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FUTURE



WORK



*in*

INDIA



**INCLUSION, GROWTH & TRANSFORMATION**  
*AN ENTERPRISE SURVEY*



**THE FUTURE OF WORK IN INDIA**  
INCLUSION, GROWTH AND TRANSFORMATION

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OCTOBER 2018

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FUTURE 



OF WORK



*in* INDIA



**INCLUSION, GROWTH & TRANSFORMATION**  
*AN ENTERPRISE SURVEY*

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# PREFACE

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All consequential innovations in technology effect change on the organization of human societies. From steam engines and railways to data and platforms—this reality manifests itself repeatedly through history. For the most part, human organizations respond predictably—initially with fear and uncertainty, followed by a period of slow and painful transition. Some communities are able to sense the new opportunities that accompany this transition and these communities are able to shape economic, social and political order decisively.

The fourth industrial revolution can be different. While it heralds many of the same challenges; the technologies driving change can also provide unique tools and granular insight that governments require to frame effective public policies that will respond to the new and residual obligations to their citizens. In other words, human societies can be better prepared. Even as robotics threaten low-skilled jobs, for example, machine learning and big data can help us anticipate future job opportunities and skills requirements.

This is after all the most pressing challenge of the fourth industrial revolution—how do countries avoid the worst-case scenario of rapid technological advancements accompanied by upheaval in the job market. We know the consequences are dire. Inequality and mass unemployment can, and already have, precipitated social risks. Globally, urgent efforts are underway to implement a fair and equitable work agenda in the digital age.

There are few other countries as pivotal to this effort as India. The size of its workforce, the informal nature of its industry, and the limitations of its state capacity make it the 'model' country. In other words, its choices are replicable in much of the world. If China's template for growth was underpinned by the success of low end-manufacturing, India's transition to a middle-income economy may well provide solutions for development in the fourth industrial revolution.

Providing options to policy-makers and business in India requires aggregating reliable evidence on the direction of technological change, its impacts on labour markets and changing business expectations. To do this, the Observer Research Foundation and the World Economic Forum have undertaken extensive research including conducting an enterprise survey of more than 770 companies across four industries in India. These are bellwether sectors that will

implicate the dynamics of the larger job market and work space. Many of the results are insightful, and sometimes counter-intuitive—new technologies are being rapidly adopted by companies of all sizes, and more often than not, this adoption necessitated hiring new employees.

Insights from the survey also make clear that India requires a new social contract between the individual, business and state. With advances in robotics and machine learning, traditional manufacturing-based models of providing financial and social security are both inadequate and redundant. Creating a new framework will require reassessing some of the basic features of the emerging political-economy.

Indeed, the new labour market is likely to be disaggregated, yet highly networked, with digital platforms linking skilled individuals, small enterprises and customers. Promisingly, our analysis suggests that India's youth are cautiously optimistic about the 'gig economy.' The challenge for India will be to leverage this opportunity to integrate its large informal sector with global value chains and find new commercial opportunities.

Education can no longer be linear. Most enterprises we surveyed expect that existing jobs will be restructured and not lost; with nearly a third reporting that existing staff will require new skills to remain employable. Education policy must adapt to these dynamic needs by legitimizing mid-career acquisition of new skills by individuals while businesses must be more prepared to provide learning solutions to their workforce.

The factory and the commercial complexes can no longer form the basis of social protection. With most individuals expected to perform multiple economic roles, linking social protection to fixed employment will undermine the potential of the gig economy. Only two percent of surveyed youth, for example, considered contract work desirable, reflecting an aversion to work in environments with low social protection. This contradiction between optimism for the gig economy and the reluctance for contract work indicates the clear need to offer social protection to the individual irrespective of their economic role.

Above all, the government must create an enabling policy environment for a more productive, fairer and more inclusive 'workscape'. The naysayers would suggest that digitization, informalization, big data and robotics are going to make job creation impossible. That countries such as India are going to see significant societal disturbances due to the lack of provisioning of opportunities for the future. There are others who believe that India is going to lose less jobs, generate more new employment opportunities and serve the entire technology frontier in the fourth industrial revolution. To be sure, no single actor can fulfil this agenda alone—and happily, the results of our report ultimately suggest that most businesses and workers agree that technology and digitization can provide Indians with paychecks, purpose and protection.

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## EXECUTIVE SUMMARY

*The future of work in India is uncertain, but full of opportunities. This report attempts to answer key questions around the present and future of transformative technology in India and its impact on job creation, workplaces, employment trends and relations, and the nature of work itself.*

Our research reveals that companies in India are optimistic about the future and are open to the possibilities presented by new technologies and digitisation. This optimism is likely to stimulate innovation and adoption of new technology and drive transformation, growth and progress. This report sets out a roadmap for an inclusive future of work in India that capitalises on the opportunities presented by technological disruption and digitisation. By using the opportunities at hand, India can:

- Generate sufficient new employment opportunities for the existing and growing labour force.
- Create decent jobs with better wages, security, protections and safety, necessary for improving individual and household welfare and well-being.
- Ensure equal opportunities for women, youth and other marginalised communities previously unable to participate equally in the paid economy.
- Establish an ecosystem better equipped to prepare the workforce for changing skill and education requirements.
- Create an inclusive policy environment which balances the need for job creation with the interests of workers.

This report outlines findings from the *Future of Work, Education and Skills Enterprise Survey*. Data was collected from 774 companies in India, from micro-sized firms to those employing more than 25,000 workers. It presents findings on the pace of technological adoption and digitization among Indian companies, and its impact on job creation, displacement and the nature of work. In addition to the effects of the changing nature of jobs on wages, contracts, protections and security. Finally, the report includes recommendations for policies, programmes and action needed for India to leverage the possibilities of technological disruption, manage the associated risks, and enhance its preparedness for the future of work in the digital age.

Key insights from our research are summarised below.

**Companies are mostly optimistic about the future and about technology:** Among the surveyed companies, 25 percent identified technological adoption as the trend most likely to positively impact their business in the next five years.

**Companies anticipate job creation not job loss:** Despite widespread concern that machines and technology are displacing human workers, our research finds that among the surveyed companies, 33 percent needed to hire additional workers owing to the adoption of industrial technologies and machinery in the last five years, compared to 19 percent that reduced their staff as a result. Companies expect this trend to continue in the medium term.

**Companies recognise the potential of the Internet of Things (IoT) and big data:** 40 percent of companies report that aspects of IoT are present in their companies today. 64 percent of companies plan to introduce aspects of it in the next five years. At present, 14 percent of companies report using big data, while 52 percent plan to do so in the next five years.

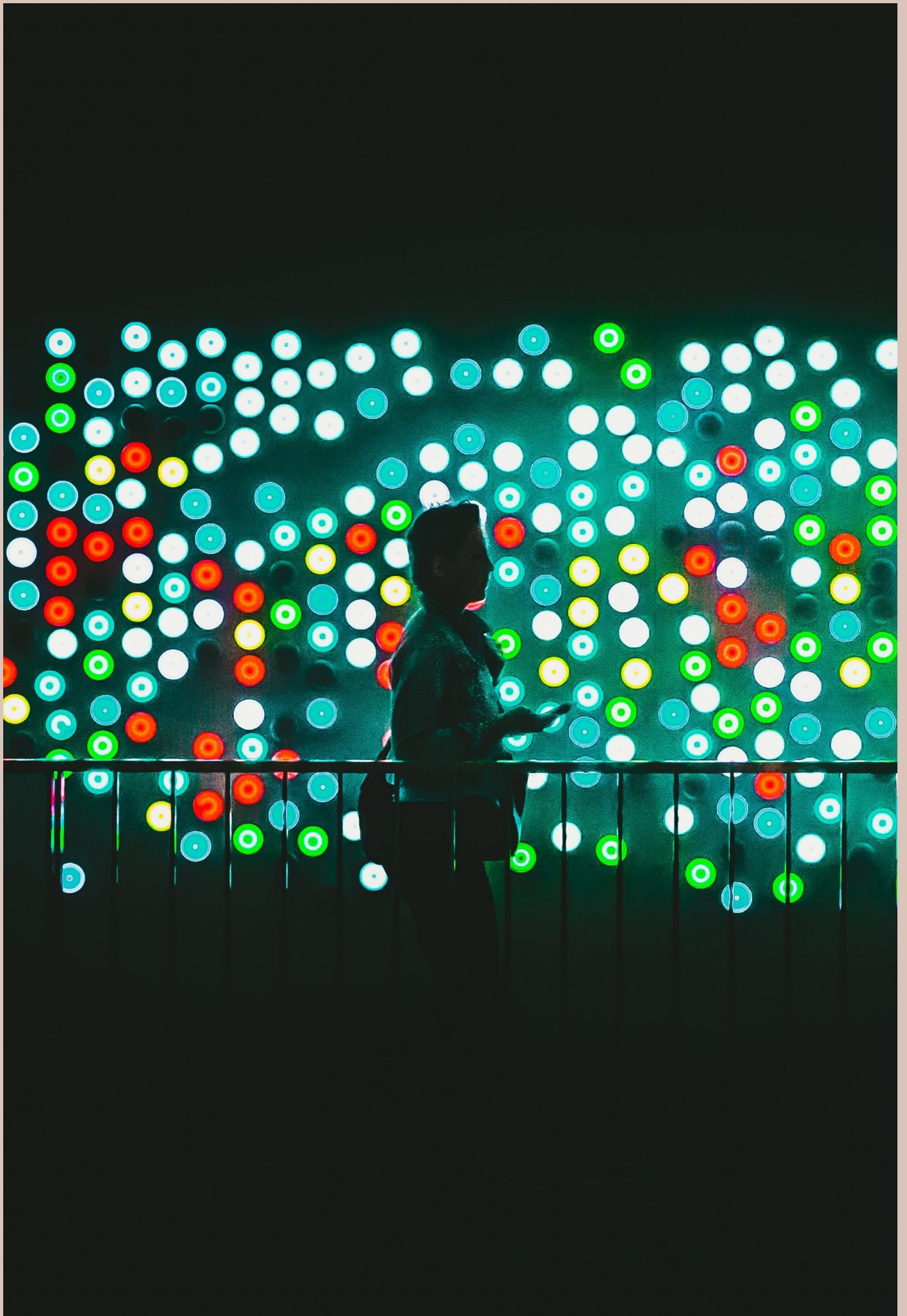
**Quality improvements, new markets, and government regulations drive technology adoption:** 39 percent of companies report introducing new technologies and machinery in the last five years to improve the quality of output and 35 percent to expand into new markets. Among companies that have introduced new digital tools or services, 43 percent report doing so to attract new customers and 34 percent to comply with government regulations. Cutting costs was a less important reason for introducing new technologies.

**Skills gaps and financial constraints are the main barriers to technology adoption:** 34 percent of the surveyed companies report a lack of know-how among their employees as the most significant barrier to technology adoption, while 24 percent attribute this to a lack of investment capital.

**Retraining and learning on the job to address changing skill requirements:** 33 percent of the surveyed companies report changes in the skill sets required of their staff due to the introduction of new technologies and machinery. 84 percent of companies plan to address such gaps in knowledge and skills internally through retraining existing workers in new capabilities, or having employees learn new requisite skills on the job.

**Companies are hiring, but not women:** Among the surveyed firms, 71 percent currently employ fewer than 10 percent female workers, with 30 percent having no female workers at all. Companies are hiring, but few of the new hires in the last five years have been women. 37 percent of firms said that they prefer to hire men, while 11 percent report that they are looking to bring on more women.

**Companies offer jobs offline, young job seekers look online:** The research reveals communication misalignment between companies looking to hire and job seekers, especially youth. Only 14 percent of the surveyed companies use online modes of



*Our research reveals that companies in India are optimistic about the future and are open to the possibilities presented by new technologies and digitisation.*

recruitment for filling vacancies, while 81 percent of youth reported looking for jobs online.

**Contractualisation is increasing:** 24 percent of the surveyed companies hire contractual workers (workers hired through a third-party). On average, around 20 percent of all employees of surveyed firms are contract workers. 49 percent of companies report hiring contract workers to reduce labour costs, an uncertain business environment and workload along with inflexible labour regulations were mentioned by 64 percent of companies.

**There is a significant need to rethink worker protections, security and benefits:** The existing provision of worker protections and benefits, both for permanent and contract workers, is grossly insufficient. Only 37 percent of the surveyed firms provide paid annual leave, and 36 percent provide paid sick leave to permanent employees. For contractual workers, the corresponding proportions are 15 and 16 percent respectively.

**An independent future:** 19 percent of the surveyed companies reported hiring freelancers or independent workers in the past year. The main reasons cited by companies for hiring freelance workers include reduced costs and difficulties in finding skilled permanent staff.

With the rapid disruptions triggered by technological advancement, there is a window of opportunity for India to adapt to the changing requirements imposed by transformative technologies on jobs, work and skills. By succeeding in doing so, India will be able to create new employment opportunities for its large labour force, improve the working conditions for the existing workforce, enhance its productivity and accelerate economic growth and social inclusion.



# INTRODUCTION



*Technological disruption has the potential to reshape the employment landscape in India for the better. The possibilities include automating dangerous jobs, making income generating opportunities accessible online, and better matching of workers with opportunities through digital platforms.*

In addition to enabling job creation, technological disruption can make work more efficient; increase productivity and formalise informal operations, thus capturing a greater tax base; provide social security and protections to a larger number of individuals; make financial services more accessible; and make work more inclusive. The future of work and technology is not set in stone, and policy makers, the private sector and civil society can shape that future. The key questions addressed in this report include:

- To what extent are companies optimistic about the future of

technology and digitisation?

- Is job displacement in India inevitable, or is job creation and change more likely?
- What is the impact of the changing nature of work on social outcomes like gender parity, worker protections and conditions of work, and labour market equality?
- What kind of strategies and approaches can help to manage the ongoing realignments and transitions in the labour market to shape a future of work that expands economic growth and social inclusion?
- What role can various stakeholders, such as the state, businesses and civil society, play in order for India to optimally leverage the opportunities presented by technological disruption?

Despite widespread concern that automation will lead to technological substitution and job displacement, little evidence exists to either support or dismiss the concern in the Indian context. This report attempts to fill the gap in

knowledge by presenting data from the *Future of Work, Education and Skills Enterprise Survey*,<sup>2</sup> in which 774 companies, from micro sized enterprises to companies employing more than 25,000 workers were surveyed in four industries in India, including textiles, financial services, logistics and retail. Insights from the enterprise survey shed light on the extent and pace of technological adoption and digitisation among firms in India, as well as the impacts of this on job creation and displacement, job roles, and skill requirements. This report also addresses questions regarding the quality of jobs vis-à-vis contracts, wages, security and protections.

The report proceeds as follows: Chapter 2 defines a vision for an inclusive future of work in India, discussing the many possibilities presented by technological disruption. Chapter 3 outlines the methodology. Chapter 4 presents findings on the level and pace of technological adoption and digitisation among Indian firms today, and expectations for the next five years. Chapter 5 presents findings on job creation, job change and job displacement experienced by Indian firms due to technological adoption and digitisation. Chapter 6 explores findings on job quality, with a focus on contractual labour, protections and benefits, unpaid work and the future of independent work in India, Chapter 7 provides a conclusion.





# VISION



*This chapter outlines a vision for an inclusive future of work in India that optimises the opportunities presented by technological disruption in order to create sufficient gainful employment opportunities for the growing working-age population as well as enhance labour force equality. An inclusive future of work must strive to ameliorate job quality and worker protections, promote individual and household welfare and well-being, and lead to an increase in overall productivity. In the distinct socio-economic and cultural context of India, an inclusive future of work must ensure that previously excluded segments of society are brought into the wage economy. A shift towards such a future of work is premised on the creation of appropriate ecosystems to support workers in the transition towards a more digital and technologically-rooted economy, as well as policy frameworks and regulations that are able to balance the needs of industry with the welfare and security of workers.*

## 2.1 | JOB CREATION

**T**here is an unresolved debate around the potential of automation to cause job displacement and job loss. Academics such as Frey and Osborne find that 47 percent of occupations in the United States are at a high risk of being lost due to computerisation.<sup>3</sup> The authors use an occupation-based approach to arrive at this estimate, which involves classifying entire occupations by their susceptibility to automation. This approach has garnered criticism for vastly overstating the potential threat of automation as usually only specific tasks within an occupation are displaced rather than entire occupations. Against this, Arntz et al. analysed 21 OECD countries using a task-based approach and found that on average only nine percent of jobs are at risk of automation.<sup>4</sup>

The debate is equally, if not more, relevant in the context of India owing to factors such as its unique mix of a complex industrial structure, its demographic dividend, and technical prowess. *The*



*Future of Work, Education and Skills Enterprise Survey* reveals that nearly twice as many companies have needed to increase their number of staff as a result of introducing new technology, machinery or digital tools in the last five years, as those that saw reductions. Automation is also changing the structure and nature of occupations, job roles and tasks. As companies introduce new technologies, workers will need to acquire new skills and know-how to use them effectively. Similarly, as some tasks become automated, individual workers will have additional time for other activities, and must be able to adapt in order to successfully shift from one set of core activities to a new set of activities. While these transitions may raise alarm, they present a significant opportunity for reducing the share of time spent by workers doing manually strenuous, dull, repetitive or hazardous tasks.

While one McKinsey Global Institute study estimates that 52 percent of jobs in India can be automated using existing technologies,<sup>5</sup> another McKinsey report suggests that job creation will be adequate to make up for these potential losses.<sup>6</sup> Despite the potential of some technologies to displace workers, technological adoption remains contingent on a slew of factors, including, amongst others, the cost of labour and the need to improve the quality of output. The question India must answer is this: How can automation and digitisation be leveraged for reducing the number of dangerous and undesirable jobs, while simultaneously being able to generate opportunities in higher-wage, safer, and more satisfying occupations?

Economic growth is a necessary but not sufficient condition for job creation. It is estimated that India must create more than 8.4 million jobs a year to maintain its current employment rate.<sup>7</sup> With the current rate of job creation per percentage point of economic growth, the country will need to grow at a rate of more than 10 percent. While not unprecedented, a 10-percent growth

rate is higher than projected growth to 2020.<sup>8</sup> By setting a slightly more ambitious employment target that is comparable to other countries at the same income level, the World Bank estimates that India would need to generate 13.4 million jobs a year, translating into a growth rate of 18 percent.<sup>9</sup>

A key factor in the increasing demand for jobs is India's demographic structure. India has seen several positive demographic transformations in recent decades, including a rise in life expectancy at birth from 36 years in 1950 to 68 in 2015. At the same time, the country has seen a decline in the fertility rate, from 5.9 children per woman in 1950 to 2.3 in 2013.<sup>10</sup> The changing age structure in India implies that the share of people in the working-age population (15–64) will increase by five percentage points, from 64 to 69 percent by 2040.<sup>11</sup> This will result in an additional 300 million working-age adults, a major potential driver of economic growth.

Today, half of India's population is below the age of 25, and 1.3 million young people enter the working-age population every month.<sup>12</sup> India will not only need to ensure that there are enough job opportunities for these aspiring young people, but that these jobs meet their economic ambitions and desire for upward mobility.<sup>13</sup> Youth in India report that wages, job security and opportunities for promotion and career development are the most important factors when considering a job. Reflective of youth preferences for security and opportunities for advancement, 49 percent report a preference for a job in the public sector, followed by 23 percent who prefer the private sector and 17 percent who prefer entrepreneurship.<sup>14</sup>

Major structural shifts are underway in India's labour market. A substantial number of individuals are moving out of agricultural employment into other sectors.<sup>15</sup> Moreover, the manufacturing sector, which has historically absorbed individuals migrating

INDIA MUST  
CREATE MORE THAN  
**8.4 MILLION JOBS**  
A YEAR TO MAINTAIN  
ITS CURRENT  
EMPLOYMENT RATE

out of agricultural work, has stagnated in terms of employment. Much of recent growth has been driven by capital, rather than labour-intensive industries.<sup>16</sup> These trends have increased the pressure on job creation, but at the same time, are creating opportunities for job growth in higher productivity and higher wage jobs.

Global forces are also redefining the employment landscape domestically. For instance, automation aided by Artificial Intelligence (AI), machine learning, and big data, as well as technologies such as 3D printing and advanced robotics are reshaping business and production models, consumption patterns, and global value chains. All of these factors will have an impact on national growth, competitiveness, employment, skill requirements, and sustainability.<sup>17</sup> Similarly, increasing protectionism in countries such as the United States and China is challenging the export-led growth model that had previously helped transform lower and middle-income economies into high-income countries.<sup>18</sup>

There are economic, political and human imperatives for job creation in India. While India's ranking has improved on the World Bank's Ease of Doing Business Index and the country has implemented a number of reforms, hurdles remain. These include those associated with starting a business, dealing with construction permits, registering a property, paying taxes, trading across borders, enforcing contracts, and resolving insolvency.<sup>19</sup> The ability of firms and entrepreneurs to generate job opportunities will be contingent on the business environment.

While demographic, structural and technological shifts are making rapid job creation critical, they are also creating opportunities for generating new, relevant and decent jobs for the future India.

## 2.2 | A DECENT WORK AGENDA FOR A DIGITAL FUTURE

The increased demand for jobs is accompanied

*The International Labour Organization (ILO) defines decent work as, "Opportunities for work that is productive and delivers a fair income, security in the workplace and social protection for families, better prospects for personal development and social integration, freedom for people to express their concerns, organise and participate in the decisions that affect their lives and equality of opportunity and treatment for all women and men."*

TABLE 1 DECENT WORK

by the need to create high-quality employment opportunities, for both the existing workforce and new entrants, including India's aspiring youth and women. Digitisation and technological adoption, if managed carefully, can support the growth of decent jobs and greater economic inclusion.

Each of the dimensions of the ILO 'decent work agenda' are relevant for an inclusive future of work in India. However, this framework in the Indian context must account for the fact that most workers are not employed in large firms, which are legally obligated to provide employees with security and protections. In addition, the changing nature of workplaces,<sup>20</sup> which are for many workers shifting from offices to the cloud will require different non-place-based protections. Thus, the question is, how can employer-provided and premise-based protections and security be adapted for a workforce that is largely informal and micro in nature, and increasingly digital?

This predicament is amplified by a trend—especially in advanced economies—towards non-standard forms of employment and an increasingly

atomised workforce, i.e. part-time, casual, on-call and gig-based independent work. India will not only need to re-orient its social security and protection regimes, but also the mechanisms for collective action to ensure that they are accessible to a fragmented workforce.<sup>21</sup> Take for instance independent workers who provide a service such as driving for a ridesharing platform. Unlike unionised workers, these individuals have few mechanisms for collective action and for making demands. An inclusive future of work will have to simultaneously facilitate job creation by enabling new business models, while also supporting the well-being of workers by ensuring mechanisms for collective action.<sup>22</sup>

The highly informal and micro nature of India's economy provides impetus to digitally-enabled independent employment opportunities. These forms of work have gained momentum in recent years with the emergence of native and international freelancing platforms. According to the MGI, between 700,000 and 900,000 technology-enabled independent jobs were created in India between 2014 and 2017, primarily in transport, logistics and financial services.<sup>23</sup> The report also points to the jobs created as a result of the loan programme by the Micro Units Development and Refinance Agency Bank (MUDRA), which provided financing to 13 million individuals between 2014 and 2017.<sup>24</sup> Further, our findings point to a very entrepreneurial youth population in India, with 17 percent of youth respondents reporting that entrepreneurship is their ideal form of employment.<sup>25</sup>

Related to this, an inclusive future of work in India must be one that provides individuals with needed wages. Strikingly, 18 percent of the employed population are living in poverty, pointing to a low-wage problem.<sup>26</sup> Technological adoption and digitisation present both an opportunity and a threat to wages. For many workers, the impact of technological adoption on their income will be contingent on their ability to adapt to changes and

acquire the know-how required to work alongside new technologies and machines and use new digital tools and services. The risks of increasing income inequality also must be managed carefully.

In addition to providing security, protections, mechanisms for collective action and decent wages, jobs must also provide individuals with a sense of purpose. Quality jobs in India should meet the aspirations of India's population, particularly India's youth and women, for whom jobs on factory floors or in street-side stalls may not meet their labour-market ambitions.<sup>27-28</sup> Our research reveals that for 62 percent of youth one of the most important factors in considering a job is the opportunity for upward career mobility.<sup>29</sup>

### 2.3 | ECONOMIC INCLUSION

The inclusion of women in the labour market in India is both a social and an economic imperative. The IMF estimates that India would be 27 percent richer if there was equal participation of women in the workforce.<sup>30</sup> Despite years of high growth in India, women are severely under-represented in the paid economy. In fact, India has seen a decline in female labour-force participation in recent decades. Today, it stands at a mere 27 percent.<sup>31</sup> This is one of the lowest in the world, with a global average of 49 percent.<sup>32</sup>

India is undergoing vast transformations with regard to how people work, where they work, and the kind of work that they do. These transformations should be leveraged as a catalyst for positive change. One of the changes that should be prioritised is gender parity at work. India stands to benefit immensely from greater female participation in the labour force, and now is a window of opportunity to make that happen.

There is variation in the rates of female labour-force participation between rural and urban India. While in rural areas, approximately 36 percent women participate in the labour market, likely due to their

high participation in agriculture, just 21 percent do so in urban (and broadly better-off) India.<sup>33</sup> There is also variation in participation by level of education, with poorly and highly educated women participating at much higher rates than those with secondary education.

In corporate employment in India, approximately 50 percent of women drop out between junior- and middle-level positions, as compared to an average dropout rate of 29 percent across Asia.<sup>34</sup> Moreover, women receive considerably lower wages than their male colleagues, with an average gender wage gap of 39.5 percent.<sup>35</sup> Increasing female participation in the labour force, retaining female workers, ensuring their mobility to leadership positions and eliminating disincentives such as lower wages are all areas that require policy intervention, as well as dedicated efforts on the part of the private sector.

At the same time, the OECD estimates that 31 percent of Indian youth between the ages of 15 and 29 are not in education, employment or training (NEET).<sup>36</sup> Our *Youth Aspirations in India Survey* reveals that 34 percent of youth between the ages of 15 and 30 are not in education or employment. Bringing India's youth into the labour market will mean equipping them with the required education and skills, as well as creating opportunities for them to gain labour-market experience and ensuring that job opportunities are both accessible and desirable.

Digital tools and services can support efforts to this end. For instance, 51 percent of Indian youth report that one of the top barriers they face in finding desirable employment opportunities is a lack of guidance in identifying jobs most suitable to their skillsets. Similarly, 32 percent of respondents report a lack of occupational and job-seeking information as a main barrier. Related to this, 44 percent of youth report that the main barrier they face is a lack of work experience.<sup>37</sup> Each of these can partially

## 51 PERCENT OF INDIAN YOUTH REPORT THAT ONE OF THE MAIN BARRIERS TO EMPLOYMENT IS A LACK OF GUIDANCE

be addressed through strategic use of digital tools, services and platforms. Online career counselling, skill assessment tools, and opportunities for short-term, paid projects and internships can assist in addressing information gaps, assessing and matching skills, and increasing work experience

among youth.

