

# **Economic Sub-Sector and Labor Market Analysis of Nepal**



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## Abbreviations

ALFAN	: Aluminum Fabricators Association Nepal
CBS	: Central Bureau of Statistics
CEO	: Chief Executive Officer
CNC	: Computer Numerical Control
CTEVT	: Council for Technical Education and Vocational Training
DoFE	: Department of Foreign Employment
FCAN	: Federation of Contractors Association of Nepal
FDI	: Foreign Direct Investment
FGD	: Focused Group Discussion
GDP	: Gross Domestic Product
GoN	: Government of Nepal
ICT	: Information and Communication Technology
IPP	: Independent Power Producer
JTA	: Junior Technical Assistant
KNIT	: Korea Nepal Institute of Technology
MoF	: Ministry of Finance
MoLESS	: Ministry of Labour, Employment and Social Security
NCS	: National Competency Standard
NEA	: Nepal Electricity Authority
NLFS	: Nepal Labour Force Survey
NLSS	: Nepal Living Standard Survey
NRB	: Nepal Rastra Bank
NSIC	: Nepal Standard Industrial Classification
ODA	: Overseas Development Assistance
PLC	: Programme Logic Control
R & D	: Research and Development
RPL	: Recognition of Prior Learning
SEZ	: Special Economic Zone
SMEs	: Small and Medium Enterprises
SSF	: Social Security Fund

TBM : Tunnel Boring Machine  
TITI : Training Institute for Technical Instruction  
TVET : Technical Education and Vocational Training  
UNCDF : United Nations Capital Development Fund



## Executive Summary

1. This study aims to identify the existing gaps, issues, and challenges of the labor market and possible measures to address them in the overall TVET system in Nepal. Similarly, this study was essential to identify the highly contributing economic sub-sectors and employable occupations within those sectors. This study, therefore, i) provides the status of 18 economic sub-sectors at the national level, and ii) conducts labor market analysis of 10 economic sub-sectors with special emphasis on the demand of workforce
2. The analysis of 18 economic sub-sectors has been done by looking at the available secondary data sources. The labor market demand-side analysis of 10 economic sub-sectors has been done by ranking sub-sectors based on the contribution of the sub-sector in GDP, employment, and productivity. Secondary data along with qualitative primary data has been used to analyze the labor market demand-side analysis. This study team used the snowball sampling method to select informants for this study. There were 253 primary informants for this study from different industries and departments.
3. The average economic growth rate of Nepal remained at 4.3 percent over the last five years, with the economic growth rate reaching as high as 9 percent in 2017 and a negative 2.09 percent in 2020. The worldwide impact of Covid 19 has led to a loss of jobs, thereby creating an economic disparity between rich and the poor. An estimate suggests that nearly 16.67 percent of the total population of Nepal is still below the poverty line, even when the GDP per capita has increased to USD 1126 in 2020 which was USD 866 in 2016 (MoF, 2021).
4. Among the 15+ population (20.7 million), 7.1 million people are employed while 908 thousand people are either semi-employed or not employed at all. In this respect, the employment rate of 15+ males are 48.3 percent and the employment rate of 15+ females are 22.9 percent with an aggregate of 34.2% in the case of both males and females.
5. The major sources of development finance are remittances, tax revenues, external loans, internal loans, and foreign grants. Migration and flow of remittances have become an integral part of the national economy for 10 years. The data from 2013 showed that an estimated 3 to 3.5 million Nepalese are outside the country, which might have increased by 2021 in a significant number. However, the number of migrants in 2020 and 2021 has decreased due to COVID-19.
6. The Ministry of Finance has categorized economic activities into primary, secondary, and tertiary sectors. The contribution of the primary sector to GDP reached 34.0% in 2010/11 and has regressed each year reaching as low as 26.6% in 2019/20. The contribution of the secondary sector has remained stable across 10 years with as high as 14.6% in 2011/12 and reaching as low as 13.2% in 2019/20. However, the share

of the tertiary or the service sector is gradually increasing each year. The share of this sector was 51.9% in 2010/11 while the share has now increased to 60.2% in 2019/20.

7. Agriculture, forestry, and fishing remain at the top of the position with a 26.01 percent contribution in GDP and 21.50 percent contribution in the share of employment. Similarly, in wholesale and retail trade; motorcar repair and maintenance services remain at the second position with a 14.93 percent contribution in GDP and 17.5 percent contribution in the share of employment. Manufacturing is at a third of the list with a 15.13 percent contribution in the share of the employment and 11.27 percent of the establishment even though the contribution of this sub-sector to GDP is 5.10 percent. Similarly, construction is the fourth largest sector by employment (13.8 percent) even though the contribution of this sub-sector to GDP is 6-30 percent.
8. Agriculture is relatively a less productive sector. Cereal crops, horticulture, livestock, fisheries, and forestry are the major subsectors of the agricultural sector. Cereal crops contribute the highest (49.4 percent) to the sector's value addition followed by livestock (25.8 percent), horticulture (16.7 percent), and forestry (8.1 percent). Out of employed people of the 15 -44 age group, only 12.5 percent have formal vocational training.
9. The agriculture sub-sector is highly dominated by domestic workers. Regarding foreign employment, a total of 559 people flew overseas in terms of agricultural works in 2018/19 while this number dropped to 183 in 2020/21.
10. There is a mismatch between the agriculture incentive policy and the implementation mechanism. Most of the agricultural graduates have competencies in traditional occupations but have limited competencies in 21<sup>st</sup>-century skills. This has limited their opportunities in the occupations related to agro-processing, value chain, and logistic support.
11. The mining and quarrying sub-sector employ 0.8 percent of the total labor force out of which 27 percent are females and the remaining 73 percent are males (NLFS 2017-18). The employed number of people in this sub-sector is 59775 which is 0.83 percent of the total employed. The average real GDP growth rate of this sub-sector during 2002-2019 is 5 percent and the contribution of this sector is 0.59 percent in terms of the total GDP. Data shows that a total of 59775 population is employed in the mining and quarrying sub-sector, out of which, a total of 41476 (69%) are between 15-44 age group and remaining are above 44 years of age. Out of that age group, 10717 (25.83 %) are women and the rest 30759 (74.16 %) are men which indicates that this sub-sector is predominantly occupied by men.
12. The trained manpower in the mining and quarrying sub-sector is only 5.38% as only 2232 workforce has received some sort of training while 39244 (94.61 %) are without any form of training. During the field interaction, the sectoral experts mentioned that women are also in this sub-sector but as labor only.

13. At present, the data shows that there are no migrants in the mining and quarrying sub-sector, but some foreign mine engineers are working in Nepal due to a lack of skilled Nepali engineers. Similarly, are inadequate human resources associated with this sub-sector
14. There are currently 104,058 establishments within the manufacturing sub-sector, which is 11.27 percent of the total business establishments. There are altogether of 1071847 workforces in the manufacturing sub-sector, out of which 755285 (70.46 percent) are in between the 15 to 44 age group. In terms of the gender composition of age 15-44, 278184 (36.83 percent) are women whereas 477101 (63.17 percent) are men which clearly shows that the manufacturing sector is also predominantly occupied by men.
15. The manufacturing sub-sector also has lots of untrained workforces. Out of 755285 workforces that are in between 15 to 44 years of age, only 195828 (25.93 percent) have received some sort of training whereas the remaining 559457 (74.07 percent) have not received any training at all, which indicates that this sub-sector heavily relies on non-skilled workers.
16. CNC Operator, PLC operator, Laser welding machine operator, software operators, Mechatronics (Mechanical and electronics) are some of the emerging occupations in the manufacturing sub-sector. They also emphasized that the majority of the jobs in this sub-sector now require grade 12 or Diploma level education to handle the necessary technology.
17. Machine Operator, Manufacturing Worker, Welder, Tailor are the major occupations in the manufacturing sub-sector for Nepali migrant workers abroad. In another aspect, Mechanical Engineers or Designers, Electromechanical Engineers are occupied by immigrants. Likewise, CNC operators, PLC operators, Laser cutting and welding technicians, industrial electricians, digital machine operators, A/C maintenance technicians, machine operators, boiler operators, chemists in Cement, food technologist, cutting master, finishing, and tailoring workers in garment industries are from India.
18. The industries are compelled to bring workforce from India as there is an acute shortage of skilled workers. Similarly, the industries are suffering from an inadequate supply of raw materials and this has led to the import of cheap products from neighboring countries thus jeopardizing the status of industries in Nepal.
19. Out of the total 977615 workforces employed in the construction sub-sector, only 97882 are employed in an informal way which is 10 percent of the total workforce. The remaining 879733 (90 percent) are employed in a non-formal way. This sub-sector is also dominated by men as 630623 out of 720186 workforces (87.6 percent) are men while the remaining 89563 (12.4 percent) are women.
20. The number and percentage of workforces receiving training are 83015 (11.5 percent) while the number and percentage of workforces not receiving any training are 637171 (88.5 percent) which is an alarming concern as this sub-sector completely relies on untrained workers.

21. The emerging jobs in the construction sub-sector are mason, steel fixture, tile marble fixer, plumber, building painter, plasterer, electrician, shuttering carpenter, scaffolder, pipefitter, gypsum installer, gabion weaver, drafting technician, construction workers, heavy equipment operator (concrete layer, bituminous surface road worker, crane operator, motor grader operator, wheel loader operator, bulldozer operator, excavator operator, backhoe loader operator, road roller operator).
22. Construction is the main sub-sector for foreign employment. It was revealed that more than 30 percent of workers in this sub-sector are from India, especially heavy equipment operators, asphalt technicians, gypsum technicians, tile marble fitters, etc. Since this sector has non-skilled workforces, the industries are facing a major challenge in terms of the capable workforces that are required for this sub-sector.
23. Near to one-fourth of 1239900 workforces that are in wholesale and retail trade; repair of motor vehicles and motorcycles sub-sector, 881517 are in between 15-44 years of age group, out of which 412789 (46.8 percent) are women and the rest 468728 (53.2 percent) are men. The data source shows that a total of 145913 (16.55 percent) have received some sort of training while 735604 (83.45 percent) are without any training.
24. Main occupations of major jobs available in wholesale and retail trade; repair of motor vehicles and motorcycles sub-sector as shared by the concerned stakeholders are technicians, mechanics, dent painter, auto electricians, engine fitter, machine operator, body maker, fuel injector, welder, electric mechanic, car mechanic, body mechanic, refrigeration technician, charging station technician, welder, chassis and springs maker, and spare parts salesperson.
25. The number of migrants in this wholesale and retail trade; repair of motor vehicles and motorcycles sub-sector is very negligible. In contrast, there are many immigrants from India in the repair of motor vehicles. The current TVET does not support the production of the workforce that is related to this sub-sector.
26. The contribution of the transportation and storage sub-sector to the national GDP is 5.14 percent, the number of people employed in this sub-sector is 322379 and the share of employment is 4.55 percent to the total employment. Likewise, the average real GDP growth rate of this sub-sector during 2002-2019 is 6 percent.
27. Of the 322379 workforces that are involved in the transportation and storage sub-sector, a total of 258510 (80.19 percent) are between 15-44 age group while the remaining 63869 (19.81 percent) are above 44 years of age and in terms of gender participation, only 6680 (2.58 percent) are women and the rest 251830 (97.42 percent) are men which indicates that transportation and storage sub-sector is men dominated sub-sector.
28. In the transportation and storage sub-sector, a total of 58239 (22.53 percent) have received some sort of TVET or professional training whereas 200271 (77.47 percent) have not received any training at all.
29. Transportation and storage are one of the major sub-sectors for foreign employment and there are no foreign workers in this sub-sector. Inadequate skill amongst the workforce is the major issue associated with this sub-sector. In addition to this issue, the concerned stakeholders stated that the license system is very lengthy and difficult,

and as a result, many drivers and machine operators have not been able to hire certified drivers/operators on time

