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UNDP

Impact of COVID-19 and Industry 4.0 on Future of Work for Women

An Insight from Formal Sector in India



May 2021

The team

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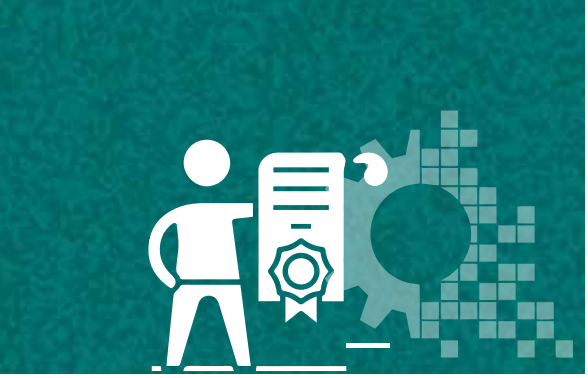
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List of Acronyms

AI	Artificial intelligence
BFSI	Banking, financial services and insurance
FICCI	Federation of Indian Chambers of Commerce and Industry
FMCG	Fast movable and consumer goods
ILO	International Labour Organisation
IoT	Internet of things
IT	Information technology
OCED	Organisation for Cooperation and Economic Development
UNDP	United Nations Development Programme
WFH	Work from home
WEF	World Economic Forum







Executive Summary

COVID-19 has necessitated major changes in the world of work globally. Undoubtedly, new technologies such as automation, digitalization, artificial learning, 3D manufacturing, etc. have played a major role in facilitating these changes. To understand the opinion of the head of a firm about the role of new technologies in the future of work for women in India, UNDP and FICCI conducted a survey of 150 firms in the formal sector. Responses were collected online from the leaders/top management of 150 firms, and two group discussions were conducted with the heads of 10 firms for a detailed understanding of these issues. The sample characteristics of the survey are:

- 69.33% of the surveyed firms are service sector firms and 30.67% are manufacturing sector firms.
- 35.33% of the surveyed firms are represented by women and 64.67% are represented by men.
- 61.33% of the surveyed firms have an annual turnover more than INR 5 crores; 18.67% have an annual turnover between INR 1–5 crore; 10% have an annual turnover of between INR 50 lakhs and 1 crore; and 10% have an annual turnover of less than INR 50 lakhs.
- 21% of the surveyed firms are from the education industry; 15% from the health industry; 11% from research and consultancy; 11% from the energy industry; 8% from banking, financial services and insurance (BFSI); 7% from the automobile industry; and the remaining 16% are from other miscellaneous industries.

Key findings of the study



Impact on business due to COVID-19

- 34% of the heads of the firms surveyed said that business had decreased in comparison to the pre-COVID-19 scenario.
- 44% said that while business had decreased during lockdown, it was back on track post the lockdown. This reflects the temporary downturn in economic activities in the formal sector.
- Only 10% said that the pandemic had not had an impact on their business.



Adjustments made to cope with the pandemic

- 69% of the heads of the firms surveyed stated that they had to adjust their investment plans during the lockdown period.
- 64% of the heads of the firms said that they had made adjustments to the hiring strategy and employment patterns of their organization during lockdown period.
- 59% and 53% of the employers respectively have made adjustments in terms of employment benefits and executive compensation strategies.
- Only 24% had made alterations in dividends during the lockdown.



Impact of COVID-19 on employment by gender and sector

- The equal proportion i.e., 29% of the head of the firms agreed that employment opportunities had decreased for both men and women in the lockdown.
- 60% of the heads of the firms surveyed said that there was no change in the employment of men in the formal sector in the lockdown. Similarly, 55.33% of the corporate firms said that there was no change in women's employment in the formal sector.
- 36.67% agreed that women's employment in the manufacturing sector was more adversely impacted than women's employment in the service sector. Only 25.33% disagreed with this, and the remaining 38% remain inconclusive in their response.



Work from home a new normal in the world of work

- 68.27% of the heads of the firms surveyed in the service sector have adopted WFH, while only 41.30% of the surveyed firms in the manufacturing sector have adopted WFH.
- Of the total surveyed firms, only 6.73% and 21.74% firms in the service and manufacturing sectors respectively were not able to adopt WFH.



Boost in women's employment post COVID-19

- Around 38% of the heads of the firms surveyed agreed that WFH would boost women's employment.
- Only 19% of the surveyed firms disagreed that WFH would boost women's employment in the post-pandemic scenario. The remaining 43% surveyed firms remain inconclusive.



Increased importance of reskilling in the world of work

- 73% of the heads of the firms surveyed agreed that 50% of the jobs in India will require skilling and reskilling.
- Only 5% did not agree with this.
- The remaining 22% remain inconclusive.



Rise in gig work boost women's employment a new normal in the world of work

- 57% of the heads of surveyed firms felt that the advent of the gig economy would boost women's employment.
- Only 4% said that it would not boost women's employment.
- The remaining 39% of the heads of firms surveyed remained inconclusive.





Earlier adoption of technology could have a smaller impact on the business

- 37% of the heads of the surveyed firms acknowledged that an earlier (i.e., before the outbreak of COVID-19) adoption of new technologies in their businesses would have lessened the impact of COVID-19 on their activities.
- Around 23% did not agree that an earlier adoption of new technologies would have led to a smaller impact on business during the pandemic.
- The remaining 40% remain inconclusive



Popular disruptive technologies being adopted in Indian business

- 60% of the heads of the firms surveyed have adopted automation in their activities.
- Around 23% have used artificial intelligence (AI) in the daily operational work of their organization.
- 8% and 9% respectively have adopted robotization and 3D printing respectively in their businesses.



COVID-19 as a catalyst for Indian employers to adopt new technologies in their business

- 41.33% of the heads of the firms surveyed agreed that COVID-19 had acted as a catalyst for Indian employers to adopt new technologies in their businesses.
- 37.33% did not consider COVID-19 as a catalyst for Indian employers to adopt new technologies in their businesses.



Adoption of new technology cause job polarisation

- 62% of the heads of the firms surveyed of felt that new technologies would create a favourable impact on the jobs of high-skilled women workers, 30% felt new technologies would create no impact on the jobs of high-skilled women workers and only 8% thought that new technologies would create an adverse impact on the jobs of high-skilled women workers. The opinion is almost same on the job of high-skilled men workers.
- 54% and 58% of the heads of the firms surveyed opined that new technologies would create a favourable impact on the job of medium-skilled women and medium-skilled men workers; 33% and 34% thought that new technologies would create no impact these jobs; and only 13% and 8% think new technologies would create an adverse impact on jobs of medium-skilled women and medium-skilled men workers respectively.
- 27% and 29% of the heads of the firms surveyed opined that new technologies would create a favourable impact on the jobs of low-skilled women and low-skilled men workers; 42% and 41% think new technologies would create no impact on these jobs; and 31% and 30% think new technologies would create an adverse impact on the jobs of low-skilled women and low-skilled men workers respectively.
- As per the opinion of the surveyed firms' heads, there is evidence of job polarization in India.
- In India, according to the opinion of heads of the firms surveyed, the impact of new technologies on job is gender neutral. Low-skill and high-skill jobs are gender neutral, whereas medium-skill jobs are marginally gender differential.



Impact of adoption of new technology on women's employment in different industries in India

- The top three industries in the manufacturing sector where new technologies would increase women's employment are the health and pharma, electrical and electronics, and fast-moving consumer goods (FMCG).
- The top three industries where women's employment would decrease because of new technology are automobiles/tyres, construction and infrastructure, and textiles.
- The top three industries in the service sector where new technologies would increase women's employment are health services, informative technology (IT) and BFSI.
- The top three industries in the service sector where new technologies will decrease women's employment are travel, tourism and hospitality.



Business divisions that face changes with respect to women's employment on the adoption of new technologies

- 53%, 45% and 37% of the heads of the firms surveyed felt that women's employment in the IT division, customer relations division and administrative division of any industry would significantly change due to the adoption of new technologies.
- 21%, 33% and 41% felt that women's employment in the IT division, customer relations division and administrative division of any industry respectively would face moderate change due to the adoption of new technologies.
- Only 17–21% felt that there would be no change in women's employment in all the division i.e. IT, human resources (HR), administrative, accounts and customer relations division of any industry.





Chapter 1

Introduction

The world of work has been disrupted with the onset of Industry 4.0, and disruptive technologies,[1] such as automation, AI, robotization, etc., the gig economy, demographic and social shifts are together defining a "future of work" that is already affecting companies, supply chains and workers globally. In this evolving scenario, the spread of COVID-19 has necessitated unprecedented changes in the world of work. For example, prior to the pandemic, "remote working' and "work from home" were considered unusual phenomena worldwide and especially in India. However, after the spread of COVID-19 and the subsequent lockdowns, these work modalities have become the new normal and a part of business as usual in India. Technology has, undoubtedly, played a major role in facilitating the new normal in the world of work.

David Autor, a leading economics professor at the Massachusetts Institute of Technology and co-chair of the university's Task Force on the Work of the Future[2], has called the COVID-19 crisis an "automation forcing event" that will fundamentally transform the global economy. Other studies amplify the claim that new technologies like automation, robotization, 3D manufacturing, etc. may substitute human work with machines. One of the first attempts to understand the impact of various technologies on jobs was made by Frey and Osborne[3] in 2013, where they estimated that 47 percent of the jobs in the United States were at high risk of computerization within the next two decades. In addition, in 2016, the Asian Development Bank and the International Labour Organization (ILO) jointly[4] conducted a study in five ASEAN countries[5] and estimated that approximately 56 percent of all jobs are at a high risk of displacement due to technology in the next two decades. This study also highlights that the risk of automation is not uniform across industries and gender. In these five ASEAN countries, hotels and restaurants, wholesale and retail trade, and construction and manufacturing are the industries with a potential high risk of automation. Education, health and social work are industries with a potential low risk of automation. In all five ASEAN countries, women are more likely than men to be employed in high-risk jobs.

The gendered impact of automation has worsened employment opportunities for women. In an International Monetary Fund staff discussion note,[6] the gender implication of new technologies in the

[1]In this report, the words 'new' and 'disruptive' have been used interchangeably.

[2]For more information see, https://workofthefuture.mit.edu/

[3]Carl Benedikt Frey and Michael A. Osborne, "The future of employment: How susceptible are jobs to computerisation? Future of Employment Working Paper, (Oxford, Oxford Martin Programme on Technology and Employment, 2013).

[4]Jae-Hee Chang and Phu Huynh, "ASEAN in transformation: the future of jobs at risk of automation", Bureau for employers' activities, Working Paper No. 9 (Geneva, ILO, 2016).

[5]Cambodia, Indonesia, the Philippines, Thailand and Vietnam

[6]Mariya Brussevich and others, Gender, technology and the future of work, Staff discussion note (IMF, 2018).



world of work has been discussed. The note highlights that 180 million women's jobs are at a high risk of being displaced due to automation globally. Similar findings have been discussed in the McKinsey report (2019)[7] which states that 7–24 percent of the women currently employed globally may have to face transitions across occupations by 2030 because of automation.

These estimates were, however, made in the pre-COVID-19 scenario. It is expected that post COVID-19, the situation will change and so will the impact of technology on jobs and employment. India still predominantly uses labour-intensive technologies, the introduction of new technologies like automation and robotization may not affect the labour market like they have affected the labour markets of developed nations in at least the medium term. Moreover, there is no literature that exists specifically for India on this subject.

