakeholder relationships that enable continued growth rather than requiring complete rebuilding.

Cross-National Learning and the Imperative for Startup-Specific Policy Design

The international press analysis reveals numerous approaches to protecting startup innovation potential, though specific measure effectiveness remains incompletely understood. What emerges clearly from comparative analysis is that programs specifically targeting innovative startups must be considered mandatory components of comprehensive crisis response rather than optional enhancements to generic business support. The temporal staggering of COVID-19 impacts across countries created an unusual opportunity for cross-national policy learning, as later-affected nations could observe and evaluate measures implemented by early-affected countries. While healthcare systems demonstrated this learning capacity—with many European countries adopting proactive measures informed by Chinese

and Italian experiences—the potential for economic policy learning remains underutilized.

Although the temporal lag in economic impacts may diminish over time as global integration transmits shocks rapidly across interconnected economies, the crisis nonetheless provides a natural experiment in policy effectiveness. Policymakers can systematically observe how different startup protection measures unfold across varied institutional contexts, adopting successful approaches and discarding ineffective ones to improve collective knowledge about crisis response. This learning process should extend beyond mere policy imitation to encompass understanding of implementation challenges, contextual adaptation requirements, and interaction effects between different intervention types. Future research must evaluate differential policy measure effectiveness on entrepreneurial activity across countries while examining how response speed affects outcomes, recognizing that rapid deployment of adequate support may prove more valuable than delayed implementation of optimal programs.

The research establishes that for entrepreneurs, confronting uncertainty and managing failure constitutes normal business activity rather than exceptional circumstances requiring special psychological resources. Even when uncertainty derives from exogenous crises like the COVID-19 pandemic rather than endogenous market competition, entrepreneurs demonstrate flexibility and adapt business models in response to changed conditions. This suggests startups possess inherent crisis preparedness superior to other economic actors, raising questions about the necessity of governmental aid. However, this conclusion would be fundamentally mistaken. While startup flexibility and relatively limited employment numbers might suggest that excluding them from aid programs would not critically impact aggregate economic indicators, allowing startups to fail potentially jeopardizes future state innovativeness by eliminating the ventures that would have driven technological advancement, productivity growth, and competitive advantage in subsequent decades.

Therefore, medium and long-term policy measures targeting future innovativeness, while unlikely to constitute first-line crisis responses, nonetheless prove essential for maintaining national innovation capacity. This finding reinforces prior research demonstrating that entrepreneurial responsiveness to crises depends on factors including entrepreneurial culture and knowledge diversity—ecosystem attributes that cannot be created through emergency interventions but require sustained policy commitment over extended periods. Just as healthcare system resilience determines pandemic response capacity and reflects years of prior investment and institutional development, entrepreneurial ecosystem resilience determines economic recovery speed and reflects sustained cultivation of entrepreneurial capabilities, support structures, and cultural foundations. Countries that have established such ecosystems through consistent policy will emerge from crises more rapidly and with greater innovation potential than those that have not,

underscoring the strategic imperative of startup-specific crisis interventions as investments in future economic competitiveness rather than merely short-term stabilization measures.

FINDINGS

Impact of COVID-19 on the Gig Economy

The research reveals that the pandemic created a **paradoxical dual effect** on gig work. While traditional employment sectors experienced severe contractions, platform-based gig work demonstrated remarkable expansion, particularly in India where gig workers increased from 5.26 million (2017-18) to 6.8 million (2019-20), with projections reaching 23.5 million by 2030. The pandemic accelerated digital transformation, with triple-digit growth in marketing and sales positions and geographic diversification into Tier 2 and Tier 3 cities beyond metropolitan centers. However, this growth came at significant human cost. Gig workers faced **intensified vulnerabilities**: heightened health risks due to essential service delivery requirements, acute income volatility from demand fluctuations, complete absence of social protection mechanisms, and increased algorithmic control over working conditions. The crisis exposed fundamental structural weaknesses—92.5% of India's workforce operates informally without formal protections, and over half of regular wage workers lack any social security benefits.

Resilience Strategies and Adaptive Responses

The study identifies a **hierarchical taxonomy of crisis responses** operating at three distinct levels:

Immediate Survival Level: Startups and gig platforms employed creative resource recombination (bricolage), leveraging existing technological capabilities to develop pandemic-specific solutions—hygiene products, contactless delivery systems, remote work technologies. They activated network resources for flexible payment arrangements and joint sales initiatives, converting social capital into economic resources during financial constraint.

Operational Adaptation Level: Organizations pursued strategic downsizing while maintaining organizational flexibility for future expansion, channeling resources exclusively toward viable value-generating activities. Digital transformation accelerated dramatically, with platforms adopting multi-language support, job tracking solutions, and streamlined payment mechanisms to facilitate remote work normalization.

Growth Positioning Level: Forward-looking entities positioned themselves to exploit post-crisis opportunities including accelerated digitalization trends, shifted consumer behaviors, and restructured market dynamics. The research reveals that **employment elasticity of gig workers relative to GDP growth exceeded unity** throughout 2011-2020, signaling robust future demand.