30. The contribution of the accommodation and food service activities to the national GDP is 1.7 percent. There are a total of 370924 workforces that are engaged in this sub-sector, out of which 275298 (74.22 percent) are between the 15-44 age group while the remaining 95626 (25.78 percent) are above 44 years of age. Out of the total 275298 workforces employed in this sub-sector, 48507 (17.62 percent) have received some sort of training while 226791 (82.38 percent) are without any training.
31. The emerging occupations identified in accommodation and food service sub-sector during the field interaction are Cooks (Japanese, Mediterranean, Italian, Continental, Chinese and Indian), Chef, Barista, Waiter and Waitress, Housekeeper, Housekeeping supervisor, HR officer, Business promotion officer, Front Desk Officer, Laundry Technician, Dishwashers, and Gambling Inspector.
32. Accommodation and food service is one of the major sub-sectors for foreign employment and there are few chefs and general managers of the big hotels are foreign workers.
33. The contribution of the information and communication sub-sector to the national GDP is 2.22 percent with employment to 60263 workforces which is 0.85 percent of the total employment. Out of the total 60263 population engaged in this sub-sector, 47872 (79.44 percent) are between the 15 to 44 age group while the remaining 12391 (20.56 percent) are above 44 years of age. Out of those age groups, 10521 (21.98 percent) are women and 37351 (78.02 percent) are men which shows that like other sub-sectors, this sub-sector has men in front in comparison to their counterparts.
34. In terms of training status, 16608 (34.69 percent) have received some sort of professional or vocational training while the remaining 31264 (65.31 percent) have not received any training at all in the information and communication sub-sector.
35. The migrant workers are very few in the information and communication sub-sector. Similarly, there are almost all non-immigrant workers in this sub-sector. However, the inadequacy of competencies of the workforces is the key issue.
36. Electricity, gas, steam, and air conditioning supply sub-sector collectively contribute only 1.23 percent to the GDP despite posing an annual growth rate of 25.58 percent in 2019-20. This sub-sector only employs 0.5 percent of the total labor force in the country with employment to 34,234 workforces across the country. Similarly, out of the employed workers, 28.10 percent have received some sort of formal vocational/professional training while 71.90 percent are without any training.
37. A/C technician, energy auditor, electrical lineman, electrical motor re-winder, transformer repair technician, switchboard operator, cable jointer, armature re-winder, gas pipefitter, and transmission line technician, TBM machine operator, CNC operator, PLC operator are the emerging occupations of electricity, gas, steam, and air conditioning sub-sector.
38. There are very few migrant workers in the electricity, gas, steam, and air conditioning sub-sector. In contrast, many workers from India are in Nepal in this sub-sector. The

highly dominated occupations by immigrants are transmission line technicians, A/C, and refrigeration technicians.

39. The contribution of water supply, sewerage, waste management, and remediation sub-sector to the national GDP is 0.58 percent. The composition of the age group (15-44 and above 44 years of age) is 75.43 and 24.57 percent respectively as 31895 workforces are 15 to 44 years of age while the remaining 10,374 are above 44 years. In terms of gender participation, 7020 (22 percent) are females and the rest 24875 (78 percent) are males which shows that female involvement in this sub-sector is less than one-fourth of the total employment.
40. In terms of training, 1100 (34.49 percent) are trained while the remaining 20895 (65.51 percent) are untrained workforces working in water supply, sewerage, waste management, and remediation sub-sector.
41. Emerging occupations in water supply, sewerage, waste management, and remediation sub-sector are Tunnel Technician, Process Engineer for water purification & sewerage water treatment, Process Overseer, Solid Waste Processor, Repair & Maintenance (Electro-Mechanical) Technician, and Green Plumber.
42. There are very few migrants in the water supply, sewerage, waste management, and remediation sub-sector. There are workers from India and Bangladesh in the occupation related to waste collection.
43. Inadequately skilled workers, high turnover of skilled workers, and lack of 21<sup>st</sup>-century skills especially in ICT and digital technology, and entrepreneurship skills are major issues in all sub-sectors.
44. This report has presented available occupations, emerging occupations, green occupations of all 10 sub-sectors. A projection of the future workforce in sub-sectors and gaps of the demand side is presented. Similarly, the report has given economy, TVET, and sub-sectoral recommendations to mitigate the issues and gaps.

# CHAPTER 1

## INTRODUCTION

### 1.1 National Economic Context

The average economic growth rate of Nepal remained at 4.3 percent over the last five years, with the economic growth rate reaching as high as 9 percent in 2017 and a negative 2.09 percent in 2020. The economic survey 2021 estimates that this growth rate will remain at 2.9 percent (IMF, 2021); while the Ministry of Finance estimates this growth rate to remain at 4.0 percent and ADB estimates this growth rate to remain at 6.4 percent<sup>1</sup>.

The recent growth in GDP is also reflected in the number of establishments across years. The economic census (2018) revealed that 394,219 establishments were established within April of 2015 and 2018. This is around 42.7 percent of the total 923,356 establishments in Nepal. These new establishments have created additional employment for 910,490 during these three years. This has also created a need for a skilled workforce to enhance productivity.

Table 1: Key economic indicators

Indicators	2016	2017	2018	2019	2020
GDP	0.4	9.0	7.6	6.7	-1.9
Per Capita Income (\$)	866	1009	1138	1159	1126
Remittance Income as % of GDP	25.5	22.6	21.8	22.8	22.4

Source: Economic Survey 2020-21, Ministry of Finance; Nepal Labor Force Survey 2017-18, Central Bureau of Statistics

Despite the high growth in recent years, nearly 16.67 percent of the total population of Nepal is still below the poverty line. The GDP per capita has increased to USD 1126 in 2020 which was USD 866 in 2016 (MoF, 2021). The economic disparity between the rich and the poor is high and growing. The matter has been made worse by the worldwide impact of Covid-19 that has led to a loss of jobs—primarily through working in the low-skilled informal sector. It is due to this reason the TVET needs to be reformed so that the skilled workforce can address national and global standards.

### 1.2 Gender and age status of the existing workforce

According to the Nepal Labor Force Survey (2017/2018), the share of the 15+ population is 20.7 million, which is 71.5 percent of the total population of the country. Out of this population, 7.1 million people are at jobs while 908 thousand people are either semi-employed or not employed at all. In this respect, the employment rate of 15+ males is 48.3 percent and the employment rate of 15+ females is 22.9 percent with an aggregate of 34.2 percent in the case of both males and females. Meanwhile, among the 15+ population that do not have a secondary level of education, 31.5 percent of them are employed. In comparison, this percentage is 43.5 percent in the case of the 15+

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<sup>1</sup><https://www.adb.org/news/nepals-economy-slow-fy2020>

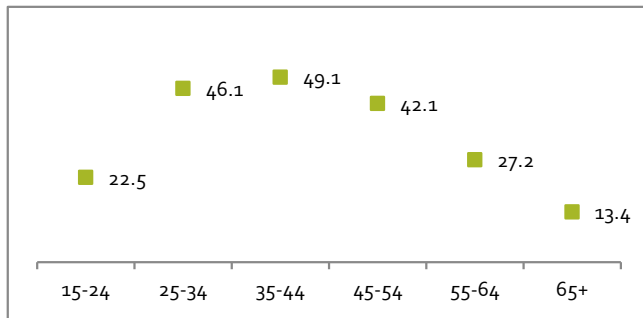


Figure SEQ Figure \\* ARABIC 1: Share of employed in different age group

scope of TVET in terms of plans and programs.

### 1.3 The rationale of the Study

As new labor forces enter the market, jobs need to be created, or else there is a risk that people migrate overseas for a job. Data shows that five hundred thousand new labor forces enter the market every year, out of which 1.5 percent are skilled, 24 percent are semi-skilled, and 74.5 percent are unskilled (DoFE, 2020). Those who are migrated are engaged in what is referred to as 3D Jobs (dirty, dangerous, and difficult), thus pushing them into vulnerable job positions. Even when remittance has become an important source, yet not the viable option for the long-lasting development of an economy, the competent labor force is a major need of the current economy, and Technical and Vocational Education Training (TVET) can play a vital role in enhancing the employability skills of the youths and the adults.

The declining number of students in the TVET stream indicates a mismatch between the demand and supply of the TVET programs as courses are often implemented without prior research on the labor market. There are study reports on the labor market, but those reports are not adequately linked with overall TVET courses and their program. Therefore, this study was necessary to identify the existing gaps, issues, and challenges of the labor market and possible measures to address them in the overall TVET system. Similarly, this study was essential to identify the highly contributing economic sub-sectors and employable occupations within those sectors. We hope that this report will help the Ministry of Education, Science, and Technology (MoEST) in developing the TVET national strategic plan that can be beneficial to all levels of government and stakeholders.

### 1.4 Objectives

The context mentioned above has necessitated a paradigm shift in the TVET sector with conventional TVET practice to be replaced by the market-driven TVET system, which is possible only by providing skills with global competitiveness. It is hoped that such competitiveness would reduce the economic disparity with growth in employment and economy. With this view in mind, the MoEST aims to develop the national strategic plan for the TVET sector that lays out the strategic vision, mission, objectives, financing

population with a secondary level of education and 61.8 percent in the case of the 15+ population with a tertiary level of education. In another analysis, the share of the population that is employed in the formal sector is 15.4 percent while this percentage is 84.6 percent in the case of the informal sector. Figure 1 above shows the workforce share as per different age groups and provides the



mechanisms, and targets for the sector, to be achieved by the three tiers of government by 2030. This study, therefore, aims to:

- i) provide the status of 18 economic sub-sectors at the national level
- ii) conduct labor market analysis of 10 economic sub-sectors with special emphasis on the demand of workforce

This study uses the Central Bureau of Statistics (CBS)'s Nepal Standard Industrial Classification (NSIC)<sup>2</sup> which has categorized economic activity into 18 different sub-sectors. The detailed definition of sectors and sub-sectors is given in chapters 3 and 4 of this report.