India's contemporary labour market has individuals at both ends of the skill distribution, from very low-skilled workers to highly skilled individuals. This variation is indicative of different futures of work for different segments of society. It will therefore be crucial to ensure that there are opportunities for upward mobility in terms of skills, occupations and incomes.

Economic inclusion in India will not only mean bringing previously excluded groups into the formal and paid economy, it will also have to lead to an increase in social and occupational mobility, such that the occupation and income of one's parents does not determine an individual's labour-market outcomes. The digital opportunity for achieving this is immense, through, for example, better access to income-generating opportunities online, reduced barriers to accessing skill and education content, and greater availability of labour-market information.

### 2.4 | ENHANCING CAPABILITIES

Preparing India's emerging and experienced workforces alike for a rapidly changing labour market will be an immense challenge. It will require revitalising India's education and skills ecosystems to account for the growth in demand due to India's bulging youth population, changing skills requirements driven by technological adoption and digitisation and the changing aspirations of the population.

While India has achieved near-universal primary education, quality and learning outcomes remain a challenge, with many students learning little while in school.<sup>40</sup> While many argue that traditional education is becoming obsolete, education will remain essential. First, because education is the process through which individuals learn how to learn. Active learning skills are expected to become increasingly important as job transitions become more frequent and as traditional job roles change with the introduction of new digital and technological tools.<sup>41</sup>

Second, in school individuals learn important soft skills such as communication, analytical thinking, creativity and problem solving. It is projected that soft and human skills will become more important for workers in the future.<sup>42</sup> While digital tools and new technologies will certainly aid in the delivery of education and ideally improve education outcomes, it is unlikely that they will become a

*These efforts must be fine-tuned to not only ensure employment in the short-term but also to equip individuals with the basic skills and knowledge needed to continuously up-skill and re-skill in the long-term.*

TABLE 2 SKILL GAPS AND SKILLS MISMATCHES

#### SKILLS GAPS

*A disparity between the current capabilities and skills available in the labour market, and the skills required.*

#### SKILLS MISMATCHES

*A scenario in which the level of skills or type of skills of individuals do not match those required in the labour market. These mismatches could be horizontal or vertical. Horizontal means mismatches in the type of education or skill qualifications, and vertical means mismatches in the level of education or skills required.*

substitute for traditional education models in the near future.

The recent pivot towards skilling as a crucial investment in human capital has created a push towards enhancing individual capabilities. These efforts must be fine-tuned to not only ensure employment in the short-term but also to equip individuals with basic skills and knowledge needed to continuously up-skill and re-skill in the long-term.

Mobile phones and the advent of online learning platforms have the potential to reshape the learning process, enabling young people and the experienced workforce alike to quickly learn new skills independently. Low cost and free learning modules, courses, trainings and workshops are also more readily available today than ever before. This is enabling a lifelong approach to learning and it is putting greater impetus on the need for students to learn how to learn.



## 2.5 | SUPPORTIVE POLICY ARCHITECTURE

Several policy opportunities exist that can support an inclusive future of work in India. For example, improvements in the attractiveness of the Indian market, both for domestic and foreign investment. Since companies employ workers, they are crucial for job creation. Improving the business environment in India is, therefore, a critical area of intervention in the drive to create sufficient jobs. This will naturally require a balance between the interests of businesses, workforce, and environment.

Further, India's increasingly dynamic labour market—shaped by workers taking on multiple roles as employers, employees and entrepreneurs simultaneously—requires new frameworks that can account for this dynamism.<sup>45</sup> Not only will protections need to be expanded and replicated, but also adapted to the realities of a large number of workers engaged in employment online. The same policy frameworks for physical workplaces may not be sufficient for the dynamics of digital workspaces.

## 2.6 | SUMMARY

Disruption due to technological adoption and digitisation is inevitable. The opportunity for India is in leveraging these transformations to realise the immense possibilities they present. If managed carefully, technological disruptions in India can lead to the creation of sufficient gainful employment opportunities (and commensurate paycheques) for the growing working-age population. As well as enable effective protections for individuals in a changing world of work and enable economic participation of previously excluded groups. India can prepare individuals with the know-how and capabilities for a changing labour market, and update policies for a new and more dynamic employment context. The following chapter provides an overview of the methodology used in this report.



# M E T H O D O L O G Y



*To understand how the future of work is unfolding in the Indian context, the report uses a mixed-methods approach, including analysis of secondary data, an enterprise survey of 774 companies across India, and semi-structured informant interviews.*

The report attempts to:

- Gauge the excitement of Indian firms about the potential of technology.
- Uncover perceptions among companies about the growth potential and opportunities presented by technological adoption and digitisation.
- Shed light on the potential of job creation vs. job displacement in the fourth industrial revolution.
- Generate evidence around gender dynamics in the fourth industrial revolution and identify potential opportunities for parity.
- Unpack how disruption can be leveraged to create a desirable future of work, and define the ideal roles for the state, industry and civil society in shaping that future.

This report takes an in-depth look at four industries, including banking and financial services, retail, textiles, and transportation and logistics. The criteria for selecting these industries are summarised in Table 3. The focus industries attempt to do justice to the fact that different industries have different levels of openness towards change and innovation. We therefore assume that the impacts of technological adoption and digitisation will vary significantly. The focus industries also take into consideration different levels of skill intensity and wage levels in order to uncover variation in the impacts of technology on different parts of the skill and wage distribution. Further, the report considers the overall importance of the industries vis-à-vis their share of total employment.

## **3.1 | SECONDARY DATA**

The report uses the National Sample Survey Organisation (NSSO) employment and unemployment data and the most recent Economic Census data for 2014–15. NSSO data is valuable as it provides information on both informal and formal employment. While both of these datasets are outdated, they are the most recent employment data available. The analyses of the two datasets here are purely descriptive.<sup>46</sup>



### 3.2 | ENTERPRISE SURVEY

The *Future of Work, Education and Skills Enterprise Survey* carried out by the Observer Research Foundation and World Economic Forum was conducted in person with the leadership of 774 companies across 4 industries in India in 14 locations across the country.<sup>47</sup> The central questions that the enterprise survey attempts to unpack include:

- To what extent and at what pace are Indian firms adopting technology and digitising?
- How are technological adoption and digitisation in the Indian context impacting job creation, change and displacement? How does this vary between different industries, geographies and firms of different sizes?

- How are technology adoption and digitisation impacting the quality of jobs, vis-à-vis contracts, wages, protections and security?
- What policies, programmes and initiatives are needed to manage these transformations both by the public and private sectors? What are the risks in case of failure?

The selection of sample companies was based on factors including sub-sector, size of the company, and location. An overview of the sampling strategy is given in Table 4.

While we expect that the impacts of technology on formal and informal firms will be different, and important for understanding the future of work in India, our sample only covers formal enterprises. This report

TABLE 3 INDUSTRY SELECTION MATRIX

Industry	Skill Intensity	Wages (average daily wage)	Formal/ Informal (percent)	Speed of tech adoption	Company sizes Percent: M/S/M/L	Share of employment
Textiles	Low to High	Low (176.1)	12/87	Low	56/13/10/18	1.8
Financial Services	Low to High	High (701.4)	59/40	High	26/13/16/36	0.97
Retail	Low to High	Low (181.2)	2/98	Medium	91/4/1/2	8.0
Transport and Logistics	Low to High	Medium (308.0)	16/84	Medium	72/6/3/12	4.4

**Source:** NSSO 2011-12.  
**Notes:** MSML definitions based on NSSO classification. Micro: <6; Small: 6-10; Medium: 10-20; Large >20. May not add up to 100 due to rounding and unknown.

INDUSTRY	TARGET COMPANIES	CLUSTERS/GEOGRAPHY
<b>Textiles</b>	<ul style="list-style-type: none"> <li>• Export-oriented and large firms</li> <li>• Small and medium domestic-focused firms</li> </ul>	<p>Ludhiana, Delhi-NCR, Lucknow: North/Northwestern cluster, woollen apparel</p> <p>Ahmedabad and Mumbai: Western region, traditionally cotton textiles and apparel</p> <p>Chennai and Bengaluru: Southern region, silk apparel</p> <p>Madurai: Southern region, hosiery</p>
<b>Logistics</b>	<ul style="list-style-type: none"> <li>• Truck fleet owners</li> <li>• Shipping lines</li> <li>• Container companies</li> <li>• Warehouses</li> <li>• Freight forwarders</li> <li>• Courier companies</li> </ul>	<p>Delhi, Ludhiana, Ahmedabad, Mumbai, Indore, Lucknow, Bangalore, Chennai, Kolkata</p>
<b>Retail</b>	<ul style="list-style-type: none"> <li>• Large and medium online retail companies</li> <li>• Micro, small, medium and large brick and mortar retail companies</li> </ul>	<p>Equal distribution of firms between Tier I and Tier II cities</p>
<b>Financial Services</b>	<ul style="list-style-type: none"> <li>• Banking services</li> <li>• Non-banking financial service companies</li> </ul>	<p>Head offices in Mumbai, Delhi, Bangalore and Hyderabad; remaining sample equally distributed between cities in the North, East, South and West</p>

TABLE 4 SAMPLING STRATEGY

does capture companies across the spectrum of firm size, namely micro to large-sized firms in retail; and

small, medium and large firms in logistics, financial services and textiles.

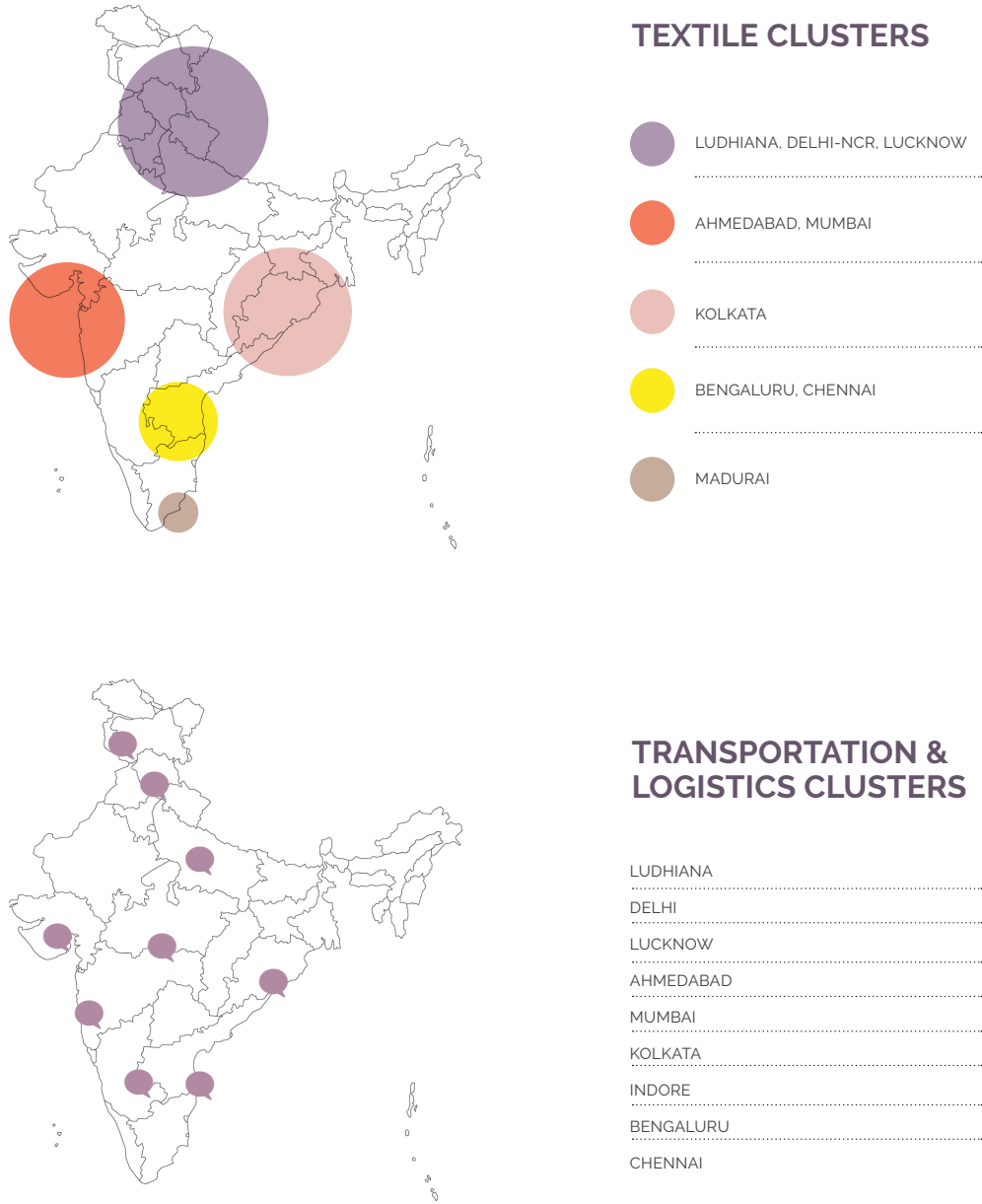
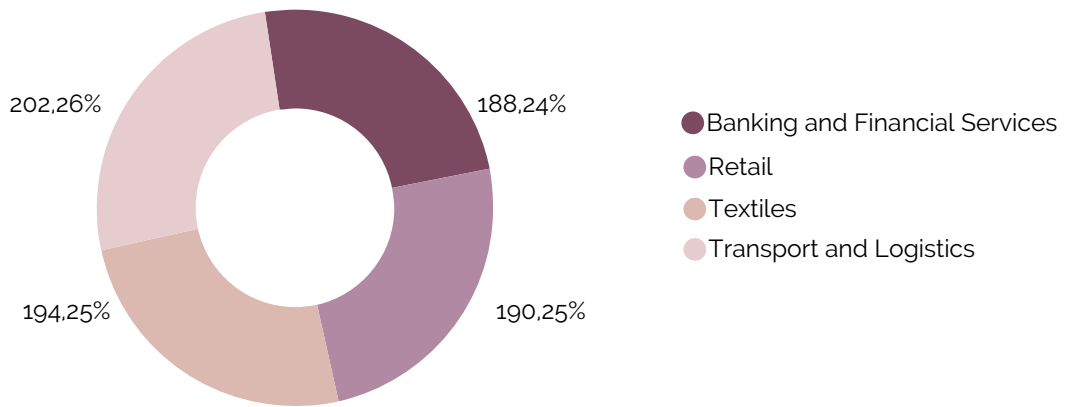


FIGURE 1 SAMPLE CLUSTERS

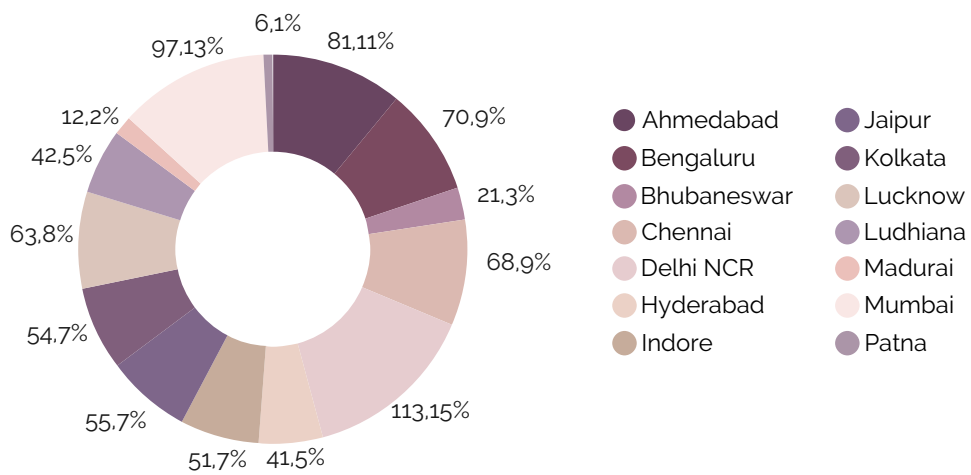
In order to identify target companies, focus geographies were selected using a clustered approach for the textiles and transportation and logistics industries as illustrated in Figure 1. Because the retail industry is relevant across geographies in India, the sample was constructed with a focus

on capturing companies in Tier I and Tier II cities. Banking and Financial service firms were targeted in geographies across the country. Data for all industries was collected in Delhi-NCR, Jaipur, Lucknow, Ludhiana, Ahmedabad, Indore, Mumbai, Bhubaneswar, Kolkata, Patna, Bengaluru, Chennai, Hyderabad and Madurai.

NUMBER AND SHARE OF RESPONDENTS BY INDUSTRY



NUMBER AND SHARE OF RESPONDENTS BY FIRM SIZE



NUMBER AND SHARE OF RESPONDENTS BY LOCATION

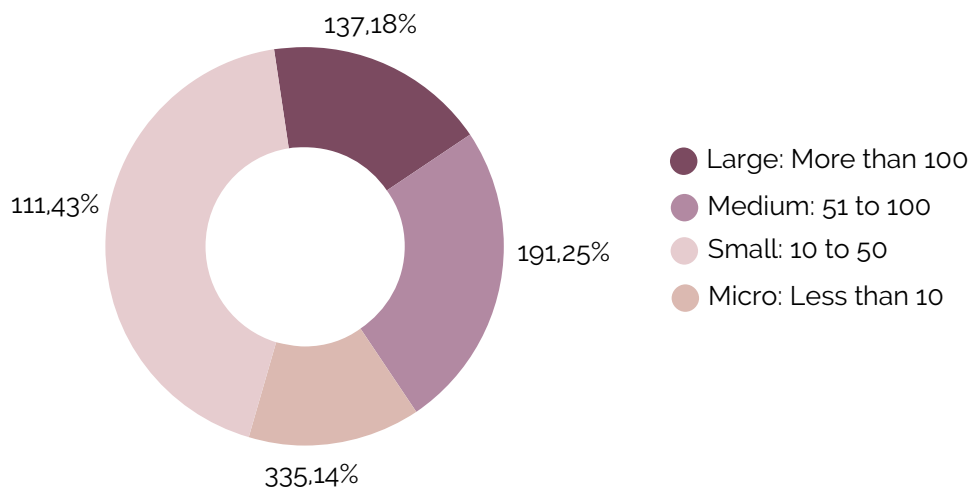


FIGURE 2 RESPONDENT DATA (NUMBER, %)



### 3.3 | INFORMANT INTERVIEWS

The authors conducted key stakeholder interviews with 28 experts in India to add nuance to the survey findings. The key areas of interest covered in these interviews were:

- Perceptions of technological adoption and digitisation and the impacts on employment, workplaces and the nature of work.
- Insights on micro-sized companies in key industries, which were insufficiently covered

in the survey due to feasibility constraints.

- The impacts of changing technology on employment relations, wages and employee well-being.
- Trends and adoption of technologies in the unorganised sector, and across key industries more broadly.

The interviews were semi-structured and conducted in person or on the phone between June and July 2018. Findings from interviews were analysed qualitatively.



## TECHNOLOGY ADOPTION & DIGITISATION AMONG INDIAN FIRMS

*Technological disruption and digitisation hold immense prospects for the future of work in India. The possibility of reducing dangerous jobs alone would be a large stride in improving working conditions and worker well-being. There are 1.8 million industrial robots in operation around the world today.<sup>48</sup> Can India leverage the capabilities of robotics to reduce the number of people engaged in unsafe jobs?*

It is estimated that online talent platforms could lead to an increase in GDP of 1.9 percent in India through an increase in labour force participation, reductions in informality, and faster and better matches.<sup>49</sup> Therefore, with improvements in digital infrastructure, and rapid increases in the number of smartphone and internet users, can India better connect individuals to income-generating opportunities? Further, with increasing numbers of workers in India

finding work on digital platforms, can we create a non-gendered valuation of services and thus reduce bias in hiring and pay?

Advanced economies are seeing a rise in non-standard forms of work such as gig-based, part-time and freelance employment. In India, the vast majority of workers are in a sense already gig-based workers, with self-employed individuals providing goods and services. What is needed is to ensure that these individuals now connected to the internet and to larger markets - benefit from these transformations, including greater access to social security and protections?

A central finding of this report is that companies in India are optimistic about technology and the future. This optimism will be a driving force behind adoption, transformation and innovation and thus growth and progress. The five trends companies see as positively impacting their business in the next five years are:

- increasing adoption of new

technology

- an increasing young population
- rising incomes
- the expansion of education
- increasing urbanisation

It is necessary to understand *how* companies are adopting *which* technologies, at *what pace* and for what reasons. Only then can India leverage the opportunities of disruption and manage associated risks. In this chapter we present data from the *Future of Work, Education and Skills Enterprise Survey*, with a focus on the extent and rate of technological adoption and digitisation among Indian firms. We asked companies what technologies they are currently using, and what they expect to introduce in the next five years. For this we classified technologies into industrial technology and machinery, and digital tools and services (see Table 5). We also asked companies what barriers they face in adopting new technologies.

#### 4.1 | KEY INSIGHTS

- Most companies adopt industrial technology and machinery to improve the quality of output, to expand into new markets, and to maintain their current market position.
- The main barriers to industrial technology and machinery adoption are a lack of skills and access to finance. 35 percent of companies face barriers to technology adoption due to a lack of needed skills, 24 percent of companies say they face financial constraints.
- The main drivers for planning to introduce digital tools and services in the next five years are to attract new customers, comply with government regulations and to improve the quality of output.
- 64 percent of companies expect to introduce aspects of IoT in the next five years.
- Most companies use recruitment strategies

INDUSTRIAL TECHNOLOGY & MACHINERY	DIGITAL TOOLS AND SERVICES
<p>Technologies of different levels of sophistication, ranging from basic manufacturing machinery and hand-held power tools to autonomous transport and machine learning.</p> <p>These technologies are usually associated with higher levels of capital requirements and investment.</p>	<p>Digital tools and services which are used by businesses, usually to support administrative and communication-related processes. They range from email and internet banking to digital inventory systems and SMS marketing.</p> <p>Owing to the spread of digital technologies, many of these digital tools and services are available at decreasing costs.</p>
<p><b>Examples:</b></p> <p>Production robots, 3D printing, new materials, machine learning, IoT, autonomous transport, hand-held power tools</p>	<p><b>Examples:</b></p> <p>Email, internet banking, electronic payment (incl. e-wallets), digital accounting, web-based customer service chats, SMS marketing</p>

TABLE 5 CLASSIFICATION OF TECHNOLOGIES COVERED IN THIS REPORT

TECHNOLOGY	DETAILS
Mobile Technology	The use of mobile devices to access the internet and related services
Cloud Computing	Cloud technology allows access to computing services such as data storage or software over the internet. This enables creation and delivery of apps and tools with limited local computing power and software
Digital Platforms	Digital platforms are systems which allow individuals and organisations to create content, network, and access shared services
Artificial Intelligence (AI) & Machine Learning	Artificial intelligence and machine learning use advanced computing power, big data and algorithms to provide analysis previously requiring a human mind. This now includes speech recognition and computer vision
Big Data	Large quantities of data that is too big for conventional computer programs to process. Instead computers with increased computing power are required
Internet of Things (IoT)	Smart devices that are connected to the internet and to other connected devices
Robotics	Automated machines used for example in assembly lines and smart factories. Humanoid Robots are robots that are designed to look like humans
Additive Manufacturing & 3D Printing	Manufacturing processes that use computer-aided-design (see CAD) software to add layers of material to create an object (3D printing)
Quantum Computing	Quantum computing is computer-based technology based on the principles of quantum theory
Digital Payments	Widely accepted and reliable electronic payment systems
Verifiable Digital Identity	Digital identity that can be verified and thus enable secure delivery of payments and access to government and other services
Computer Aided Design (CAD)	Computer program used in design processes
Virtual Reality	Artificial environment created with software
Blockchain Technology	Distributed database or ledger that uses immutable data structures to securely store records and enable trusted transactions. Applications of Blockchain include digital currencies (cryptocurrencies) such as Bitcoin
Wearable Electronics	Smart electronic devices that can be worn on the body as implants or accessories (e.g. for health purposes)
Autonomous Transport	Transport that does not need human intervention – e.g. self-driving cars
Digital Trade	Digitally enabled trade of goods, and trade in digital services
<b>Source:</b> Adapted from Brynjolfsson & McAfee, 2014; McKinsey, 2017; WEF, 2017.	

TABLE 6 TRANSFORMATIVE TECHNOLOGIES



that are offline, with just 14 percent of companies using websites or online platforms for filling vacancies. While 81 percent of youth report looking for jobs online.

- The use of digital tools and services remains limited, with just one third of companies using digital accounting, 15 percent digital inventory systems, 12 percent online customer service chats, and just 25 percent making sales online.
- Only 5 percent of companies use encryption, and just 42 percent of companies that do not, plan to introduce it in the next five years.

Table 6 provides an overview of key terms discussed in this chapter and throughout the report.

## 4.2 | ADOPTION OF INDUSTRIAL TECHNOLOGY AND MACHINERY

### Current scenario

Across industries, 40 percent of companies report that aspects of IoT are prevalent in their companies today. 51 percent of companies in the banking and financial service (BFS) industry report using features of IoT. This is closely matched by transportation and logistics companies, in which 48 percent of companies report using aspects of IoT, and a still significant 33 percent of companies in textiles and 28 percent in retail. Overall, the application of new materials is also very common at 29 percent of companies, especially in textiles with 46 percent of companies reportedly using new materials.

As expected, there is large variation in the adoption

## 52 PERCENT OF COMPANIES REPORT THAT THEY ARE LIKELY OR VERY LIKELY TO INTRODUCE BIG DATA ANALYTICS

rates of these technologies and machinery due to the different business models of the four industries. While 27 percent of the companies in BFS are using big data analytics, only 7 percent of retail companies are doing so. In textiles, 28 percent of companies are using CAD technologies, while between 7

and 9 percent of companies in the other industries are doing so. The use of augmented reality, however, is consistently low across industries, ranging between 2 and 7 percent. Similarly, the use of blockchain is at low levels between 2 and 8 percent. The responses regarding the use of industrial technologies and machinery can be found in Table 7.

### Future adoption of industrial technologies and machinery

When companies were asked what industrial technologies they expect to apply in the next five years, 64 percent reported that they are likely or very likely to adopt aspects of IoT. Related to this, 52 percent of companies also reported that they are likely or very likely to introduce big data analytics. 54 percent of companies expect they will adopt new materials in their businesses, primary among them are textile companies.

On the other hand, 53 percent of surveyed companies deem it unlikely or very unlikely that they will adopt production or stationary robots in the next five years. With the low level of current use of robots at 11 percent, this points to a future of human rather than robotic workers in India at least in the medium term. Similarly, 49 percent of companies say that blockchain adoption and 51 percent say that 3D printing adoption are unlikely or very unlikely in the next five years.