We hear news everyday that COVID-19 has had a devastating effect on jobs, and women were more adversely impacted. In addition, there are many ongoing debates about the role of technology in shaping the world of work. Therefore, it is important to study if the COVID-19 outbreak has forced employers in India to adopt disruptive technologies in their business/firms. How have the adoption of disruptive technologies and the effects of the pandemic impacted the future of work for women in the formal sector in India? To examine the issue, UNDP India in collaboration with the Federation of Indian Chambers of Commerce and Industry (FICCI) conducted

[7]Anu Madgavkar and others, The future of women at work: transitions in the age of automation, McKinsey Global Institute (New York, MGI, 2019).

a survey of senior management/corporate leaders of 150 firms in India. The survey helped in understanding the opinion/perception of Indian business leaders on ten issues given below:

- How has business been affected by the outbreak of COVID-19?
- What adjustments have been made in their business to cope with the pandemic?
- How has employment in the formal sector been affected due to COVID-19?
- What are the "new normal" environments that COVID-19 could bring in the world of work? Will these boost women's employment?
- Would the earlier adoption of technology have had a smaller impact on business?
- What are the popular disruptive technologies being adopted in Indian businesses?
- Has adaptation to working during the COVID-19 pandemic acted as a catalyst for Indian employers to adopt new technologies in their businesses?
- Will the adoption of new technologies cause job polarization and adversely affect women workers in India?
- How will women's employment be affected in different industries with the adoption of new technologies?
- Which divisions of business will face changes with respect to women's employment on adoption of new technology?

This study is an attempt to understand these ten questions. The second chapter of the report deals with a detailed review of the available literature of the impact of COVID-19 and new technology on jobs. The third chapter talks about the new possibilities arising from the COVID-19 crisis and the adoption of new technology in the world of work. The fourth chapter presents the sample characteristics of the surveyed firms. The fifth chapter discusses the findings of the survey on the 10 issues mentioned above. The sixth and seventh chapter presents the conclusion and way forward of the study respectively.



Chapter 2

Literature review

2.1. COVID-19 and its impact on jobs

Before the COVID-19 crisis, 1.3 billion, or 44.3 percent, of women worldwide were employed as compared to 2 billion, or 70 per cent, of men.[8] Women's jobs are 19 percent more at risk than men's because women are disproportionately represented in sectors (hospitality, retail and wholesale trade, arts, recreation and public administration) which are negatively affected by the COVID-19 crisis. As a result, women have lost 1.8 times more jobs in comparison to their male counterparts. Thus, COVID-19 has unduly affected women workers globally.[9] A similar trend can be seen in India, where higher female unemployment is currently one of the most pressing problems. COVID-19 has caused over 100 million Indian men to lose their jobs as against 17 million Indian women. But the impact is larger for women as 39 percent of working women reported themselves as unemployed during March–April 2020 against 29 percent of working men.[10]

The economic downturn caused by COVID-19 is different from previous global financial crises, such as the one in 2008. COVID-19 is a health crisis followed by economic crisis, whereas the latter is purely a financial crisis. In the COVID-19 crisis, the ILO has rated four sectors namely accommodation and food services; real estate, business & administrative activities; manufacturing; and the wholesale & retail trade in terms of jobs losses and decline in working hours. In 2020, globally 527 million women, representing 41 percent of total female employment, were employed in these sectors as compared to 35 percent of the total male employment.[11] This suggests that women's employment is likely to be more severely affected than men's employment in the current crisis.

2.2. New technology and its impact on jobs

Over the past two centuries, ever since the first Industrial Revolution in the eighteenth century, technological change has constantly reshaped the world of work. During the first Industrial Revolution, mechanical 'technology' had powered the first factories. In nineteenth century, the discovery of electricity gave an impetus to the division of labour and mass production. The second Industrial Revolution discovered complementary technologies, which helped humans to perform various tasks easily. The third Industrial Revolution in the twentieth century was an era of IT-enabled solutions which has streamlined programmatic work and made technology more complimentary to human labour. With the advent of new

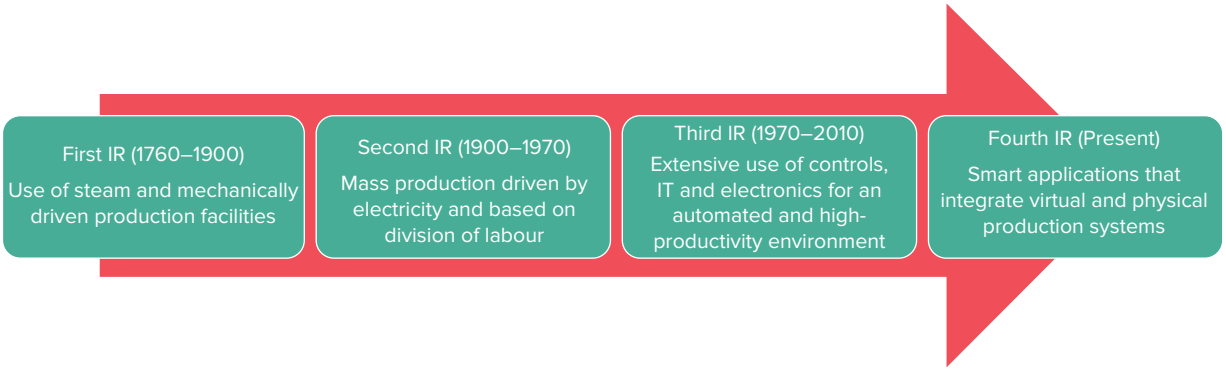
[8]ILOSTAT, ILO Department of Statistics, 2020, https://ilostat.ilo.org/

[9]See article by CNBC dated 08 July 2020. Accessed May 2021 https://www.cnbc.com/2020/07/08/since-coronavirus-pandemic-started-only-a-third-of-womens-lost-jobs-have-returned.html

[10]Ashwini Deshpande, "Early effects of lockdown in India: Gender gaps in job losses and domestic work", National Public Health Emergency collection, covid-19 initiative (October 2020).

[11]ILO Monitor: COVID-19 and the world of work. Second edition.

Figure 1: Advancements in technology by industrial revolution (IR)



Source: Authors' own compilation

technologies like AI, robotics, IoT (the Internet of Things), etc., the fourth Industrial Revolution has the potential to fully replace human jobs. It connects the cyber and physical worlds. From creating knitting machines and power looms to the invention of electricity, and from computers to automating production, these technological advancements have constantly been changing the world of work.

The disruptive changes brought on by new technologies have had a profound impact on employment, the nature of jobs and the future of work. The changes caused by the adoption of new technologies on jobs differs on the basis of location, industries, skill level and gender.

The available literature presents varied opinions about the impact of the adoption of new technologies on employment, and most of the available literature pertains to developed countries. Katz and Murphy (1992) believe that before the advent of new technologies, technological progress was used to increase productivity, which would increase labour demand and wages for unskilled workers, and to a greater extent for skilled workers.

With the advent of Industry 4.0, the view of the researchers has changed. The new technologies have the potential to displace jobs, which was not the case earlier. Job displacement is based on level of skill a worker possess. Eventually, the adoption of new technologies results in job polarization in the world of work. This means that medium-skill jobs, which require routine cognitive and manual tasks, can be easily replaced, whereas high-skill and low-skill jobs, which require more cognitive and more manual tasks respectively, can be preserved. For example, the jobs of telemarketers, tailors, data entry operators and clerks are at highest risk of automation. Jobs such as those of recreational therapists, occupational therapists, healthcare and social workers are at lowest risk of automation.

The risk of automation on jobs is not uniform in all countries. Arntz, Gregory and Zierahn conducted a study in 2016 in which they highlighted that the risk of automation on jobs varies between countries, ranging from 6 percent in Korea to 12 percent in Austria. The possible factors that contribute variations in degree to the automation of jobs are differences in workplace organization, previous levels of automation and educational attainment. In Europe, the risk of the automation of jobs is estimated to be in the range of 45–60 percent; in Finland, it is 35 percent; and in Germany, it is 59 percent. The available literature, however, suggests that though technology



may be replacing workers in some jobs, it also simultaneously creates new jobs and raises the overall demand for labour. Although it may be the case that men workers may be demanded more in comparison with their female counterparts. Gender differential of new technologies on jobs has gained popularity in the research circle in the last 3-4 years.

The International Monetary Fund, in a staff discussion note on gender, technology and future of work in 2018, highlighted that job opportunities for women would be fewer in the future.[12] They examined 28 Organization for Economic Cooperation and Development (OECD) member countries plus Cyprus and Singapore (2018) and concluded that in the next two decades, automation will replace 11 percent of the female workforce (those who tend to perform more routine and codifiable tasks) as compared to 9 percent of the male workforce in these countries. The possible reason could be that in most parts of the world, women workers are often concentrated in undervalued and low-paid jobs with poor working conditions in comparison with their male counterparts. Women also suffer from lack of access to education, training, recruitment and equal remuneration, and they have limited bargaining and decision-making power.

In India, 60 percent of women workers are concentrated in the agriculture sector, and they are expected to face huge jobs losses due to automation.[13]

[12]See discussion paper titled "Gender, technology and the future of work" (2018). Accessed May 2021 at https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2018/10/09/Gender-Technology-and-the-Future-of-Work-46236

[13]For more details, you can visit: www.catalyst.org.

The remaining 40 percent of women workers are in the service and manufacturing sector. Of these, the majority of the women workers are concentrated in routine manual jobs which can be easily displace by technology. According to an estimate in the 2018 All India Survey on Higher Education, only 14 percent of the total scientists, engineers and technologists at research development institutions are women.[14] The available literature represents that women are at a high risk of job loss due to the adoption of new technologies in the world of work. Currently, there is very limited research available which focuses on the impact of COVID-19 and new technologies on the world of work in India. Thus, it is necessary to understand these impacts in the Indian context.

The literature highlights that new technologies will impact jobs in one way or another. The role of technology on the world of work has been dramatically changed during the pandemic, which has in turn inadvertently caused a "new normal" in the world of work. It is expected that these changes will continue even post the pandemic. The next chapter covers the new normal in the world of work in detail.

[14]See article titled "STEM and the digital economy for Women", ORF Foundation dates 11 September 2020. Accessed March 2021 at https://www.orfonline.org/expert-speak/stem-and-the-digital-economy-for-women/

Chapter 3

New Possibilities Arising from the COVID-19 Crisis and the Adoption of New Technology in the World of Work

Before the outbreak of COVID-19, generally it considered that the largest disruptions in the world of work were due to the adoption of new technologies. The popular narrative about the impact of new technologies on employment and jobs is that the adoption of new technologies will eliminate human jobs. During this pandemic, it is technology which helped businesses survive globally. Otherwise, the situation would be more aggressive; more businesses would be completely shut down and the job losses would be much greater. Thus, new technology has played a major role in bringing a new normal to the world of work.

Generally speaking, the effect of the pandemic has accelerated four broad trends which may reshape the world of work in the aftermath of the pandemic.

3.1. Increase in remote working

The COVID-19 is originally a health crisis, which eventually also became an economic crisis. To control the spread of the virus, strict social distancing norms needed to be followed. Thus, national lockdowns were imposed across the



world. In the lockdown period, there was a massive shift from the physical workspace to remote working. The existent technology has facilitated the work-from-home scenario on the current large scale today. It is clear that businesses and jobs would have been more severely affected during the pandemic if these remote working technologies did not exist.

The technology to facilitate remote work has existed for many years, but employers have hesitated to use it. Now, public health restrictions for COVID-19 have forced employers and employees worldwide to engage more widely in remote working arrangements. The culture of remote working will create more opportunities for women to join the labour force. A work-from-home scenario would allow flexible working hours, which will give opportunities for women to work along with taking care of their family responsibilities.