### **1.5 Limitation of the study**

The analysis of 18 economic sub-sectors has been done by looking at the available secondary data sources. The labor market demand-side analysis of 10 economic sub-sectors has been done by ranking sub-sectors based on the contribution of the sub-sector in GDP, employment, and productivity. Secondary quantitative data along with primary qualitative data has been used to analyze the labor market demand-side analysis. The field visits were made to 11 major cities, and discussions were held with 253 sectoral experts, but it is felt that equal and scientific representation of sectoral industries could not be met.

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<sup>2</sup> <https://cbs.gov.np/nepal-standard-industrial-classification-nsic/>

## CHAPTER 2 METHODOLOGY

### 2.1 Sub-Sector Selection

There are 18 sub-sectors identified in the Nepal Labor Force Survey report prepared by the Central Bureau of Statistics. This report, therefore, has analyzed all those 18 sub-sectors and has prioritized ten sub-sectors for the labor market analysis. The criteria for identifying the 10 sub-sectors have been developed by looking at real GDP growth, the share of employment, and the share of productivity of each sub-sector and has been referred to as sectoral ranking as given in Table 2. While calculating the sectoral ranking, the following steps were used.

**Step 1:** Identifying key variables that represent the current economic contribution and potential for growth of the sub-sector. For current economic contribution, two major variables, and that include, average real GDP growth rate and share of the workforce were considered whereas, for potential growth, sales per entity has been considered.

**Step 2:** Categorize each variable into high, moderate, and low values. For this, the given metrics were used for categorizing the variables.

Table 2: Metrics

Variables	High	Moderate	Low
Average Growth	Above 5 percent	2-5 percent	Below 2 percent
Employment	Above 10 percent	5-10 percent	Below 5 percent
Productivity	Rs. 25000 and above	Rs. 5000 – 25000	Below 5000

**Step 3:** Providing value to each category. High, moderate, and low categories each were given values of 5, 3, and 1, respectively.

**Step 4:** Calculating total sectoral value. The sectoral value was calculated as weighted average sectoral value, with categorical values used as weight.

**Step 5:** Deriving sectoral ranking. Sectors were ranked from 1 to 18 as per the total sectoral values calculated in step four.

Based on these steps, table 3 below provides the status of sectors across variables and their sectoral values and ranking.

Table 3: Sub-sector analysis

Sub-sector	Average Growth (Real GDP growth)		Employment (Share of the workforce)		Productivity (Sales per entity)		Total Sectoral Value	Sectoral Ranking
	Category	Value	Category	Value	Category	Value		
Construction	High	5	High	5	High	5	5.0	1
Wholesale & retail trade	High	5	High	5	Low	1	4.2	2
Education	High	5	High	5	Low	1	4.2	-
Manufacturing	Moderate	3	High	5	Moderate	3	4.0	3
Transportation & Storage	High	5	Moderate	3	High	5	4.0	4
Agriculture; forestry & fishing	Low	1	High	5	Low	1	3.0	5
Mining & Quarrying	High	5	Low	1	High	5	3.0	6
Electricity, gas, steam, & air conditioning supply	High	5	Low	1	High	5	3.0	7
Information & communication	High	5	Low	1	High	5	3.0	8
Water supply; sewerage, waste management, & remediation activities	High	5	Low	1	Moderate	3	2.6	9
Accommodation & food service activities	Moderate	3	Moderate	3	Low	1	2.6	10
Financial & insurance activities	High	5	Low	1	Moderate	3	2.6	11
Professional, scientific & technical activities	Moderate	3	Low	1	Moderate	3	2.0	12
Administrative & support service activities	Moderate	3	Low	1	Moderate	3	2.0	13
Human health & social work activities	Moderate	3	Low	1	Low	1	1.6	14
Arts, entertainment and recreation, & other service activities	Moderate	3	Low	1	Low	1	1.6	15
Other service activities	Moderate	3	Low	1	Low	1	1.6	16
Real estate activities	Low	1	Low	1	Moderate	3	1.4	17

While calculating the ten economic sub-sectors and the rankings, the growth, employment and productivity have been provided the weight of 30, 50, and 20 percent, respectively.

Education and financial and insurance activities have been deliberately left out based on the assessment that TVET graduates are less likely to be engaged in those two sub-sectors.

## 2.2 Source of data

The analysis presented in this report is mainly derived from secondary data on the economic and labor market published by the Government of Nepal. The main sources are the economic surveys published by the Ministry of Finance and the Labor Force Survey 2017/2018 published by the Central Bureau of Statistics (CBS).

## 2.3 Data collection technique

Both qualitative and quantitative data have been used in this study. Qualitative information has been collected through interviews, focus group discussions, and consultative meetings with stakeholders that included employers, employees and their respective associations, professional associations, practitioners, TVET experts, academia, and policymakers in major industrial cities of seven provinces. The collected information has been supplemented with desk-based sector research and literature analysis. The list of FGD respondents is given in Annex III.

## 2.4 Target Population and Sample

The target population of this study is industries/employers of the selected ten prioritized economic sub-sectors along with concerned government departments and line agencies.

This study team used the snowball sampling method to select sectoral experts for this study. Table 3 below provides the number of sectoral experts.

## 2.5 Data Analysis

Both primary and secondary data were analyzed separately. The response from the primary qualitative questionnaire was used to supplement the output obtained from secondary data. The secondary data has been grouped by gender and age categories of 15-24, 25-34, and 35-44. The age above 44 has been deliberately left out from this analysis since those populations are less likely to be supported by any type of TVET reform. Table 4 given below provides the details on sectoral experts/industries that were part of the discussion during this study.

Table 4: Number of sectoral experts/industries

Economic Sub-Sector	Number of sectoral experts/industries by Provinces							Gov. Dept Officer	Total
	1	2	Bagmati	Gandaki	Lumbini	Karnali	Far West		

Construction	8		10	2	4	8	4	2	38
Agriculture; Forestry & Fishing	8		2	3	6	4	4	4	31
Manufacturing	4	4	13	6	14	4	2	1	48
Accommodation & Food Services	10	5	12	16	6	4	8	4	65
Wholesale & retail trade; repair of motor vehicles and motorcycles	1	1	3	4	9	2	6		26
Transport & Storage	1		2	2	2		4		11
Mining & Quarrying			1		1	1	1	1	5
Electricity, gas, steam, & air conditioning supply	1		2	2	4	1	2	1	13
Information & communication	1		1	1	2	1	1	1	8
Water supply; sewerage, waste management	1		1	1	1	1	2	1	8
Total	35	10	47	37	49	26	34	15	253

Focused group discussion and consultative meetings were held in eleven major cities of all seven Provinces That include Biratnagar, Kathmandu, Birgunj, Hetauda, Bharatpur, Pokhara, Butwal, Bhairahawa, Nepalgunj, Surkhet, and Dhangadhi.

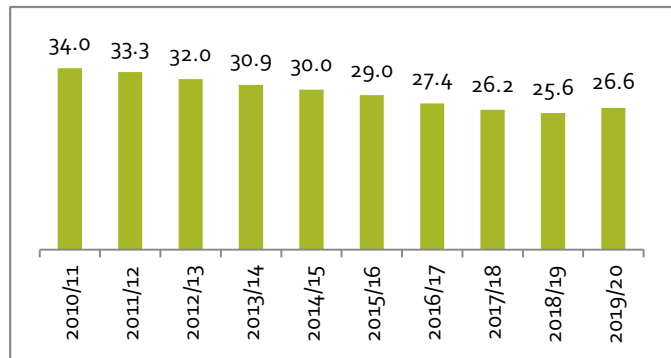
## CHAPTER 3

### ECONOMIC SECTOR ANALYSIS

The Ministry of Finance has categorized economic activities into primary, secondary, and tertiary sectors. The primary sector includes economic activities, also called a sub-sector related to agriculture, forestry, fishery, mining, and quarrying. The secondary sector includes economic activities related to manufacturing, construction, electricity, gas, and water, while the tertiary sector is activities associated with wholesale and retail trade, hotel and restaurant sector, real estate, and business and renting activities.

#### 3.1 Primary sector

The contribution of the primary sector to GDP reached 34.0 percent in 2010/11 and has regressed each year, reaching as low as 26.6 percent in 2019/20. Lack of information of finances and support system; use of outdated technology and farming methods; difficulties in access to inputs including



the irrigation, and timely market access to get fair prices are often cited as the reason for lower productivity and hence, the declining contribution of the primary sector to GDP (UNCDF 2018)<sup>3</sup>. Such a situation has resulted in a lack of interest, especially

among youths to search for jobs in the sector (Chaudhary 2018; Gauchan 2008). They are searching for a job in the service sector that is growing rapidly even though agriculture has remained a priority sector of successive governments and all long-term plans and policies vow to transition from subsistence to commercialization.

In the fifteen five years plan (2019-2024), the government aims to decrease the share of the agriculture sector in GDP from 26.6 percent in 2019 to 22.3 percent by the end of five years and to 9 percent in 25 years. This plan aims to commercialize the agriculture sector with the provision of 50 percent tax exemption on the income from dairy and tea production and 100 percent exemption for all micro agriculture businesses.

<sup>3</sup><https://www.uncdf.org/article/3798/unlocking-the-potential-of-the-agriculture-sector-in-nepal>

### 3.2 Secondary sector

The contribution of the secondary sector has remained stable across 10 years with as high as 14.6 percent in 2011/12 and reaching as low as 13.2 percent in 2019/20. Part of the reason for a slight decline in this sector can be attributed to the manufacturing firms not being willing to expand their operations despite various exemptions and incentives provided by the government, simplified administrative procedures, and the creation of a Special Economic Zone (SEZ) (IBN 2020)<sup>4</sup>. Similarly,

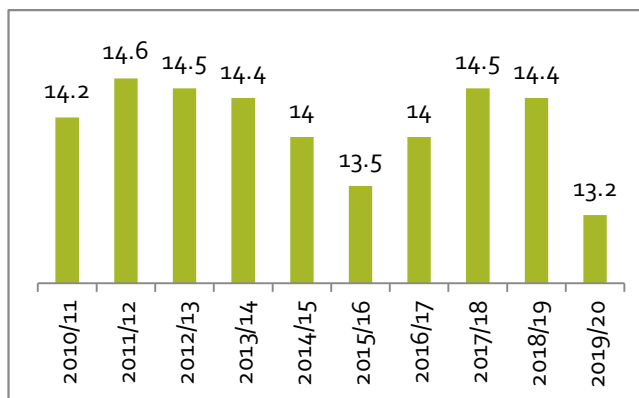


Figure SEQ Figure \\* ARABIC 3: Share of secondary sector on GDP

'policy implementation uncertainty; inadequate supply of electricity; high cost of transport; and challenging industrial relations and outdated labor laws and regulations are also cited as constraints to growth in this sector (MOF 2014, page 5).