The responses seem to confirm that IoT is emerging as an important disrupter in India, with an estimated 60 million units in use today and expected growth

Industrial Technology and Machinery	Banking and Financial Services	Retail	Textiles	Transport and Logistics
Internet of things	51	28	32	48
Big data analytics	27	7	9	15
Cloud computing	24	5	11	7
New materials	20	32	46	20
Production/Stationary robots	19	4	12	10
CAD/CAM (Computer Aided Design/Manufacturing)	15	9	28	8
3D printing	14	5	18	13
Machine learning	13	9	13	8
Autonomous transport	12	6	10	30
None	12	15	3	7
Wearable electronics	10	12	9	9
Hand-held power tools (e.g. drills)	7	9	14	7
Augmented and virtual reality	7	3	6	3
Distributed ledger (blockchain)	7	7	6	2
Basic manufacturing or production machinery	6	47	38	4

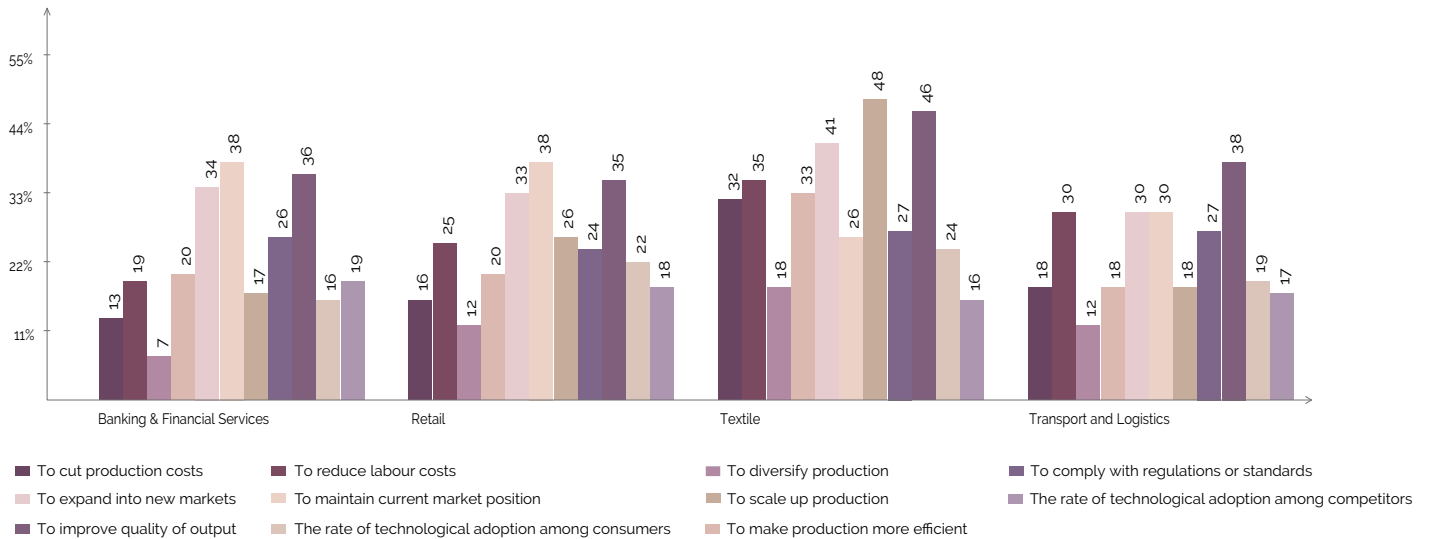
TABLE 7 CURRENTLY USED INDUSTRIAL TECHNOLOGY AND MACHINERY, (%)  
NOTE: MAY NOT ADD UP TO ONE HUNDRED PERCENT AS RESPONDENTS COULD SELECT MULTIPLE OPTIONS

to 1.9 billion units by 2020.<sup>50</sup> IoT can reshape business models, optimise processes and lead to innovation. Its applications include facility management, quality control, production monitoring, safety and security assessments, and plant and operations optimisation.<sup>51</sup>

Imagine, for example, a smart factory which uses massive amounts of information (big data) to predict rather than react to changes in demand. The assembly lines in this smart factory are operationalised by advanced robots rather than production workers. These robots are able to adapt to changes and make decisions autonomously, enabled through machine learning, while also communicating with other robots and devices through IoT technologies. The combination of big data, advanced robotics, machine learning and IoT enables flexible, optimised and autonomous production processes. At the same time, companies are able to monitor and evaluate

workflow and production in real time. The drivers of industrial adoption of IoT include the declining costs of sensors, the rise of cloud computing, and increasingly connected consumers.<sup>52</sup> IoT is therefore set to impact various industries in India, from automotive, transportation and logistics, agriculture, retail to the health industries.<sup>53</sup> A large fraction of surveyed companies either apply some elements of IoT today or are planning to do so in the future.

Besides IoT, big data analytics is an area many of the surveyed companies expect to be important for their business in the next five years. The collection, storage, management and analysis of massive amounts of information provides multiple applications to improve quality, innovate and increase productivity beyond applications in smart factories.<sup>54</sup> Big data is widely used across industries including financial services, retail, and education.



**FIGURE 3** RATIONALE FOR PLANNING TO INTRODUCE INDUSTRIAL TECHNOLOGY AND MACHINERY, (%)  
 NOTE: MAY NOT ADD UP TO ONE HUNDRED PERCENT AS RESPONDENTS COULD SELECT MULTIPLE OPTIONS

Big data has multiple effects on labour markets. In the short to medium term the demand for data analysts and computer scientists who are able to make sense of large amounts of information is expected to rise. In the medium to long term however, fewer data analysts may be required, as machine learning enables computers to increasingly analyse data and make decisions themselves. Data scientists will still be needed, but their skills will have to complement the increasing capabilities of computers.

New materials are a less obvious disrupter. In textiles, apparel and fashion, however, a number of technologies are reshaping production processes and textile products themselves. Technical textiles for instance are textiles designed for function rather than aesthetics. Technical textiles are becoming increasingly advanced, applied in agriculture, construction, industry, medicine, aerospace, packaging, and ecological protection. Another contemporary example is biofabrication, which is the process of manufacturing leather without the use of animal derivatives. Technical textiles and biofabrications are skill intensive, requiring experts such as material scientists, molecular biologists,

engineers, and designers. The adoption of new materials is most important for the textile industry, but companies in other industries have indicated that they may become important for them as well.

### Reasons for having introduced industrial technologies

The potential benefits of introducing industrial technologies such as IoT or big data are evident. Yet, it is only when we try to understand the companies' motivations, that realistic predictions about technological adoption and the future of work can be made.

Contrary to the widespread concern about the future of work, just 28 percent of the surveyed companies adopted technologies and machinery to reduce labour costs. Highest among them were companies in textiles at 32 percent of companies, followed by 18 percent of transportation and logistics companies.

39 percent of companies report that the main reasons for introducing industrial technologies or machinery in the last five years was to improve the quality of output.

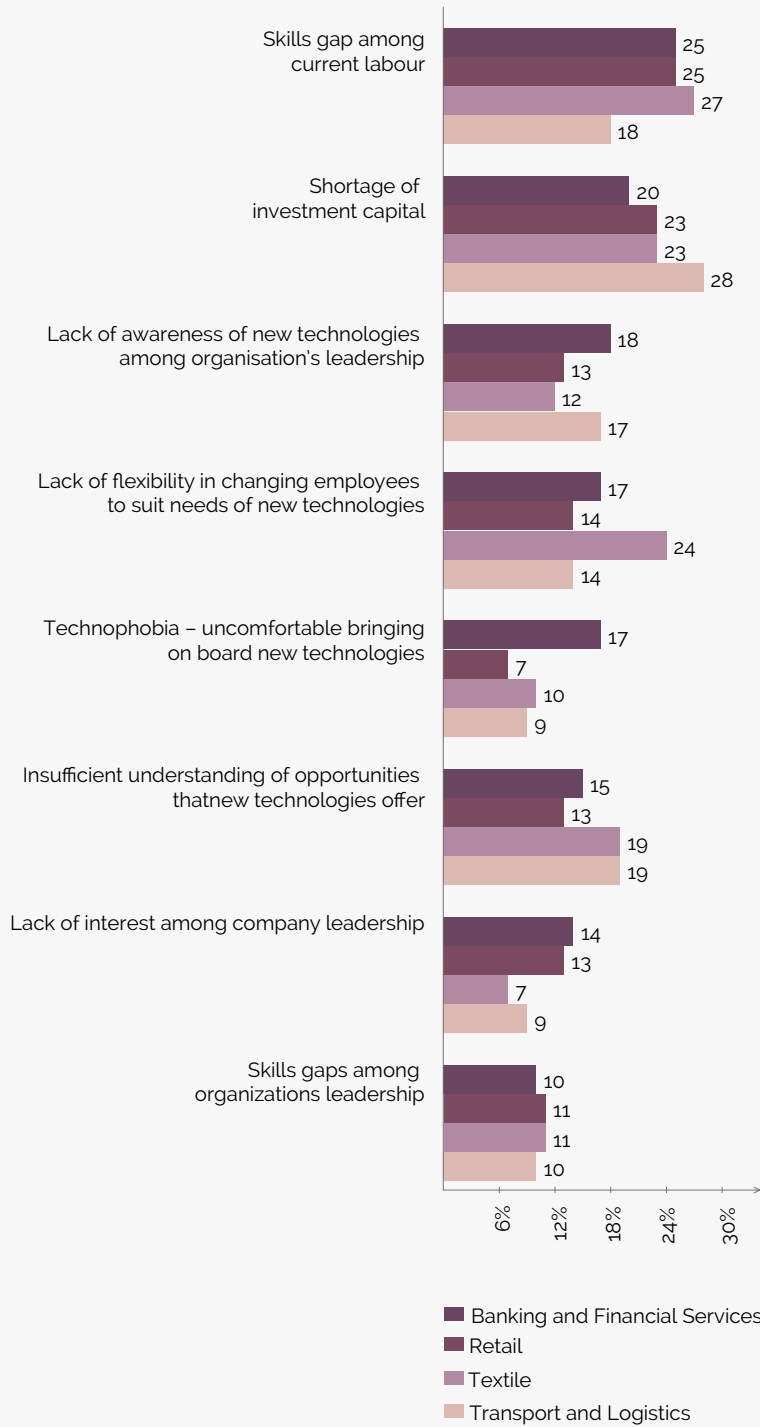


FIGURE 4 BARRIERS TO TECHNOLOGICAL ADOPTION, (%)

NOTE: MAY NOT ADD UP TO ONE HUNDRED PERCENT AS RESPONDENTS COULD SELECT MULTIPLE OPTIONS

35 percent of companies report having introduced technology or machinery in order to expand into new markets, and 33 percent to maintain their current market position. Interestingly, just 20 percent of companies report that technological adoption among consumers and 17 percent that adoption among competitors was a driver of adoption for them.

### 4.3 | BARRIERS TO TECHNOLOGICAL ADOPTION

While the adoption of industrial technologies and machinery holds potential benefits for companies and their customers, 67 percent of firms reported facing barriers to adoption, including:

- shortage of investment capital
- lack of needed skills among their workforce
- lack of labour market flexibility
- insufficient understanding of the opportunities

24 percent of companies said that they face financial barriers to industrial technology and machinery adoption. The industrial technologies and machinery covered in this report vary in capital costs from low levels of investment for basic manufacturing machinery (such as sewing machines) to capital-intensive technologies such as robotics. For many micro-sized firms, even low-levels of investment may be a constraint.

In addition to financial barriers, the combined lack of skills of current employees and leadership, along with limited labour market flexibility are barriers to technology adoption for 52 percent of companies. This highlights a need for both upskilling and reskilling of workers within firms, and a need for rethinking labour regulations to better suit a more dynamic labour market context today.

As is explored in Chapter 6 of this report, companies are increasingly getting around labour regulations that severely limit their ability to fire workers, by hiring contractual rather than regular/permanent workers.

For companies operating in an uncertain market and needing to adjust to technology-driven disruptions, remaining nimble is often essential. At the same time, this creates insecurities and decreases access to protections and social security for workers who are hired as contract workers.

33 percent of companies report facing no barriers to adoption at all, highest among them are retail companies at 41 percent. This is interesting given the relatively low levels of adoption in the industry today. A partial explanation for this may be a lack of knowledge or understanding about new industrial technologies or machinery reported by 32 percent of companies, who say that insufficient understanding about the opportunities presented by new industrial technologies, along with a lack of awareness of new technologies among company leadership are barriers to adoption.

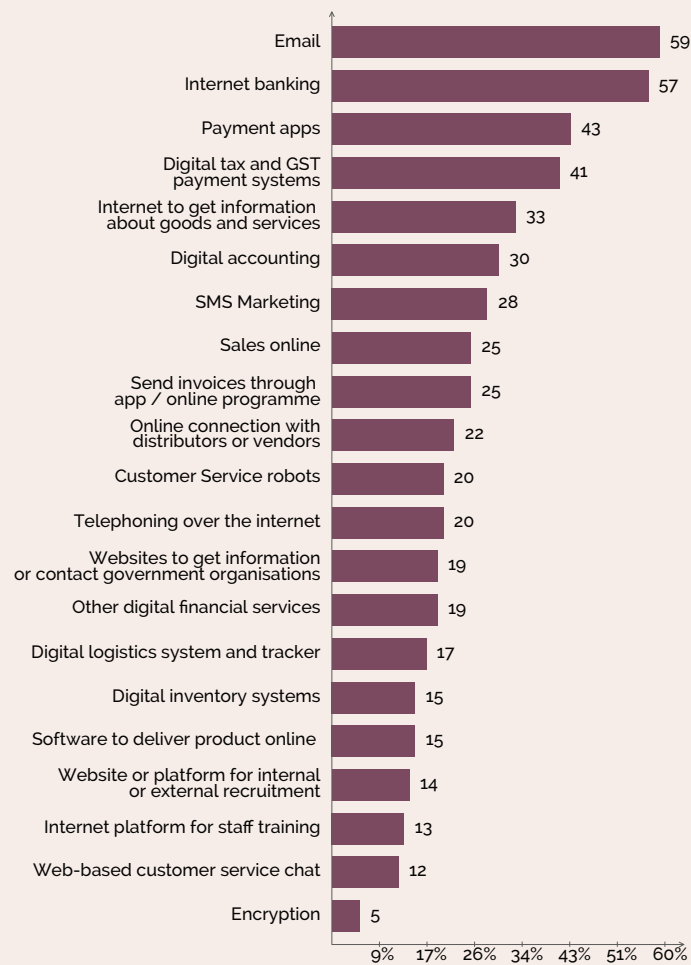
### 4.4 ADOPTION OF DIGITAL TOOLS AND SERVICES

#### Current scenario

59 percent of companies report using email, 57 percent internet banking, 43 percent e-wallets, and 41 percent digital tax and GST systems. While such digital tools are ubiquitous for many of the readers of this report, there is still much room for expanding their use among the surveyed companies.

The use of many digital tools and services remains relatively limited, with 30 percent of companies using digital accounting, and 15 percent using digital inventory systems. Further, just 25 percent of companies make sales online and 12 percent use online customer service chats. A worryingly low rate of just 5 percent of companies use encryption.

Importantly, only 14 percent of firms use a website or online platform for internal or external recruitment of staff. This points to a potential bottleneck in matching jobseekers with opportunities. If the prevailing means



**FIGURE 5** CURRENTLY USED DIGITAL TOOLS AND SERVICES AMONG FIRMS TODAY, (%)  
**NOTE:** MAY NOT ADD UP TO ONE HUNDRED PERCENT AS RESPONDENTS COULD SELECT MULTIPLE OPTIONS

of hiring new workers is through social networks, this could lead to poor matching, and thus inefficiency and low retention rates, as well as an increase in inequality.

Our findings from the Youth Aspirations in India survey reveal that 81 percent of Indian youth use online media as a key source of information about job opportunities. In addition, the survey reveals that while 44 percent of employed youth found a job within 3 months, for 56 percent of youth it took between 3 months to more than a year. Youth also pointed to poor information about job opportunities as a major barrier to finding a desirable job.

**Reasons for having introduced digital tools and services**

For companies that have introduced digital tools in the last five years, 43 percent say that the main driver was to attract new customers, followed by 34 percent that reported a need to comply with government regulations, and 29 percent to improve the quality of output. Just 23 percent of companies report introducing digital tools and services to reduce labour costs.

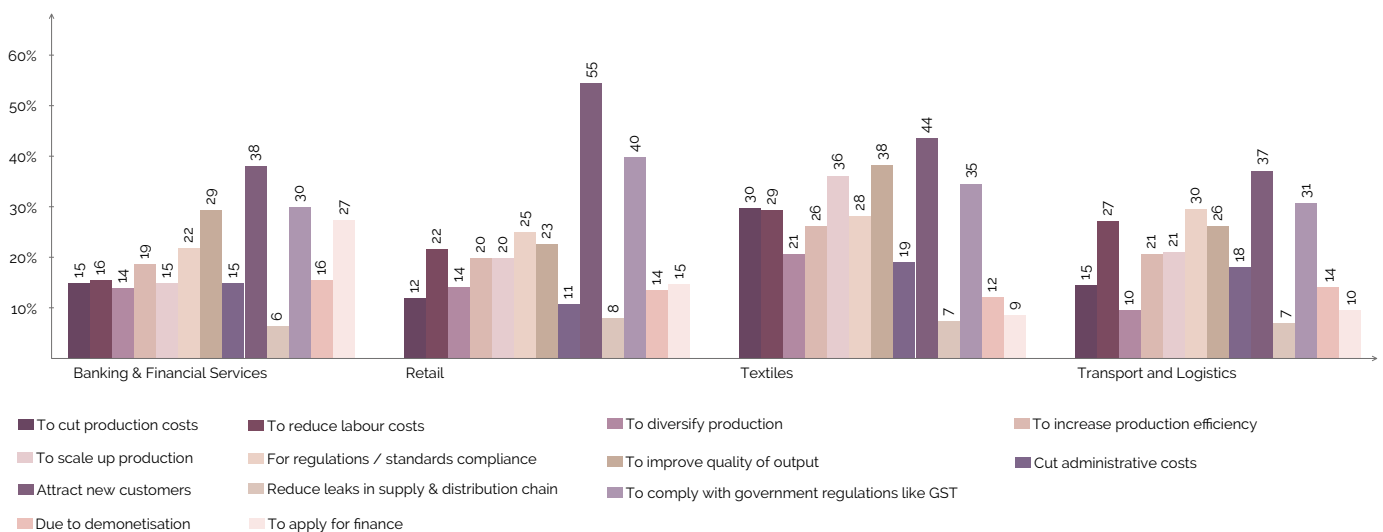
The adoption of digital tools for attracting new customers is highest in the retail industry, driven by

the rise in mobile phone ownership, internet use and mobile shopping. The need to comply with government regulation was most commonly stated by retail and textiles firms, this is likely due to the highly informal nature of these industries and recent government initiatives such as the introduction of GST. The motivation to improve the quality of output is greatest among BFS and textile industries. Cutting labour costs and improving efficiency of production are the greatest drivers of adoption in transportation and logistics and textiles.

**Future adoption of digital tools and services**

The companies that are not using a particular digital tool or service today, were asked to say how likely their adoption will be in the next five years. 78 percent of companies who have not been using email so far are likely or very likely to do so. Followed by 76 percent who report that it is likely or very likely that they will introduce internet banking, and 74 percent say internet for gaining information about goods and services.

Of the 59 percent of companies that are not currently using digital tax and GST systems, 67 percent plan to introduce such a system in the next five years.



**FIGURE 6** RATIONALE FOR INTRODUCING DIGITAL TOOLS AND SERVICES IN THE LAST FIVE YEARS, (%)  
 NOTE: MAY NOT ADD UP TO ONE HUNDRED PERCENT AS RESPONDENTS COULD SELECT MULTIPLE OPTIONS

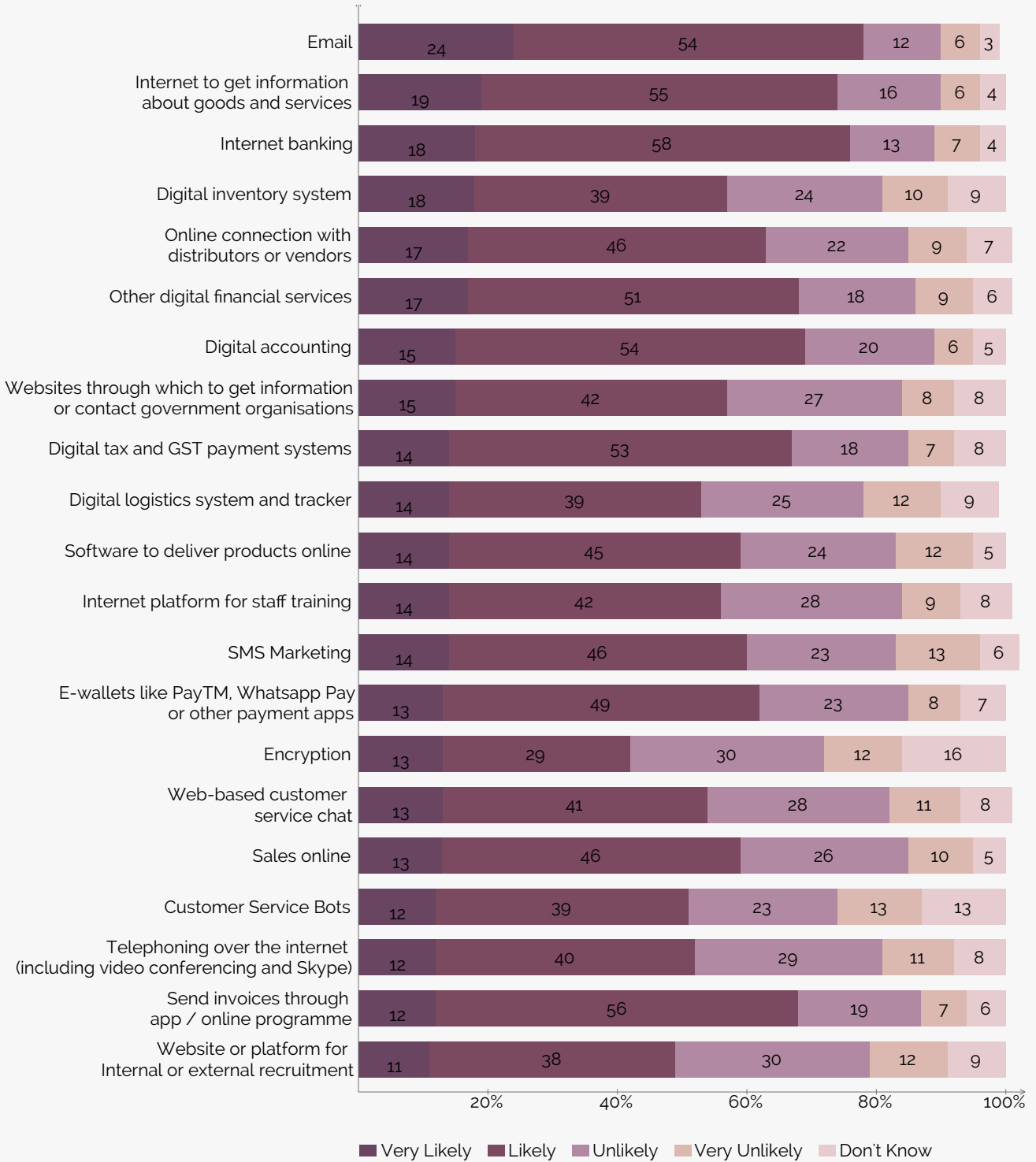


FIGURE 7 EXPECTED DIGITAL TOOL AND SERVICE ADOPTION IN THE NEXT FIVE YEARS (%)

NOTE: MAY NOT ADD UP TO ONE HUNDRED PERCENT DUE TO ROUNDING.



Likewise, 75 percent of the companies that currently do not use internet banking or digital wallets plan to introduce them. While the expected adoption of digital and GST systems, internet banking and digital wallets will be an improvement towards formalisation, the low rates of adoption today points to a potentially slow process of formalisation.

At present, 5 percent of companies use encryption technologies, and just 42 percent of those that do not, plan to introduce it in the next five years. This is an unsettling finding, as encryption is a crucial tool for protecting digital data as it is stored or transmitted. Data security will be crucial for creating trust online and an essential enabler for the rise of the digital economy in India. The low levels of use of encryption technologies point to future data security hurdles.

Of the 85 percent of companies that are not currently using websites and online platforms for recruiting staff, 49 percent of companies plan to introduce them in the next five years. Given that India's rapidly growing young population is increasingly digitally connected, companies will likely need to expand their recruitment strategies to online platforms frequented by India's youth.

#### 4.5 | THE E-COMMERCE AND TRADE IN SERVICES OPPORTUNITY

Increasing internet access, driven in part by the declining cost of mobile phones and by improvements in digital infrastructure, has supported the proliferation of online marketplaces. This has, in turn, shifted market transactions from the physical world to the digital world. Today, e-commerce is further supported by big data, social networks, and cloud computing, transforming cross-border trade in merchandise and services.<sup>57</sup>

While 29 percent of firms participate in e-commerce today, 61 percent of firms report that it is likely or very likely that they will do so in the next five years. Already, e-commerce has opened up domestic and

global markets for India's MSMEs. Previously, many micro and small-sized firms were limited to their local market.

Today, through online platforms such as Flipkart and Amazon, these companies are able to access consumers around the world. Similarly, digital platforms are facilitating cross-border trade in services. Platforms such as Upwork for example allow individuals or companies to source diverse services from anywhere in the world.<sup>58</sup>

Take for instance a design firm based in Germany. This firm is able to source services from individual workers based anywhere in the world, who carry out tasks and complete entire projects for them. They are able to seamlessly work together and communicate online without ever having to meet in person. To understand the immensity of the flow of data, according to MGI, global data flows now have a larger impact on GDP growth than the trade in goods.<sup>59</sup>

#### 4.6 | RECOMMENDATIONS

In order to realise the opportunities outlined above, efforts on the part of the government and the private sector alike are required. For instance, the state should assist in addressing the two main barriers to technological adoption faced by companies, which are skills gaps and financial constraints.

Similarly, the private sector will need to pursue online recruitment strategies in order to attract and access India's increasingly digitally connected job seekers. 81 percent of youth use online sources when looking for jobs. This highlights an opportunity for reducing the time it takes for job seekers to find opportunities, and improving the matching of individuals with suitable jobs, which in turn will likely lead to higher employee retention and a rise in productivity.

The survey results do not support the widespread belief that technological adoption will lead to widespread job displacement in the Indian context. This is explored in more detail in the following chapter.