3.2. Increase in the use of digital technologies

There has been a surge in the use of digital technologies since the beginning of the pandemic. The Consumer Pulse surveys, conducted by McKinsey & Company around the world in the month of June 2020, interestingly note that people who used digital channels to shop, make payments, etc. for the first time during the pandemic say that they would continue using them even when brick-and-mortar stores open. This change in consumer behaviour opens new avenues, resulting in the creation of many new jobs in the IT industry. There are no similar studies that estimate the sentiments of Indian consumers on usage of digital technologies during the pandemic is available. But to understand the scenario of digital world in India, we can proxy it by number of smart phones users. There were 530 million smart phone users in India in 2018[15] and in 2020, 150 million more smartphones get sold[16]. This clearly shows that there is increased usage of digital technologies. During lockdown, smartphones, the internet have easily facilitated work-from-home modalities in India.



3.3. Faster adoption of disruptive technologies

To follow social distancing norms, a national lockdown was imposed in India during the COVID-19 pandemic. This may have pushed faster adoption of disruptive technologies like automation and AI, especially in businesses with high physical proximity. During the pandemic, we have seen that the jobs which could not be done remotely were the worst affected, such as shop-floor jobs, construction site jobs, domestic work, etc.

The pandemic has provided employers with the opportunity to redesign their work processes in a way that will require less human

[15]See article by Indian Money titled "India set to have 530 million smartphone users in 2018: study" dated 16 October 2017. Accessed May 2021 at https://indianmoney.com/news/india-set-to-have-530-million-smartphone-users-in-2018

[16]See article by The Week titled "No lockdown on phone sales: 150 million smartphones sold in India in 2020", dated 27 January 2021. Accessed May 2021 at https://www.theweek.in/news/biz-tech/2021/01/27/no-lockdown-on-phone-sales-150-million-smartphones-sold-in-india-in-2020.html



presence, and these changes can be made possible with the deployment of automation and AI. This shift may disproportionately favour skilled workers and adversely affect unskilled workers. As mentioned earlier, women are more concentrated in low-skilled jobs and therefore, the impact of the faster adoption of technologies on jobs and employment of women are matters of concern and require proper research.

3.4. Rise of the gig economy and independent work

A pre-pandemic OECD report, Gig economy platforms: boon or bane, estimated the global proportion of gig workers to be between 0.3 percent (in developing countries) and 0.5 percent (elsewhere) in 2018. This number is likely to have increased as a result of the pandemic. With the economic and financial downturn causing many people around the world to lose secure employment, the gig economy has given people globally an enormous opportunity to look for part-time work and independent work. These alternative work arrangements, provided through gig platforms, will facilitate flexible working. This will encourage those women who could not opt for full-time work to join the workforce. This scenario will boost women's employment globally.

Chapter 4

Sample Characteristics of the Survey

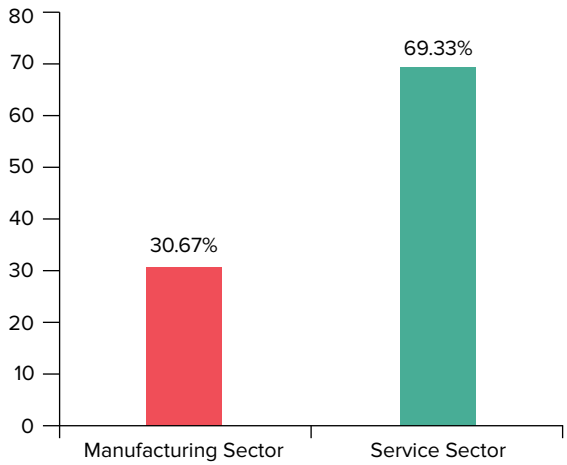
The COVID-19 pandemic has impacted the Indian economy, and the informal economy has been the most disrupted. However, the formal sector has also felt the brunt of the pandemic, and companies have been affected on several parameters like scale of business, employment, new work modalities, etc. But the advent of digitalization and adoption of new technologies have mitigated the losses to an extent in the formal sector. To analyse the impact of new technologies and COVID-19 on the future of work for women, UNDP conducted a survey of 150 firms across various industries in the manufacturing and service sectors of the Indian economy in January 2021. The online questionnaire was emailed to the leaders/ senior management for their responses. In addition, two group discussions with 10 heads of the surveyed firms' on the same themes were also conducted. The survey covers basic information about the firms, opinion of the firm's head on the impact of COVID-19 on their business and the employment of women, and their opinion on the impact of the adoption of new technologies on women's employment.

4.1. Sample characteristics of the survey

4.1.1. Distribution of firms by sector

Of the total number of surveyed firms,[17] 69.33 percent were service-based firms and 30.67 percent were manufacturing-based firms.

Figure 2: Distribution of firms by sector



Source: Author' calculations using survey data

4.1.2. Distribution of firms by gender

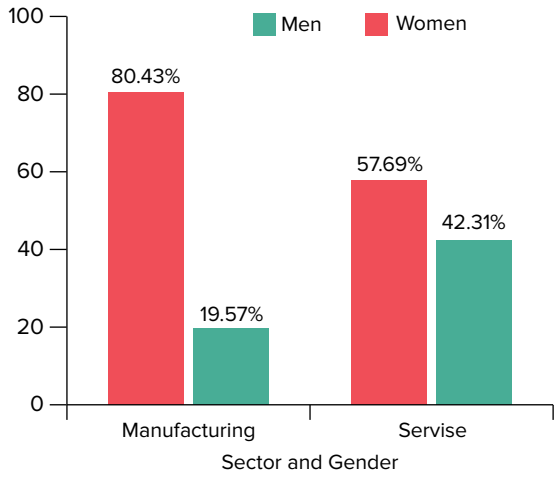
Around 35.33 percent of the surveyed firms were represented by women and 64.67 percent by men. The cross tab of gender and sector reflects a clear trend of fewer women being in leadership roles in the manufacturing sector in comparison to the service sector (see figure 3). In our survey, only 19.57 percent of manufacturing firms are represented by women in comparison to 42.31 percent of service firms that are represented by women.

4.1.3 Distribution of firms by size

In our survey, a firm's size was proxied by their annual turnover. The distribution of firms with respect to their size is show in figure 4: 61.33

[17]The total number of surveyed firms are 150. (N=150)

Figure 3: Distribution of leadership roles by sector and gender



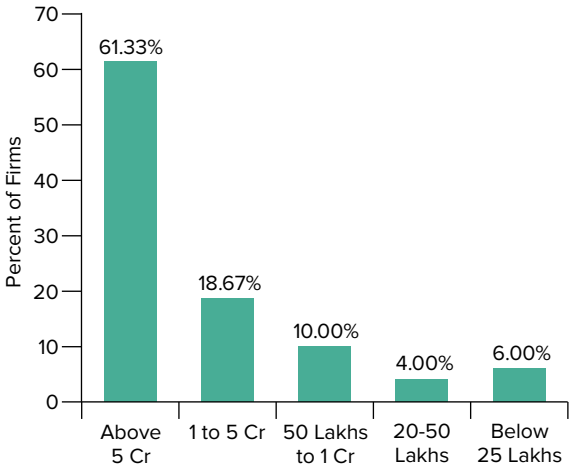
Source: Authors' calculations using survey data

percent of the firms have an annual turnover of above INR 5 crores; 18.67 percent have an annual turnover between INR 1–5 crores and 10 percent have an annual turnover between INR 50 lakhs to INR 1 crore. In total, of all the surveyed firms, around 90 percent had annual turnovers of INR 50 lakhs and more. Only 10 percent of the surveyed firms had an annual turnover below INR 50 lakhs (6 percent had an annual turnover below INR 25 lakhs and 4 percent had an annual turnover of between INR 25–50 lakhs).

4.1.4. Distribution of firms by industry

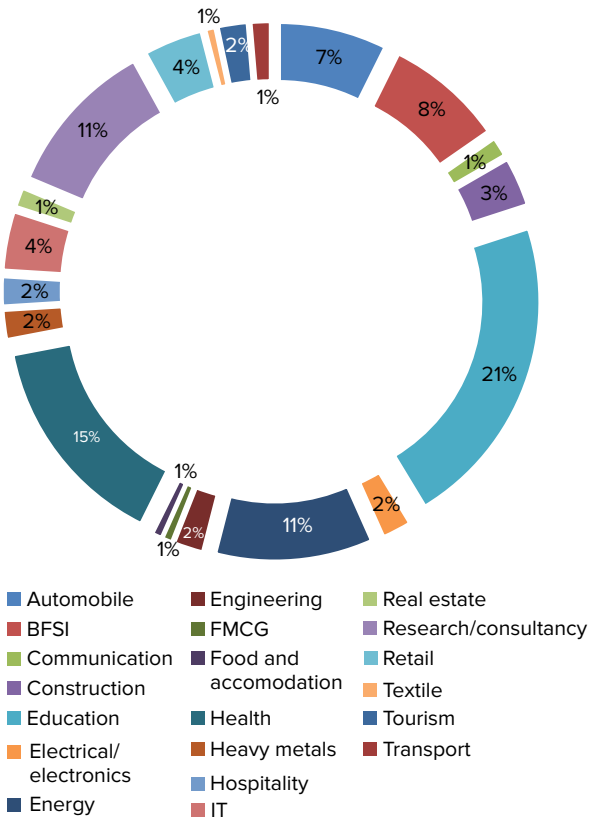
In this survey, the firms were categorized first by sector i.e., manufacturing and service. The firms were also categorized into their respective industries (see figure 5). Around 21 percent of the firms belong to the education industry, 15 percent to the health industry, 11 percent to research and consultancy, 11 percent to energy, 8 percent to BFSI, 7 percent to automobiles, 4 percent each to IT and retail, and 3 percent to construction. The remaining 16 percentage made up of firms belonging to different industries like transport (1%), tourism (2%), electrical and electronics (2%), textiles (1%), heavy metals (2%), food and accommodation (2%), hospitality (2%), real estate (1%), engineering (2%), FMCG (1%) and retail (2%).

Figure 4: Distribution of firms by size



Source: Authors' calculations using survey data

Figure 5: Distribution of firms by industry



Source: Authors' calculations using survey data

Chapter 5

Analysis and Findings on 10 Broad Issues

5.1. Impact of the pandemic on corporate business and women's employment

With the spread of COVID-19, the world of work has changed drastically. To prevent the spread of the virus, every country had imposed lockdowns, and this brought countries to a complete standstill. It slowed down economic activities all around the globe and eventually all the economies can face some kind of economic shocks.

5.1.1. How was business in India affected during the COVID-19 outbreak?

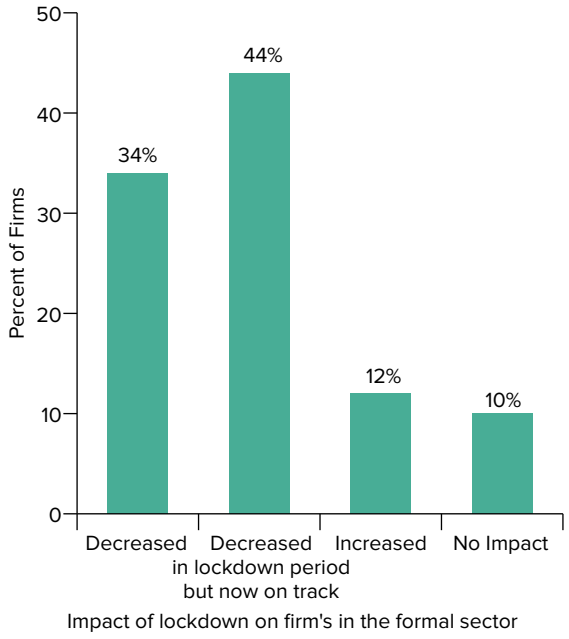
The effect of COVID-19 has been devastating on the Indian economy, and firms in the formal sector have also suffered the consequences of the lockdown during the pandemic. There are huge job losses around the country, which have resulted in a fall in earnings of individuals, which has, in turn, led to a decrease in purchasing power and low consumer demand. Along with a downturn in demand, businesses are also suffering from supply fluctuations. When asked about the impact of the pandemic on their business, 34 percent of the heads of the firms surveyed said their business had decreased in comparison to pre-COVID-19 levels. Around 44 percent of the heads of the firms surveyed said that their business had decreased during the lockdown, but it was now back on track (see figure 6).