### 3.3 Tertiary sector

The primary and secondary sector share has declined over the years. However, the tertiary or service sector share is gradually increasing each year. The share of this sector was 51.9 percent in 2010/11, while the share has now increased to 60.2 percent in 2019/20. Part of the growth of this sector has been attributed to household spending on consumption and housing and other construction activities. The construction sector's contribution to the total value added to the national economy has gradually increased over the years and stood at 7.8 percent in the fiscal year 2018-19. The inflow of remittances has led to the private consumption of the households, leading to the increase in the share of the tertiary sector in the national economy.

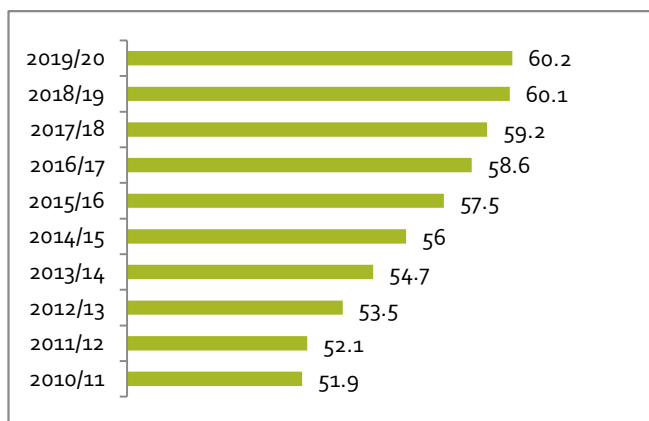


Figure SEQ Figure \\* ARABIC 4: Share of tertiary sector on GDP

### 3.4 Migration trend and contribution of remittances in the national economy

Migration and flow of remittances have become an integral part of the national economy for 10 years. The population census 2011 showed that around 7.24 percent of Nepali citizens are outside Nepal in search of jobs (CBS 2011), which might have increased by

<sup>4</sup><https://ibn.gov.np/opportunities/sectors/manufacturing/>

2021 in a significant number. The data from 2013 showed that an estimated 3 to 3.5 million Nepalese are outside the country, out of which one third is in India (CCESLAM, 2013). The MoF data puts the number of migrants to 2.1 million other than India in 2015 (MOF 2017).

Figure 5 shows that the number of migrants leaving Nepal for jobs has declined after the earthquake in 2015. Also, in the middle of the Covid 19 during 2019/20, the number of migrants leaving Nepal has remained at 172266, with 157137 males and 15129 females (DoFE, 2021). Still, Data shows that even with the decline of migrants, the flow of remittances has increased and has reached 879 billion in 2018/19. It is hoped that once the worldwide impact of Covid 19 ends or declines, the number of migrants will increase, but until this situation is under control, there will be fewer migrants resulting in a decrease in remittances in the national economy.

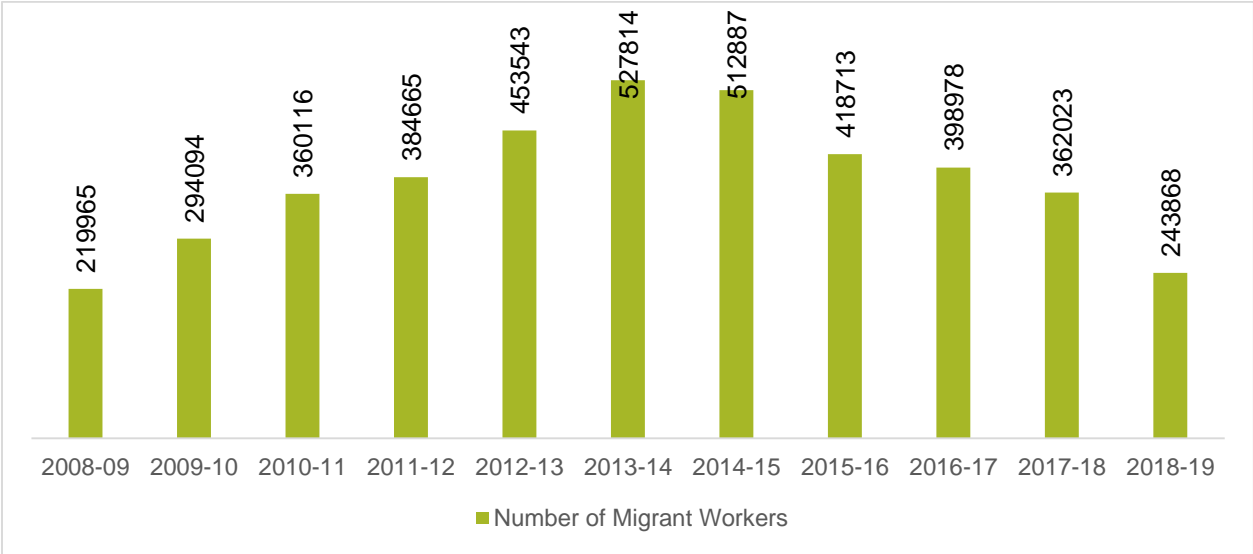


Figure 5: Number of migrant workers



While the number of migrants leaving Nepal has dropped from 2013-14, the volume of remittances is rising steadily. The remittance inflow has increased by 9.8 percent in FY 2019-20, to Rs. 961.05 billion.

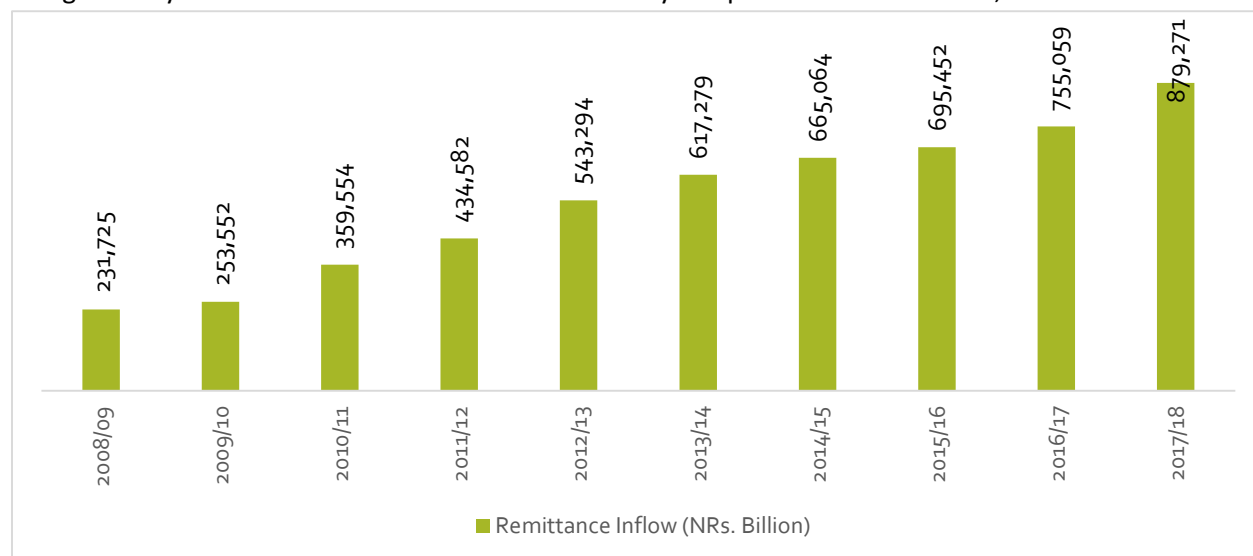


Figure 6: Inflow of remittances

At the household level, the inflow of remittances has also been reflected in Nepal Living Standard Survey (2010/11) as this data source estimates that 56 percent of Nepali households receive remittance each year which has also led to the reduction of the poverty level in the country. 30.9 percent of the population was below the poverty line in 2001/02, however, this has now dropped to 16.67 percent (MoF, 2021), and part of the reasons can be attributed to income from remittances (NRB 2020). Meanwhile, table 5 given below provides the top 15 occupations of migrants for 2019/20.

Table 5: Top 15 occupations by sector and by number of migrants

Sector	Occupation	Number of Migrants
Tertiary	Cleaner	38780
Secondary	Factory Worker	14869
Tertiary	Security Guard	14869
Tertiary	Driver	13714
Secondary	Metal Scaffolder	5774
Secondary	Mason	5790
Tertiary	Waiter/Waitress	4004
Secondary	Production Operator	3694
Tertiary	Cook	3435
Secondary	Electrician	2154
Tertiary	Salesman	1842
Secondary	Plumber	1408
Secondary	Construction Carpenter	950
Secondary	Welder	936
Tertiary	Care Giver	220
<b>Total</b>		<b>38780</b>

Source: DoFE, 2021

Remittances have supported the development of the financial sector as well. The central bank has assessed that the remittance flow has helped in mobilizing the domestic deposit and private lending capacity of the financial institutions. Similarly, remittances have also contributed to improved government revenue and supported macroeconomic stability. The surge in import duty collections is directly attributed to an increase in imports financed by the remittance income. The remittance flow has helped maintain a relatively balanced external sector and has enabled the economy to maintain a reasonable level of foreign reserves, and to maintain the value of their exchange rate. But unless the country seeks an alternative stream of revenue amidst the slowing remittance flow, the national economy is likely to have a negative balance of payment very soon.

### 3.5 Impact of different economic sub-sectors in the national economy

Within the primary, secondary, and tertiary sectors, there are 18 different sub-sectors as defined by Nepal Standard Industrial Classification (NSIC) as given in Table 5. This table shows the share of GDP of different sub-sectors including the number of establishments, the share of establishments, number and percentage of the employed workforce, and annual sales per person engaged for 2017/18.

Table 6: Sub-sectors and their share in the national economy

Sub-sectors	GDP Share (2020-21,%)	Total Establishments		Employment Status 2017-18		Annual Sales Per Person Engaged (1000 Rs.)
		Number	Share	Number	%	
Agriculture, forestry, and fishery	26.01	24,229	2.62	1,523,338	21.50	579
Wholesale and retail trade	14.93	498,069	53.94	1,239,900	17.50	613
Real estate activities	9.11	207	0.02	16,544	0.23	2,209
Education	8.29	40,839	4.42	558,077	7.88	523
Public administration and defense	7.95			133,213	1.88	-
Financial and insurance activities	6.76	17,996	1.95	117,678	1.66	1,215
Construction	6.30	1,608	0.17	977,615	13.80	6,349
Transportation and storage	5.14	3,182	0.34	322,379	4.55	4,480
Manufacturing	5.10	104,058	11.27	1,071,847	15.13	1,405
Information and communication	2.22	2,796	0.30	60,263	0.85	5,831
Human health and social work activities	1.72	19,990	2.16	170,840	2.41	521
Accommodation and food service activities	1.70	130,540	14.14	370,924	5.23	692
Electricity, gas, steam, and air conditioning supply	1.22	1,242	0.13	34,234	0.48	9,057
Professional, scientific, and technical activities	1.01	8,204	0.89	44,372	0.63	1,576
Administrative and support service activities	0.78	6,873	0.74	63,840	0.90	1,582
Arts, entertainment, and recreation; Other service activities	0.60	60,335	6.53	280,128	3.95	448
Mining and quarrying	0.59	663	0.07	58,775	0.83	3,290
Water supply; sewerage, waste management and remediation activities	0.58	2,525	0.27	42,229	0.60	3,247

Source: National Accounts 2021; Economic Census 2018; Nepal Labor Force Survey 2017-18 (Central Bureau of Statistics.)