Role of Organizational Resilience

The findings emphasize that **resilience is not a static attribute but an evolving capability** shaped by anticipation, absorption, adaptation, and recovery stages. Smaller innovative startups demonstrated inherent structural advantages in crisis response compared to larger bureaucratic firms, possessing routine operational characteristics of improvisation, coordination, flexibility, and endurance that proved exceptional during disruption.

Critical resilience determinants included: financial strength and liquidity management, government support accessibility, crisis management capabilities, digital financial innovation, supply chain agility, relational capabilities through professional and community networks, and dynamic capabilities enabling sensing of opportunities, seizing them, and reconfiguring resources effectively.

Sustainability Implications

The pandemic-driven transformations present **concerning sustainability contradictions**:

Economic Dimension: While the gig economy demonstrated capacity to absorb surplus labor and facilitate essential services, it perpetuated precarious employment patterns. The "gigisation" of economies threatens to normalize informal work arrangements lacking fundamental protections.

Social Dimension: Despite policy advances like the Code on Social Security 2020 and e-Shram portal (280 million registrants), **substantial implementation deficits persist**. The 2022 Fairwork survey found minimal platform compliance with fair labor standards, no platforms willing to engage in collective bargaining, and key regulatory instruments remaining unenforced.

Environmental Dimension: The research identifies limited attention to environmental sustainability, with ecosystem resilience and circular economy practices mentioned but not comprehensively examined.

Structural Barriers to Resilience

The study reveals **critical policy-practice mismatches**:

Regulatory Ambiguity: Fundamental questions of worker status remain unresolved, with public interest litigation seeking reclassification of platform workers still awaiting judicial determination. The Digital Personal Data Protection Bill 2022 has yet to receive parliamentary approval.

Resource Constraints: SMEs and startups reported being "stuck in the middle"—too sophisticated for micro-enterprise programs yet unable to meet eligibility criteria designed for established businesses with revenue history and asset holdings.

Implementation Gaps: Government support measures were "hasty and heuristic," focusing on short-term relief (87.80% of countries) rather than long-term structural interventions (only 17.07%). Only 26.83% of studied countries introduced startup-specific schemes.

Digital Divide: Unequal technology access creates significant barriers, particularly for women (only 16% are mobile internet users in India). Many women remain disinterested in gig work due to job insecurity and uncertain employment status.

Concluding Observations

The COVID-19 pandemic has fundamentally altered labor market landscapes, accelerating transformations toward platform-mediated work arrangements that would have unfolded more gradually under normal conditions. This acceleration has compressed decades of potential change into months, thereby rendering visible structural dynamics, policy gaps, and resilience mechanisms that might otherwise have remained obscured. The gig economy's demonstrated capacity to absorb displaced labor while facilitating essential services during mobility restrictions confirms its significance within contemporary economic systems. However, this functional importance must not obscure persistent vulnerabilities, implementation deficits, and equity concerns that threaten sustainable development. The research establishes that organizational resilience emerges not from resource abundance but from adaptive capabilities, relational networks, and institutional support enabling creative response to unprecedented uncertainty. Yet such resilience operates within policy frameworks that frequently privilege short-term stabilization over long-term structural reform, established businesses over innovative startups, and efficiency metrics over human dignity considerations. Bridging the gap between legislative intent and enforcement reality, between policy pronouncement and worker protection, represents the central challenge confronting policymakers, platforms, and civil society stakeholders. The projected growth to 23.5 million gig workers in India by 2030 signals not temporary displacement but permanent restructuring of employment relationships. Whether this transformation produces inclusive prosperity or deepens precarity depends entirely on choices made regarding regulation design, enforcement commitment, ecosystem investment, and the values embedded within economic institutions. The evidence presented in this research provides foundations for such choices, though implementation responsibility rests with actors across governmental, corporate, and civil society domains. Ultimately, the intersection of the gig economy and COVID-19 pandemic illuminates broader questions regarding the future of work, the appropriate balance between flexibility and security, and the institutional frameworks necessary to ensure that technological innovation serves human flourishing rather than merely capital accumulation. These questions extend beyond academic inquiry to encompass fundamental matters of economic justice, social cohesion, and sustainable development that will shape labor markets for generations. The answers we collectively construct to these questions will determine whether platform-mediated work arrangements represent genuinely new forms of economic organization enabling opportunity and autonomy, or merely technologically-mediated reinscription of historical precarity under contemporary conditions. The crisis has therefore acted both as a mirror reflecting systemic vulnerabilities and as a catalyst accelerating transformation in enterprise, labour, and policy spheres. As economies move beyond the immediate shadows of the pandemic, the essential question persists—not simply how businesses survived the crisis, but what kind of

entrepreneurial world will emerge from it. Will the post-pandemic era witness the flowering of resilient, inclusive, and innovation-led ecosystems, or will the lessons of this unprecedented disruption fade into institutional amnesia? In the quiet aftermath of global turmoil, one is left to wonder: **did the crisis merely test the endurance of entrepreneurship, or did it quietly redefine its destiny?**

SUGGESTIONS

Policy Framework Redesign

Develop Startup-Specific Crisis Interventions: Policymakers must abandon the assumption that generic SME support adequately addresses startup needs. Establish dedicated eligibility criteria considering future growth trajectories rather than exclusively examining past revenues, recognizing hockey-stick growth patterns characteristic of innovative ventures.