Similar findings have also emerged in a survey conducted by the Institute for Competitiveness and Times Network in the lockdown period.[18] Of the total manufacturing firms surveyed, 41.30 percent of the firms' heads said that their business had decreased during the lockdown but were now back on track; 32.61 percent said their business had decreased during lockdown and 15.22 percent said there was no impact of the lockdown on their business. Similarly in the service sector, 45.19 percent of the firms' leaders said that their businesses had decreased during lockdown but were now back on track; 34.62 percent said their businesses had decreased during and 7.69 percent said that there was no impact of lockdown on their business.



[18]See article by Economic times, titled, 'How have Indian Business been impacted during and after lockdown', dated September 29, 2020. Accessed May 2021 at https://economictimes.indiatimes.com/news/economy/indicators/how-have-indian-businesses-been-impacted-during-and-after-the-lockdown/articleshow/78382728.cms

Figure 6: Opinion of the impact of COVID-19 on business



Source: Authors' calculations using survey data

Of the total surveyed firms, only 10 percent have had no impact of the pandemic on their business. The only industries which reported that their business had not been affected by the pandemic were essential utility industries i.e., health, education, energy and IT.

On further analysis, it has also been seen that the impact of the lockdown on business was severe for the firms whose annual turnover was between INR 50 lakhs and INR 1 crore. Of the firms which had an annual turnover of between INR 50 lakhs and INR 1 crore, around 60 percent responded that their business had decreased.[19] In contrast, of the firms whose annual turnover was more than INR 5 crores, only 28 percent reported a decrease in business.[20]

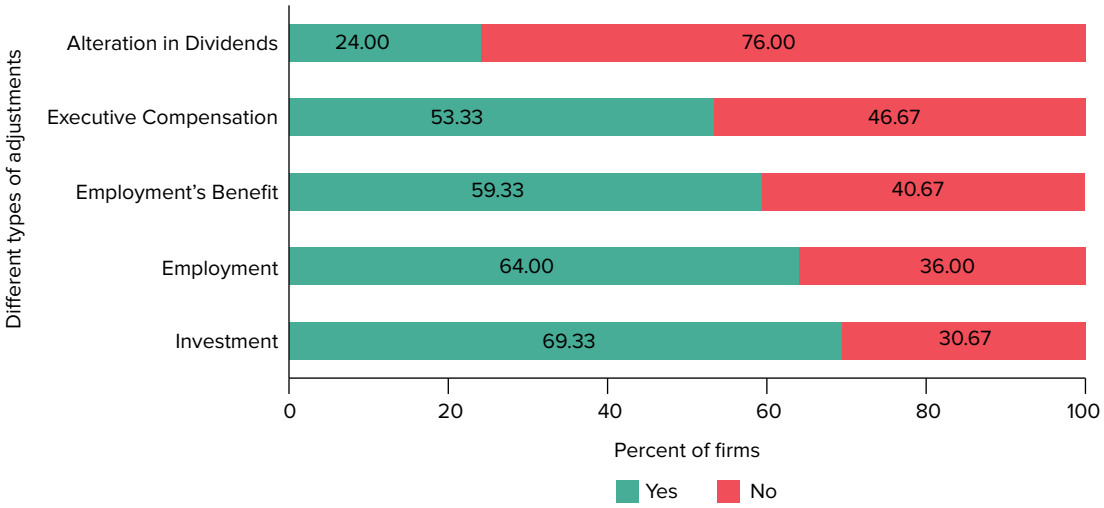
5.1.2. What adjustments were made to the business to cope with the pandemic restrictions?

During the lockdown period, firms have had to tweak their business plans so that they could survive the pandemic. Indeed, all businesses had to make adjustments to their investment plans, hiring and employment strategies, salary and compensation distribution schemes, etc. Figure 7 shows that around 69 percent of the heads of the firms surveyed said that they had to make adjustments to their investment plans during the lockdown, while 31 percent said they did not. Similarly, 64 percent of heads of the firms surveyed responded that they had made adjustments in the hiring strategies and employment patterns of their organizations during the lockdown. firms' head also reported they had made adjustments in terms of employment benefits (59 percent) and executive compensation strategies (53 percent) for the smooth operation of their business. In comparison, only 24 percent stated that they had made alterations in dividends during lockdown. As a dividend is a form of benefits given to shareholders, it is clear that many firms had not changed their dividend strategy during the crisis period. The firms who had not made any adjustments in their dividends believed that the effects of the pandemic were temporary, and they did not want to take hard decisions which may affect the firm's reputation in the eyes of investors and consumers in the future.

[19]Of the surveyed firms, 15 have a turnover in the category of INR 50 lakhs to INR 1 crore.

[20]Of the surveyed firms, 92 have a turnover of more than INR 5 crores.

Figure 7: Types of adjustment made to cope with the pandemic (in percent)



Source: Authors' calculations using survey data

More than 50 percent of the firms have made adjustments on all parameters except alteration in dividends. Of the firms that made alterations in dividends (24 percent), the largest number operate in the education industry. This clearly highlights that COVID-19 has adversely affected the education industry. Although new technologies like web conferencing and digital platforms like Zoom, Google Meet and Microsoft teams enable the education industry to function, the education industry faces the biggest change in all aspects during the crisis. The changes that occurred in the education industry during the crisis and which will be retained post the crisis are interesting to look forward. The COVID-19 pandemic has caused operational, financial and labour challenges for everyone in the business. It is a unique crisis in that it has had such devastating effect on all fronts of business in comparison with any previous crisis. Thus, the challenges posed by COVID-19 have taught businesses to adapt. Business heads and leaders have learnt that the world is unpredictable, and they have to be better prepared for unprecedented crises.

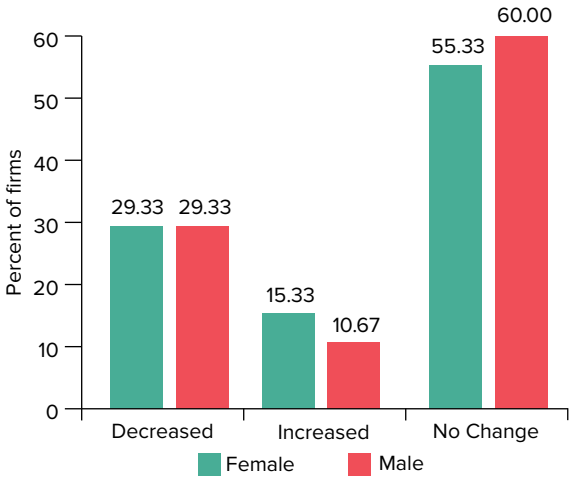
5.1.3. How has the formal sector employment been affected by COVID-19?

With the imposition of a nationwide lockdown, the Indian economy came to a complete standstill, and during this time, the loss of employment in the informal sector was at a record high. The lockdown also took a toll on employment in the formal sector as well. According to financial statement of the companies listed on the Bombay Stock Exchange, it was seen that the expenditure on employees in the services and non-essential manufacturing sector had reduced sharply.[21] Though the fall in employee expenses is not a direct measure of job losses, but this can shed some light on the problem. In the survey, 29.33 percent of the firms' leaders agreed that employment has decreased for men as well as women in the lockdown period (see figure 8). On the basis of this response, it is clear that both men and women have suffered in terms of loss of employment in the formal sector.

[21] "What Job Losses in the Formal Sector Tell Us About the Lockdown's Impact on Economy", The Wire (New Delhi), 19th August 2020.

Of the firms surveyed, 15.33 percent of the firms' leaders opined that employment had increased for women, while only 10.67 percent said that employment had increased for men; 60 percent of the firms' heads said that there was no change in men's employment in the formal sector; 55.33 percent agreed that there was no change in women's employment in the lockdown period in the formal sector.

Figure 8: Opinion of employers regarding change in employment by gender (in percent)



Source: Authors' calculations using survey data

The heads of surveyed firms in the education, research and consultancy, health and BFSI industries stated that there was increase in employment for both men and women during the pandemic, whereas the heads of the surveyed firms in the hospitality, tourism, construction, and food and accommodation industries stated that there was a decrease in employment for both men and women during the pandemic.

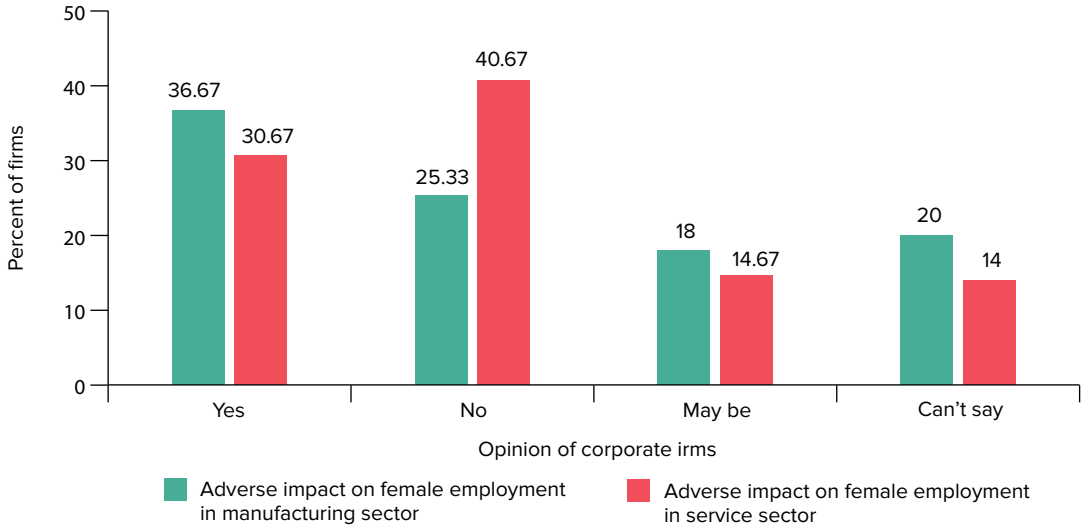
On further analysis at the sectoral level, we found that women's employment has been more adversely affected in the manufacturing sector than in the services sector. Around 36.67 percent of the heads of the surveyed firms agree that women's employment in the manufacturing sector has been more adversely impacted than women's employment in the service sector. Only 25.33 percent disagreed with this, and the remaining 38 percent remained inconclusive.[22]

A possible reason for this could be that the WFH modality is not feasible for manufacturing



[22]The term "inconclusive" refers to the combined percentage of people who responded with "Maybe" and "Can't say".

Figure 9: Opinion of firms on women's employment during the pandemic (in percent)



Source: Authors' calculations using survey data

plants. According to a manager at Rossell Techsys, only non-manufacturing industries can afford for WFH options for their employees, and employees in non-manufacturing industries have the option to work from home and continued their job and get adjusted to the new normal. However, during the lockdown, due to increased care work at home, many women have chosen to opt out of their jobs, especially in the manufacturing sector. In the opinion of the surveyed employers, these job losses are temporary in nature. Women will come back into the workforce once the situation comes back to normal. Thus, the situation that arose because of the pandemic has clearly given an edge to the women working in the service sector as it is less adversely impacted than manufacturing sector.