Agriculture, forestry, and fishing remain at the top of the position with a 26.01 percent contribution in GDP and 21.50 percent contribution in the share of employment. Table 5 also shows that the share of the new establishment is only 2.62 percent in the case of agriculture, forestry, and fishing while this share is 53.94 percent in the case of wholesale and retail trade, which indicates that this sub-sector probably could rise in the future.

Manufacturing is at the second of the list with an 11.27 percent contribution in the share of the establishment even though the contribution of this sub-sector to GDP is 5.10 percent. This also indicates that the manufacturing sub-sector is likely to attract more employment in the future. The share of a new establishment in mining and quarrying is only 0.07 percent and is likely to get fewer new employment opportunities.

## CHAPTER 4

### SUB-SECTORAL ANALYSIS

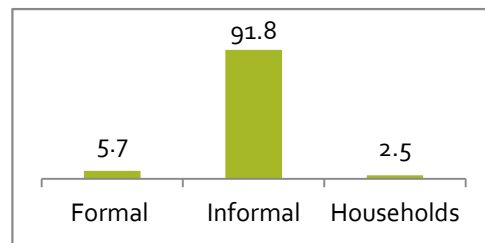
This chapter provides the analysis of 10 major sub-sectors identified from the economic sector analysis. While providing the analysis, detailed employment status of different age groups categorized by gender, level of qualification, and training status has been provided. The identified major occupations, issues associated with each sub-sector, and the specific case study have also been discussed in this section. Each sub-sector's GDP and employment projection has also been provided at the end of this chapter.

#### 4.1 Agriculture, forestry, and fishery sub-sector

Agriculture is the major sector in terms of GDP contribution and the share of employment. The contribution of agriculture, forestry, and fishery to GDP was 36 percent in 2008 while this share declined to 27 percent in 2018 (MoF 2019) and the 15th five-year plan has set a target to achieve a minimum economic growth of 9.4 percent per annum over the planned period (2023-24). However, the contribution of this sector is declining and major reasons for such decline, according to UNCDF (2018)<sup>5</sup> lack of information of finances and support system; use of outdated technology and farming methods; difficulties in access to inputs including the irrigation, and timely market access to get fair prices. This is not necessarily a bad sign for the economy. For the economy to develop the relative contribution of agriculture to output and employment must decline and the contribution of service and industry should increase.

##### 4.1.1 Workforces in agriculture, forestry, and fishery sub-sector

Out of the 1523,337 population that is engaged in the agriculture sector, 86,282 (5.7 percent) are employed in the formal sector while 1398,238 (91.8 percent) are engaged through the informal sector and the remaining 38,816 (2.5 percent) are engaged in household activities. Table 5 below provides the agriculture sector's current status disaggregated by gender and different age groups.



**Table 7: Employment status in the agriculture sector by age, gender, level of education, and training**

Status	15-24		25-34		35-44	
	Female	Male	Female	Male	Female	Male

<sup>5</sup><https://www.uncdf.org/article/3798/unlocking-the-potential-of-the-agriculture-sector-in-nepal>

Total Employed	132,255	89,898	186,948	103,280	232,273	130,863
No formal education	22,543	15,768	79,650	24,366	165,873	45,628
Primary level education	48,253	35,503	68,685	49,536	49,666	42,134
Secondary level education	60,093	38,233	36,491	26,413	16,734	41,786
Tertiary level education	1,367	394	2,122	2,965	-	1,315
With formal vocational/ professional training	18,537	8,890	25,562	12,900	23,991	20,726
Without formal vocational/ professional training	113,718	81,008	161,385	90,380	208,281	110,138

Source: Nepal Labor Force Survey 2017-18

Out of the 1523337-population involved in the agriculture sector, a total of 875,516 (57 percent) are between the 15 to 44 age group. Within this age group, 353,829 (40 percent) are without any formal qualification while only 8,161 (0.9 percent) are with tertiary education. In terms of training, 764,910 out of 875,517 (87 percent) workforces employed in the agriculture sector have not received any training at all while only 110,607 workforces (13 percent) have received some sort of training. It is to be noted that economic activities that fall under agriculture, forestry, and fishery as defined by Nepal Labor Force Survey (NLFS) are i) crop and animal production, hunting, and related service activities; ii) forestry and logging, and iii) fishing and aquaculture.

#### 4.1.2 Occupations in agriculture, forestry, and fishery sub-sector

Based on the discussions with sectoral participants and occupational standards development by NSTB/CTEVT, the major occupations are Junior Technician, junior technical assistant, vegetable producer, lead farmer, agro processor, and harvester. Meanwhile, the high-level occupations and the major occupations in this sub-sector are given in Annex II.

#### 4.1.3 Emerging occupations in agriculture, forestry, and fishery sub-sector

Agriculture is the less productive sector. Cereal crops, horticulture, livestock, fisheries, and forestry are the major subsectors of the agricultural sector. Cereal crops contribute the highest (49.4 percent) to the sector's value addition followed by livestock (25.8 percent), horticulture (16.7 percent), and forestry (8.1 percent). Besides, agriculture is based on low-value crops (such as cereals) and subsistence production, with only about 43 percent of agricultural households trading their products in markets. The research team carried out FGDs and interactions with related entrepreneurs to collect information regarding various aspects of the agriculture sector and its potential growth in the future. During the interaction, the sectoral experts stated that the need for linking technological advancement has been a major issue in the agriculture sector and therefore, this should be the major priority from both public and the private sector.

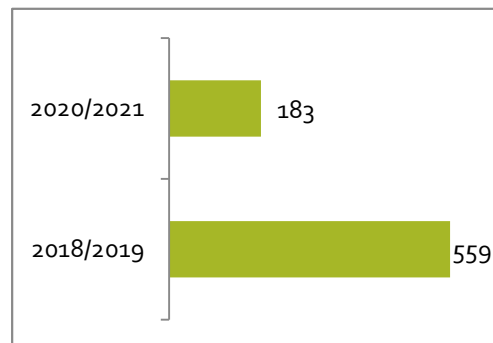
### Case 1: Use of technology in agriculture

A livestock entrepreneur in Butwal stated that a cow in India gives 9000-10000 liters of milk; the same cow gives 14000-15000 liters in Arab and Israel whereas we only get 3000 liters of milk during her lactation period. This inefficiency is partly due to the old technology that is still being used in Nepal. The use of technology is the better option to answer this inefficiency and therefore, both the public and private sector need to work together in that direction.

During the interaction, all sectoral experts agreed that domestic workers highly dominated this sub-sector. However, workers from India are employed as tea testers, food technologists, chemists and are also employed in managerial positions in various agriculture and food-based industries. Still, they felt that there is a high scope for agriculture technicians, junior technical assistants (JTA), organic certification inspectors, nutrition managers (farm management), tea coffee technicians, tea quality tester, fruit processors, agriculture logistic technicians, poultry hatching technician, fish hatching technician, dairy products producer, gardener and flower decorator.

#### 4.1.4 Migrants in agriculture, forestry, and fishery sub-sector

As shown in the figure given on the right, 559 people flew overseas in agricultural works in 2018/19 while this number dropped to 183 in 2020/21. In other words, the tendency to leave Nepal for possible jobs outside the country is declining due to COVID-19. As a result, the number of laborers and workers if provided adequate training and educational qualification can be beneficial in terms of the agriculture sector.



#### 4.1.5 Immigrants in the agriculture, forestry, and fishery sub-sector

As per the sectoral participants, there are workforces from India working in tea testing, herbal processing, fruit picking, and fruit grading, however, immigrants from other countries outside India are negligible in numbers.

#### 4.1.6 Green occupations in agriculture, forestry, and fishery sub-sector

Based on the discussions with sectoral participants, the key green occupations in this sub-sector are agriculture meteorologist, agriculture technician, climate risk manager, plantation technician, natural resource manager, forest and wildlife manager, forest officer, and forest conservation worker (Camors & Lopez, 2015). Based on the discussions with sectoral experts, organic farmers, vermiculture technicians, tea plantation technicians, orchard farmers, floriculture technicians, plant nursery

technicians, herbal farm technicians, and organic vegetable producers are the major green occupations.

#### **4.1.7 Issues associated with agriculture, forestry, and fishery sub-sector**

During the interaction with sectoral experts, various issues were identified regarding the agriculture sector and those issues are:

- There is a mismatch between the agriculture incentive policy and the implementation mechanism. Despite different incentives provided by the government, farmers have not been able to get that information and as a result, they are not getting the required support and incentives.
- Most of the agricultural graduates have competencies in traditional occupations but have limited competencies in 21<sup>st</sup>-century skills. This has limited their opportunities in the occupations related to agro-processing, value chain, and logistic support.
- There are inadequately skilled workers in all occupations requiring ICT and digital technology and competencies for machine and heavy equipment operation in the agriculture sector.
- The labor policy has been blamed for being more focused on workers' rights but not on performance-based incentives and productivity.
- Due to the lack of a skilled workforce, industries are recruiting foreign workers in illegal ways, and therefore, information on those types of workers is completely missing.
- The absence of National Competency Standards (NCS) has led to variations in occupational standards across different industries.
- Many workforces do not meet the required educational qualification as many machines and technology workforce require at least a tertiary level of education.
- There is no provision of providing skill certificates or licenses for the skilled occupations and therefore, this has been reflected in the low productivity of the workforce.
- Pulling of competent workers from one industry to another.

The fifteen plan targets to increase agricultural productivity by “agriculture and forest-related research and development, latest knowledge, and skills development in farmers, mechanization, irrigation, land development, land pooling, and intensive production and development of high value agricultural and forest products”. The agriculture sector will be made competitive, sustainable, self-reliant, and export-oriented through the development of scientific, commercial, market-driven, and consumer-oriented agricultural practices. Agriculture will be developed as an industry driven by modern technology modernization and commercialization. The plan also vows specialization for increased productivity in agricultural labor and aims to attract the youth. Agriculture will be transformed into a technology-friendly, mechanized, professional, highly rewarding, and dignified occupation.