# TECHNOLOGY DRIVEN JOB CREATION AND DESTRUCTION

*Will technology and machines displace human workers? That is one of the key questions around the future of work, and arguably the one that attracts the most attention. The fear of job displacement stems from the political, social and economic importance of jobs themselves. That is, jobs do not just provide people with wages, but also provide individuals and their dependents with security and social protections. The perceived threat of job loss therefore extends to more than just the job itself. This chapter looks at the current status of job creation, displacement and job change in India.*

**D**ebates around the potential of machines replacing humans in the workplace are unresolved. As outlined in Chapter 2, several researchers have found evidence

that widespread job loss may result from automation. On the other hand, studies have shown that automating entire occupations is unlikely, as not all tasks within those occupations are automatable.<sup>60</sup> They argue that automation will change tasks within occupations rather than destroy entire occupations.<sup>61</sup> At the same time, others suggest that technologies that are able to replace routine tasks, can drive down costs and subsequently lead to positive labour market effects such as increased employment.<sup>62</sup>

## 5.1 | KEY INSIGHTS

- More than twice as many companies report having needed to hire additional workers due to the adoption of industrial technologies and machinery than those that needed to reduce their number of workers.
- Similarly, adoption of digital tools and services in the last five years has led to a need for additional workers.
- 33 percent of companies report

needing workers with new skills due to technological adoption.

- Companies plan to address skill gaps by re-training existing workers and having workers learn on the job.
- The job roles with the most hiring in the next five years are expected to be customer service, sales, information technology support, accounting and auditing and marketing and public relations.
- Net job creation is expected in the next five years across all four industries.
- Companies are hiring, but just 26 percent of hiring in the top five roles in the last five years were female.
- Today, 71 percent of companies have fewer than 10 percent female workers, while 30 percent have none. Just 2.4 percent of companies have a workforce that is half or more female.

the need to hire more workers and the need for new skills. Across industries, 33 percent of surveyed companies reported a need to hire additional workers due to technological adoption and the introduction of machinery, compared to 19 percent that needed to reduce their number of workers. 33 percent of companies reported a need for new skills among their workers as a result.

This is in stark contrast to predictions about the future of work, which posit that the adoption of industrial technologies and machinery such as machine learning, IoT, big data and robotics will displace workers. Our findings point to an opposite effect, in which the introduction of new technologies and machinery in the last five years has meant that companies have had to bring on additional workers.

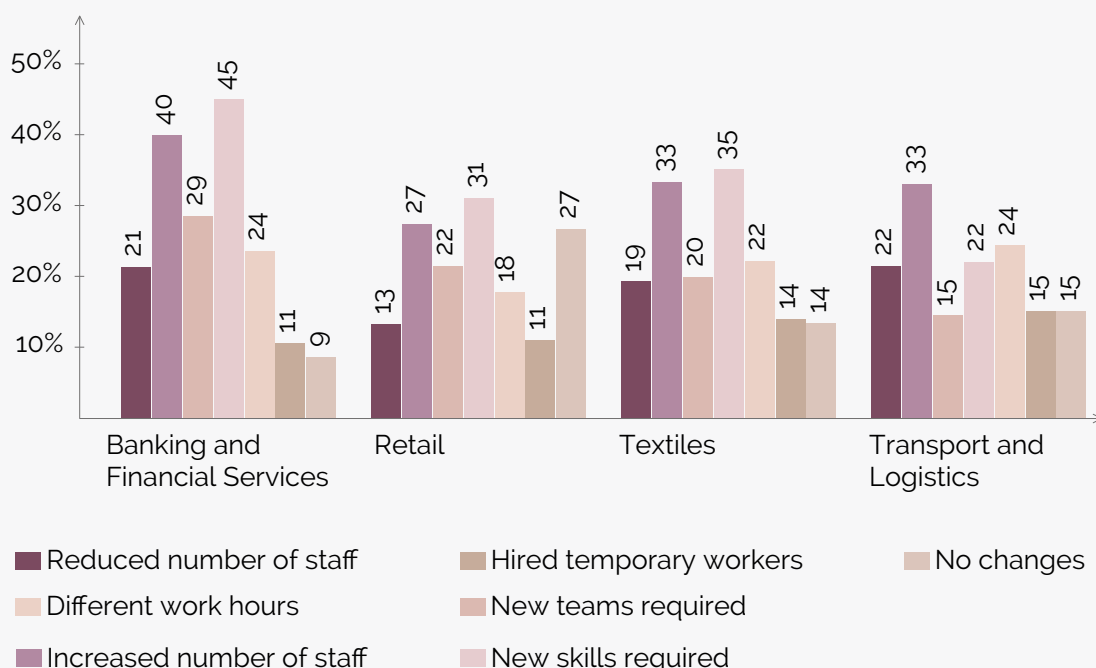
### 5.2 | THE IMPACTS OF INDUSTRIAL TECHNOLOGY AND MACHINERY

The largest impacts on the workforce due to technological adoption in the last five years was

40 percent of banking and financial services companies needed to hire additional workers, compared to 21 percent that needed to reduce their workers. Similarly, 33 percent of textile companies, and 33 percent of transportation and logistics

FIGURE 8 IMPACTS OF INDUSTRIAL TECHNOLOGY AND MACHINERY ADOPTION ON THE WORKFORCE IN THE LAST FIVE YEARS, (%)

NOTE: MAY NOT ADD UP TO ONE HUNDRED PERCENT AS RESPONDENTS COULD SELECT MULTIPLE OPTIONS.



firms needed to hire more workers as a result of introducing new technologies or machinery, compared to reductions of 19 and 22 percent respectively. Finally, in transportation and logistics, 27 percent of companies hired new workers, compared to 17 percent that needed to reduce staff.

The introduction of new technologies was accompanied by a change in working hours, reported by 22 percent of companies. The hiring of temporary workers as a result of new technologies was not as high as expected, with 13 percent of companies reportedly hiring temporary workers. The need for temporary workers was greatest in transportation and logistics and textiles. Overall, retail reported experiencing the least impact of technological adoption on the workforce, with 27 percent of firms reporting no changes at all.

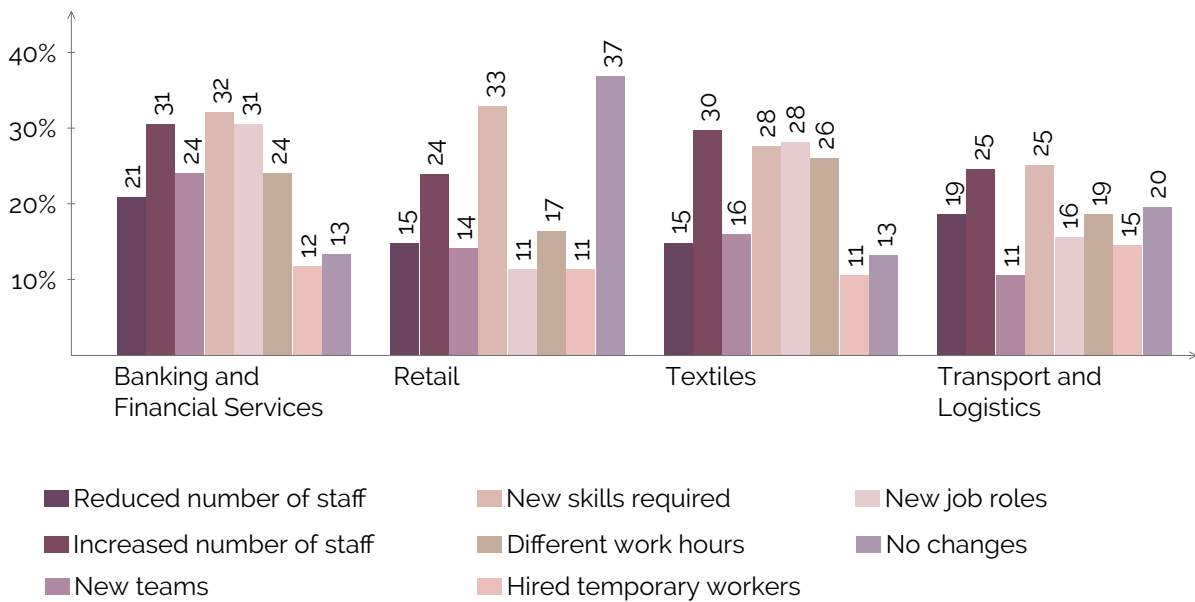
**5.3 | DIGITAL TOOLS AND SERVICES: NEW SKILLS, MORE STAFF AND NEW JOB ROLES**

29 percent of surveyed companies reported that the introduction of new digital tools and services

in the last five years led to the requirement for new skills. 27 percent reported that they needed to hire additional workers. This was followed by 21 percent of companies that needed to create new job roles, and 21 percent that saw a change in working hours.

An increase of staff due to the introduction of digital tools and services was reported by 27 percent of companies, compared to 17 percent that saw a reduction in their number of workers as a result. Again, this points to a divergence from projections about the impacts of digitisation on the workforce. 31 percent of companies in BFS needed to hire new staff, followed by 30 percent in transportation and logistics. This, in combination with the need for new skills, points to a likely increase in the workforce and need for new strategies to enhance worker know-how and capabilities. It does not support the hypothesis that overall jobs may be lost due to digitisation.

In addition to new skills, new job roles were required by 21 percent of companies, most prominently in BFS and textiles. For example, the introduction of



**FIGURE 9** IMPACT OF DIGITAL TOOL AND SERVICE INTRODUCTION ON THE WORKFORCE, (%)  
 NOTE: MAY NOT ADD UP TO ONE HUNDRED PERCENT AS RESPONDENTS COULD SELECT MULTIPLE OPTIONS.

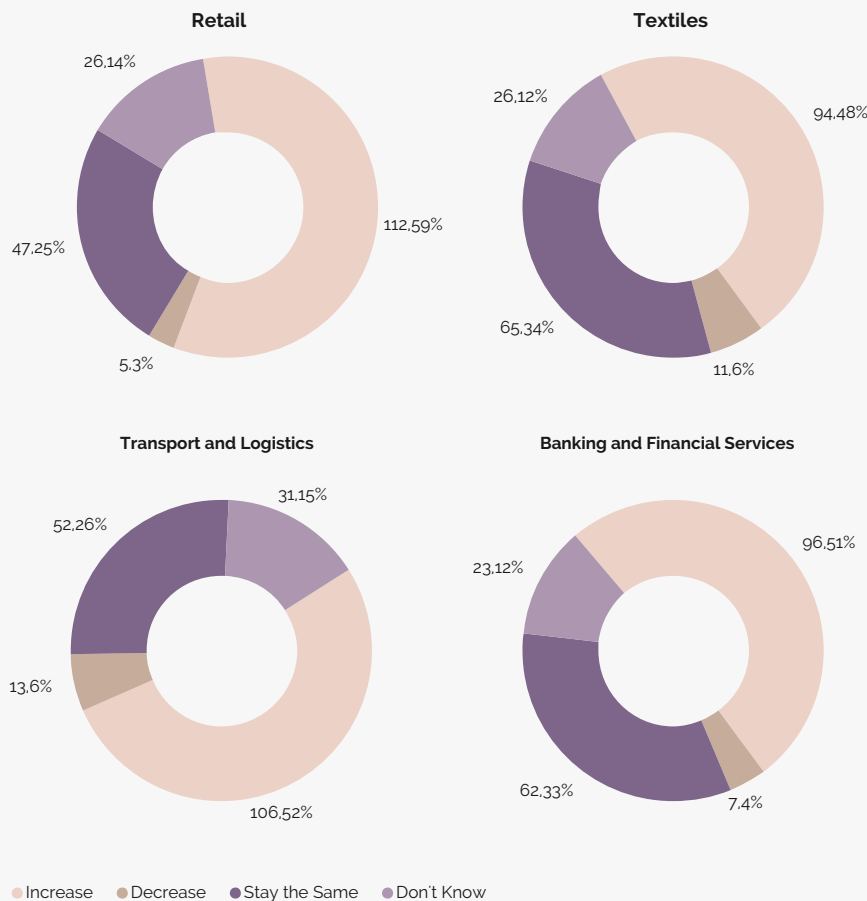


FIGURE 10 EXPECTED INCREASE/DECREASE IN THE WORKFORCE IN THE NEXT FIVE YEARS

a digital accounting system requires accountants who also know about IT security. Such new job roles, which become necessary because of new digital tools and systems, may blur some of the traditional job roles of the past.

How will Indian companies address the need for new skills and the emergence of new job roles? Will they hire new full-time staff, hire temporary workers to work on short-term projects, or rely on ad-hoc support from freelance workers? A common argument is that the job for life model is a thing of the past and that non-standard forms of employment are the future. The findings of the survey do not give a final answer, but do not point towards such radical changes. 12 percent of companies reported that they needed to hire

temporary workers because of the adoption of digital tools and services in the last five years. This was greatest among transportation and logistics companies. Contractual labour and freelance work are covered in greater detail in Chapter 6.

The responding companies expect that the trend over the past five years will also continue over the next five years: 28 percent of surveyed companies report that the implementation of new digital tools and services in the next five years will lead to new skill requirements. 27 percent expect that it will lead to an increase in the demand for staff, and 23 percent the creation of new kinds of jobs. When asked whether they expect their workforce to increase, stay the same or decrease in the next five years, 53 percent of surveyed companies reported expecting

an increase. That is compared to 29 percent that expect their workforce to remain the same, and 5 percent that expect the workforce to decrease.

#### 5.4 | SKILLS GAPS AND JOB CREATION

##### Industrial technologies and machinery

The introduction of industrial technologies is expected to lead to new skill requirements. Companies stated that this especially applies to the introduction of robotics, big data, IoT, machine learning and augmented reality – all of which are expected to require very different or somewhat different skills. The introduction of robotics in a factory, for example, may mean that the production workers previously carrying out routine tasks will require know-how in tasks such as machine maintenance and quality control. How do the companies plan to respond to the required skills needed due to adopting new industrial technologies? The most common strategies that companies plan to implement to address changing skill requirements in the future include:

- retraining existing employees
- expecting employees to pick up skills on the job
- Hiring new permanent staff with the needed skills

The surveyed companies seem to acknowledge that technological changes are here to stay. That might be why they do not want to rely on temporary workers or freelancers with the new skills that they require, nor outsource business functions to external contractors. However, the approaches differ by industry. While 64 percent of textile companies see it as likely or very likely that they will outsource business functions to close anticipated future skills gaps, only 47 percent of retail companies expect to do so.

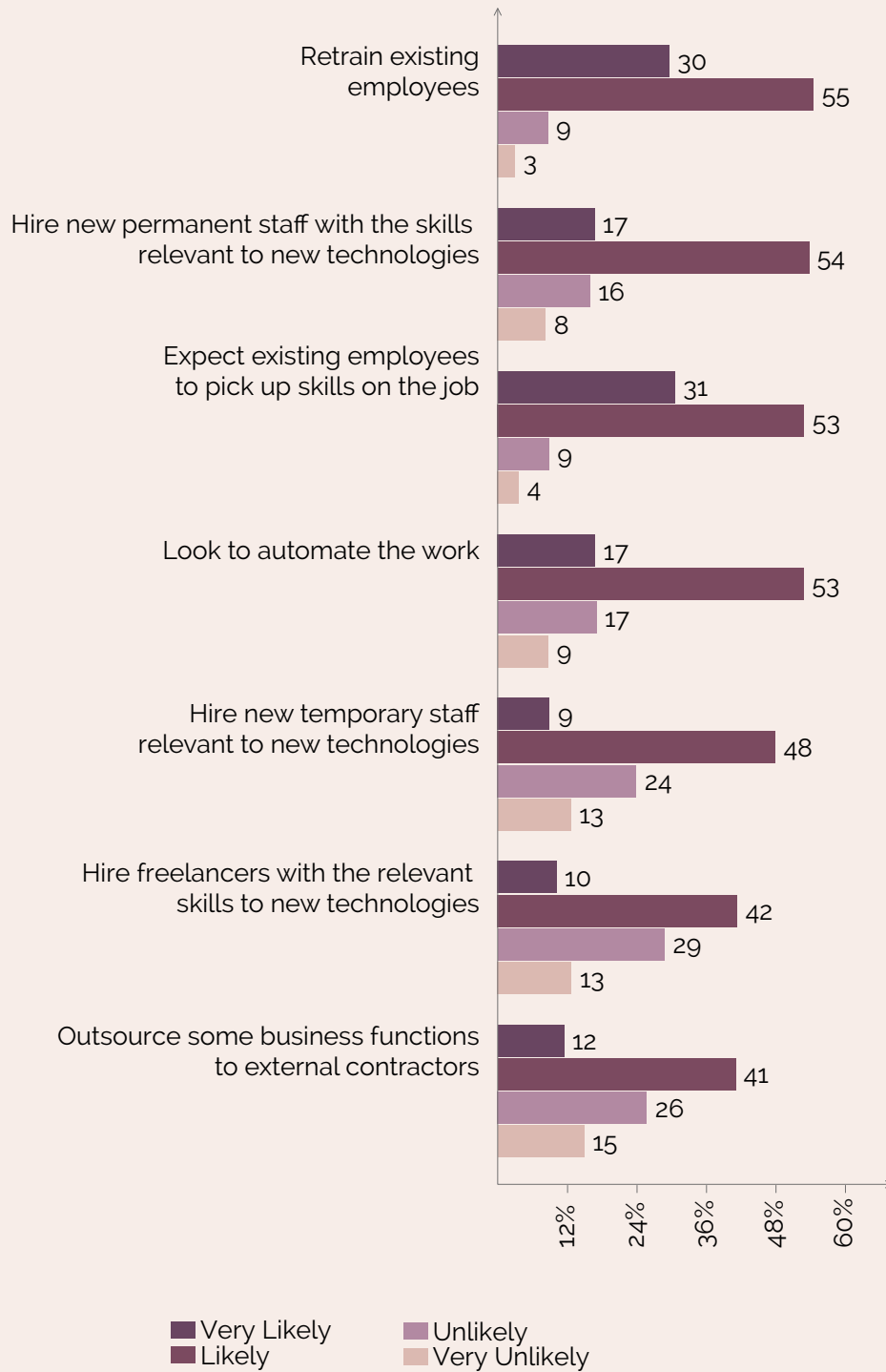
27 percent of youth surveyed in the *Youth Aspirations in India Survey* report feeling very up to date with changing skill requirements, and 58 percent feel

moderately up to date. This is surprising, given the difficulty in predicting changing demand, particularly those related to new technologies and digital tools. This is reflected in the fact that while 84 percent of youth perceive higher education as crucial for someone in their ideal job, they are also cognisant of the importance of skills. 76 percent of respondents reported being very interested in pursuing a skill development programme. Further, 49 percent of youth identified soft skills as being highly valued by employers, more than the 44 percent who perceive technical skills to be important. 70 percent of youth reported that the main motivator for wanting to pursue skill development training was to have more choice in employment opportunities, while 48 percent said it was to receive higher pay.<sup>63</sup>

##### Digital tools and services

When introducing new digital tools and services, companies have seen skills gaps primarily related to delivering products and services to customers online, communicating with customers online, as well as those required for operations such as inventory and logistics tracking, and GST payment systems. Further, they said they would require specialist skills for things like the introduction of encryption.

The tools and services discussed here are primarily available online and are not capital-intensive. This means that if companies have the needed skills and capabilities, they can adopt the technology relatively easily. 84 percent of companies plan to address lacking skills mainly by having workers learn the skills on the job. While 84 percent plan to retrain their workers, and 73 percent to hire new full-time staff with the needed skills. Another 70 percent of companies say that they will look to automate work that requires new skills. This is highest in banking and financial services at 77 percent. On average, 56 percent of companies plan to address future skills gaps by hiring new temporary staff or freelance workers with the needed skills relevant to the new digital tools. Outsourcing business functions to contractors is a strategy preferred by 54 percent of companies. The kind of skills that



**FIGURE 11** FUTURE STRATEGIES FOR ADDRESSING CHANGING SKILL REQUIREMENTS DUE TO TECHNOLOGY ADOPTION, (%)  
**NOTE:** MAY NOT ADD UP TO ONE HUNDRED PERCENT AS RESPONDENTS COULD SELECT MULTIPLE OPTIONS.

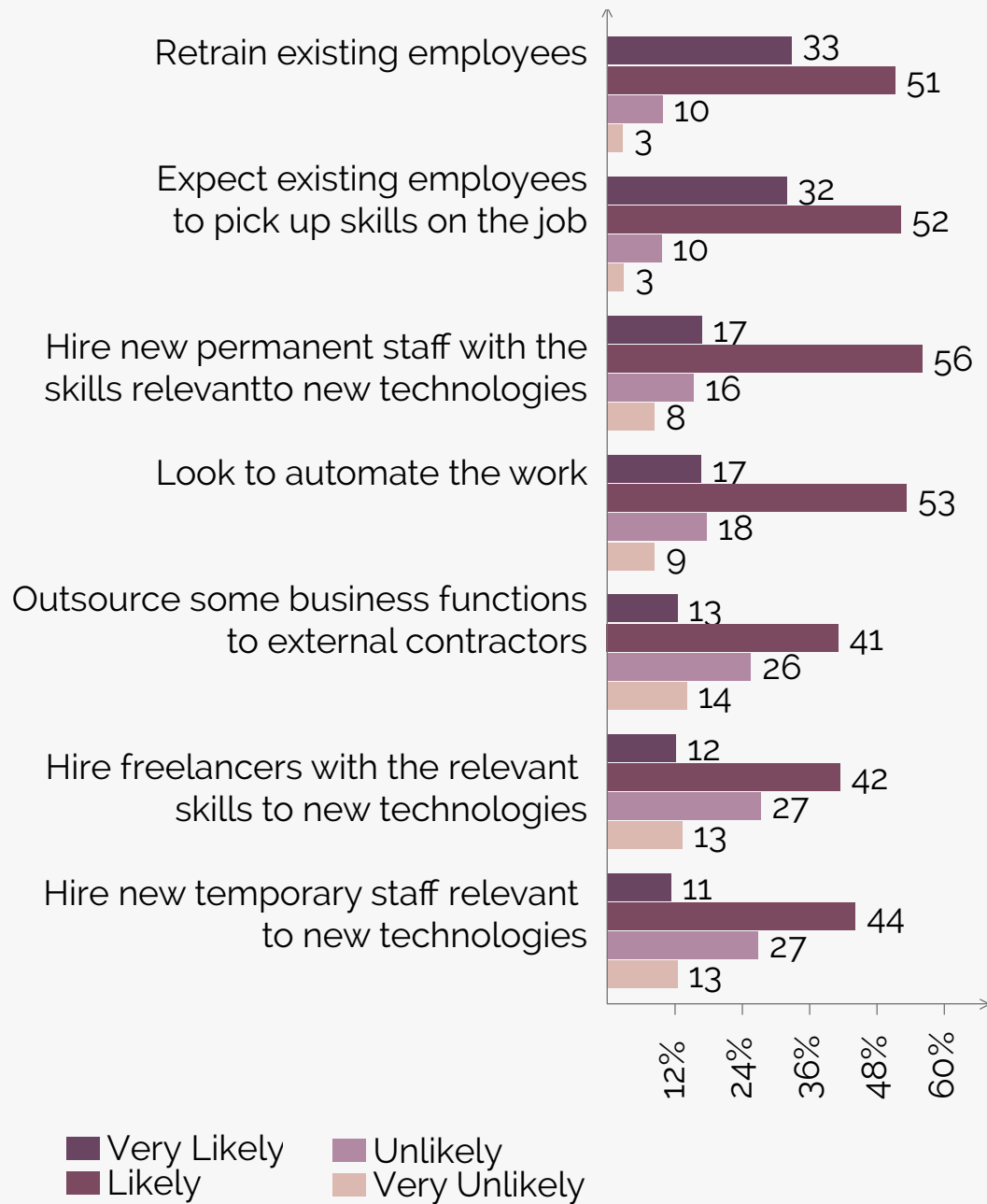


FIGURE 12 FUTURE STRATEGIES FOR ADDRESSING CHANGING SKILLS REQUIREMENTS DUE TO DIGITAL TOOL ADOPTION, (%)

NOTE: MAY NOT ADD UP TO ONE HUNDRED PERCENT AS RESPONDENTS COULD SELECT MULTIPLE OPTIONS.



are required for adopting digital tools and services vary. For instance, introducing email as a means of communicating with customers or the introduction of web-based customer service chats not only require competency with computers, but also strong communication skills. The introduction of digital logistics systems and trackers require digital literacy, as well as competencies in data analysis and management.

### 5.5 | COMPANIES EXPECT JOB GROWTH, NOT JOB LOSS

Changing consumer preferences, along with transformations in global supply chains and production processes are transforming how firms operate. While automation is a part of that, other more incremental changes are occurring at the firm level. In order to understand these changes, we asked companies what job roles in their companies

**TABLE 8** INCREASINGLY IMPORTANT JOB ROLES IN THE LAST FIVE YEARS, (%)  
 NOTE: MAY NOT ADD UP TO ONE HUNDRED PERCENT AS RESPONDENTS COULD SELECT MULTIPLE OPTIONS.

Job Roles	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Total
Sales	18	9	6	6	6	10
Customer service	13	10	10	10	10	11
Accounting and auditing	7	7	8	7	7	7
Information technology support	6	8	8	8	9	8
Marketing and public relations	6	7	4	5	7	6
Digital experts	6	5	5	7	5	6
Quality control	5	7	7	7	3	6
Data analysts	4	4	3	4	5	4
Logistics and transportation	4	7	4	6	4	5
Digital security	4	4	5	4	6	4
Administration and support services	4	3	5	5	5	4
Design, creative	3	3	5	5	5	4
Purchasing and procurement	3	2	3	2	2	2
Supervisors (e.g. of factory floors / basic operations)	3	2	2	1	3	2
Senior and middle management	3	2	4	3	3	3
Factory floor roles	2	2	3	2	2	2
Training and development	2	4	4	5	4	4
Social media experts	2	1	2	2	1	2
Research and development	2	2	2	2	2	2
Programmers	1	2	1	2	3	2
Other	1	0	1	0	0	1
Legal	1	3	3	3	4	2
Regular building / product / staff security	1	2	1	2	1	1
Human resources and recruitment	1	2	2	2	1	2
Secretarial	1	1	1	1	1	1

have become more or less important in the last five years. The job roles that have become increasingly important for companies include customer service, sales, information technology support, accounting and auditing, and quality control. On the other hand, few companies report secretarial job roles having gained importance over the past five years. In line with increasing importance of some job roles, greatest hiring in the last five years was in:

- sales
- customer service
- marketing and public relations
- information and technology support
- accounting and auditing <sup>64</sup>

Similarly, when companies were asked which job roles they expect to become more important in the next five years, they named customer service,

sales, information technology support, accounting and auditing and marketing and public relations. Job roles that few companies anticipate becoming increasingly important include secretarial work, physical security, and human resources and recruitment.

Not only is technology and digitisation changing the importance of job roles within firms, but also changing the tasks and know-how required of workers to perform those roles. For example, the introduction of a digital check-out system in a shop might not displace the shop's salesperson, but that person will need to be able to use the new system, as well as have the ability to troubleshoot when it is not functioning properly.<sup>65</sup> Similar changes in tasks and capabilities are likely across job roles with the introduction of new digital tools.