Of the heads of firms surveyed, 40.67 percent disagreed that women's employment in the service sector was adversely affected during the pandemic period. Many service-based organizations shifted their entire work arrangements to a remote model, and the transition from offline to online work created opportunities for women to join the workforce in the service sector. The CEO of Apollo Medskills said that there was an adverse impact on women's employment in the manufacturing sectors, but women workers were still preferred in service sectors particularly in healthcare, retail and hospitality. Thus, the impact of COVID-19 has been more adverse on women employed in the manufacturing sector than in the service sector.

5.1.4. What is the "new normal" that COVID-19 could possibly bring into the world of work? Will it boost women's employment?

To curtail the spread of the virus, national and state lockdowns were imposed. The restriction of moving out from the house has tremendously affected jobs. Even though people were not going out to work, but they were still working from home. Work from home (WFH) or remote working, which was not considered feasible in the pre-COVID-19 scenario, has become common these days. The pandemic has brought new cultures into the world of work, which are popularly called the "new normal".

a. WFH scenario

The COVID-19 crisis changed people's conception of "normal" overnight. With lockdowns in place across the world, more than 3 billion people, excluding the essential workers like defence and healthcare officials, have been pushed to work from home.[23] During this time, WFH has emerged as a mainframe modality of working, and corporate firms and authorities around the world have had no other option than to provide flexible working conditions including remote work/ WFH. The Chief Human Resources Officer at Satin Creditcare Network Ltd says, "COVID-19 has broken the myth that work can't be done from home. Today, most people are working from home, thanks to new technologies and the change in mindset of people. While we can't predict the future, a lot of organizations, especially in the IT and ITES industries will entirely shift to a WFH culture. In the finance and service industry, the challenge will be to ensure higher productivity while working from home. For the manufacturing sector, it may be challenging to adopt to WFH practices."

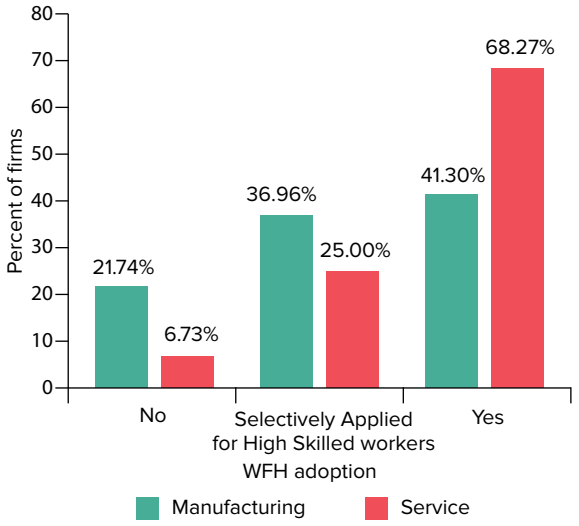
WFH is not a new concept, and before the pandemic, employers did not seem to be comfortable with the idea, even though there were some industries which practiced WFH before the pandemic. It is not a practical option for those in the manufacturing, hospitality, performing arts and heavy industries. However, during a pandemic, WFH is a saviour for many companies that would otherwise have had to shut down and cost thousands of professionals their jobs.

In the survey, 68.27 percent of the surveyed firms in the service sector adopted WFH, 25 percent firms adopted WFH for skilled workers, and only 6.73 percent did not adopt WFH modality. In the manufacturing sector, only 41.30 percent of the surveyed firms have adopted WFH; 36.95 percent have selectively adopted WFH for skilled workers, and around 21.74 percent could not adopt WFH modality of working. This data clearly reflects that the WFH working modality is more prevalent in the service sector and selectively prevalent in manufacturing sector (figure 10).



[23] COVID-19 impact: Is work from home the new normal? published in financial express on 4th June 2020

Figure 10: Percentage of firms adopting work from home

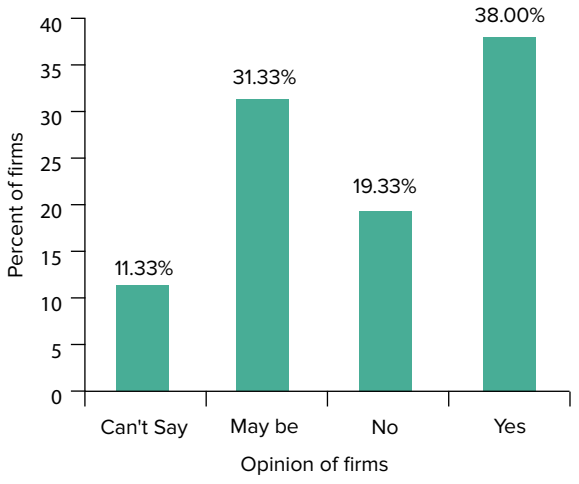


Source: Authors' calculations using survey data

b. Boost to women's employment

With the use of WFH and remote working modalities (as seen in figure 11), around 38 percent of the surveyed firms agreed that WFH would boost women's participation in the labour force. Approximately 19 percent disagreed that WFH would boost women's employment in the post-pandemic world. The remaining 43 percent of the firms remained inconclusive about this.

Figure 11: Opinion on whether WFH would boost women's employment



Source: Authors' own calculations using survey data

On the one hand, WFH may provide more opportunities to women to join the workforce. On other, it may increase the burden on women. The Director, Philips India Limited says, "Work from home has become new normal. At the same time it has also created challenges for women. While doing work from home there is need to maintain work-life balance, failing which it can affect work as well as personal life."



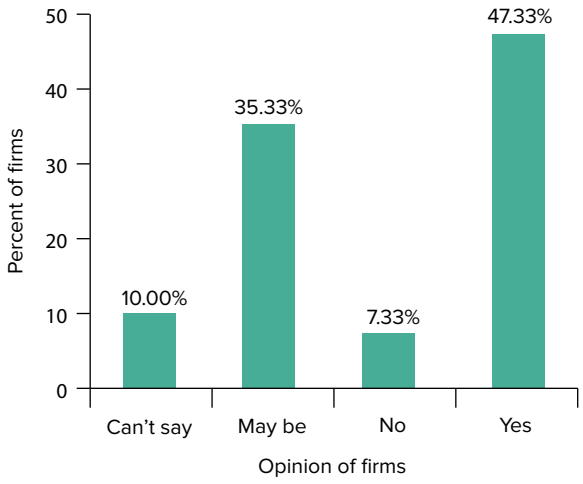
In the survey, business heads acknowledge that though WFH and a flexible working system may increase the opportunities for women to participate in labour market, they will also increase the burden on working women. Remote work may gradually eliminate the line between work and leisure, and in the medium and long run, it may adversely affect the mental well-being of women. The CEO of Orane International says, "Many women who could not go to the workplace due to various reasons now have the option to work from home. They are managing both office and work in the home effectively. Women are more empowered due to the option of work from home."

The CEO of Grundfos Pumps, India, said that there would be no significant change in the world of work for women, but the adoption of new technologies in the manufacturing and service sectors may lead to flexible and

virtual working environments, which would be useful to women employees to suit to their requirements and needs.

WFH has boosted women's employment by allowing flexible working arrangements. Simultaneously, it has brought changes in work modalities, and alternative arrangements like contractual, part-time, independent forms of work are becoming popular, which will boost women's employment. Around 47.33 percent of the surveyed firms agreed that post-COVID-19 modalities like increased options for independent work and increased contractual work would be prove favourable for women. Only 7.33 percent corporate firms did not seem to agree with this, and the remaining 45.33 percent of the firms remained inconclusive on the same. According to the Director of Empower Pragati Vocational and Staffing Pvt Ltd, "More women are likely to get short-term WFH options at lower wages. At the same time, women more likely to be overburdened with responsibilities of home, children, the elderly and work."

Figure 12: Opinion of firms on whether post COVID-19 modalities of work would be favourable for women

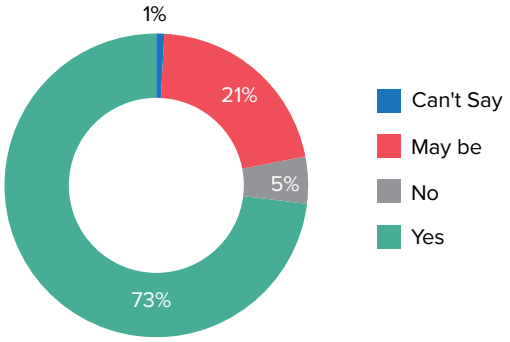


Source: Authors' calculations using survey data

c. Favourable opinion on re-skilling employees in the world of work

According to the World Economic Forum (WEF), 50 percent of jobs globally will require skilling and reskilling irrespective of COVID-19 pandemic. In India, around 73 percent of heads of the firms surveyed fully agreed with this statement. Only 5 percent did not agree and remaining 22 percent remained inconclusive over this statement (see figure 13). According to a senior leader from Magic Bus India, "No doubt work has increased manifold, especially for women, but for a few, it is also an opportunity to upskill and learn new technologies and reskill themselves."

Figure 13: Indian employers who agree with WEF findings

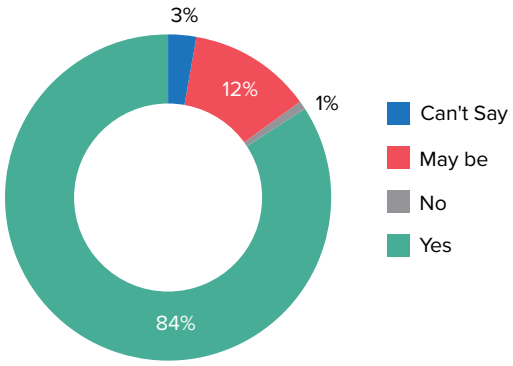


Source: Authors' calculations using survey data

The impact of skilling and reskilling on women's employment is very crucial; around 84 percent of the heads of the surveyed firms agreed that skilling and reskilling would boost women's employment, and only 1 percent think that it would not boost employment. The remaining 15 percent are inconclusive about their opinion. According to K.V. Ravichandran, vice president of the SBI Foundation, COVID-19 has provided corporate leaders and authorities with many opportunities to reskill the women in the labour force.



Figure 14: Opinion of corporate leaders on skilling and reskilling to boost women's employment

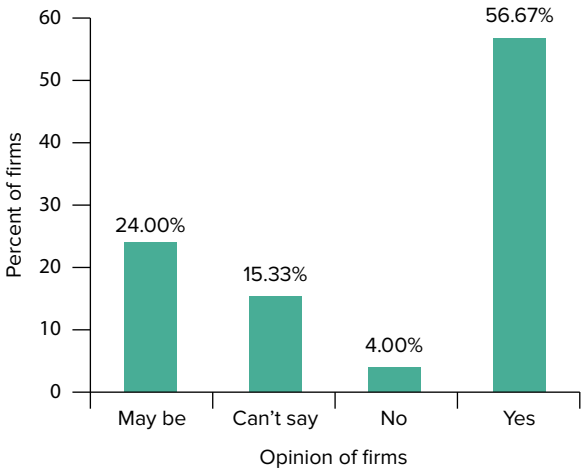


Source: Authors' calculations using survey data

d. Rise of the gig economy

The gig economy means a free market system in which businesses use part-time workers and independent contractual workers for shorter period of times to complete designated task[24]; for example, Uber. The emergence of gig economy is rapidly changing labour market globally. Gig economy is also expanding in India. Like Uber, there are various other on-demand platforms that have come into existence to facilitate consumer access to a range of care and domestic work services, such as cooking, cleaning, and child and elderly care. These include MyDidi in India, Domestly and SweepSouth in South Africa, and Aliada in Mexico (Hunt and Machingura 2016**)**. The gig economy has huge potential to encourage women employment as it facilitates flexible and remote working. In our survey, approximately 57 percent heads of the surveyed firms felt that that the gig economy would boost women's employment. Only 4 percent said that it would not boost, and the remaining 39 percent remained inconclusive.