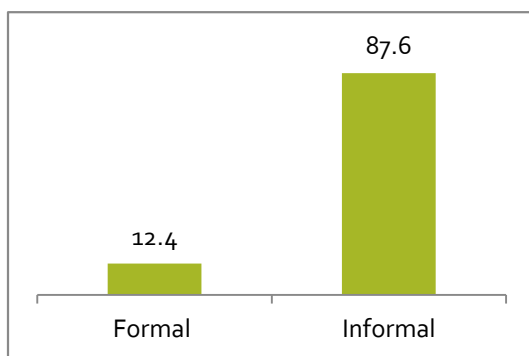
## 4.2 Mining and quarrying sub-sector

This sector employs 0.8 percent of the total labor force out of which 27 percent are females and the remaining 73 percent are males (NLFS 2017-18). The employed number of people in this sub-sector is 59775 which is 0.83 percent of the total employed. The average real GDP growth rate of this sub-sector during 2002-2019 is 5 percent and the contribution of this sector is 0.59 percent in terms of the total GDP (CBS, 2020). This has been the consistent phenomenon of this sector for at least the last ten years. The economic activities that fall under this sub-sector as mentioned by Nepal Labor Force Survey (NLFS) are i) mining of coal and lignite; ii) other mining and quarrying, and iii) mining support service activities.

According to the report (MoI, 2017), 63 minerals have been identified in Nepal to date. In 2015/16, 85 mines and quarries for 15 different minerals were in operation, out of which 31 are lime-stone quarries and 7 are gem mines. Currently, over 250 private investors have shown interest and have acquired the necessary licenses to operate various kinds of mining-related activities in Nepal. Hongshi Cement is probably the largest mining-based company currently in operations, with financing from FDI.

### 4.2.1 Workforces in mining and quarrying sub-sector

Data shows that 59775 workforces are employed in this sub-sector, out of which, 41476 (69 percent) are in between the 15 to 44 age group and 18299 (31 percent) are above 44 years of age. Out of that age group, 10717 (25.83 percent) are women and the rest 30759 (74.16 percent) are men which indicates that men predominantly occupy this sub-sector. Meanwhile, this sub-sector has been marked by informality as only 12.4 percent of the workforce is working in formal mine industries while 87.6 percent of the workforce is working in informal mining industries.



The sectoral experts mentioned that women are also in this sub-sector but only as labor as found during the field interaction. In another analysis, out of the 41476 workforces in this sub-sector, 11484 (27.69 percent) are without any formal educational qualification, 21566 (52 percent) have a primary level of education, the remaining 20 percent are with a secondary level of education and 0.5 percent have a tertiary level of education.

Table 8: Employment status in the mining sector by age, gender, level of education, and training

Status	15-24		25-34		35-44	
	Female	Male	Female	Male	Female	Male

Total Employed	1898	11860	4866	10737	3953	8162
No formal education	0	1416	1155	1607	2846	4460
Primary level education	1679	6898	3052	5818	1018	3101
Secondary level education	219	3546	659	3118	89	601
Tertiary level education	0	0	0	194	0	0
With formal vocational/ professional training	404	225	1162	46	89	306
Without formal vocational/ professional training	1494	11635	3704	10691	3864	7856

Source: Nepal Labor Force Survey 2017-18

The trained manpower in this sub-sector is only 5.38 percent as only 2232 workforces have received some training while 39244 (94.61 percent) have not received any training. Meanwhile, the lack of skilled manpower in this sub-sector was the major word of emphasis during the interaction with the sectoral experts. The case study below highlights this emphasis.

### **Case 2: Scarcity of workforce in the sub-sector**

The information officer in the Department of Mines and Geology revealed that there is only one mining engineer within the whole department. With no additional workforce, the informant also shared that foreign mine engineers are now working in the mines, mostly in cement factories. A similar situation exists for metallurgy engineers, mine supervisors, and my inspector where there is an acute shortage of skilled workforce. As a result, the mine owners are forced to either use an unskilled workforce or foreign workers.

During the interaction, it was also revealed that there is a scarcity of mining engineers, metallurgy engineers, and mining overseers across the whole nation. During the interaction, it was assessed that there is a high scope for Lab Assistant/Technicians for mineralogy and soil test, Mineral Processor, Remote Sensing Expert, Driller, Rigger, Auger Operator, Mines Supervisor, Mine Inspector, Quarry Inspector, Cutting and Drilling Machine Operator (Foreman), Plant Setter in the middle-level workforce although the required quantity is small in these occupations. It was also revealed during the interaction that there is a high turnover of skilled workers and most of the workforce often goes to Malaysia, the Middle East, and India for the same kind of employment.

#### **4.2.2 Occupations in mining and quarrying sub-sector**

Based on the discussions with sectoral participants, the key occupations in this sub-sector are engineers, overseers, surveyors, geologists, and mining technicians. The detailed information regarding all the occupations is given in Annex II.

### **4.2.3 Emerging occupations in mining and quarrying sub-sector**

This sub-sector is yet to be developed and therefore, the sectoral experts were less informed about the emerging jobs in this sub-sector. However, they mentioned that tunnel technicians, mining technicians, and 21<sup>st</sup>-century skill-based machine operators and technicians are highly demanded.

### **4.2.4 Migrant status in mining and quarrying sub-sector**

At present, the data shows that there are no migrants from this particular sub-sector (DoFE, 2021).

### **4.2.5 Immigrants in the mining and quarrying sub-sector**

During the interaction, it was revealed that geologists are abundantly available in Nepal. However, mining engineers, metallurgy engineers, metallurgy overseers are scarce and it has been assumed that foreign workers are working in that particular job. Similarly, some foreign mine engineers are working in Nepal.

### **4.2.6 Green occupations in mining and quarrying sub-sector**

The desk review and the interaction with sectoral experts showed no green occupations associated with this sub-sector.

### **4.2.7 Issues associated with mining and quarrying sub-sector**

The mining sub-sector has limited scope as the bulk of this sector remains unexplored. Even with this status, the mining operators are operating on a sub-par basis and the major issues that were identified are:

- Many mines are yet to be explored. The major mines that are in operation are stone and limestone. It has been difficult to assess the necessary workforce required for this sub-sector with such limitations.
- There are inadequate human resources associated with this sub-sector, including mining engineers, overseers, mining technicians, and groundwater technicians.
- There are inadequately skilled workers in all occupations requiring ICT and digital technology and competencies for machine and heavy equipment operation in the mining sector.
- The skilled workforce has a high turnover rate as those workforces are easily attracted to foreign employment.
- The labor policy has been blamed for being more focused on workers' rights but not on performance-based incentives and productivity.
- Due to the lack of a skilled workforce, industries are illegally recruiting foreign workers and therefore, information on those types of workers is completely missing.
- The absence of National Competency Standards (NCS) has led to variations in occupational standards across different industries.

- Many workforces do not meet the required educational qualification as many machines and technology workforce require at least a tertiary level of education.
- There is no provision of providing skill certificates or licenses for the skilled occupations and therefore, this has reflected in the low productivity of the workforce.

The fifteenth plan aims to conduct various feasibility studies for mine and mining sectors that will be developed and integrated into a value chain system. This will help the sector grow and contribute valuably to the national economy and job creation. The plan forecast the sector to grow by 15.6 percent annually over the plan period.

### 4.3 Manufacturing sub-sector

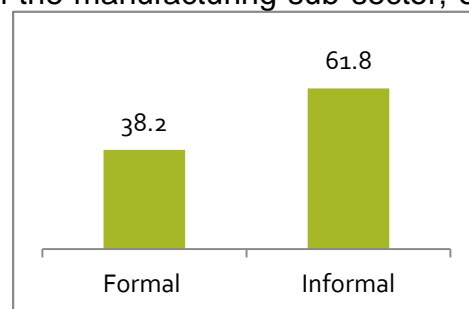
This sector is one of the prominent sectors in terms of GDP contribution and employment. In 2010-2011, the share of this sector was above 6.09 percent; however, this share has declined to 5.03 percent by 2019-20. This sector has also recorded sluggish growth with an average sectoral growth of 1.18 percent in the last ten years.

There are currently 103,115 establishments, out of which 49,768 (48 percent) are registered ones while the remaining 53,347 (52 percent) are operated without any registration (NEC 2018). The largest share of these establishments (41 percent) is in the manufacturing sector, which has 2,585 establishments, followed by the service and tourism sectors. The economic activities that are included in the manufacturing sub-sector include the manufacture of food products; beverages; tobacco products; textiles; wearing apparel; leather and related products; wood and products of wood except for furniture. In addition, other economic activities covered are the manufacture of paper and paper products; Printing and reproduction of recorded media; manufacture of coke and refined petroleum products; manufacture of chemicals and chemical products; manufacture of pharmaceuticals, medicinal chemical and botanical products; manufacture of rubber and plastics products; manufacture of other non-metallic mineral products; manufacture of basic metals; manufacture of fabricated metal products, except machinery and equipment; manufacture of electrical equipment; manufacture of machinery and equipment; manufacture of motor vehicles, trailers, and semi-trailers; manufacture of other transport equipment; manufacture of furniture; other manufacturing; and repair and installation of machinery and equipment.

The manufacturing industry is dominated by fast-moving consumer goods (FMCG) which constitutes around 59 percent of the total number of industries. The major FMCG sub-sector includes food and beverages, tobacco, soap, etc. The other major sub sectors are industrial goods (38 percent) like fabricated metals, plastics, rubber products, textiles, etc., and consumer goods (3 percent) like electronics wire cable, furniture, leather, allied products, etc.

#### 4.3.1 Workforces in the manufacturing sub-sector

There are an altogether of 10,718,47 workforces in the manufacturing sub-sector, out of which 7,552,85 (70.46 percent) are in between the 15 to 44 age group while the remaining 3,165,62 (29.54 percent) are above 44 years of age. In terms of the gender composition of age 15-44, 2,781,84 (36.83 percent) are women whereas 4,771,01 (63.17 percent) are men which clearly shows that the manufacturing sector is also predominantly occupied by men. Out of the total



1071850 workforces that are employed in this sub-sector, 409090 (38.2 percent) are employed through the formal sector whereas 662757 (61.8 percent) are engaged in the informal sector.

**Table 9: Employment status in the manufacturing sector by age, gender, level of education, and training**

Status	15-24		25-34		35-44	
	Female	Male	Female	Male	Female	Male
Total Employed	73699	144467	127190	167498	77295	165136
No formal education	3659	12423	28240	17462	33104	34261
Primary level education	25073	72584	46770	79040	29152	84183
Secondary level education	44853	56550	49842	51316	12634	37076
Tertiary level education	114	2910	2338	19680	2405	9616
With formal vocational/ professional training	35205	19735	60873	34242	19973	25800
Without formal vocational/ professional training	38494	124732	66317	133256	57322	139336

Source: Nepal Labor Force Survey 2017-18

Concerning table 9 given above, out of the 755285-population engaged in this sub-sector, 129149 (17.09 percent) are without any formal educational qualification, 366802 (48.56 percent) have a primary level of education, 252271 (33.40 percent) have a secondary level of education and only 37063 (4.9 percent) have a tertiary level of education.