TABLE 9 JOB ROLES EXPECTED TO BECOME INCREASINGLY IMPORTANT IN THE NEXT FIVE YEARS, (%)  
NOTE: MAY NOT ADD UP TO ONE HUNDRED PERCENT AS RESPONDENTS COULD SELECT MULTIPLE OPTIONS.

Job Roles	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Total
Customer service	13	13	9	10	9	11
Sales	17	9	7	7	7	11
Information technology support	7	7	9	9	10	8
Accounting and auditing	8	6	6	10	5	7
Marketing and public relations	5	8	8	6	7	6
Quality control	7	8	5	3	4	6
Digital experts	5	4	5	7	7	5
Logistics and transportation	5	5	6	3	4	5
Digital security	3	4	6	4	7	5
Data analysts	2	4	6	7	5	4
Training and development	3	3	4	3	5	4
Design and creative	2	5	4	3	4	4
Administration and support services	3	3	3	6	3	3
Senior and middle management	3	3	4	2	2	3
Purchasing and procurement	1	3	3	4	4	3
Supervisors (e.g. of factory floors / basic operations)	2	2	3	3	3	2
Factory floor roles	2	2	3	1	2	2
Legal	2	2	2	3	2	2
Programmers	1	3	1	3	3	2
Social media experts	2	1	2	1	2	2
Research and development	1	2	1	1	2	2
Human resources and recruitment	2	1	1	1	1	1
Regular building / product / staff security	1	0	1	1	1	1
Secretarial	0	0	1	2	1	1

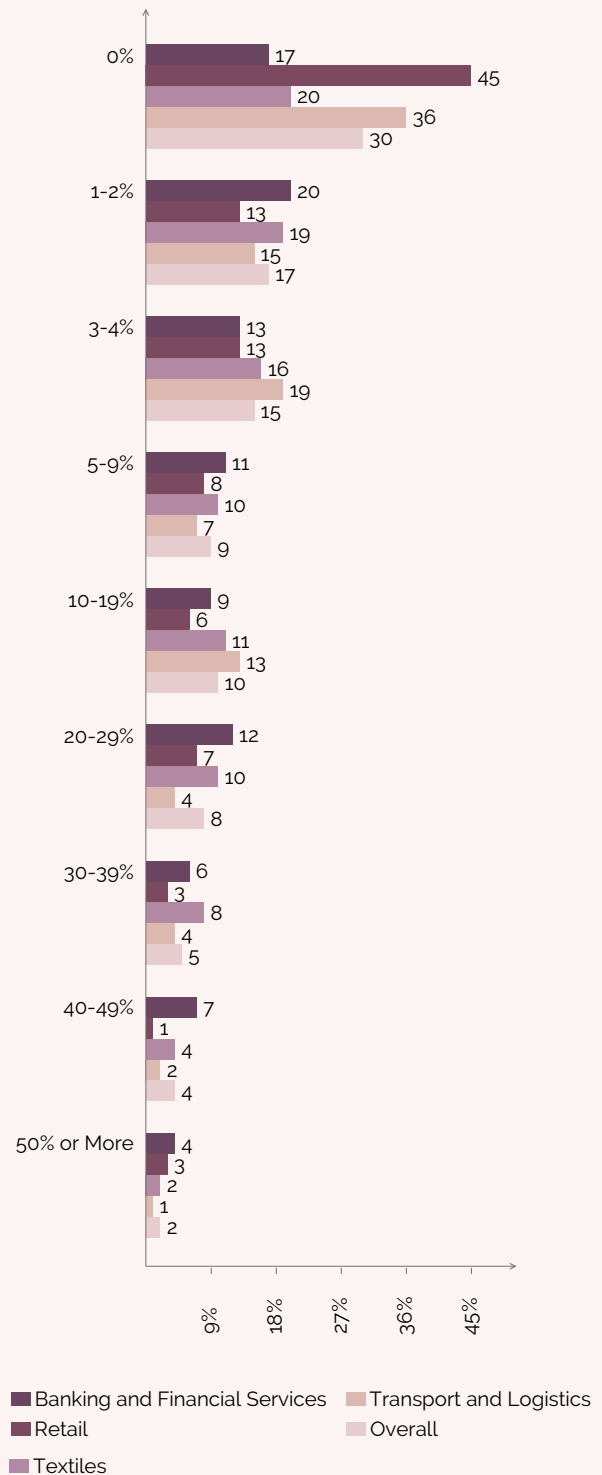
### 5.6 | ASPIRATION GAPS

It is surprising, but reassuring, that job creation has been observed, and is expected to continue. What is less reassuring, however, are potential misalignments in both the know-how required to carry out new kinds of activities and tasks, and misalignments in job creation and the aspirations of India's youth and women. While the job roles expected to see the greatest new opportunities in the next five years are in sales and customer service, just 5 and 6 percent of youth reported these as their ideal job respectively. Similarly, just 11 percent of India's youth selected marketing and public relations as their ideal job. Youth are attracted to jobs in administration and support activities, research and development, arts and creative industries, training and development, and human resources and recruitment.<sup>66</sup>

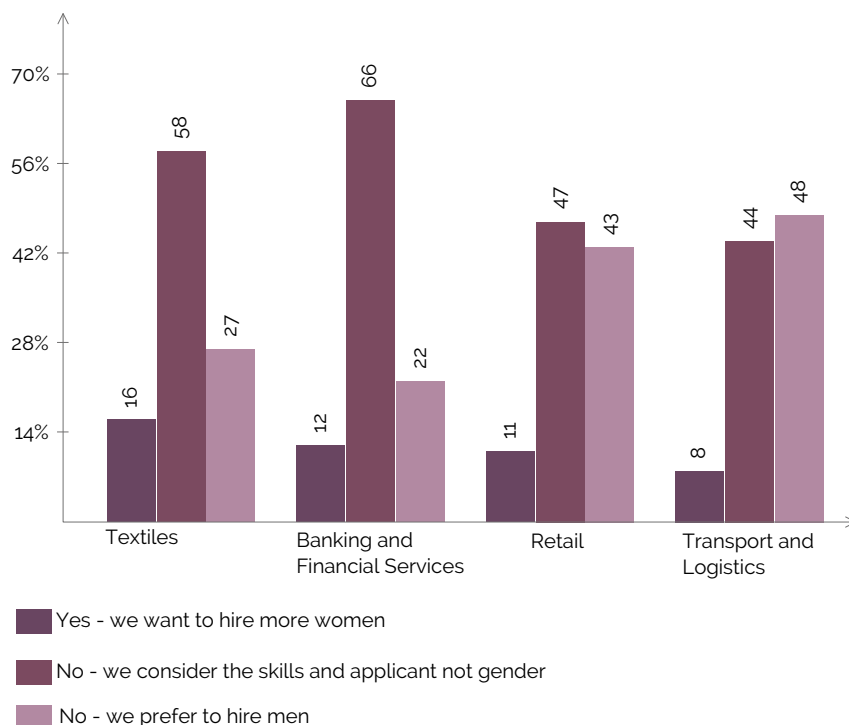
Youth have a strong preference for public sector jobs, with 49 percent of youth identifying this as the sector in which they would most like to work. This is in contrast to the 17 percent of respondents that report being interested in entrepreneurship. When asked what the most important factors are when considering a job, 63 percent of respondents said salary, 62 percent said job security and another 62 percent said opportunities for career development.<sup>67</sup> What is promising, however, is that youth appear to be open to independent work. 63 percent of respondents reported that they would be very or moderately interested in working in the gig economy as a supplement to their income, compared to 59 percent of respondents that expressed interest in the gig economy as a main source of income.<sup>68</sup>

### 5.7 | WOMEN AND THE WORKFORCE

In light of India's dimly low female labour force participation, it is insightful to analyse how the shifts in skills and job roles affect the gender balance of India's workforce. In the past five years, the surveyed companies stated that they hired just 26 percent female workers in the job roles that saw the most growth.<sup>69</sup> This is less than India's already low female labour force participation of 27 percent.



**FIGURE 13** SHARE OF FEMALE EMPLOYEES BY INDUSTRY, (%)  
 NOTE: MAY NOT ADD UP TO ONE HUNDRED PERCENT AS RESPONDENTS COULD SELECT MULTIPLE OPTIONS.



**FIGURE 14** SHARE OF COMPANIES LOOKING TO HIRE MORE WOMEN, (%)  
 NOTE: MAY NOT ADD UP TO ONE HUNDRED PERCENT DUE TO UNKNOWN

At present, a third of companies report having no female employees at all. 71 percent of companies have fewer than 10 percent female employees, and just 2.4 percent have half or more female workers today.

When companies were asked if they are looking to bring more women into the company, 53 percent reported that they do not consider the gender of the applicant, 36 percent reported that they prefer to hire males, and 11 percent said that they are looking to hire more females. Related to this, 15 percent of female respondents to the *Youth Aspirations in India 2018 Survey* report that personal biases such as marital status, gender, age, or family background are the main barrier they face in finding a desirable job. The findings are not promising, and point to a need for concerted efforts on the part of both the public and private sectors to bring more women into the paid economy. India cannot afford to have half of its population outside of the labour market. One of the predominant sentiments about female participation in the labour force, is one driven by a sense of scarcity. That is, 84

percent of Indian respondents to a 2012 survey report that men have more of a right to work than women when jobs are scarce.<sup>70</sup> Recent discussions around job displacement driven by technology adoption are furthering the sense of job scarcity and the idea that the few jobs available should go to men. Our findings point to job growth, and to a strong economic and social case for encouraging more women to work.

### 5.8 | RECOMMENDATIONS

Two areas in particular stand out as opportunities for making large strides towards a more productive and inclusive future of work. The first is related to enhancing capabilities and skills, and the second is bringing more women into the workforce. The fact that companies are looking internally for addressing skills gaps related to technology adoption points to a potential need to recalibrate government initiatives, which mostly focus on skilling *potential* workers who are currently not employed. While the government is investing heavily in skills training, a different form

of engagement with the private sector might be required.

In addition, mechanisms for enabling individualised approaches to skills upgradation will be a step in the right direction. That is, individuals will increasingly need to invest in their own skills to adapt to multiple shifts in career throughout their lives.

It is individuals who will know best how to invest in themselves, and this should be supported and enabled by the state. One model for achieving this would be to provide universal grants to use for skills training by accredited providers. This would need to be supported by a strong accreditation and certification system and regulation that ensures the quality of training providers. The trainings provided would need to be demand-driven and dynamic.

At the same time, companies gripe about not having qualified, employable and skilled workers, but hesitate to invest in their workers. Firms must shoulder some of the burden of skilling their employees with job-specific know-how. For 28 percent of surveyed companies, the average tenure of an employee is less than three years. The low retention rate of workers is a likely driver of an unwillingness to invest in upgrading employee skills. Companies will need to incentivise employees to stay by providing better wages, opportunities for advancement and greater job security. It is doubtful to what extent learning on the job will be sufficient to keep pace with the technological changes. Firms will therefore need to invest in training programmes and workshops that support the skills upgradation of workers.

A balanced effort moving forward will be needed, in which the state provides an enabling education and skilling ecosystem, as well as adapting skilling initiatives to meet the needs of firms and enabling individuals to pursue skilling programmes. At the same time, the private sector will need to take responsibility for providing job-specific skills and training to workers, while also incentivising them to stay.

One of the most problematic and actionable findings

## OUR FINDINGS POINT TO JOB GROWTH, AND TO A STRONG ECONOMIC AND SOCIAL CASE FOR GREATER FEMALE LABOUR FORCE PARTICIPATION

is that while companies are hiring, they are hiring far fewer women than men. Female labour force participation stands at just 27 percent. Due to missing official data since 2011, it is commonly speculated that this rate has been increasing. Our data points to an opposite reality, in which fewer women are coming into the workforce than the existing

participation rate. Concerted efforts on the part of the government and companies alike will be required for bringing more women into the paid economy.

One of the main barriers to female participation in the paid economy is the social expectation that caring responsibilities are women's responsibilities. India's Maternity Benefit (Amendment) Act, 2017, should be adapted further to allow the 26 weeks of parental leave to be split between parents, with a mandatory leave requirement for males. While the government should also aim to make parental benefits more accessible to individuals that are not currently covered by the Maternity Benefit (Amendment) Act, 2017, including contract workers, agricultural workers, and those that are self-employed. In addition, further action towards universal provision of early childhood care and education should be prioritized.

The Equal Remuneration Act, 1976, should be accompanied by a reporting requirement even for micro-sized companies. In short, companies of all sizes in India should be required to report gender wage gaps and gaps in bonuses and benefits.

Finally, private and public sector platforms that match service providers with customers or employers should seek to anonymise the matching process with the aim of creating a non-gendered valuation of services, and thus a reduction in bias in hiring and wages.



# ENHANCING JOB QUALITY



*Arguably, more than the need to create enough new jobs to make up for those displaced by automation, India's focus in the next five years will need to be on creating the right kind of jobs. At least in the medium term it is unlikely that automation is going to displace large numbers of workers. A greater risk is that the stock of jobs, and newly created opportunities, will not meet the expectations and aspirations of India's workforce nor the needs and protections of workers overall. A key question is how can technology and digital tools can be leveraged to reduce this risk?*

**T**his chapter presents findings from the *Future of Work, Education and Skills Enterprise Survey* and the *Youth Aspirations in India* survey with a focus on the

contractualisation of labour, protections and benefits, unpaid work, and the future of independent work in India.

## 6.1 | KEY INSIGHTS

- 24 percent of companies report hiring contractual workers, mainly because of the cost of hiring full-time permanent staff, an uneven workload and lack of flexibility in labour regulations.
- On average 20 percent of employees in surveyed firms are contract workers. 22 percent of companies plan to replace at least some permanent workers with contract workers in the next five years.
- Protections and benefits provided to both permanent and contractual workers are limited. With just 37 percent of firms providing paid annual leave, and 36 percent paying sick leave to permanent employees. This is more than double that of contractual workers at 15 and 16 percent respectively.
- 13 percent of companies report employing non-salaried family

workers. While just 1 percent of female youth report wanting to work in family businesses, at present 37 percent do.

- 19 percent of companies have hired freelance workers in the last year, the main driver of which was to reduce costs, followed by difficulties in finding skilled labour.
- Indian youth are cautiously optimistic about the gig economy.

Some of the terms used in this chapter are defined in Table 10.

On average, 68 percent of employees in the surveyed companies are permanent workers, followed by

20 percent contractual workers and 12 percent temporary workers. The use of contract workers is greatest in the retail, and transportation and logistics industries. Temporary workers are greatest in retail and BFS.

Contractualisation of labour is a concern in India for several reasons. Contractualisation often comes along with informalisation, as contract workers are exempt from many labour regulations, benefits and security provided to permanent workers.<sup>71</sup>

Contractualisation is on the rise in the organised manufacturing sector, where the use of contract workers increased from 15.7 percent in 2000-01 to

TERM	DEFINITION
Contract workers	Are hired by companies through a third-party contractor to work alongside permanent employees for a fixed period of time.
Freelance workers	Are self-employed and do not necessarily sit with their client company; instead, they have tasks and activities outsourced to them directly from a company. While freelance workers may use an online platform to find work, they are not hired through a third-party agency. Freelance workers can be hired for lower skilled tasks, but generally perform technical and expert activities
Gig-based workers	Are workers engaged in the gig economy, which can be understood as self-employed individuals that provide goods and services such as driving, food preparation, cleaning etc. Gig-based jobs tend to be at the lower and middle levels of skills, compared to freelance workers that tend to be at the higher end of skills
Permanent employee	A permanent employee is either a full or part-time employee in a company with an open-ended agreement with the employer
Temporary employee	A temporary employee is either a full or part-time employee in a company with a fixed-term agreement with a company
Full-time employee	A full-time employee works 30 or more hours a week
Part-time employee	A part-time employee works less than 30 hours a week

TABLE 10 DEFINITION OF TERMS

26.5 percent in 2011-12. At the same time, the share of permanent/regular workers declined from 61.1 percent to 51.1 percent.<sup>72</sup> The trend towards contractualisation has also been observed in the services sector.<sup>73</sup>

### THE TREND TOWARDS CONTRACTUALISATION OF LABOUR IN INDIA IS LIKELY TO RISE WITH TECHNOLOGICAL ADOPTION

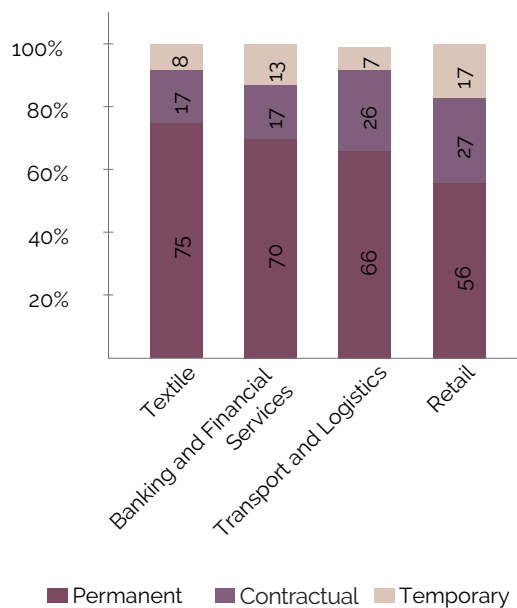
The drivers of contractualisation include stringent labour regulations,<sup>74</sup> the wage differential between permanent workers and contract workers (which is one and a half times greater for permanent workers on average), increasing import competition, and the lack of bargaining power of contract workers compared to that of the unionised and regular workforce.<sup>75</sup>

The trend towards contractualisation of labour in India is likely to rise with technological advancement in Indian manufacturing, and technological and digital disruptions in services. Companies will likely prefer to keep their workforce flexible so that they are able to adapt to changes quickly.<sup>76</sup> At present, 24 percent of surveyed companies reported that they hire contract workers.

Textile companies reported hiring contract workers at 37 percent, followed by transportation and logistics at 24 percent. The main reasons respondents cited for hiring contract workers include:

- Too costly to employ staff permanently
- Uneven workload - temporary staff are brought in when work increases
- Difficulty in finding labour to employ permanently

50 percent of companies that hire contract workers report doing so because it is too costly to hire permanent workers. This supports evidence that wages for contract workers are significantly lower than that of permanent workers, as are the costs associated with hiring them.<sup>77</sup> 34 percent of respondents said that they hire contract workers because of an uneven workload. This is supported by an increasing preference among many firms to hire staff on a project-basis. 24 percent of respondents report the reason being that it is difficult to find permanent staff. This points to potential gaps



**FIGURE 15** THE EMPLOYMENT STATUS OF WORKERS, (%)  
 NOTE: MAY NOT ADD UP TO ONE HUNDRED PERCENT DUE TO UNKNOWN



# NOT ONLY IS CONTRACTUALISATION A CHALLENGE, BUT SO TOO IS ENSURING THAT WORKERS HAVE CONTRACTS AT ALL

in recruitment processes and matching of potential labour with available opportunities.

There are differences in the tasks performed by contract workers between industries. 27 percent of companies that hire contract workers hired them to do physical and manual tasks. Followed by accounting, and communicating with customers and suppliers, which is most common among retail companies. Among banking and financial service companies, contract workers are most commonly hired to collect and analyse data.

Looking to the future, 22 percent of companies expect to replace a few or many permanent workers with contract workers, compared to 51 percent that do not expect to replace any permanent workers with contract workers. Of the companies that report that they will likely hire contractual workers in the next five years, the job roles they are expected to fill include sales, customer service, support services, training and development, quality control, management, and marketing and public relations. This is reflective of overall job growth expectations in these positions.

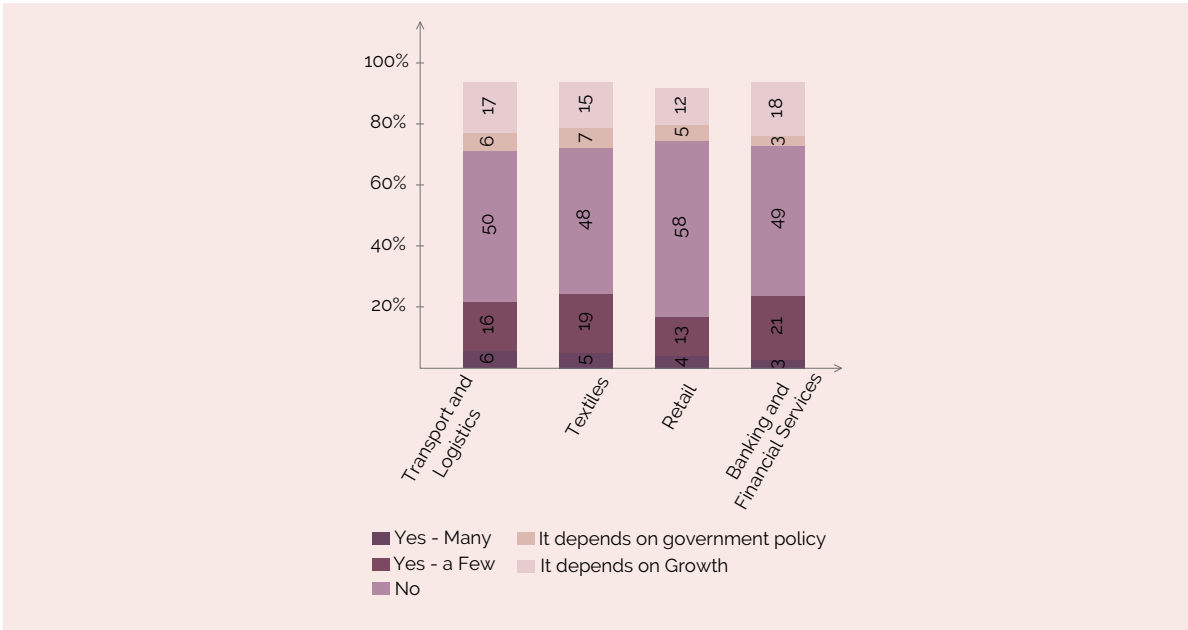


FIGURE 16 EXPECTED HIRING OF CONTRACT WORKERS IN THE NEXT FIVE YEARS, (%)  
NOTE: MAY NOT ADD UP TO ONE HUNDRED PERCENT AS RESPONDENTS COULD SELECT MULTIPLE OPTIONS.

**TABLE 11** JOB ROLES LIKELY TO BE CONTRACTUALISED IN THE NEXT FIVE YEARS, (%)  
**NOTE:** MAY NOT ADD UP TO ONE HUNDRED PERCENT AS RESPONDENTS COULD SELECT MULTIPLE OPTIONS.

Job Roles	Banking and Financial Services	Retail	Textiles	Transport and Logistics	Overall
Sales	21	39	25	16	24
Management	17	14	6	8	11
Training and development	14	14	7	12	12
Customer service	13	20	16	20	17
Quality control	12	12	14	7	11
Administration	12	8	9	11	10
Marketing and public relations	11	11	9	14	11
Information technology support	11	11	6	10	9
Accounting and auditing	11	8	6	11	9
Security	8	6	7	3	6
Programmers	8	6	6	1	5
Support services	7	8	11	6	8
Research and development	7	6	5	1	5
Human resources and recruitment	7	2	2	1	3
Legal	6	6	2	4	5
Social media experts	5	5	12	3	6
Consulting	5	2	7	4	5
Design and creative	4	8	9	6	6
Purchasing and procurement	2	12	6	6	6
Other	2	0	5	1	2
Secretarial	1	6	2	3	3

Not only is contractualisation a challenge, but so too is ensuring that workers have contracts at all. Our *Youth Aspirations in India Survey* for example, reveals that 37 percent of employed youth between the ages of 15 and 30 have no contract.<sup>78</sup>

Employment contracts, including for part-time and temporary work, are critical for ensuring the rights, safety, and protection of workers. Employment contracts that stipulate the nature of engagement, scope of work, and rights of both employers and workers will need to become a norm rather than an exception.

## 6.2 | THE PROTECTION DIVIDE

Employer-provided protections are the predominant form of social security provision. In the highly informal Indian context, new social security and protection mechanisms are needed. Even firms in the formal economy - those covered in the *Future of Work Education and Skills Enterprise Survey* - provide very limited benefits and protections to employees.

Our survey findings reveal that 37 percent of firms provide paid annual leave, and 36 percent paid sick leave to permanent employees. This is more than

**TABLE 12** BENEFITS AND PROTECTIONS PROVIDED TO CONTRACT AND PERMANENT WORKERS, (%)  
**NOTE:** MAY NOT ADD UP TO ONE HUNDRED PERCENT AS RESPONDENTS COULD SELECT MULTIPLE OPTIONS.

Benefits and Protections	Contractual Workers	Permanent Workers	Total
None	32	0	6
Access to medical facilities	17	37	33
Paid sick leave	16	36	32
Paid time off (annual leave)	15	37	33
Incentive compensation (bonuses)	14	44	38
Help in setting up bank account	12	27	24
Transportation to and from work	11	18	17
Maternity leave	10	24	22
Flexible work arrangements (eg. Scheduling, working remotely)	10	17	16
Onsite day care	9	11	11
Stock options	7	5	6
Retirement plans	5	11	10
Paternity leave	4	16	14
Wellness programs	4	8	7
Tuition reimbursement	3	3	3
Other	1	6	5

double that of contractual workers at 15 and 16 percent respectively. Similarly, just 11 percent of companies provide retirement plans to permanent workers .

Strikingly, just 24 percent of firms provide maternity leave to permanent workers. This is compared to just 10 percent for contract workers. On-site day care is provided to permanent workers by only 11 percent of firms. 44 percent of firms provide incentive bonuses and 37 percent access to medical facilities. The provision of benefits, such as wellness programs, tuition reimbursement, and stock options remain low.

**6.3 | UNPAID TO PAID**

78 percent of companies report not hiring family workers that do not receive a regular salary, 13 percent said they do. The greatest number of

companies hiring non-regularly salaried family members, are in retail and textiles.