Figure 15: Gig economy will boost women's employment



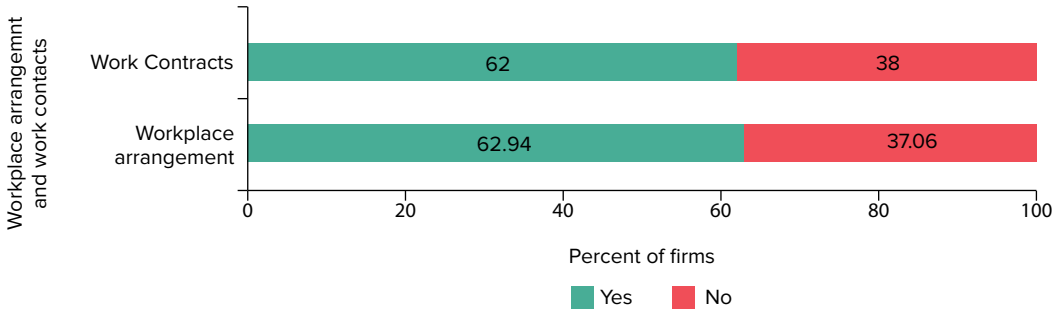
Source: Authors' calculations using survey data

e. Other favourable changes in the world of work for women

COVID-19 has not only changed the way we work, but it has also changed workplace structures. Presently a chair, a laptop and a good internet connection can create an office anywhere. The rising trend of a remote workforce does not indicate the extinction of the physical office space, but employers are being mindful in redefining the purpose of an office space in the post-pandemic world. In the survey, corporate leaders opined that some types of jobs will permanently shift to being WFH, and that the complete staff of a firm may gather together in one place only on rare occasions. There would be alternative arrangements, such as shifts that will be managed for all staff, and more offices are

[24]For details see https://www.thimble.com/blog/gig-worker

Figure 16: Opinion of firms' leaders on the change in work parameters for women (in percent)



Source: Authors' calculations using survey data

likely to take care of workplace arrangements like crèches, transport facilities and office infrastructure more seriously rather than doing it merely for compliance. This has given the opportunity to employers to rethink and redesign their office spaces to be conducive to all genders. Around 63 percent of the surveyed firms responded that workplace arrangements would be more conducive for women post the pandemic. An equal percentage of firms agreed that there would be changes in work contracts that would be more beneficial for women in the post-pandemic world of work.

5.2. Impact of technologies on the future of work for women

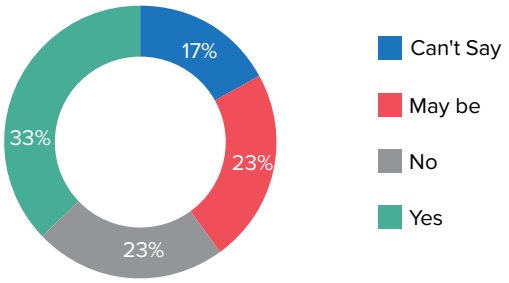
Historically, technological evolution tends to cause significant short-term labour displacement, but in long run, it creates an array of new jobs. In particular, technological change affects the demand for and the supply of labour. Thus, the advent of new technologies seems to be a blessing in disguise. When everything was closed during the lockdown, business were able to operate using new technologies. The current situation has uplifted technological adoption while also pushing companies to adopt newer and more innovative approaches. If the adoption of technologies has helped business survive in the crisis, then could it be possible that if businesses had adopted these technologies before the outbreak of COVID-19, they may have been less impacted?



5.2.1. Has an early adoption of technology led to a smaller impact of COVID-19 on the business?

The restriction placed on leaving the house has tremendously affected all jobs during the COVID-19 crisis. The effect would, however, have been more devastating in the absence of various technologies for remote working. In our survey, 37 percent of the heads of the firms surveyed acknowledged that an early adoption of newer technologies in their business operations (before outbreak of COVID-19) would have led to a smaller impact on their business activities. Around 23 percent of the firms did not agree with this view. The remaining 40 percent were inconclusive i.e., they did not have a very strong opinion on this point.

Figure 17: Opinion of firms' heads on earlier adoption of new technology leading to a smaller impact on business

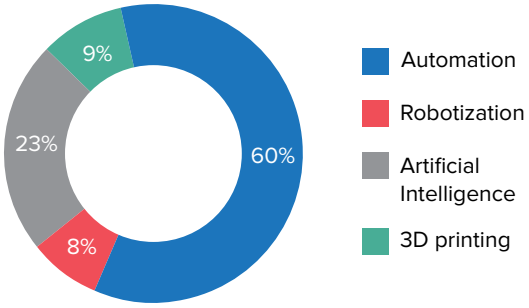


Source: Authors' calculations using survey data

5.2.2. Which are the popular disruptive technologies being adopted in Indian business?

Currently, as a result of the COVID-19 crisis, most business heads have led their companies to digitize at least some part of their business to protect employees and serve customers facing mobility restrictions. In our survey, we found out automation, AI, robotization and 3D printing are the technologies seeing the highest rates of adoption in Indian businesses. Of those surveyed, 60 percent of the heads of the firms said that they used automation in their organization; around 23 percent of the firms used AI in their daily operations. Around 8 percent and 9 percent of the heads of the firms surveyed have adopted robotization and 3D printing respectively in their businesses. (See figure 18)

Figure 18: Adoption of popular technologies in Indian businesses



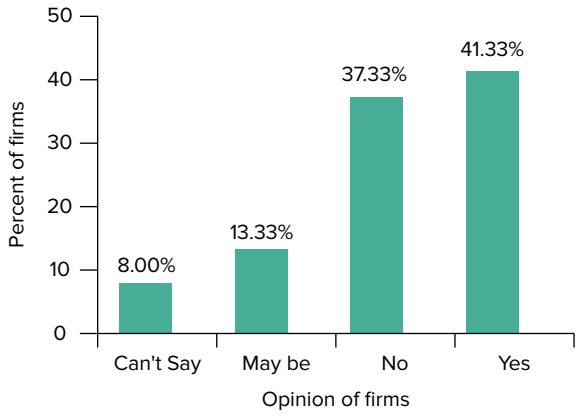
Source: Authors' calculations using survey data



5.2.3. Has COVID-19 acted as a catalyst for Indian employers to adopt new technologies in their business?

Data from a McKinsey & Company study shows that COVID-19 has accelerated the adoption of digital technologies in business by five years globally.[25] As a result, the COVID-19 period will surely be remembered as a time of a historic, unprecedented deployment of remote work and digital access to services across every domain. According to the survey, around 41.33 percent of corporate firms agreed that COVID-19 had acted as a catalyst for firms adopting new technologies in their businesses, while 37.33 percent did not consider it a catalyst. Around 21.33 percent corporate firms remained inconclusive on this question.

Figure 19: Opinion of corporate firms on COVID-19 as a catalyst to adopt new technologies

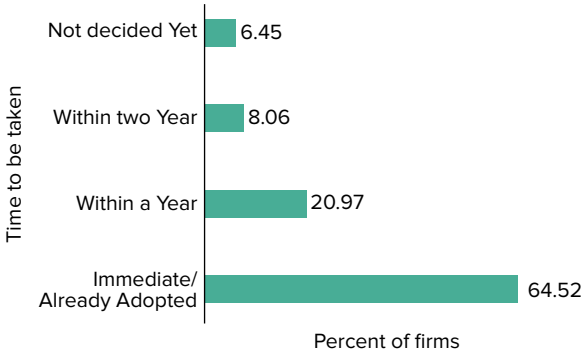


Source: Authors' calculations using survey data

[25] "The COVID-19 recovery will be digital: A plan for the first 90 days", Mckinsey & Co. (May 2020).

Among the heads of firms' who accepted that the pandemic had forced them to adopt or think about adopting new technologies, around 64.52 percent planned to adopt these immediately, 21 percent planned to adopt them within a year, 8 percent within two years and 6.45 percent had not decided on a timeline.

Figure 20: Opinion of firms' head on planning to adopt new technologies (in percent)



Source: Authors' calculation using survey data

5.2.4. Will the adoption of new technologies cause job polarization and adversely affect women workers in India?

The post COVID-19 world of work with its rapid adoption of new technology will change the fundamental nature of work. There is a growing polarization in high- and low-skill jobs. Acemoglu and Autor (2011) show that wages for unskilled workers have started to decrease instead of increasing in the 1980s. The new technologies being adopted also have the potential to displace medium- and low-skilled workers. The adoption of new technologies results in skilled biased technical change (SBTC), which means that technology would positively affect high- and low-skill jobs and negatively middle-skill jobs. For example, the jobs of cashiers, book keepers, telephone operators, etc. would be the most at risk in the future.

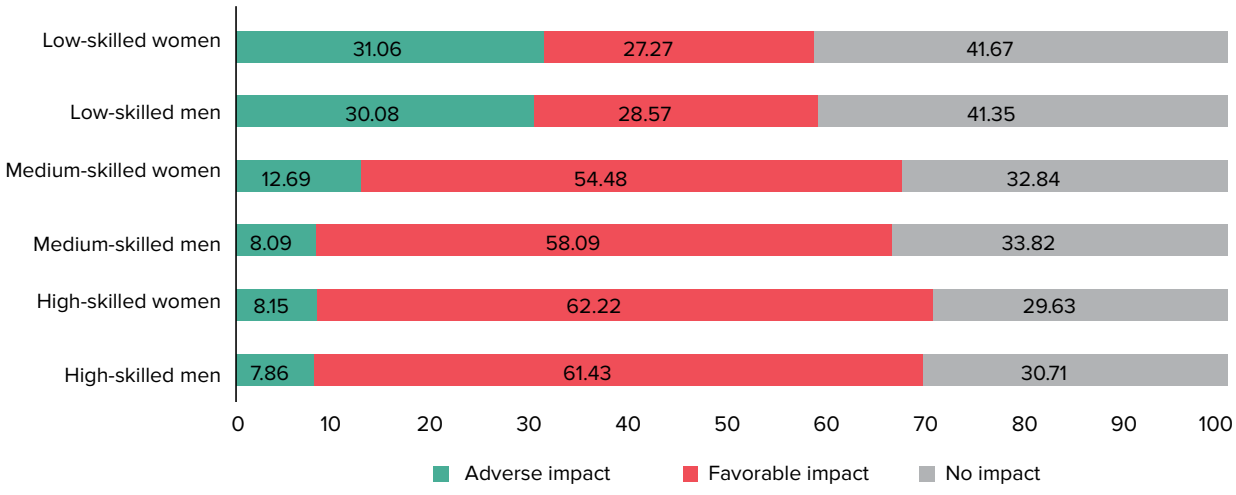


> Dr Renuka David, the MD of Radiant Medical Services, agreed that in the financial and medical services sector, blue collar jobs (field staff) are more prone to significant change with the adoption of new technologies like automation. There is also likely to be an increment in clerical and administrative jobs, and women are more successful in this administrative layer.

In our survey, 61 percent and 62 percent of the firms felt that new technologies would have a favourable impact on the employment of high-skilled men and women workers respectively. Similarly, 58 percent and 54 percent opined that new technologies would have a favourable impact on the employment of medium-skilled men and women workers respectively. Only 29 percent and 27 percent said that new technologies would have a favourable impact on employment of low-skilled men and women workers respectively. On the other hand, 30 percent and 31 percent of corporate firms agreed that new technologies would have an adverse impact on the employment of low-skilled men and women workers respectively. Only 8 percent of the corporate firms felt that new technology would have an adverse impact on the employment of high-skilled men and women. For medium-skilled jobs, 8 percent of the surveyed firms said that technology would have an adverse impact on the employment of men workers, whereas around 13 percent said it would be the same for female employment.