In another analysis, this sub-sector also has lots of untrained workforces. Out of 755285 workforces that are in between 15 to 44 years of age, only 195828 (25.93 percent) have received some sort of training whereas the remaining 559457 (74.07 percent) have not received any training at all, which indicates that this sub-sector heavily relies on non-skilled workers.

The research team visited the country's major cities to gather information regarding the occupations available and the potential for future occupations. The team conducted FGDs and interactions during the visit for this purpose. Most of the sectoral experts agreed that the industries are facing a scarcity of skilled workforce and are bound to hire workers from India in the industries.

### **Case 3: Industries face a crisis of skilled workforce**

An entrepreneur of a ketchup industry in Nepalgunj stated that the industry is in a stage to close down due to a lack of skilled workers. Another respondent in Butwal shared that the technicians who graduated from Korea Nepal Institute of Technology (KNIT) can be absorbed by 'Sarbottom Cement' alone if they meet the required competencies; however, most of the skilled workers in this cement factory are from India. A publication industry in Pokhara shared that out of 11 skilled workers present in that industry, 9 of them are from India. Another respondent working in the furniture and brick industry shared that more than 80 percent of the carpenters, furniture makers, and the workers needed for brick factories are from India.

During the interaction, it was also noted that the industries have now started working as training centers. The industries often recruit unskilled workers and gradually upgrade

them to the skilled workforce as they learn through experience and on-the-job training facilities. Such training was necessary to ensure that the workforce has required skills and training. In terms of gender-wise segregation, this interaction also showed that most female workers are involved in packaging and marketing and work as laborers. Their involvement in skilled occupation is negligible. The data from ALFAN also shares the same information as female participation in Aluminum fabrication is less than 1 percent.

#### **4.3.2 Occupations in the manufacturing sub-sector**

During the visit, it was noted that machine Operator, Electrician, Industrial electricians, A/C technicians, Welders (G1, G2, G3, G4, G5, G6), Machine Fitter, Boiler Operator, Quality Control Officer, Lathe Operator, Computer Numerical Control (CNC) Operator, Plasma Cutter, Metallurgists, troubleshooter, Laser Welding Machine Operator, software operators, Milling Machine Operator, Food Technologist, Aromatic and Medicinal Plant Processing Technicians, cold storage technicians have still high scope of employment in the sub-sector. Detailed occupations available in the sub-sector are presented in Annex II.

#### **4.3.3 Emerging occupations in the manufacturing sub-sector**

During the interaction with sectoral experts, it was revealed that CNC Operator, PLC operator, Laser welding machine operator, software operators, Mechatronics (Mechanical and electronics) are some of the emerging occupations in this sub-sector. They also emphasized that the majority of the jobs in this sub-sector now require grade 12 or Diploma level education to handle the necessary technology.

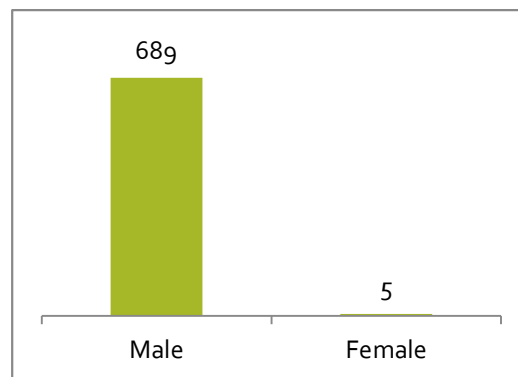
#### **4.3.4 Migrants in the manufacturing sub-sector**

A report on labor migration highlighted that Machine Operator, Manufacturing, Welder, Tailor are the major occupations in the manufacturing sub-sector for Nepali migrant workers abroad. The report stated that 3549 migrant workers in machine operators departed for work in foreign countries in the year 2018/19 (DoFE, 2020). Major destination countries for Machine operators were Malaysia, Saudi Arabia, UAE, and Kuwait. In the same way, 5056 workers departed as manufacturing workers without specified occupations. Similarly, 1277 migrant welders left the country for work mainly in Saudi Arabia, Qatar, Kuwait, and UAE. Likewise, tailoring was also another occupation, and 854 migrant workers in tailoring went to Qatar, the year was 10646 in the occupations mentioned above of the sub-sector. It was also revealed that there is a high turnover of skilled workers due to foreign employment. The occupations highly demanded in foreign countries as indicated by the industries are machine operator, electrician, Industrial

electricians, welders, fabricators, fitter, machine fitter, Boiler Operator, tailors, carpenters. Similarly, 689 males and 5 females went to foreign employment in 2021 (DoFE, 2021).

#### 4.3.5 Immigrants in the manufacturing sub-sector

According to the sectoral experts, higher-level positions such as Mechanical Engineers or Designers, Electromechanical Engineers are occupied by immigrants. Likewise, CNC operators, PLC operators, Laser cutting and welding operators, industrial electricians, digital machine operators, A/C maintenance



technicians, machine operators, boiler operators, chemists in Cement, food technologist, cutting master, finishing, and tailoring workers in garment industries are from India. The sectoral experts also highlighted that 95 percent of workers in garment industries are from India. Similarly, mechanics for firefighting, industrial heavy motor re-winder, problem diagnostic expert, quality controller, firefighting technician (mid-level) brick factory workers, boiler operators and machine operators, metal caster, and other mid and high-level skilled workers are from India too.

#### 4.3.6 Green occupations in the manufacturing sub-sector

According to the report (EHSjobs.org, 2021), the key green occupations in this sub-sector are biomechanical engineer, vertical shaft brick kiln technician, molder, Automation Tech, Electric Vehicle Electrician, Electric Motor Mechanic, Facility Engineer, Green clothing designer, Green Construction, Green Manufacturing Engineering, Green Manufacturing technician, Hybrid Auto Jobs, Hybrid Auto Production, Machinists, Machinist Tool And Die, Machine Operator, Organic Food Technician, Organic Manufacturing, Organic R&D, Plant Engineer, Process Engineer, Wind Turbine Jobs, Wind Turbine Technician. Utility Operator and reusable product producer, reused product technician, and other product manufacturers applying 6 R principles (Rethink, reduce, reuse, recycle, repair and recharge).

#### 4.3.7 Issues associated with manufacturing sub-sector

Specific issues of the sub-sector identified during the FGDs and interactions are:

- There is no provision of skill certificate to be provided to the workforce by recognition of prior learning (RPL) which is very essential for the industry-based workers
- The industries are compelled to bring workforce from India as there is an acute shortage of skilled workers.
- The industries are suffering from an inadequate supply of raw materials and this has led to the import of cheap products from neighboring countries thus jeopardizing the status of industries in Nepal.



- There are inadequately skilled workers in all occupations requiring ICT and digital technology and competencies for machine and heavy equipment operation in the mining sector.
- The skilled workforce has a high turnover rate as those workforces are easily attracted to foreign employment.
- The labor policy has been blamed for being more focused on workers' rights but not on performance-based incentives and productivity.
- Due to the lack of a skilled workforce, industries are illegally recruiting foreign workers and therefore, information on those types of workers is completely missing.
- The absence of National Competency Standards (NCS) has led to variations in occupational standards across different industries.
- Many workforces do not meet the required educational qualification as many machines and technology workforce require at least a tertiary level of education.
- There is no provision of providing skill certificates or licenses for the skilled occupations and therefore, this has reflected in the low productivity of the workforce.

The fifteenth plan has an ambitious target for the manufacturing sector's growth. The plan targets the sector to grow by an average of 12.7 percent and contribute 6.5 percent to GDP by the end of 2023-24. Moreover, the plan expects government investment to increase significantly in the manufacturing sector.

## 4.4 Construction sub-sector

This sub-sector comprises economic activities related to the construction of buildings, roads, canals, railway lines, airports, new housing, apartments, hydropower projects, and railways, along with utility projects and other specialized construction-related activities (Demolition and site preparation, electrical, plumbing and other construction installation activities, building completion and finishing). The contribution of this sub-sector to the national GDP is 6.30 percent and the total workforce employed in this sub-sector is 977615 which corresponds to 13.80 percent of the total workforce. This sub-sector's average real GDP growth rate during 2002-2019 remained at 4 percent (CBS, 2020).

Contractors' Associations of Nepal (FCAN) claim over 12400 registered contractors in Nepal, including Class A 228, Class B 282, Class C 1158, and Class D 10740 respectively<sup>6</sup>. There are estimates that this sub-sector provided employment to 978,000 workers in 2018 and it is also estimated that this number could reach 1.2 million by the end of 2021. After agriculture, construction is the third largest sector by employment (13.8 percent) after wholesale and retail trade (17.5 percent) and manufacturing (15.1 percent). Hence, both in terms of economic growth and employability, construction is an important sector.

### 4.4.1 Workforces in construction sub-sector

Out of the total 977615 workforces employed in the construction sub-sector, only 97882 are employed in a formal way which is 10 percent of the total workforce. The remaining 879733 (90percent) are employed in a non-formal way.

Table 10: Employment status in the construction sector by age, gender, level of education, and training

Status	15-24		25-34		35-44	
	Female	Male	Female	Male	Female	Male
Total Employed	19696	188574	34144	244586	35723	197463
No formal education	2279	18633	15585	40213	22008	57847
Primary level education	7519	110014	12421	129606	12707	102057
Secondary level education	9898	56427	5837	65321	256	33468
Tertiary level education	0	3500	301	9446	752	4091
With formal vocational/ professional training	2061	20204	4320	34528	1165	20737
Without formal vocational/ professional training	17635	168370	29824	210058	34558	176726

Source: Nepal Labor Force Survey 2017-18

A total of 720186 out of 977615 workforces (73.7 percent) are in between the 15 to 44 age group while the remaining 257429 (26.3 percent) are above 44 years of age which shows that this sub-sector demands early age workforces in comparison to the late age workforces. Men dominate this sub-sector as 630623 out of 720186 workforces (87.6 percent) are men while the remaining 89563 (12.4 percent) are women.

In terms of educational qualification, 156565 (21.7 percent) have not received any formal education; 374324 (52 percent) have a primary level of education; 171207 (23.8 percent)

<sup>6</sup><https://fcan.org.np/about-us/>

have a secondary level of education, and the remaining 18090 (2.5 percent) are tertiary graduates. The number and percentage of workforces receiving training are 83015 (11.5 percent) while the number and percentage of workforces not receiving any training are 637171 (88.5 percent) which is an alarming concern as this sub-sector completely relies on untrained workers.

#### Case 4: Increased demand for skilled workers

During the interaction with contractors in Biratnagar, a contractor revealed that Duhabi Municipality has the mandatory provision of a skilled training certificate that all workers from this sub-sector need to get from the Municipality. This indicates the level of awareness and the move toward using skilled manpower in this sub-sector.