Implement Multi-Temporal Policy Architecture:

- **Immediate (0-6 months):** Payment delays, wage subsidies, and direct payments without extensive documentation requirements
- **Medium-term (6-18 months):** Employee development programs for digital skill acquisition, temporal downsizing support through wage subsidies preserving employment relationships
- **Long-term (18+ months):** Growth capital incentives linked to sustainability transitions and digital transformation agendas

Reduce Application Barriers: Establish startup-focused information hotlines, communicate intentions for startup-specific support early in crises, and minimize bureaucratic requirements imposing disproportionate burdens on ventures with limited administrative capacity.

Social Protection Enhancement

Enforce Existing Legislation: Immediately operationalize the Code on Social Security 2020 and Motor Vehicle Aggregator Guidelines through rigorous enforcement mechanisms and resolution of legislative ambiguities. Accelerate parliamentary approval of the Digital Personal Data Protection Bill 2022.

Extend Universal Coverage: Build upon the e-Shram portal's success (280 million registrants) by integrating benefit portability for migrant workers, extending pension and health benefits, and ensuring minimum wage applicability to all gig and platform workers as announced in Union Budget 2021-22.

Mandate Platform Compliance: Require platforms to commit to minimum hourly wages, provide adequate working conditions, and recognize collective bargaining with worker organizations. Implement penalty mechanisms for non-compliance with fair labor standards.

Digital Infrastructure Development

Bridge the Digital Divide: Invest in targeted programs expanding mobile internet access, particularly for women and rural populations. Provide subsidized devices, digital literacy training, and culturally appropriate onboarding support.

Develop Technology-Enabled Support Systems: Create integrated platforms combining job matching, skill development, payment processing, and social security enrollment. Leverage AI and automation for efficient service delivery while ensuring human oversight for equitable outcomes.

Promote Responsible Platform Design: Incentivize platforms incorporating worker wellbeing metrics, transparent algorithmic management, and participatory governance structures giving workers voice in operational decisions.

Ecosystem Resilience Building

Cultivate Entrepreneurial Culture: Implement sustained policies fostering entrepreneurship as valued social activity through education system integration, failure destigmatization, and celebration of risk-taking and experimentation.

Enhance Knowledge Diversity: Invest in technical education, interdisciplinary research collaborations, and knowledge transfer mechanisms connecting startups with universities, research institutions, and experienced mentors.

Develop Relational Infrastructure: Support formation of professional networks, industry associations, and peer support groups enabling resource sharing, collective problem-solving, and ecosystem-wide resilience during disruptions.

Research and Monitoring Systems

Establish Longitudinal Evaluation Frameworks: Move beyond reactive crisis response to systematic monitoring of coping strategy effectiveness, enabling evidence-based policy refinement and identification of emerging vulnerabilities.

Create Cross-National Learning Mechanisms: Develop systematic processes for observing policy effectiveness across countries, facilitating rapid adoption of successful approaches and contextual adaptation based on institutional differences.

Integrate Sustainability Metrics: Expand evaluation frameworks beyond economic indicators to comprehensively assess social equity, environmental impact, and long-term viability of gig economy transformations.

Questions Left for Future Research

Yet this conclusion must end not with certainty but with **curiosity and questioning**, recognizing that our understanding remains incomplete:

- How do we balance platform innovation with worker protection? The current binary framing—flexibility versus security—may prove false. Can we design institutional frameworks enabling both entrepreneurial dynamism and comprehensive social protection, or does platform capitalism inherently preclude such synthesis?
- What are the long-term psychological and social consequences of gig work proliferation? Beyond measurable economic indicators, how does

algorithmic management, perpetual availability demands, and absence of workplace community affect human wellbeing, family structures, and social cohesion over decades rather than years?

- Will the implementation gap between policy pronouncement and lived reality narrow or widen? India has enacted progressive legislation and registered 280 million informal workers, yet enforcement remains minimal. What institutional innovations, political coalitions, or economic pressures could transform paper protections into actual safeguards?
- What does "sustainable" gig work actually mean? The research identifies economic, social, and environmental dimensions but provides limited integration. How do we operationalize sustainability beyond rhetorical commitment to concrete metrics, targets, and accountability mechanisms?
- Whether we seize this visibility to build more inclusive, resilient, and humane labor systems, or allow drift toward deeper precarity masked by entrepreneurial rhetoric, remains the essential question future research must help us answer.

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