These results are in line with several seminal studies. For example, Autor, Levy and Murnane (2003) argue that technology can replace human labour in routine tasks (low-skill jobs) and cannot replace human labour in non-routine tasks (high-skill jobs). According to a McKinsey survey conducted in six developed economies[26] and four developing economies,[27] 40 percent of the routine physical jobs held by

Figure 21: Impact of the adoption of new technologies on employment by gender and skill (in percent)



Source: Authors' calculations using survey data

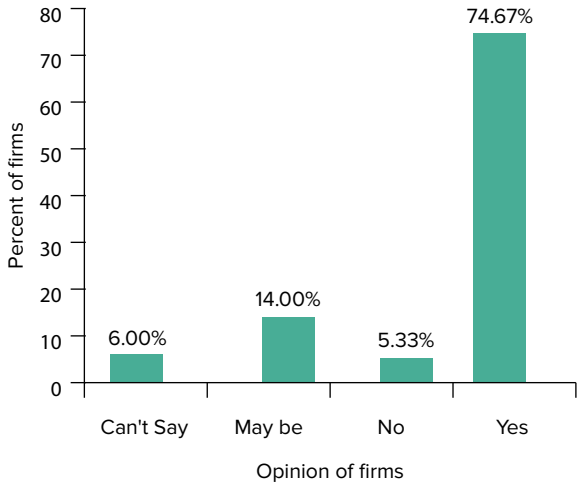
[26]These countries are Canada, France, Germany, Japan, the United Kingdom and the United States.

[27]These countries are China, India, Mexico and South Africa.

men can be displaced by 2030. In the case of routine cognitive work, such as clerical support or service worker roles, around 52 percent of these jobs, which used to mostly be held by women, will be displaced by 2030. Our survey results show that in India, the impact of new technology on employment is mostly gender neutral. The impact of technology on low-skill and high-skill jobs are gender neutral whereas medium-skill jobs are marginally gender differential. Like other countries, the impact of new technology on jobs is skilled biased in India as well. There is a less adverse impact on high-skill and medium-skill jobs and high adverse impact on low-skill jobs.

In our survey, around 75 percent of heads of the firms surveyed agreed that in labour abundant countries like India, the adoption of new technologies will create better opportunities for women. Only 5 percent of the heads of the firms surveyed were not in favour of this opinion. Around 20 percent of the respondents seemed to be unsure.

Figure 22: Adoption of new technologies in India providing better opportunities for women



Source: Authors' calculations using survey data

> Ms Radhika Sharma Makker, Deputy General Manager–HR, CHAI POINT, Mountain Trail Food Pvt. Ltd., opines that women in the low-skilled category may be adversely impacted because of the adoption of new technologies, but the loss will be temporary. For retail sector the loss of employment is not gender differentiated. Moreover, the impact varies from industry to industry.

5.2.5. How will women's employment be affected in different industries with the adoption of new technologies?

In section 5.1.3, we have seen that the COVID-19 pandemic has adversely impacted women's employment in the manufacturing sector more than in the service sector. However, corporate leaders acknowledge that these adverse impacts on employment are temporary in nature. Apart from this, we had also asked corporate executives and leaders about how the adoption of new technologies would impact women's employment in different industries in India. According to them, the top three industries in the manufacturing sector where new technology would increase women's employment are health and pharma (approximately 59 percent), electrical and electronics (approximately 44 percent), and the FMCG industry (approximately 41 percent).

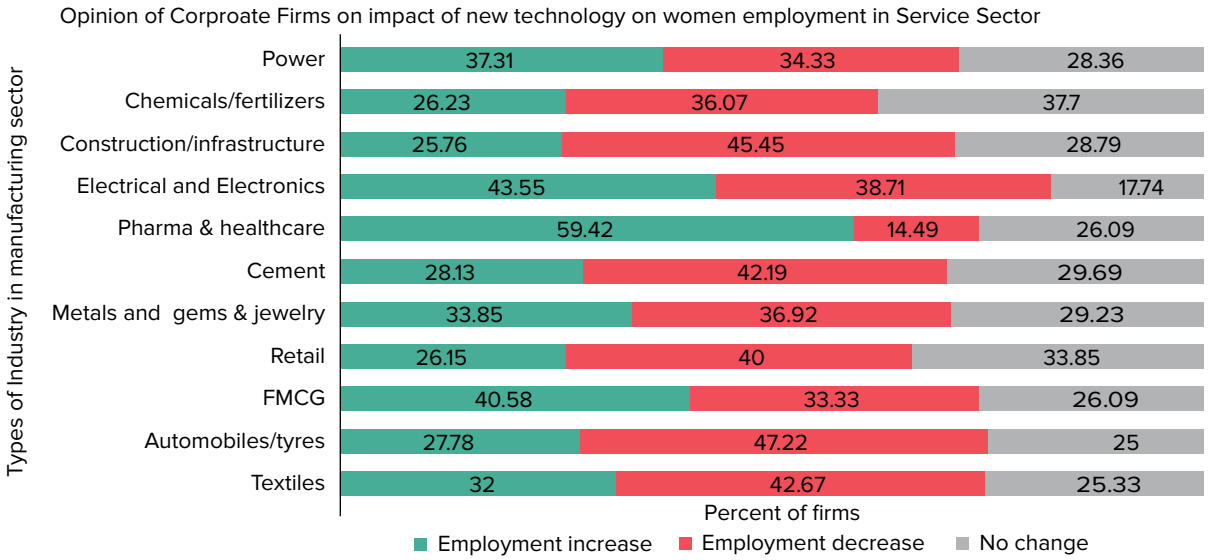
On the other hand, according to the survey, the top three industries where women's employment would decrease because of the adoption of new technology are automobiles/ tyres (approximately 47 percent), construction and infrastructure (approximately 45 percent), and textiles (43 percent).



In an ILO report (2016a), jobs in the manufacturing sector in ASEAN countries are at risk of automation in Cambodia and Vietnam; more than 80 percent of the workers in the textile, clothing and footwear industries can be substituted by automation. In Indonesia, Philippines, Thailand and Vietnam, 60 percent of the workers in the electrical appliances and electronics sectors might be made redundant. Similar results have been observed in our survey as well. In sectors like automobiles, textiles, cement, chemicals and infrastructure, which are core manufacturing sectors, women are at a high risk of job loss because of technological advancement. From the available literature we came to understand that changes brought in by the adoption of new technologies differ from country to country and industry to industry. Thus, to get better insights into the technical change on jobs in Indian industries, we conducted direct interviews with the heads of 10 firms on the impact of new technologies on jobs. From these discussions, we found out that firms' are hopeful that emerging technologies will create favourable opportunities for women's employment in the manufacturing sector in India.

Mr Shashikant Gurav, Vice President, Octillion Power Systems India Pvt Ltd agreed that there are very few women on the shop floors in India, which is unlike many developed countries such as Mexico, where the shop floors have a majority of women workers, around 95 percent. This is because new technologies like automation and robotization have reduce the need for strength and muscular work on shop floor, and thus, there are more women present on the shop floor in developed countries. A Similar trend can be witnessed in India in the future if Indian manufacturing firms also adopt

Figure 23: Impact of new technology on women's employment in the manufacturing sector (in percent)



Source: Authors' calculations using survey data

automation and robotization. In his opinion in women have more opportunities in the future because he considered women as more disciplined than men in such job's profiles. Therefore, in the future, along with automated machines and robots, employers will look for women employees to employ on shop floors.

> Ms Bhawna Kirpal Mital, GM–HR Hero Future Energies, said there were many jobs which could only be done from remote sites or which involved very frequent travelling. With new, evolving technologies like drones, image processing through AI and ML, etc., these jobs done from the office and may not involve as much travelling, which may encourage more women to seek these jobs.

a. Power industry

Mt Gurav also raised a concern specific to his industry in terms of employment opportunities. He said that the biggest challenge in his industry is to find the person with the right skills. The battery manufacturing industry is now seeking people who have knowledge of chemical engineering, mechanical, electrical and electronic engineering. It is very difficult to find people with knowledge of all these domains. Therefore, the skill shortage is the problem in the battery manufacturing industry not the job shortage.

When there were no disruptive technologies in the energy sector, it was represented by very few women engineers. The situation is still not very different, but these technologies have the potential to encourage more women to opt for careers in this sector because the technology has changed the job requirements in the industry. Before the adoption of new technologies, engineers had to conduct on-site research in tough areas under the harsh sun, which did not attract women to these jobs. But now with drones and other robotic devices, these jobs can be done by on a computer, and



this has opened avenues for women in the energy sector.

b. Retail industry

According to Ms Radhika Sharma Makker, Deputy General Manager–HR, CHAI POINT, Mountain Trail Food Pvt. Ltd., the pandemic has impacted the retail sector enormously. During this difficult time, new technologies have emerged as a boon for this sector because to run a successful business in the present scenario, technological advancement is essential. This advancement may sometimes prove to be disruptive as it eliminates a few jobs, and as an organization goes through this process, employers need to conduct reskilling programs for their staff. Ms Radhika Sharma Makker also laid emphasis on the fact that to build a favourable ecosystem for women workers, labour policies and laws need to be changed by the concerned authorities.

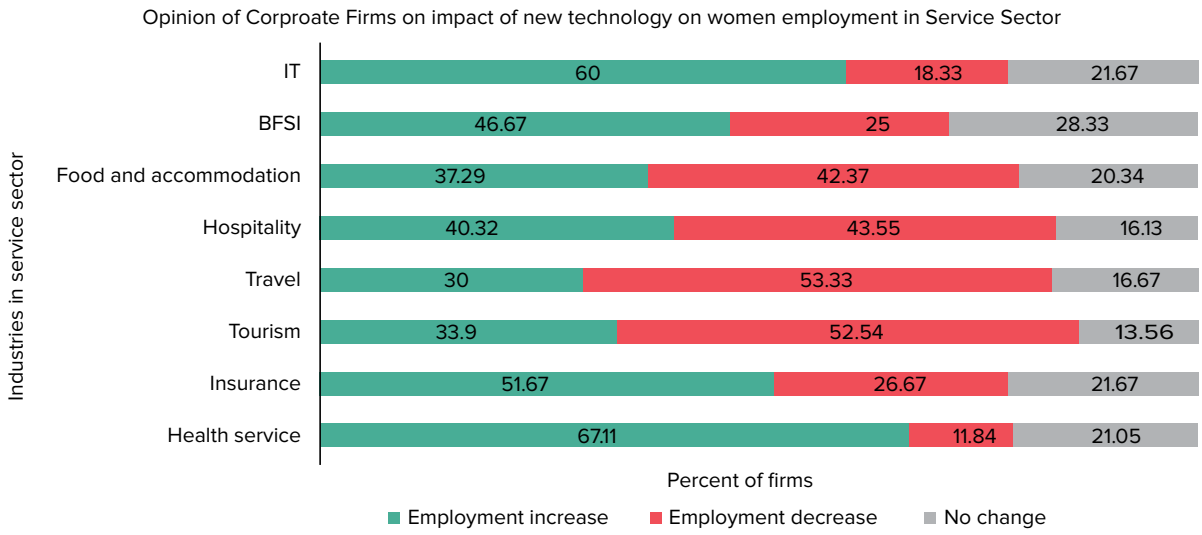
In the retail sector, according to marketing head of Latha Puttana, "For higher-level jobs, working remotely will help keep more women at work, but for lower-skilled women's jobs, automation will definitely decrease the number of jobs available."