Unpaid work in India is a challenge, primarily for - but not limited to - females. On average, women in India work 537 minutes a day, compared to 442 minutes among males – that is 21 percent longer. However, among females, 66 percent of their work on average goes unpaid, compared to 12 percent of males. Further, three times more women in India are considered contributing family workers (working for family businesses) at 32 percent compared to just 10.3 of males.<sup>79</sup> Related to this, three times more men work in professional and technical positions compared to women.<sup>80</sup>

Interestingly, while it is assumed that home-based work including unpaid household activities, care work, and contributing to family business activities are the 'rightful' domain of women, just 1 percent

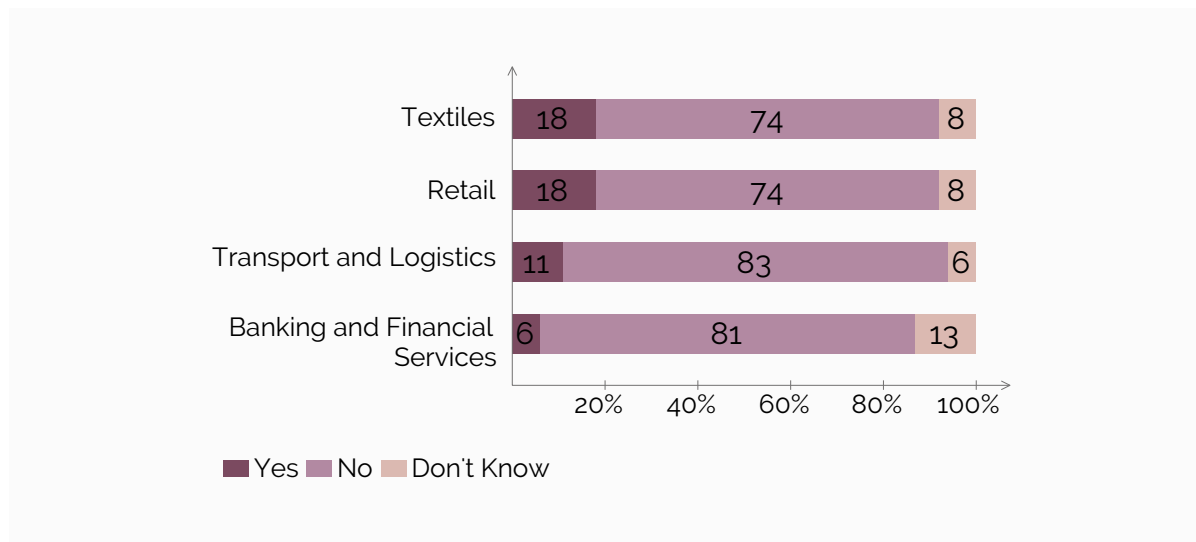


FIGURE 17 UNSALARIED FAMILY WORKERS, (%)

of female respondents in the *Youth Aspirations in India Survey* reported that they would like to work in unpaid household work. Further, just 1 percent of female respondents reported wanting to work for their family business.

This points to major misalignments between Indian women's labour market preferences and positions today. 51 percent of female survey respondents to the *Youth Aspirations in India Survey* prefer to work in the public sector. This is followed by 23 percent who prefer the private sector and 14 percent who wish to engage in entrepreneurship. Unpaid housework and working for the family business are the least desirable options reported by India's female youth.

#### 6.4 | AN INDEPENDENT FUTURE?

Independent work is on the rise in many advanced economies. Across Europe and the United States, for example, approximately 20-30 percent of the working age population is engaged in some kind of independent work.<sup>81</sup> Similarly in India, freelancing and gig-based work is becoming increasingly common.

In India, the tradition of self-employment and independent work is deeply engrained in society.

Individuals have historically made and continue to make a living through self-employment. This is reflected in the micro nature of India's firms as well.

The rise in mobile phone ownership and internet connectivity is supporting entrepreneurs and self-employed individuals to reach larger markets and scale up their operations. UrbanClap, for example, matches Indian consumers with a wide range of service providers from home repair to event planning. At the same time, India has seen the rise of international and home-grown digital platforms such as Uber and Ola, which now employ large numbers of independent drivers. At a different end of the spectrum is the rise of independent work among highly skilled professionals in India who are providing services to a wide range of industries, including IT and banking and financial services.<sup>82</sup>

Independent work holds significant opportunities for India. For individuals, however, working as a gig-based or freelance worker has both advantages and disadvantages. Some of the advantages include flexibility in working hours, the ability to work remotely, and the autonomy and control that self-employment enables. On the other hand, work hours can be long and unpredictable, work-life balance can become difficult and there are

diminished employment rights such as paid sick leave, holiday pay, and anti-discrimination. Further, self-employment often reduces social security entitlements along with investment in training opportunities.<sup>83</sup>

While Ola and Airbnb provide opportunities for thousands of individuals to earn wages, it is necessary to unpack whether these are desirable jobs. Not only do they provide limited wages and few, if any, benefits, they also don't provide any opportunities for advancement. An important distinction to make when discussing non-standard forms of employment, including gig-based and freelance work, is engagement out of choice or necessity. A useful tool for understanding this with regards to freelance work and the gig economy can be found in Table 13.

The *Youth Aspirations in India Survey* reveals that 63 percent of Indian youth are very or moderately interested in participating in the gig economy as a supplement to their income, compared to 59 percent that report being interested in the gig economy as a main source of income.

The advantages and disadvantages mentioned above are echoed by India's youth, who report being interested in participating in the gig

economy because of the flexibility it enables, the decision-making power that comes with self-employment, and the variety of work. The hesitations most commonly cited were limited opportunities for career progression, limited opportunities for personal growth, and job insecurity.<sup>85</sup>

While India's youth are on the fence about independent work as a viable career path, many Indian companies are at least experimenting with using freelance workers. *The Future of Work, Education and Skills Enterprise Survey* reveals that 19 percent of surveyed companies have hired at least one freelance worker in the last year.

The main reasons for bringing on freelance workers included reducing costs, and difficulty in finding skilled labour. For 29 percent of companies, however, the hiring of freelance workers was a one-off need, and therefore will not likely be a strategy for addressing these issues in the long-term. 16 percent of companies that have engaged freelance workers in the last year say that they hired them in to avoid recruiting people as employees - which comes with a number of regulatory hurdles and required provisions. A summary of the main reasons for hiring freelance workers can be found in Figure 19.

Despite the opportunity that freelance work

TABLE 13 FREELANCE AND GIG-BASED WORK

	Primary Income	Supplemental Income
<b>Choice</b>	These workers choose to participate in independent work as their preferred option. For these workers, independent work is their main source of income.	These workers choose to supplement their existing income with additional jobs and gigs.
<b>Necessity</b>	These workers often have a lack of alternative options, and engage in self-employment for their primary source of income.	These workers participate in self-employment on top of their main source of income in order to make ends meet, rather than out of a desire to do so.

**Source:** Adapted from MGI 2016.<sup>1</sup>

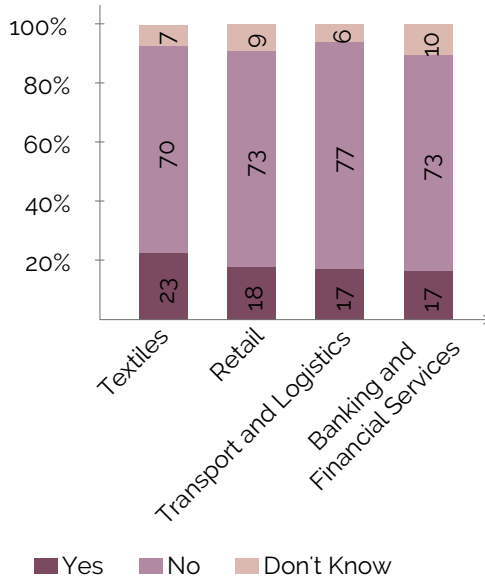


FIGURE 18 FREELANCE WORKER HIRING LAST YEAR, (%)

presents as an entry way for greater female labour force participation, it is estimated that 75 percent freelance professionals in India are male. This points to a replication of the realities in the traditional workplace, in the digitally enabled workplace. In addition to lower participation among females overall, female participation in the freelance economy declines with years of

experience, from 37 percent among workers with 0-5 years of experience, to just 10 percent among females with 10 or more years of experience. This is further compounded by the fact that females engaged in the freelance economy with 10-20 years of experience are paid 30 percent less than their male counterparts in India.<sup>86</sup>

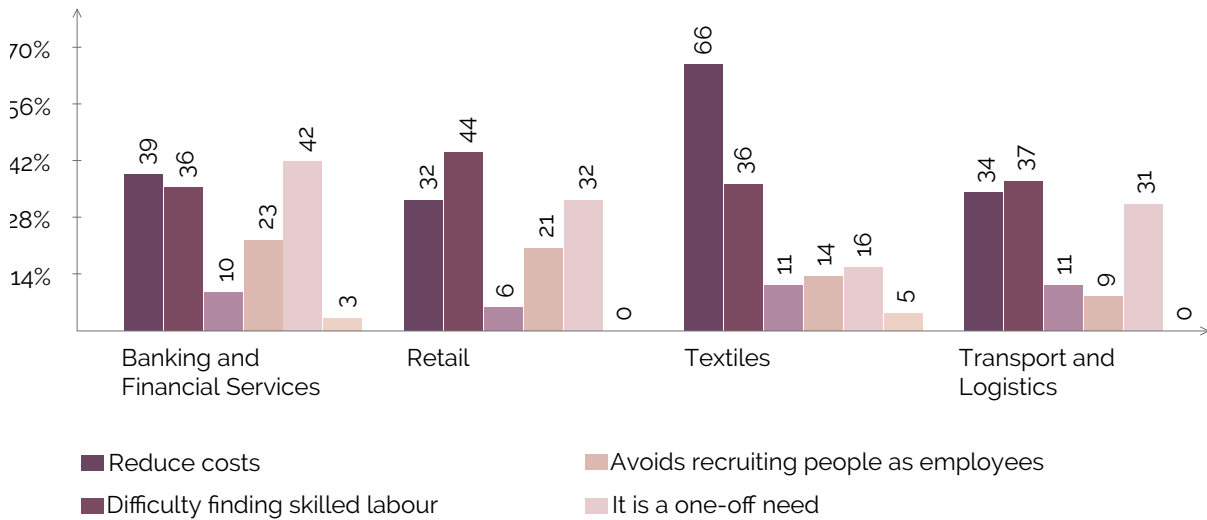


FIGURE 19 REASONS FOR HIRING FREELANCE WORKERS, (%)

NOTE: MAY NOT ADD UP TO ONE HUNDRED PERCENT AS RESPONDENTS COULD SELECT MULTIPLE OPTIONS.

*It is estimated that 75 percent of freelance professionals in India are male. This points to a replication of the realities in the traditional workplace, in the digitally enabled workplace.*

#### **6.5 | RECOMMENDATIONS**

While contractualisation is a challenge, it too can be an opportunity for driving growth by ensuring that companies have the needed flexibility to grow, innovate and adapt to new technologies and digitisation. Therefore, to enable a business environment that is conducive of growth, while also ensuring the well-being of workers, new social security and protection mechanisms are needed.

The employer-provided and premise-based nature of social security provision needs to be recalibrated to ensure access for the majority of individuals

who are not employed in organised firms. As a step towards achieving this, social security and protections should be linked directly to individuals rather than to employers.

In addition to different mechanisms of provision, which can be enabled through digitisation and mobile technology, protections will need to be adapted for a vastly different employment context. Protections will need to account for the increasing number of contractual, independent and digital workers. For example, companies will need to be responsible for underwriting the security of independent workers that provide services to them but work remotely. Similarly, companies must find ways of adapting anti-harassment policies that currently apply within office spaces, to be relevant in digital spaces.

Employment contracts themselves will need to become a norm rather than an exception. This should include contracts for part-time and temporary work, as they are critical for ensuring the rights, safety and protection of workers. Contracts are essential for stipulating the nature of engagement, scope of work, and rights of both employers and workers.

With regard to work that goes unpaid, the responsibility for changing this lies with the state, the private sector, and individuals.

Not only does unpaid work within firms by family members need to be addressed, so too does the burden of unpaid work and care work within households. This will require a change in social norms. Reducing the burden of unpaid work within households – disproportionately shouldered by women – will lead to an increase in female participation in the paid economy. This can be supported by furthering universal access to early childhood care and education. Further adjustments could be made to the Maternity Benefit (Amendment) Act, 2017 to include a provision through which the parental time can be split between partners, with a mandatory requirement for males.



# CONCLUSION



*This report unpacks key questions around the future of transformative technology in India with regard to the future of work. It sheds light on the current state of transformation, perceptions of change, and identified core opportunities presented by technological disruption for creating an inclusive future of work in India.*

The authors set out a vision that leverages the opportunities presented by technological disruption in India. This vision is an employment scenario in which enough new jobs are created for the growing working age population. In addition to the creation of sufficient new jobs, the authors argue that technology and digitisation can support efforts to create decent jobs vis-à-vis wages, contracts, protections and security. Not only are decent jobs possible, but so too are opportunities that are available, accessible and desirable for India's women, youth and previously excluded groups. To enable this, supportive education, skilling and regulation will be crucial.

The authors have presented data from the *Future of Work, Education and Skills Enterprise Survey*, in which the leadership of 774 firms were surveyed in four industries in India. These findings were contextualized with insights from the *Youth Aspirations in India Survey*,<sup>87</sup> in which 5,764 youth were asked about their ambitions, perceptions and preferences with regard to the future of work. The findings point to opportunities for a more productive, fairer and more inclusive future of work if managed carefully.

The key findings from the report are summarised below.

**Companies are mostly optimistic about the future and about technology:** Among the surveyed companies, 25 percent identified technological adoption as the trend most likely to positively impact their business in the next five years.

**Companies anticipate job creation and restructuring, not job loss:** Despite widespread concern that machines and technology are displacing human workers, our research finds that among the surveyed companies, 33 percent needed to hire



additional workers owing to the adoption of industrial technologies and machinery in the last five years, compared to 19 percent that reduced their staff as a result. Companies expect this trend to continue in the medium term.

**Companies recognise the potential of the Internet of Things (IoT) and big data:** 40 percent of companies report that aspects of IoT are present in their companies today. 64 percent of companies plan to introduce aspects of it in the next five years. At present, 14 percent of companies report using big data, while 52 percent plan to do so in the next five years.

**Quality improvements, new markets, and government regulations drive technology adoption:** 39 percent of companies report introducing new technologies and machinery in the last five years to improve the quality of output and 35 percent to expand into new markets. Among companies that have introduced new digital tools or services, 43 percent report doing so to attract new customers and 34 percent to comply with government regulations. Cutting costs was a less important reason for introducing new technologies.

**Skills gaps and financial constraints are the main barriers to technology adoption:** 34 percent of the surveyed companies report a lack of know-how among their employees as the most significant barrier to technology adoption, while 24 percent attribute this to a lack of investment capital.

**Retraining and learning on the job to address changing skill requirements:** 33 percent of the surveyed companies report changes in the skill sets required of their staff due to the introduction of new technologies and machinery. 84 percent of companies plan to address such gaps in knowledge and skills internally through retraining existing workers in new capabilities, or having employees learn new requisite skills on the job.

**Companies are hiring, but not women:** Among the surveyed firms, 71 percent currently employ fewer than 10 percent female workers, with 30 percent having no female workers at all. Companies are hiring, but few of the new hires in the last five years have been women. 37 percent of firms said that they prefer to hire men, while 11 percent report that they are looking to bring on more women.

**Companies offer jobs offline, young job seekers look online:** The research reveals communication misalignment between companies looking to hire and job seekers, especially youth. Only 14 percent of the surveyed companies use online modes of recruitment for filling vacancies, while 81 percent of youth reported looking for jobs online.

**Contractualisation is increasing:** 24 percent of surveyed companies hire contractual workers (workers hired through a third-party). On average, around 20 percent of all employees of surveyed firms are contract workers. 49 percent of companies report hiring contract workers to reduce labour costs, an uncertain business environment and workload along with inflexible labour regulations were mentioned by 64 percent of companies.

**There is a significant need to rethink worker protections, security and benefits:** The existing provision of worker protections and benefits, both for permanent and contract workers, is grossly insufficient. Only 37 percent of the surveyed firms provide paid annual leave, and 36 percent provide paid sick leave to permanent employees. For contractual workers, the corresponding proportions are 15 and 16 percent respectively.

**An independent future:** 19 percent of surveyed companies reported hiring freelancers or independent workers in the past year. The main reasons cited by companies for hiring freelance workers include reduced costs and difficulties in finding skilled permanent staff.



# APPENDIX

## INDUSTRY OVERVIEWS

### § TEXTILES

#### Overview

As of 2016–17, the textile industry contributes four percent of GDP, 14 percent of total manufacturing production, and 13 percent of export earnings.<sup>88</sup> The total

value of the industry is estimated at US\$150 billion and is expected to reach US\$230 billion by 2020.<sup>89</sup> Textile exports stood at US\$40.4 billion in 2016 and are projected to rise to US\$82 billion by 2021.<sup>90, 91</sup> The largest export sub-sector in Indian textiles is apparel, at 42.2 percent, followed by cotton at 15 percent as illustrated in Figure 20.<sup>92</sup>

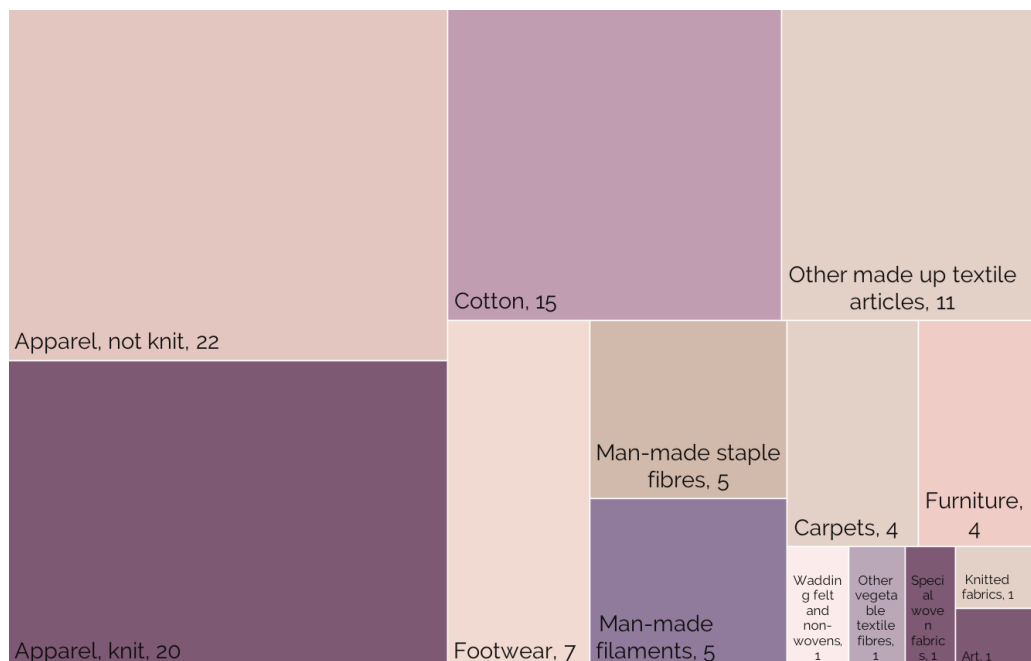


FIGURE 20 TEXTILE AND APPAREL EXPORTS, 2016

SOURCE THE CENTER FOR INTERNATIONAL DEVELOPMENT (CID), THE ATLAS FOR ECONOMIC COMPLEXITY, 2016

Indian companies operate at different stages of textile manufacturing, ranging from raw materials to apparel production (See Table 14). Each segment

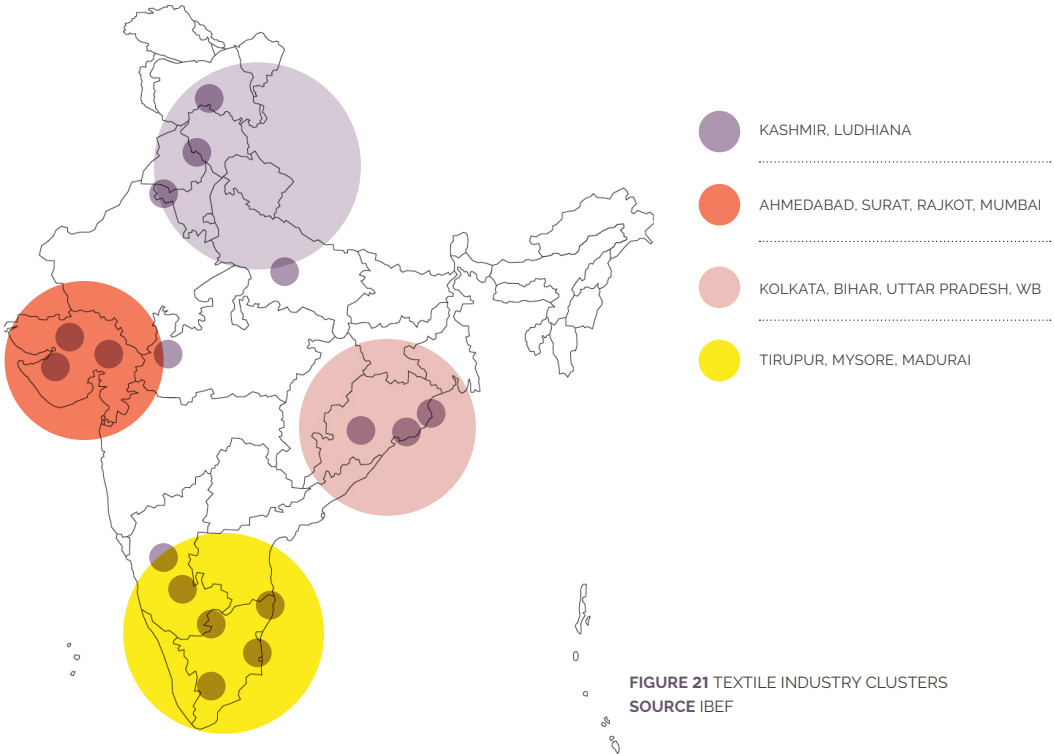
of this chain differs in its value-add and the required technologies and skills.

<b>Process</b>	Raw materials	Ginning	Spinning	Weaving and Knitting	Processing	Apparel production
Output	Cotton, jute, silk, wool	Fibre	Yarn	Fabric	Woollen, silk, jute, cotton, Technical textiles	Apparel

**TABLE 14** SEGMENTS OF THE TEXTILES AND APPAREL INDUSTRY  
 SOURCE IBEF, 2018.

The industry is located in various clusters, primarily in Gujarat, Maharashtra and Madhya Pradesh in the West; Tamil Nadu and Karnataka in the South; Bihar,

Eastern Uttar Pradesh and West Bengal in the East; and Punjab, Kashmir and Haryana in the North (See Figure 21).



**FIGURE 21** TEXTILE INDUSTRY CLUSTERS  
 SOURCE IBEF

There is steady global demand and growing domestic demand for apparel production. This is driven in part by an increase in incomes and a corresponding shift from need-based to aspirational consumption.<sup>95</sup> Moreover, the central and state governments invest substantially and roll out supportive policies to boost the industry through a range of initiatives.<sup>96 97</sup>

Thus, the textile industry has opportunities to increase production and sales both domestically and internationally. The challenges for the industry include the high cost of logistics, high volatility, intense competition and complex labour laws.<sup>98</sup>

Technology has opened up global value chains in textiles and apparel. However, India's textile industry still uses relatively outdated and low-productivity technology and has limited investment in research and development (R&D). Therefore, while it is a major producer of cotton and apparel, India is not yet a significant producer of technical textiles that

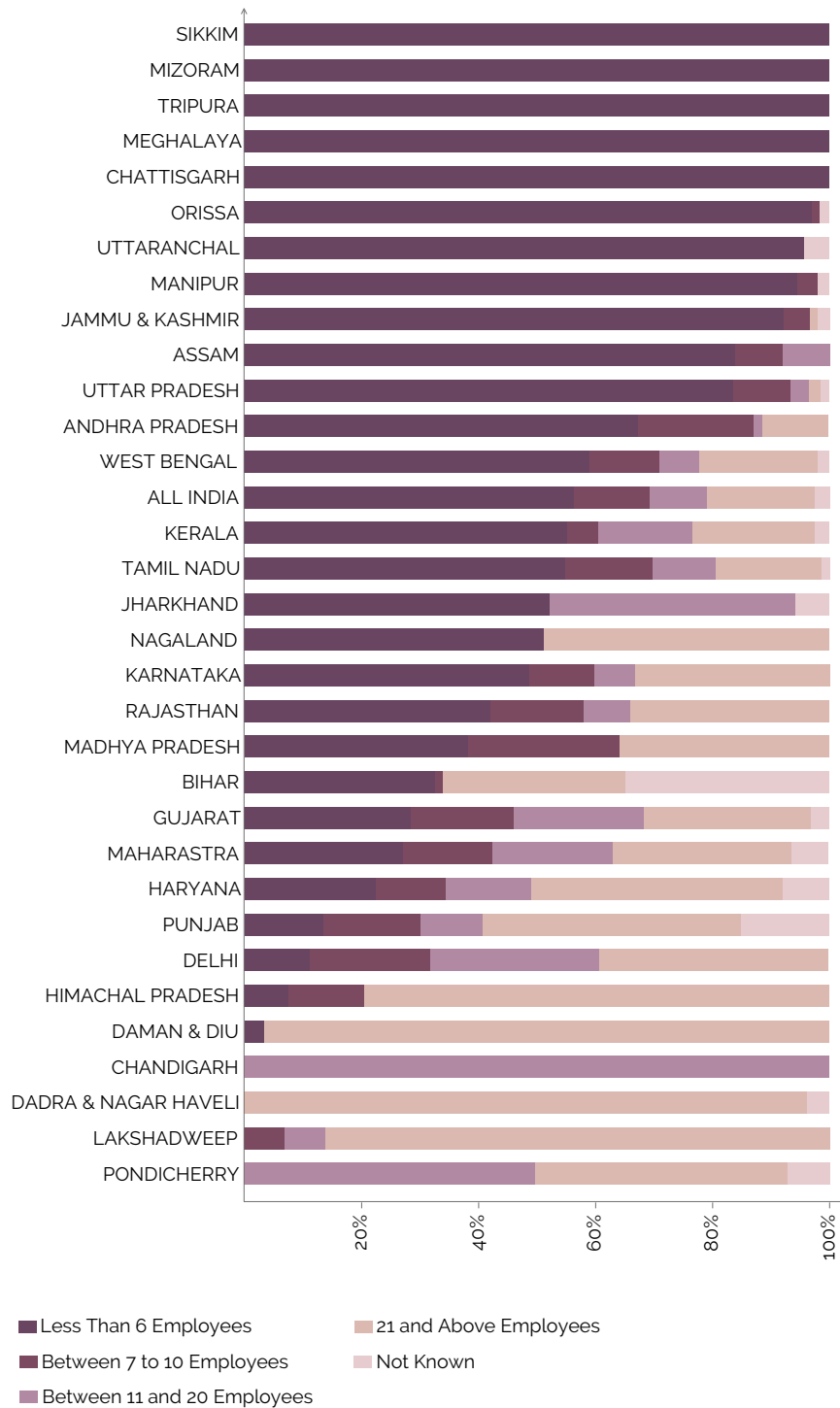
rely on modern technology and innovation.<sup>99</sup> This is a rapidly growing area in other countries, with the emergence of smart textiles and wearable electronics and the utilisation of technologies such as 3D printing in the production process.<sup>100</sup>

### **Employment**

The textile industry directly employs approximately 45 million workers in India.<sup>101</sup> By sub-sector, weaving and manufacturing of cotton is the largest employer, accounting for 20.5 percent of employment in the industry. While textiles is one of the industries with the greatest representation of female workers, women account for just 32 percent of workers overall.

Firms in the textile industry are primarily micro in size, according to the NSSO 91 percent of the companies employ fewer than six workers,<sup>102</sup> and just 1.7 percent employ 20 or more. However, this varies significantly by state.

FIGURE 22 SHARE OF FIRMS BY SIZE AND STATE, TEXTILES 2011-12 SOURCE NSSO 2011-12, 68TH ROUND



Not only are Indian textile firms small, they are also informal. Nearly 88 percent of employment in textiles is informal. It is worth noting that Indian firms exist as organised/formal and unorganised/

informal enterprises, at the same time there is formal and informal employment within both organised and unorganised firms. This is true across industries.

### Employment Summary

Employment in the textile industry is characterised by:

- Informality: Around 88 percent of employment is informal in nature.
- Micro-sized Firms: Of textile firms, 91 percent employ fewer than six workers.
- Male Dominated: Over 68 percent of workers are male.
- Low wage: The average daily wage is INR 188, compared to an average of INR 350/day across all industries.
- Diverse Skill Sets: Due to the diversity of occupations and job roles within the textile

industry, employees in textiles exist on a spectrum from low to highly skilled workers.

### 📌 **BANKING AND FINANCIAL SERVICES**

#### Overview

India's banking and financial services industry (BFS) comprises of banks, non-banking financial services, insurance, and pension and mutual funds. Banks account for 65.2 percent of financial assets, while non-banking financial institutions (NBFI) accounts for eight percent, insurance companies 13 percent, and pension and mutual funds for 11 percent.<sup>103</sup>

BFS Sub-sectors by Share (%) of Total Financial Assets (March 2017)		Bank Categories by Share (%) of Total Financial Assets (March 2017)	
Scheduled Commercial Banks	58.5	Public Sector Banks	69.9
Rural and Cooperative Banks	6.7	Private Banks	23.8
Non-Banking Financial Institutions	8.3	Foreign Banks	6.3
Insurance Companies	13.1		
Pension and Mutual Funds	11.5		

**TABLE 15** SEGMENTS OF FINANCE AND BANKING INDUSTRY  
**SOURCE** RBI, AS QUOTED IN WORLD BANK GROUP 2017, FINANCIAL SECTOR ASSESSMENT INDIA, OCTOBER 2017.

Among India’s banks, public-sector banks hold 70 percent of total financial assets, while private Indian banks hold 24 percent and foreign banks six percent.<sup>104</sup>

The industry is going through rapid changes as technology is increasingly making BFS digital and interconnected. This is creating new opportunities, including a diverse range of lending and other financial services offerings<sup>105</sup> as well as new ways to assess applicants and reducing portfolio risk.<sup>106</sup> New finance start-ups and banks are making loans, credit and insurance more readily available and the market more competitive.

The Government of India (GoI) has taken steps to improve the efficiency and profitability of the

BFS industry as well as access to bank accounts, insurance and other financial services, particularly for low-income households and for micro and small firms. Reforms include the introduction of new kinds of banks. For example, small finance banks offer savings accounts and can provide loans with a specific focus on priority-sector lending, like loans to farmers and micro entrepreneurs. Payment banks were introduced in 2015 and offer only current and savings accounts and accept deposits of up to INR 100,000. At the same time, the Reserve Bank of India has taken a tougher stand with respect to non-performing assets of banks through new resolutions and more stringent reporting criteria.

Another significant area of focus for the GoI is financial inclusion, in particular, the opening of

Industry Segments	Total Employment (in 000s)	% of total
Banking	1100-1200	25-30%
Insurance	200-300	4-5%
NBFC	25-30	0-1%
Mutual Funds	15-20	0-1%
Financial Intermediaries	2500-3000	65-70%
<b>Total</b>	<b>4000-4500</b>	<b>100%</b>

**TABLE 16** EMPLOYMENT ESTIMATES IN SEGMENTS OF THE BANKING AND FINANCIAL SERVICE INDUSTRY  
**SOURCE** NATIONAL SKILLS DEVELOPMENT CORPORATION

bank accounts through the Pradhan Mantri Jan Dhan Yojana (PMJDY) scheme, which includes no-frills accounts and an increased use of business correspondent models to reach underserved populations in rural India.<sup>107</sup> While the government's PMJDY scheme has led to the opening of more than 300 million accounts, ensuring regular use of these accounts is a challenge, as many lie dormant.<sup>108</sup> Progress in financial inclusion is uneven across the country.

### Employment

The financial services industry has seen a relatively steady increase in employment, with an estimated 4-4.5 million workers today.<sup>109</sup> Employment is highest among financial intermediaries, accounting for an estimated 65-70 percent of employment in the industry, followed by banking at 25-30 percent, insurance at 4-5 percent, and non-banking financial companies and mutual funds each at 0-1 percent.<sup>110</sup>

Employment in the BFS industry is skewed towards higher-skilled workers, with an estimated 50-60 percent of employees across sub-sectors requiring advanced degrees such as an MBA, computer science or chartered accounting degree. This is compared to an estimated 20-30 percent of employees working in middle-skilled job roles such as back-office operations, retail banking, support functions, and operations, which are less skill-intensive but tend to still require a degree. While education requirements seem to be high in the industry, technological adoption including machine learning and AI are changing the skill requirements of many workers in the industry.<sup>111</sup>

Maharashtra has the largest number of individuals working in BFS, followed by Tamil Nadu and Andhra Pradesh. Only 15 percent of financial service employees are female. Notably the Andaman and Nicobar Islands and Goa have a larger share of female workers in the industry than males, at 77 and 56 percent respectively.

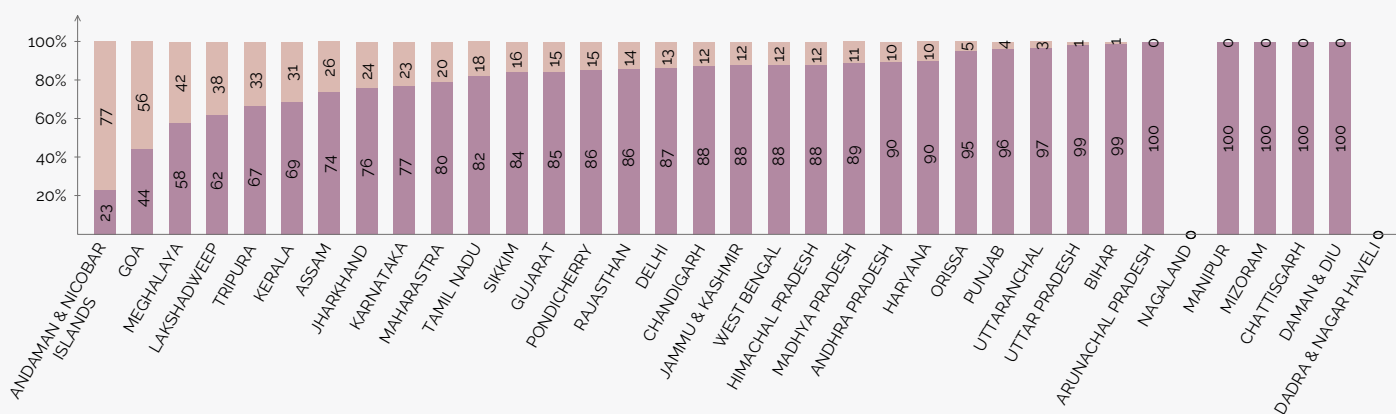


FIGURE 23 SHARE OF EMPLOYMENT BY GENDER AND STATE, BANKING AND FINANCIAL SERVICES 2011-12  
SOURCE NSSO 2011-12, 68TH ROUND

According to the NSSO, approximately 58 percent of banking and financial service firms are micro in size, employing fewer than 6 people, while 17

percent of firms have more than 20 employees. The number of employees by firm varies between states as illustrated in Figure 24.



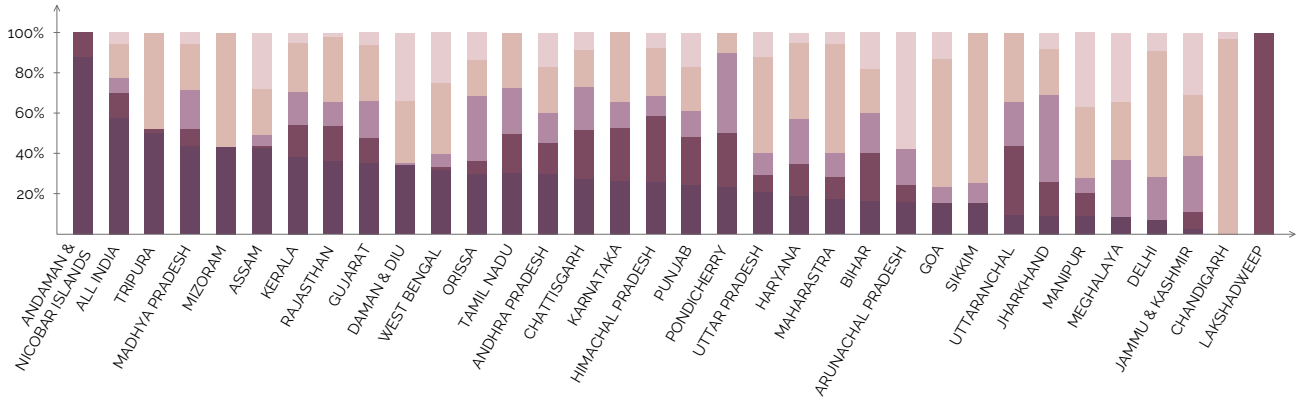


FIGURE 24 FINANCIAL SERVICE EMPLOYMENT BY FIRM SIZE AND STATE, 2011-12 SOURCE NSSO, 2011-12, 68TH ROUND

The financial services sector is primarily formal, at 60 percent, with the share of formal and informal

employment varying by state, as illustrated in Figure 25. The average daily wage in financial services is INR 702,

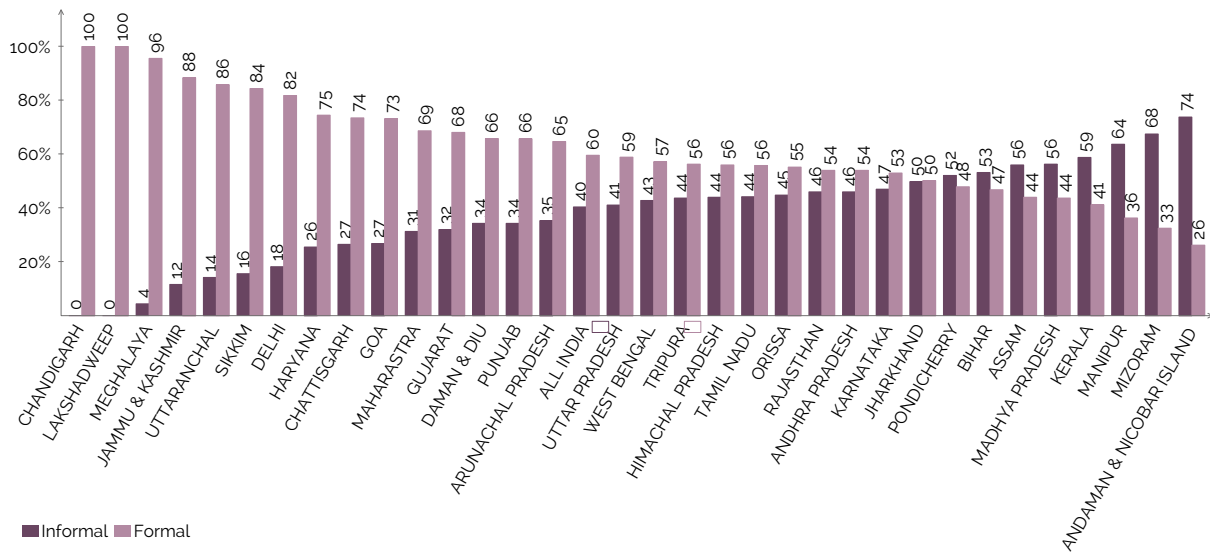


FIGURE 25 SHARE OF FORMAL AND INFORMAL EMPLOYMENT BY STATE, BANKING AND FINANCIAL SERVICES 2011-12 SOURCE NSO, 2011-12, 68TH ROUND

substantially higher than most other industries, likely due to the high level of skills required on average. The BFS industry has a significant gender wage gap of 12.2

percent, with a daily wage of INR 629 for women and INR 716 for men. Daily wages in financial services vary by state.

### Employment Summary

Employment in the financial service and banking industry is characterised by:

- Formality: A total of 60 percent of employment is formal.
- Varied firm size: The industry is more evenly split by firm size when compared to other industries. An estimated 58 percent of firms employ fewer than six workers, and 16.5 percent employ more than 20.
- High wage: The average wage is more than twice the average across other industries.
- Male dominated: Nearly 85 percent of the employees are male.
- High and changing skill intensity: The industry overall hires a greater share of high-skilled workers, yet, transformations in skill requirements are already evident in the industry.

### LOGISTICS

#### Overview

The transportation and logistics industry is critical for a country's exports, overall competitiveness, employment and integration into global supply chains. The Indian logistics market is expected to reach US\$215 billion by 2020.<sup>113</sup>

The industry primarily handles freight and passenger transportation via roads, rail, air and waterways, along with warehousing and storage.<sup>114</sup> Most freight is shipped by roads (60 percent), followed by rail (32 percent), coastal shipping (7.4 percent), and inland waterways and airways (at a combined 0.3 per cent).<sup>115</sup> The core activities within the logistics industry (excluding passenger transportation) are complemented by various value-added activities and ancillary services as outlined in Table 17.

Core Services	Value-Added Activities	Ancillary Services
<ul style="list-style-type: none"> <li>• Transportation, warehousing and storage, handling</li> </ul>	<ul style="list-style-type: none"> <li>• Sorting, grading, labelling, bar-coding, re-packaging, palletisation</li> <li>• Track and trace information flow</li> </ul>	<ul style="list-style-type: none"> <li>• Financial (banking and insurance)</li> <li>• Equipment repair and maintenance</li> </ul>

TABLE 17 COMPLEMENTARY ACTIVITIES IN THE LOGISTICS INDUSTRY  
SOURCE ADAPTED FROM DELOITTE, 2018.

The industry is important across geographies in India, with several logistics hubs including Ahmedabad, Bangalore, Chennai, Hyderabad, Kolkata, Mumbai, Delhi and Pune.<sup>116</sup> The demand for logistics is driven by rising household consumption and a robust retail industry with rapid growth in e-commerce. At the same time the industry is experiencing an increase in FDI and investment in infrastructure development.

While the transportation and logistics industry has

potential to fuel growth in India, many challenges persist, primary among them is the poor quality of infrastructure. According to a McKinsey study, logistics inefficiencies currently cost the economy US\$45 billion, equivalent to approximately 4.3 percent of GDP. This is estimated to rise to US\$145 billion (5 percent of GDP) by 2020.<sup>117</sup> Further, a lack of intermodal transportation links creates bottlenecks and restricts the flow of goods. Moreover, the informal nature of the industry makes it difficult to attract middle- and higher-skilled

workers. A greater share of higher-skilled workers could assist in the adoption of time-saving and quality-assurance technologies and efficiencies. The fragmentation of policies between states and duplication of procedures have also led to major inefficiencies.

The importance of the logistics industry in India is evidenced by several government initiatives designed to facilitate its development, including the establishment of a logistics division in the Department of Commerce.<sup>118</sup>

Technologies, digital tools and systems such as IoT, automation, blockchain, cloud computing, robotics and big data have the potential to reshape the logistics industry in India.<sup>119</sup> The application of these tools in other contexts have increased productivity and efficiency and overall competitiveness.

### Employment

At 4.4 percent of total employment, transportation and logistics is the fifth largest employing industry

in India after agriculture (47 percent), manufacturing (10.8 percent), construction (10.8 percent), and retail (8 percent).<sup>120</sup> The importance of the industry vis-à-vis employment varies between states from between 1 and 11 percent of total employment. Maharashtra has the highest number of workers in the transportation and logistics industry, followed by Andhra Pradesh and Uttar Pradesh.

The transportation and logistics industry is dominated by male workers, with just 1.3 percent female employment. Approximately 84 percent of employment in the industry is informal. The majority (72 percent) of employment in transportation and logistics is in micro-sized firms, which is in line with the highly unorganised nature of the industry.

Wages in the transportation and logistics industry are below the average of INR 350/day at INR 308/day. While women account for just 1.3 percent of employees in the industry, their average wages are higher than that of their male counterparts, at INR 368/day compared to the male average of INR 306/day.

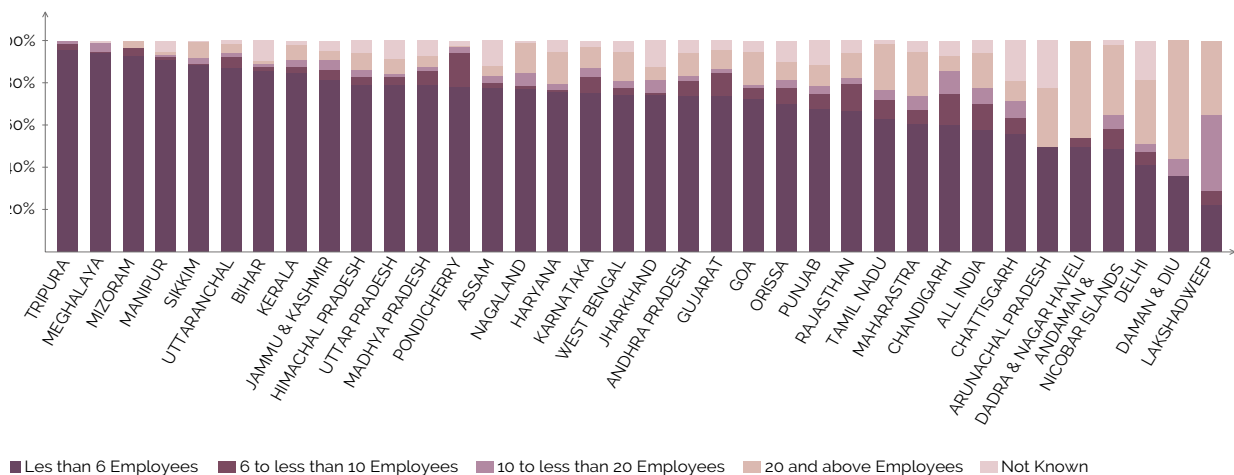


FIGURE 26 SHARE OF FIRMS BY SIZE AND STATE, TRANSPORTATION AND LOGISTICS 2011-12 SOURCE NSSO 2011-12, 68TH ROUND

## Employment Summary

The transportation and logistics industry presents an opportunity to enhance exports and competitiveness. Currently, employment in the industry is characterised by:

- Magnitude: It is one of the largest employers in India.
- Micro-sized firms: Of all the firms, 72 percent have fewer than six employees.
- Informality: Almost 84 percent of the employment is informal.
- Male dominated: Men account for 99 percent of the employees.
- Below-average wages: The current average wage is lower than the average across industries.
- Low skill intensity: The majority of employees in the logistics industry are low-skilled.

## RETAIL

### Overview

Retail has grown significantly in the last decade and is expected to nearly double to US\$1.3 trillion by 2020.<sup>121</sup> Retail accounts for approximately 10 percent of GDP and eight percent of employment in India.<sup>122</sup> E-commerce is becoming an increasingly important segment of the retail industry in India, with an estimated annual average increase in e-commerce shipments of 40 percent between 2014 and 2016.

Simultaneously, employment in e-commerce has increased by an estimated 80,000 jobs between 2012 and 2014.<sup>123</sup>

Major sub-sectors in this industry include electronics, apparel, books, music and entertainment, furniture, furnishing and home improvement, food and beverages, health, wellness and beauty, automobiles and other miscellaneous retail. Opportunities for retail in India include rapid economic growth, the size of the Indian market, rising incomes, urbanisation, a growing young population, digitisation, and improvements in the ease of doing business<sup>124</sup>

Several digital disruptions are affecting retail in India, including big data, predictive analytics, and automation. The drivers of digital transformations in retail are the rising number of internet and smartphone users, the increase in mobile shopping, improvements in digital infrastructure and digital payments, and increasing FDI in the sector.<sup>125</sup> The retail industry has many opportunities for growth. However, it currently struggles with informality and the small scale of enterprises, a lack of internet penetration (which today stands at just 25 percent),<sup>126</sup> the lack of purchasing power, poor infrastructure, and high logistics costs.

The informal and micro nature of Indian retail is matched by relatively low skills intensity.

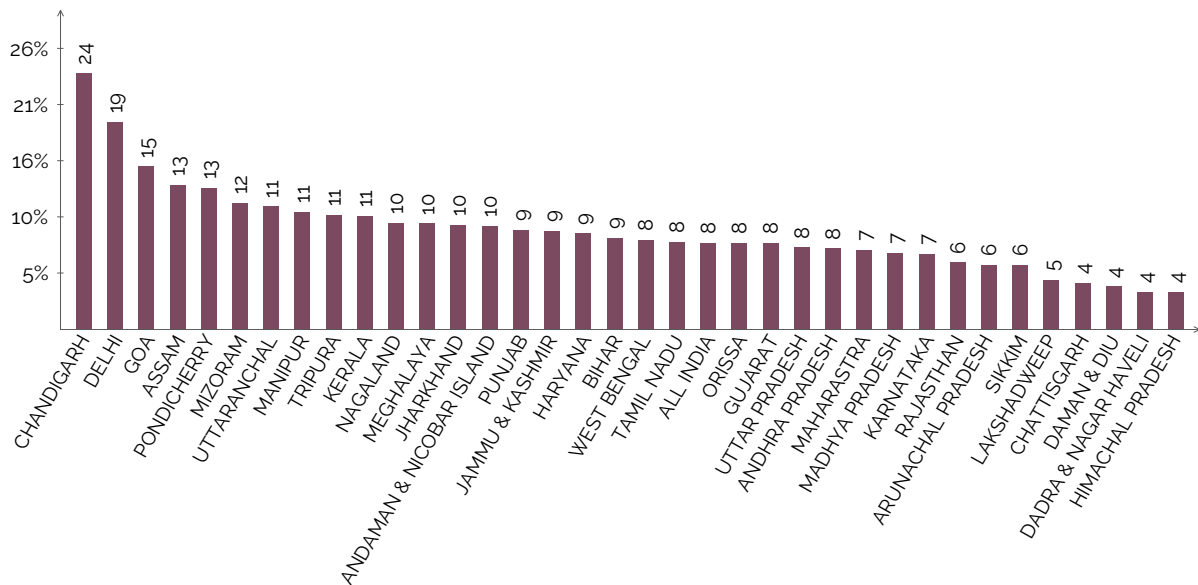


FIGURE 27 SHARE OF EMPLOYMENT BY STATE, RETAIL 2011-12 SOURCE NSSO 2011-12, 68TH ROUND

Transformations in the industry including the emergence of large and organised retailers and formalisation, along with technological adoption,

which are in turn changing the skills and education requirements of the workforce.<sup>127</sup>

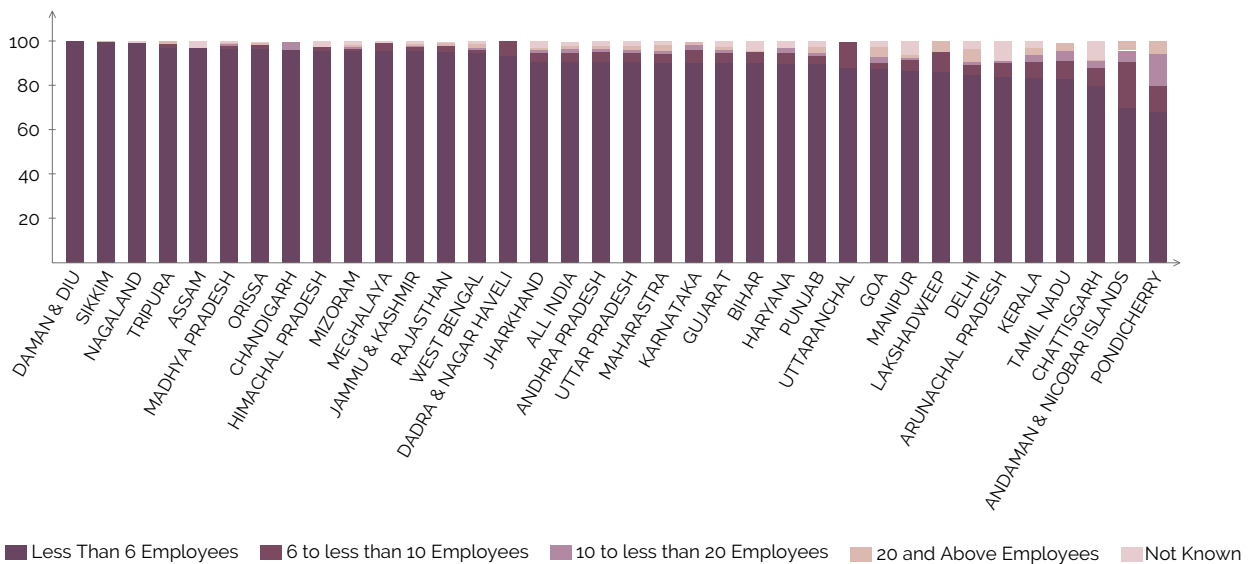


FIGURE 28 SHARE OF FIRMS BY SIZE AND STATE, RETAIL 2011-12 SOURCE NSSO 2011-12, 68TH ROUND

**Employment**

Retail is one of the top four employers in India, accounting for eight percent of total employment.<sup>128</sup> Retail is a highly informal sector, according to the

NSSO, 98.2 percent of employment is informal. It is dominated by micro-sized firms, with 90 percent of employment in firms with fewer than six workers (including both formal and informal workers). Males

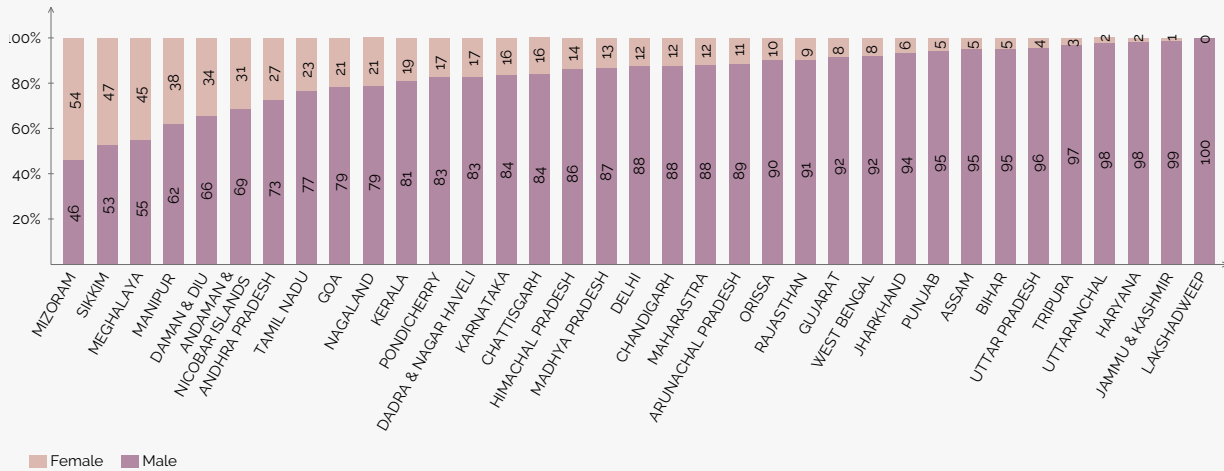


FIGURE 29 SHARE OF EMPLOYMENT BY GENDER AND STATE, RETAIL 2011-12 SOURCE NSSO 2011-12, 68TH ROUND

account for the greatest number of employees in retail at 88 percent. Only in Mizoram do women make up the majority of the employees, at 54 percent.