In the same way as the manufacturing sector, the service sector has also witnessed the impact of the adoption of new technologies on women's employment. According to the leaders of the firms surveyed, the top three industries in the service sector where new technology will increase women's employment are health services (67 percent), IT (60 percent) and insurance (52 percent). On the other hand, the top three industries where new technology will decrease women employment are travel (53 percent), tourism (53 percent) and hospitality (44 percent).

c. Financial industry

In the financial services sector, new technology has created positive interventions in all areas. The last three to four years have witnessed a lot of investment in new technologies in the financial industry. There are jobs of a routine nature like data crunching and some clerical jobs which may be eliminated and new jobs requiring more cognitive skills will emerge instead. Representatives of the financial sector have mentioned that companies have invested in upskilling their employees irrespective of gender.

Figure 24: Impact of new technologies on women's employment in the service sector (in percent)



Source: Authors' calculations using survey data

> Ms Seema Prem, CEO, FIA Global, highlights that the emergence of disruptive technologies like AI and machine learning will eliminate jobs like data crunching. With the evolving technologies, jobs like data analysis, consulting and advisory will emerge and flourish in the future.

It is not the technology that creates a gender differential impact on jobs, rather it is the level of skill attainment among individuals which acts as a decisive factor in the industries to get a job. In our country, the number of girls pursuing STEM education is very low. There is consensus among all stakeholders that collaborative interventions by government, industries and academia to encourage women to opt for science and engineering as a career choice are required. If this happens, then more women will ultimately work in these industries in the future.

The financial services corporation Mastercard has undertaken several initiatives encourage girls and women to join the workforce in the future as we were informed by Ms Priti Singh, Senior Vice-President Human Resource at Mastercard. The First initiative is 'Girls for Tech' to encourage girls to opt for STEM education. They will reach out to 1 lakh girls across 16 states in India and encourage them to choose science, maths and engineering. They have collaborated with America India Foundation in this initiative. Second, they are supporting women entrepreneurs across countries whose small businesses have been impacted or shut down during the COVID-19 pandemic. Another commendable initiative the company has taken to boost women employment is to inject 100 million INR through various banks to help digitize small businesses owned by women.

d. Publishing industry

Ms Urvashi Butalia, author and Publisher at Zubaan Books said, "The publishing sector which was earlier known as the gentlemen's sector is now represented by young women at



various roles like content developer, editorial writers, etc." This sector, like other sectors, has witnessed the impact of technology on women's jobs. With the emergence of online platforms like Amazon and Flipkart, the value of offline book stores has been vastly diminished, and these stores were usually run by women. So, while technology is enabling women to join this sector, it is, at the same time, replacing some women's jobs.

Ms Karthika VK, Publisher at Westland Publications Pvt Ltd has also expressed similar thoughts. She stated that COVID-19 has brought about revelations about the usage of technology, especially in the world of work for women. Flexible working hours and remote working, which were earlier considered unusual, would become normal practice in the post COVID-19 world of work. She was very sure that adoption of technology will bring positive changes in the world of work for women, and that flexible work hours would be the biggest boon for female workforce.

Therefore, the net impact of technology on women's jobs is assumed to be positive and highly encouraging. All the business leaders surveyed are very hopeful that technology will create favourable changes in the world of work for women. To an extent heads of the surveyed firms agrees that if COVID-19 crisis had not occurred, adoption of new technologies may have taken a few more years to be adopted. Thus COVID-19 pandemic has served as a catalyst for Indian businesses to shift to technology enabled world of work. According to Assistant Manager, Primove Engineering Pvt. Ltd, "New technologies have the potential to help women leapfrog into previously inaccessible jobs in the workplace. There is a positive potential of development growth and employment generation in every sector."

5.2.6. Which divisions of business will be more conducive to women's employment?

Traditionally, divisions like sales and distribution, marketing, engineering, environment, etc., which were dominated by men now have more, and better, opportunities for women. Divisions like finance, human resources, etc., where women have had good representation in comparison to other divisions, are also trying to engage with more women in their teams in the future. In our survey, most of the heads of the firms said that women's employment in the IT division, customer relations division and administrative divisions will be significantly impacted by the adoption of technology. In figure 25, 53 percent of the surveyed corporate executives felt that women's employment in IT divisions would significantly change due to the adoption of new technology.

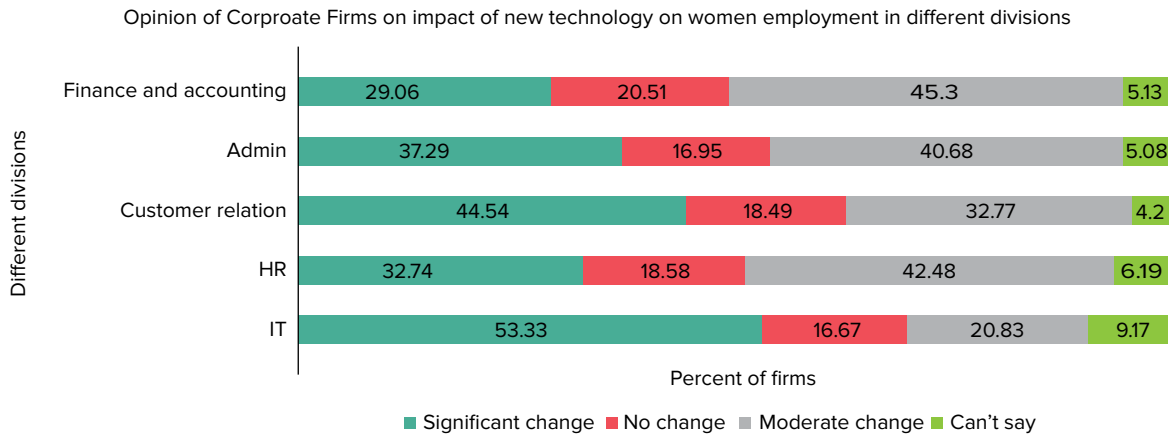
> At Hindustan Unilever Limited, Ms Anuradha Razdan, Executive Director, HR, highlights that sales and distribution jobs were predominantly done by men earlier because they required a physical presence in the market. But COVID-19 has changed the situation, and the majority of the order booking is managed through phone calls and apps. This has opened opportunities for women to enter this field.

Similarly, 45 percent and 37 percent of the surveyed leaders opined that a similar trend would be seen in the customer relations and administrative divisions respectively. Khatiwada and Veloso (2019) find that most new jobs in Malaysia, India, the Philippines and Vietnam are primarily information

communication technology- and data-related jobs. This clearly reflects that work which require more human intelligence and decisive thinking will continue to exist. Technology will make the process of doing work easier, and a majority of employers agree on this. Only 17–21 percent of the surveyed executives felt that new technologies will cause no change in women's employment in different divisions of all industries.

The divisions which will face moderate changes of women employment due to technology are finance, accounting and human resources. In the survey, 45 percent of the leaders surveyed felt that women's employment in the finance and accounting divisions would be moderately changed due to the adoption of new technology. This was also acknowledged by Mr K.V. Ravichandran, VP, SBI Foundation, work in the finance divisions at SBI branch offices had not been changed by technology, but work in all other divisions had been impacted by technology. According to him, technology had not created adverse impacts of any form on women's employment.

Figure 25: Impact of new technology on women's employment in different divisions (in percent)



Source: Authors' calculations using survey data

Chapter 6

Conclusion

The findings of the survey have clearly highlighted that there is no escape from the adoption of new technologies in the business. COVID-19 has actually leapfrogged the adoption of new technologies in India, or it would have taken a few more years for these technologies to become popular in Indian businesses. For the success of any business, continuous technological upgradation is very necessary, and during this process, there will be favourable and adverse impacts on the jobs of both genders, but it will be an auto-corrective mechanism. Old jobs will be replaced by new jobs, but the pace of the replacement of old jobs and the creation of new jobs is unknown, and this may create unemployment for some time. To overcome this, some labour laws and regulations will be required to protect workers' jobs. Overall, business leaders are very hopeful that new technologies will bring favourable changes in the world of work. Some major findings of the survey are listed below.

- The present loss of employment due to the COVID-19 pandemic in the formal sector is temporary in nature and gradually, people will get back into the workforce. In the formal sector, especially in manufacturing sector, women may have to opt to temporarily leave work because of the increased burden of domestic and care work.
- WFH and flexible working are the new normal and will definitely boost women's employment.
- The opinion of the heads of the firms surveyed indicates that there is job polarization in India. To know the trends, detailed research on the numbers and impact of job polarization on the jobs of men and women in specific industries is required.
- According to the opinion of the Indian employers the future of work in terms of job opportunities is expected to be conducive for women. The adoption of new technologies in manufacturing sector, especially on shop floors, will open avenues for more jobs for women.
- The survey findings highlight that in high-skill and low-skill jobs, the impact of technology is gender neutral. It is the medium-skill jobs that have gender differentials. The probable reason could be that in high-skill jobs, finding the right skill to do the job is most important criteria, and the candidate is a man or woman hardly matters. In low-skill jobs in India, there is wage parity, and thus employers may have to maintain equal ratio of employees which reflect no gender bias. Medium-



skill jobs require a blend of cognitive work and manual routine work, and gender can play a role here. Detailed industry-specific research may shed better insights on this.

- Employers are very keen to collaborate on reskilling programs. They are ready to reskill their employees, irrespective of gender, to the upgradations adopted in their business.
- The majority of employers agree that the pandemic has proven the multi-tasking ability of women employees, and this has built a strong image of women employees. Employers in the future would be keen to hire women employees at par with male employees.
- With the adoption of new technologies, the notion that fewer women are hired in the manufacturing sector will get eliminated. Employers are hopeful that shop floors in India, like developed countries, will also be dominated by women, and that day will come soon.



Chapter 7

Way Forward

The findings of the survey have clearly highlighted that there is no escape from the adoption of new technologies in the business. COVID-19 has actually leapfrogged the adoption of new technologies in India, or it would have taken a few more years for these technologies to become popular in Indian businesses. For the success of any business, continuous technological upgradation is very necessary, and during this process, there will be favourable and adverse impacts on the jobs especially on women. With the adoption of new technologies, the notion that fewer women are hired in the manufacturing sector will get eliminated. Employers are hopeful that shop floors in India, like developed countries, will also be dominated by women in future. This report has highlighted that to make manufacturing sector more women centric there is need to take positive interventions by employers, governments and multi-lateral organisations like UNDP.

- There is need to conduct industry wise detailed assessment and create a road map on how new technologies will impact specific industries and what are the opportunities and challenges for women in that particular industry. UNDP in collaboration with FICCI and M/o Skill Development and Entrepreneurship may initiate such assessments.
- The above assessment will help prepare women for future jobs and sustained livelihood. The assessment will indicate what qualifications/ skills are required to do the future job. This will give time to them to get skilled for the upcoming opportunities.
- The outcomes of the report indicate that the future of women in certain sectors (health and pharma, electrical and electronics, IT and FMCG) is bright while in some sectors (automobile & tyres, construction and infrastructure, textile, travel and tourism) where women workforce need to be better skilled and also require support from stakeholders to stay relevant and continue their jobs.
- There is need to increase girls' enrolment in STEM education in India. Government of India need to incentivise girls for opting science education in India. Under the guidance of Ministry of Education, FICCI and UNDP may collectively work to create awareness drives at grass root level to increase the participation of girls in STEM education.
- M/o Skill Development and Entrepreneurship in collaboration with FICCI and UNDP may collectively work on mapping skills across industries and accordingly build skill curriculum for industries.
- Industry-wise reskilling and skill upgradation programmes are needed. Industry Associations like FICCI with support from M/o Skill Development and Entrepreneurship may collaborate with industries to plan and organise reskilling programs.
- Potential collaboration with state governments will help to prepare skill profile of the states which may support the state government in creating local employment opportunities for workers.
- There is need to document the best practices across globe on how different industries are using new technologies and at the same time creating job opportunities for women. UNDP and Government of Japan may initiate such studies which will help both the stakeholders to plan future actions accordingly.



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