Wages in retail are low, at an average of INR 181/day, compared to an average of INR 350/day across industries in India.<sup>129</sup> The gender wage gap is 23 percent, at INR 185/day for men and INR 142/day for women.<sup>130</sup> There is variation in wages by state, with average wages being as high as INR 317/day in Delhi.

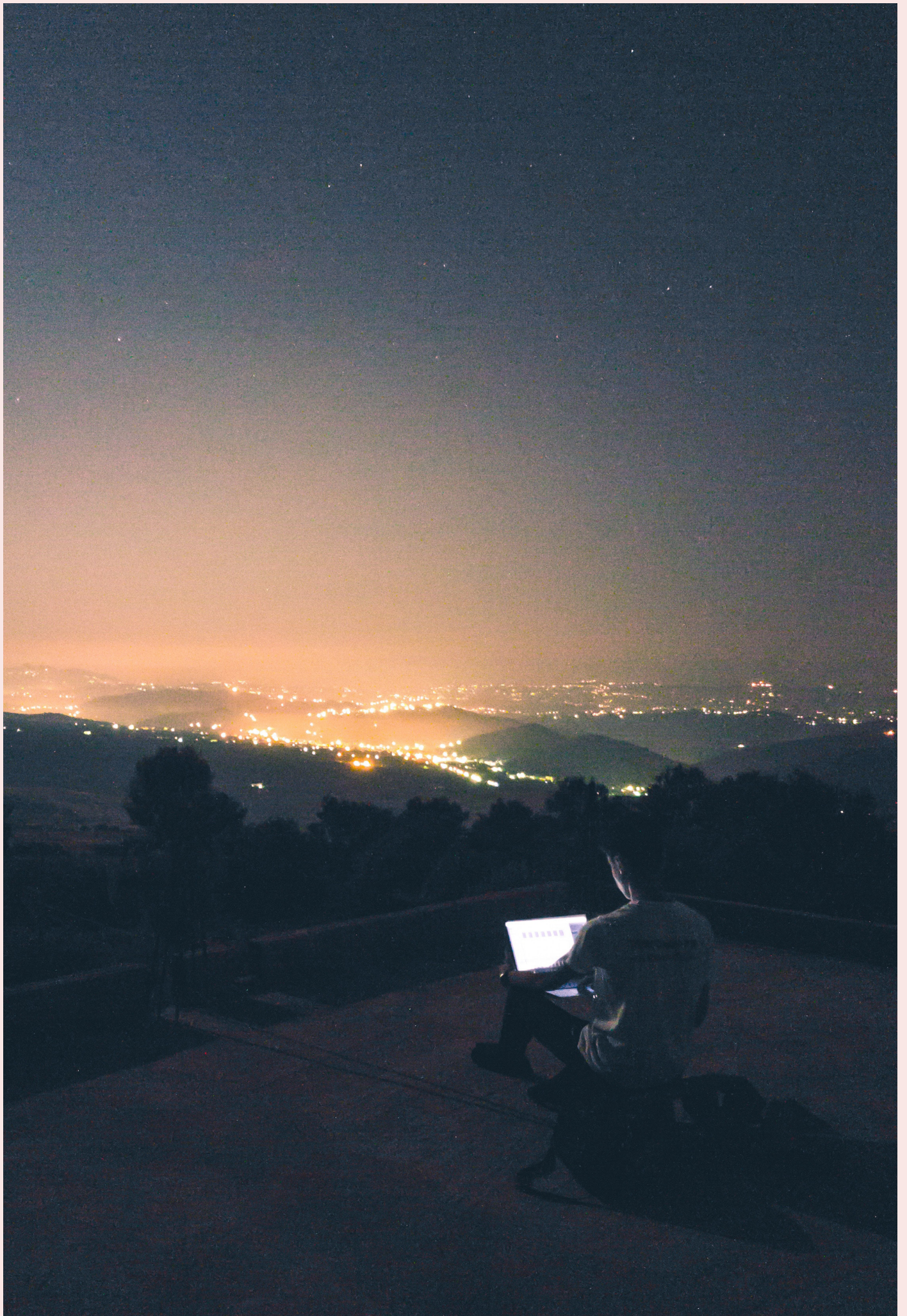
### Employment Summary

Currently, employment in the retail industry is characterised by the following:

- Magnitude: The industry is one of the largest

employers in India.

- Informality: Around 98.2 percent of employment is informal.
- Micro-sized firms: Nearly 90 percent of employment is in firms with fewer than six workers.
- Male dominated: Only 12 percent of employees are female.
- Low wage: The average daily wage is INR 181/day.
- Low skill intensity: Among micro and small-sized enterprises skill requirements are low, but are increasing with the emergence of larger firms, formalisation and adoption of technology.



1. The Future of Work, Education and Skills Enterprise Survey was designed and implemented by the Observer Research Foundation and the World Economic Forum.
2. The industries were selected based on several criteria, including the share of overall employment, skills intensity and receptiveness to technology adoption in the industry. More information on the selection criteria can be found in the Methodology Chapter.
3. Carl Benedikt Frey and Michael A. Osborne, "The Future of Employment: How Susceptible are Jobs to Automation?" *Technological Forecasting and Social Change*, (2013).
4. Melanie Arntz, Terry Gregory and Ulrich Zierahn, "The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis," *OECD Social, Employment and Migration Working Papers*, No. 189, OECD Publishing, (2016), <http://dx.doi.org/10.1787/5jlzgh56dvq7-en>.
5. James Manyika, Michael Chui, Mehdi Mirmadi, Jaques Bughin, Katy George, Paul Willmott and Martin Dewhurst, "A Future that Works: Automation, Employment and Productivity," McKinsey, (January 2017).
6. James Manyika, Susan Lund, Michael Chui, Jaques Bughin, Jonathan Woetzel, Parul Batra, Ryan Ko and Saurabh Sanghvi, "Jobs Lost, Jobs Gained: Workforce Transformations in a Time of Automation," McKinsey, (December 2017).
7. World Bank, "Jobless Growth?" *South Asia Economic Focus*, Spring (2018): 30.
8. *Ibid.*, 60.
9. *Ibid.*, 44.
10. Arunika Agarwal, Alyssa Lubet, Elizabeth Mitgang, Sanjay Mohanty, David E. Bloom, "Population Ageing in India: Facts, Issues and Options," *IZA Discussion Paper 10162*. (August 2016): 4.
11. For an overview of literature see: Shekhar Aiyar and Ashoka Mody, "The Demographic Dividend: Evidence from the Indian States," *IMF Working Paper WP/11/38* (February 2011): 5.
12. World Bank, "Jobless Growth?" *South Asia Economic Focus*, Spring (2018):30.
13. Samir Saran and Akhil Deo, "Globalization, Demography, Technology, and New Political Anxieties," *Raisina Files 3* (2018):39.
14. Findings from the Observer Research Foundation and World Economic Forum Youth Aspirations in India Survey, (2018).
15. NSSO 2011–12. It is worth noting that while there is a migration of workers out of agriculture, the sector still accounts for 47 percent of all employment in India.
16. Radhicka Kapoor, "Creating Jobs in India's Organised Manufacturing Sector," *ICRIER Working Paper No. 286*, (2014). And Arindam Bhattacharya and Aparna Bijapurkar, "India: Jobs and Growth in the New Globalisation," *Boston Consulting Group and Confederation of Indian Industry*, (March 2017): 57–89, DOI: 10.1257/mac.20150258.
17. World Economic Forum, "Technology and Innovation for the Future of Production: Accelerating Value Creation," *World Economic Forum White Paper in collaboration with A.T. Kearney*, (March 2017): 4.
18. Arindam Bhattacharya and Aparna Bijapurkar, "India: Jobs and Growth in the New Globalisation," *Boston Consulting Group and Confederation of Indian Industry*, (March 2017): 57–89, DOI: 10.1257/mac.20150258.
19. The World Bank Enterprise Survey, 2018.
20. Terri Chapman, "Making Jobs Work for India," *The Observer Research Foundation*, (July 2018).
21. Samir Saran, Terri Chapman and Mihir Sharma, "A New Social Contract for the Digital Age," *T-20 Insights*. (May 2018).
22. Samir Saran, Terri Chapman and Mihir Sharma, "A New Social Contract for the Digital Age," *T-20 Insights*. (May 2018).
23. Jonathan Woetzel, Anu Madgavkar and Shishir Gupta, "India's Labour Market: A New Emphasis on Gainful Employment: Discussion Paper," *McKinsey*, (June 2017): 10.
24. *Ibid.*
25. Findings from the Observer Research Foundation and World Economic Forum Youth Aspirations in India Survey, 2018.
26. <https://www.adb.org/countries/india/poverty>. 17.9 percent of the employed population in India are living on less than the 2011 PPP at 1.90 USD/day.
27. Vidisha Mishra, Terri Chapman, Rakesh Sinha, Suchi Kedia and Sriram Gutta, "Young India and Work: A Survey of Youth Aspirations," *The Observer Research Foundation and The World Economic Forum*. (2018).
28. Samir Saran and Akhil Deo, *op. cit.*
29. Observer Research Foundation and World Economic Forum, "Youth Aspirations in India Survey," 2018.
30. "Women in India: How India Fails its Women," *The Economist* (July 2018).
31. Luis A. Andres, Basab Dasgupta, George Joseph, Vijoj Abraham ad Maria Correia, "The Precarious Drop: Reassessing Patterns of Female Labour Force Participation in India," *World Bank Group, Policy Research Working Paper 8024* (April 2017): 4.
32. *World Bank Database*, 2017.
33. Luis A. Andres, Basab Dasgupta, George Joseph, Vijoj Abraham ad Maria Correia, "The Precarious Drop: Reassessing Patterns of Female Labour Force Participation in India," *World Bank Group, Policy Research Working Paper 8024* (April 2017): 13.
34. Wheebox, "India Skills Report 2018: Future Skills Future Jobs," 2018: 31. <https://wheebox.com/india-skills-report-2018.htm>.
35. NSSO, 2011–12.
36. OECD, "Economic Survey: India 2017," *OECD* accessed 13 July 2018, <http://www.oecd.org/eco/surveys/INDIA-2017-OECD-economic-survey-overview.pdf>.



37. The Observer Research Foundation and The World Economic Forum, "Youth Aspirations in India Survey," 2018.
38. The data for measuring female occupational mobility is scarce. We therefore use available data for males.
39. Kunal Sen, "Moving up the ladder: How Does India do in Social Mobility," Global Development Institute Blog, 15 August 2016, accessed 13 July 2018, <http://blog.gdi.manchester.ac.uk/moving-ladder-india-social-mobility/>.
40. World Bank, "World Development Report: 2018: Learning to Realize Education's Promise," World Bank, (2018). doi:10.1596/978-1-4648-1096-1.
41. The World Economic Forum, " Insights Report: The Future of Jobs Report 2018," Centre for the New Economy and Society. (2018). ISBN 978-1-944835-18-7.
42. The World Economic Forum, " Insights Report: The Future of Jobs Report 2018," Centre for the New Economy and Society. (2018). ISBN 978-1-944835-18-7.
43. Insight from industry expert interviews.
44. Adapted from the EU Commission on Skills, (2015)<https://unevoc.unesco.org/go.php?q=TVETipedia+glossary+A-Z&flt=all&id=568>.
45. Samir Saran, Mihir Sharma and Terri Chapman, "A New Social Contract for the Digital Age," T-20 Insights (May 2018).
46. For a summary of data constraints, see Jonathan Woetzel, Anu Madgavkar and Shishir Gupta, "India's Labour Market: A New Emphasis on Gainful Employment: Discussion Paper," McKinsey, (June 2017).
47. The surveys were carried out in-person by a third-party firm.
48. "Executive Summary: World Robotics 2017, Industrial Robots," World Robotics Federation, (2017):19. <https://ifr.org/free-downloads/>
49. James Manyika, Susan Lund, Kelsey Robinson, John Valentino and Richard Dobbs, "A Labour Market That Works: Connecting Talent with Opportunity in the Digital Age," McKinsey Global Institute. (2015): 8.
50. "Internet of Things: Revolution in the Making," NASSCOM and Deloitte. (November 2017): 11.
51. New Gen Apps. "8 Uses, Applications and Benefits of Industrial IoT in Manufacturing," (December 15, 2017). <https://www.newgenapps.com/blog/8-uses-applications-and-benefits-of-industrial-iot-in-manufacturing>
52. "IoT Landscape and NASSCOM Initiatives," NASSCOM, (May 2017): 3. [http://www.wfeo.org/wp-content/uploads/stc-information/L3-IoT\\_Landscape-by-S\\_Malhotra.pdf](http://www.wfeo.org/wp-content/uploads/stc-information/L3-IoT_Landscape-by-S_Malhotra.pdf)
53. "IoT Landscape and NASSCOM Initiatives," NASSCOM, May 2017. [http://www.wfeo.org/wp-content/uploads/stc-information/L3-IoT\\_Landscape-by-S\\_Malhotra.pdf](http://www.wfeo.org/wp-content/uploads/stc-information/L3-IoT_Landscape-by-S_Malhotra.pdf)
54. James Manyika, Michael Chui, Brad Brown, Jacques Bughin, Richard Dobbs, Charles Roxburgh, and Angela Hung Byers, "Big Data: The Next Frontier for Innovation, Competition and Productivity," McKinsey, (May 2011).
55. Data from the Observer Research Foundation and World Economic Forum, "Youth Aspirations in India 2018 survey."
56. "International Trade in the Digital Age," Chapter 7 Asia-Pacific Trade and Investment Report UNESCAP, (2016): 104. <https://www.unescap.org/sites/default/files/aptir-2016-ch7.pdf>
57. "International Trade in the Digital Age," Chapter 7 Asia-Pacific Trade and Investment Report UNESCAP, 2016. 105. <https://www.unescap.org/sites/default/files/aptir-2016-ch7.pdf>
58. Ziyang Fan, "These 5 Technologies have the potential to change global trade forever," World Economic Forum.(June 2018). <https://www.weforum.org/agenda/2018/06/from-blockchain-to-mobile-payments-these-technologies-will-disrupt-global-trade/>
59. James Manyika, Susan Lund, Jacques Bughin, Jonathan Woetzel, Kalin Stamenov and Dhruv Dhingra, "Digital Globalization: The New Era of Global Flows," McKinsey,(March 2016).
60. Carl Benedikt Frey and Michael A. Osborne, "The Future of Employment: How Susceptible are Jobs to Automation?" Technological Forecasting and Social Change, (2013).
61. M. Arntz, T. Gregory and U. Zierahn, "The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis," OECD Social, Employment and Migration Working Papers No. 189, OECD Publishing, (2016).
62. Terry Gregory, Anna Salomons and Ulrich Zierahn, "Racing With or Against the Machine? Evidence from Europe," ZEW, 2016,DOI: 10.2139/ssrn.2815469
63. The Observer Research Foundation and World Economic Forum, "Youth Aspirations in India survey," (2018).
64. Respondents were asked to rank the top five job roles that had become increasingly important in the last five years. This was followed by a question about the number of people that had been hired in those five roles.
65. "Skills for Future Jobs: Technology and the Future of Work in India," Tandem Research, Quest Alliance and Microsoft.(2017).
66. The Observer Research Foundation and the World Economic Forum, "Youth Aspirations in India Survey 2018."
67. The Observer Research Foundation and the World Economic Forum, "Youth Aspirations in India Survey 2018."
68. The Observer Research Foundation and the World Economic Forum, "Youth Aspirations in India Survey 2018."
69. In this question, respondents were asked how many new people they hired for each of the five job roles for which they experienced the most growth over the last five years.
70. "Why India Needs Women to Work." The Economist. July 05, 2018. Accessed September 5, 2018. <https://www.economist.com/leaders/2018/07/05/why-india-needs-women-to-work>.
71. Examples of contract worker exclusions include Employees Provident Fund, and Miscellaneous Provisions Act 1952, the Employees State Insurance Act, 1948, Workman's Compensation Act 1923, and the Maternity Benefit Act 1961. From: Radhicka Kapoor and P.P. Krishnapriya, "Informality in the Formal Sector: Evidence from Indian Manufacturing," International Growth Center: Working Paper. (2017).
72. Radhicka Kapoor and P.P. Krishnapriya, "Informality in the Formal Sector: Evidence from Indian Manufacturing," International Growth

- Center: Working Paper. 2017. 1. F-35316-INC-1.
73. "Emerging technologies and the future of work in India." ILO and Tandem Research. (June 2018): 17. ISSN: 2227-4391.
  74. Radhicka Kapoor and P.P. Krishnapriya, "Informality in the Formal Sector: Evidence from Indian Manufacturing," International Growth Center: Working Paper. 2017. F-35316-INC-1; Fallon, Peter R., and Robert EB Lucas, "Job security regulations and the dynamic demand for industrial labor in India and Zimbabwe," Journal of development Economics 40, no. 2. 1993.
  75. 241-275;and Chaurey, Ritam. "Labor regulations and contract labor use: Evidence from Indian firms." Journal of Development Economics 114. 2015. 224-232.
  76. Radhicka Kapoor and P.P. Krishnapriya, "Informality in the Formal Sector: Evidence from Indian Manufacturing," International Growth Center: Working Paper. 2017. F-35316-INC-1.
  77. "Emerging technologies and the future of work in India." ILO and Tandem Research. (June 2018): 17. ISSN: 2227-4391.
  78. A. Sood et al. "Deregulating capital, regulating labour: The dynamics in the manufacturing sector in India," Economic and Political Weekly, Volume XLVIX, (2014).
  79. Observer Research Foundation and World Economic Forum, "Youth Aspirations in India Survey," (2018).
  80. Klaus Schwab, Richard Samans, Saadia Zahidi, Till Anderson Leopold, Vesselina Ratcheva, Ricardo Hausmann and Laura D'Andrea Tyson,"The Global Gender Gap Report: 2017," The World Economic Forum, (2017): 176.
  81. Klaus Schwab, Richard Samans, Saadia Zahidi, Till Anderson Leopold, Vesselina Ratcheva, Ricardo Hausmann and Laura D'Andrea Tyson,"The Global Gender Gap Report: 2017," The World Economic Forum, (2017): 176.
  82. James Manyika, Jacques Bughin, Kelsey Robinson, Jan Mischke, and Peepa Mahajan, "Independent Work: Choice, Necessity, and the Gig Economy," McKinsey Global Institute. (October 2016).
  83. "Indian Companies say I-Do to the Freelance Economy," FlexingIt, Year Unknown. 3.
  84. Andrea Broughton et al. "Precarious Employment in Europe, Part I: Patterns, Trends and Policy Strategy," (July 2016): 85. Directorate General for Internal Policies, European Parliament.85.
  85. James Manyika, Jacques Bughin, Kelsey Robinson, Jan Mischke, and Peepa Mahajan, "Independent Work: Choice, Necessity, and the Gig Economy," McKinsey Global Institute. (October 2016).
  86. Observer Research Foundation and World Economic Forum, "Youth Aspirations in India Survey," (2018).
  87. "India's Top-Tier Freelancers: What they Earn," FlexingIt. (July 2016): 4.
  88. The Future of Work, Education and Skills Enterprise Survey was designed and implemented in collaboration with the World Economic Forum.
  89. "Textile Sector Analysis Report," Equity Master.(March 26, 2018).
  90. IBEF,"Textiles and Apparel," June 2018,<https://www.ibef.org/industry/textiles.aspx>.
  91. The Center for International Development, The Atlas For Economic Complexity, Harvard.
  92. IBEF, "Textiles and Apparels," (May 2018).<https://www.ibef.org/download/Textiles-and-Apparel-May-2018.pdf>
  93. The Center for International Development, "The Atlas For Economic Complexity," Harvard, 2016. <http://atlas.cid.harvard.edu/explore/?country=104&partner=undefined&product=undefined&productClass=HS&startYear=undefined&target=Product&year=2016>
  94. The Future of Work, Education and Skills Enterprise survey was conducted in a number of textile clusters including in Ludhiana, Delhi, Jaipur, Lucknow, Ahmedabad, Mumbai, Bengaluru, Chennai, Madurai and Kolkata.
  95. IBEF, "Textiles and Apparel," (July 2018): 23.<https://www.ibef.org/download/Textiles-and-Apparel-July-2018.pdf>
  96. FICCI, "Global Shifts in Textile Industry and India's Position," Knowledge Paper, TAG, 2016.
  97. Examples of supportive government initiatives for the textile industry include: Investment in a Technology Upgradation Fund Scheme to encourage companies to modernise and upgrade the skills of their employees. Textile Parks are being funded by both central and state governments; in Maharashtra, the state government is setting up nine such parks. Private investment is expected to receive a boost, as 100 percent FDI is now allowed in the industry. The Integrated Skill Development Scheme, and it is likely that exports will increase as a result of free trade with ASEAN countries (ASEAN-India Trade in Goods (TIG) Agreement signed in 2009 and applicable from 2010) and a proposed agreement with the European Union.
  98. Drawing on: IBEF, May 2018, op. cit.; and Ernst & Young, Future of Jobs in India: A 2022 Perspective, 2017.
  99. Ministry of Textiles, "Foreign Direct Investment Scenario in Indian Textile Sector," Wazir Advisors: Final Study Report, July 2016, 12, <http://texmin.nic.in/sites/default/files/FDI%20Scenario%20in%20Indian%20Textiles%20Sector%20-%20A%20Study%20Report.pdf>.
  100. FICCI, op. cit.
  101. Ernst & Young, op. cit.
  102. "Textile Sector Analysis Report," Equity Master. March 26, 2018.
  103. This is the definition of micro enterprises used throughout the report unless otherwise mentioned.
  104. RBI, March 2017, as quoted in World Bank Group 2017, Financial Sector Assessment India, October 2017. Finance & Markets Global Practice South Asia Regional Vice Presidency, World Bank Group 2017, 23.
  105. Ibid.
  106. Ernst & Young, op. cit.
  107. Further covered in the technology and digitisation section below.
  108. RISIL, CRISIL INCLUSIX: Financial inclusion surges, driven by Jan-Dhan Yojana, February 2018, Vol. (2018).
  109. Ibid.
  110. The Future of Work, Education and Skills Enterprise Survey covers banks and financial intermediaries, including public, private

and foreign banks, as well as non-banking financial institutions. This varies from the definition of the financial service industry by the NSSO, which includes several other sub-sectors, including insurance. The employment number of 3.7 million includes both formal and informal workers.

111. "Human Resource and Skill Requirements in the banking and Financial Services Industry," National Skills Development Corporation. Year Unknown. <https://glpc.guj.nic.in/pride/ADMINUI/Resourcefiles/Res66Banking%20Finance%20Services%20Insurance.pdf>
112. "Human Resource and Skill Requirements in the banking and Financial Services Industry," National Skills Development Corporation. Year Unknown. 21. <https://glpc.guj.nic.in/pride/ADMINUI/Resourcefiles/Res66Banking%20Finance%20Services%20Insurance.pdf>
113. Ravinder Goyal and Shashvat Singh, "Indian Logistics Sector: On the Path to Transformation," NITI Aayog, <http://niti.gov.in/content/indian-logistics-sector-path-transformation>.
114. Economic Survey 2017–18, from Ravinder Goyal and Shashvat Singh, "Indian Logistics Sector: On the Path to Transformation," NITI Aayog, <http://niti.gov.in/content/indian-logistics-sector-path-transformation>.
115. While the data that authors have collected in the enterprise survey excludes passenger transportation, NSSO data used in this chapter includes passenger transportation within transportation and logistics.
116. IBEF Insight, "Indian Logistics Industry Gaining Momentum: A Report on the Performance and Emerging Trends in the Indian Logistics Industry," (November 2013). <https://www.ibef.org/download/indian-logistics-industry-gaining-momentum.pdf>. These numbers include freight and passenger transportation.
117. "Indian Logistics: taking Giant leaps Forward" JLL (August 2015): 23.
118. "Building India: Transforming the Nation's Infrastructure," McKinsey and Company, date unknown. 9. [https://www.mckinsey.com/~/media/mckinsey/industries/travel%20transport%20and%20logistics/our%20insights/transforming%20indias%20logistics%20infrastructure/building\\_india%20transforming\\_the\\_nations\\_logistics\\_infrastructure.ashx](https://www.mckinsey.com/~/media/mckinsey/industries/travel%20transport%20and%20logistics/our%20insights/transforming%20indias%20logistics%20infrastructure/building_india%20transforming_the_nations_logistics_infrastructure.ashx)
119. Kritika Suneja, "National Logistics Plan Kicks off; Division Set up In Commerce Department," The Economic Times, 9 January 2018, <https://economictimes.indiatimes.com/industry/transportation/roadways/national-logistics-plan-kicks-off-division-set-up-in-commerce-department/articleshow/62422915.cms>.
120. "India: On the Cusp of A Logistics Revolution," Deloitte and ASSOCHAM, January (2018): 17.
121. NSSO, 2011–12. This includes formal and informal employment, in both freight and passenger transportation.
122. "Disruptions in Retail Through Digital Transformation: Reimagining the Store of the Future," Deloitte and ICC, November 2017, 10. <https://www2.deloitte.com/content/dam/Deloitte/in/Documents/CIP/in-cip-disruptions-in-retail-noexp.pdf>
123. Deloitte, op. cit.
124. Jonathan Woetzel, Anu Madgavkar and Shishir Gupta, "India's Labour Market: A New Emphasis on Gainful Employment," McKinsey Global Institute, Discussion Paper, June 2017: 20.
125. PWC, op. cit. 5
126. "Disruption in Retail Through Digital Transformation: Reimagining the Store of the Future," Deloitte and ICC (November 2017):16. <https://www2.deloitte.com/content/dam/Deloitte/in/Documents/CIP/in-cip-disruptions-in-retail-noexp.pdf>
127. Jacob Poushter, Caldwell Bishop and Hanyu Chwe, "Social Media Use Continues to Rise in Developing Countries but Plateaus Across Developed Ones," PEW Research Center: Global Attitudes and Trends, 19 (June 2018).
128. "Human Resource and Skill Requirements in the Organized Retail Sector: Study on Mapping of Human Resource and Skill gaps in India till 2022," NSDC. Date Unknown. 20.
129. NSSO, 2011-12.
130. Ibid.
131. Ibid.