During the interaction with the contractors, it was found that the workforces from India are involved as rig operators, TBM operators, drillers, crusher machine installers, grader machine operators, excavator operators, asphalt technicians, asphalt plant operators, asphalt concrete Pavers, heavy equipment repairing mechanics, heavy equipment operators, pile machine operators, lab technicians, gabion weavers, shuttering carpenters, scaffolders, tile/marble fitters, plumbers, false ceiling technicians, wall paper fixers, cable fixers in this sub-sector.

#### 4.4.2 Occupations in construction sub-sector

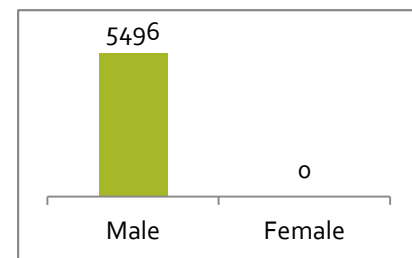
Based on the discussions with employers and available occupational skill standards in NSTB CTEVT, mason, carpenter, electrician, plumber, tile marble fixer and heavy equipment operators are the key occupations of this sub-sector. The details of the occupations in the construction sub-sector are in Annex II.

#### 4.4.3 Emerging occupations in construction sub-sector

This occupation is changing its form over time as technological advancement has replaced the human workforce. According to the informants, the emerging occupations in this sub-sector are mason, steel fixture, tile marble fixer, plumber, building painter, plasterer, electrician, shuttering carpenter, scaffolder, pipe fitter, gypsum installer, gabion weaver, drafting technician, construction workers, heavy equipment operator (concrete layer, bituminous surface road worker, crane operator, motor grader operator, wheel loader operator, bulldozer operator, excavator operator, backhoe loader operator, road roller operator).

#### 4.4.4 Migrants in construction sub-sector

While reviewing the status of migrant workers in the construction sub-sector, it was found that a total of 8313 masons departed the outside country for Qatar, UAE, and Saudi Arabia (MoLESS, 2020). Likewise, the same data source shares that 1984 plumbers, 2813 steel fixers, 1909 scaffolders, 5520 carpenters, 3341 electricians, 2332



painters, and 765 foremen departed for foreign employment. Similarly, 5496 males in different occupations within this sub-sector went for foreign employment in 2021 (DoFE, 2021). This indicates that there are ample employment opportunities outside the country in the context of the construction sub-sector.

A study carried out by Helvetas in 2018 also pointed out the high turnover of skilled workers in this sub-sector (Employment Fund Secretariat /HELVETAS Swiss Intercooperation Nepal, 2018). This study indicated that mason, plumber, furniture maker, construction workers, scaffolders, carpenters, gabion weavers, tile and marble fitters, building painters are the most demanding occupations in this sub-sector.

Another report on sector analysis of selected industry and service sectors in Nepal revealed that most of the trained people go abroad for foreign employment after getting some practical experience or even before that (Pradhan, H. & et al, 2014). This report also indicated that due to the gap between the demand and supply of the skilled workforce in the sector, skill workers are in-migrating from India thus indicating the remarkable employment opportunities in this sub-sector.

#### **4.4.5 Immigrants in construction sub-sector**

Some of the major occupations are occupied by workers from India with particular reference to occupations such as Rig operators, TBM operators, driller, Crusher Machine Installer, Grader Machine Operator, Excavator Operator, Asphalt Technicians, Asphalt Plant Operator, Asphalt Concrete Paver, Heavy Equipment repairing mechanics, Heavy Equipment Operator with digital technology and ICT, Pile Machine Operator, Lab Technicians, Gabion Weavers, Shuttering Carpenters, Scaffolders, Tile/Marble Fitter, Plumbers, False Ceiling Technicians, Welder, Wall Paper Fixer, cable fixing in bridge construction, etc. During the interaction, it was revealed that more than 30 percent of workers in this sub-sector are from India. Since this sector has non-skilled workforces, the industries are facing a major challenge in terms of the capable workforces that are required for this sub-sector.

#### **4.4.6 Green occupations in the construction sub-sector**

The major green occupations in this sub-sector are designer, metal fabricator, plumber, mason, electrician, engineer, overseer, and carpenter (Camors & Lopez, 2015).

#### **4.4.7 Issues associated with construction sub-sector**

Lack of skilled manpower is the major issue of this sub-sector as more than 80 percent of the workforces are without any vocational and/or professional training. In addition, the major issues of this sub-sector are:

- There is a mismatch between the requirements of employers and the competencies of the workforce. The TVET graduates are found to be less skilled than the required competencies as many of them do not even know basic construction terminologies and critical aspects of the construction work.

- This sub-sector is highly occupied by the workforce from India especially in medium and high skills occupations due to the lack of skilled workforces in Nepal.
- There is a difficulty in implementing the social security system and personal account number (PAN) because the majority of the workforce are still unaware of the benefits of the social security system and many of them do not have PAN, which is required by the government rules.
- There are inadequately skilled workers in all occupations requiring ICT and digital technology and competencies for machine and heavy equipment operation in the mining sector.
- The skilled workforce has a high turnover rate as those workforces are easily attracted to foreign employment.
- The labor policy has been blamed for being more focused on workers' rights but not on performance-based incentives and productivity.
- Due to the lack of a skilled workforce, industries are illegally recruiting foreign workers and therefore, information on those types of workers is completely missing.
- The absence of National Competency Standards (NCS) has led to variations in occupational standards across different industries.
- Many workforces do not meet the required educational qualification as many machines and technology workforce require at least a tertiary level of education.
- There is no provision of providing skill certificates or licenses for the skilled occupations and therefore, this has reflected in the low productivity of the workforce.

Accordingly, the fifteenth plan expects this sub-sector to contribute 8.6 percent of GDP by 2023-24 and aims to mobilize a significant share of public debt in the construction sectors.

## 4.5 Wholesale & retail trade; repair of motor vehicles and motorcycles sub-sector

The contribution of the wholesale and retail trade; repair of motor vehicles and motorcycles sub-sector to the national GDP is 14.93 percent with an employment rate of 17.90 percent (1239900), which is second only to agriculture (21.5 percent). The activities or the main job of this sub-sector as stated by the NLFS include i) wholesale and retail trade and repair of motor vehicles and motorcycles, ii) wholesale trade, except motor vehicles and motorcycles, and iii) retail trade, except motor vehicles and motorcycles. The average real GDP growth rate of this sub-sector during 2002-2019 remained at 4 percent (CBS, 2020) and before Covid-19, this sector was growing about an average annual rate of 6.6 percent, which is higher than the average economic growth rate.

A sector analysis study carried out in 2014 showed that there is a scope of numerous employment opportunities in this sub-sector and the repair and maintenance activities (Pradhan, H. & et al, 2014). This study also pointed out that around 500 new vehicles in the country would create an employment opportunity for 50 people. In line with this statement, the research team carried out FGDs and interactions with related entrepreneurs, traders, and workshops owners to collect information regarding various aspects of this sub-sector. During the interactions, sectoral experts emphasized that the workforce needs to be informed on 21st-century skills and highlighted the employment potential for the workforces that know about artificial intelligence, digital sensor system, and Common Rail Diesel (CRD) injection system. The sectoral experts also drew attention that around 40 percent of workers are from India and they are engaged as senior mechanics, denter, auto electricians, engine fitters, machine operators, body makers, and CRD based technicians.

### 4.5.1 Workforces in wholesale and retail trade sub-sector

Nearly one-fourth of 1239900 workforces in this sub-sector, 881517 are between 15-44 years of age group, out of which 412789 (46.8 percent) are women and the rest 468728 (53.2 percent) are men. The educational qualification of the workforce, as per table 11 shows that 89826 (10.18 percent) are without any formal education, 267194 (30.31 percent) have a primary level of education, 460795 (52.27 percent) have a secondary level of education while only 63702 (7.23 percent) have more than the secondary level of education.

Table 11: Employment status in wholesale and retail trade sector by age, gender, level of education and training

Status	15-24		25-34		35-44	
	Female	Male	Female	Male	Female	Male

Total Employed	94795	115389	167497	175991	150497	177348
No formal education	2467	3810	19713	10104	38776	14956
Primary level education	19592	30618	48594	43174	59172	66044
Secondary level education	64994	74711	87400	94875	53249	85566
Tertiary level education	7742	6250	11790	27838	-700	10782
With formal vocational/ professional training	12176	13800	39204	35401	23734	21598
Without formal vocational/ professional training	82619	101589	128293	140590	126763	155750

Source: Nepal Labor Force Survey 2017-18

Table 11 given above also provides the training status of the workforce employed in this sub-sector. The data source shows that a total of 145913 (16.55 percent) have received some sort of training while 735604 (83.45 percent) are without any training. Of the total 1239900 workforces engaged in this sub-sector, 41.4 percent (513323) are employed through formal approach while 58.6 percent (726384) are engaged through informal approach, which shows that industries in this sub-sector are relatively working through the informal sector.

#### 4.5.2 Occupations in wholesale and retail trade sub-sector

The research team carried out FGDs and interactions with related entrepreneurs, traders, and workshops owners to collect information regarding various aspects of this sub-sector and its potential growth in the future. During the discussion, it was revealed that main occupations of this sub-sector are Technicians, Mechanics, Denter Painter, Auto Electricians, Engine Fitter, Machine Operator, Body Maker, Fuel Injector, Welder, Electric Mechanic, Car Mechanic, Body Mechanic, Refrigeration Technician, Charging Station Technician, Welder, Chassis and Springs Maker, Spare Parts Sales Person. A Detailed list of the occupations available in this sub-sector is presented in Annex II.

#### Case 5: Worth of education

During the interactions, sectoral experts of vehicle traders revealed that there is an increasing trend to hire educated people in the vehicle trading so that the worker can brief the new technology to the customers. This emphasizes the minimum educational requirement of workers. Sectoral experts also preferred to have a minimum of twelve years of education (Plus two) for better learning due to the language problem.

The major occupations as pointed out by the corporate houses, superstores, and wholesale and retail traders during the interactions are Security Guard, Cashiers/Accountants, Store Keeper, Sales Person, Drivers (with additional soft skills), Packager, Dispatcher, Cleaner, Loader, Supervisor, Assistant Manager, Deputy Manager, and CEO depending on the scale of the trade.

#### 4.5.3 Emerging occupations in Wholesale & retail trade sub-sector

Main occupations or major jobs available in this sub-sector as shared by the concerned stakeholders are technicians, mechanics, denter painter, auto electricians, engine fitter, machine operator, body maker, fuel injector, welder, electric mechanic, car mechanic, body mechanic, refrigeration technician, charging station technician, welder, chassis and springs maker, and spare parts salesperson. During the discussion, it was shared that there are around 1000 workshops and 10000 workforces in the auto workshops engineering association in Butwal alone, thus indicating the number of workforces employed in this sub-sector across the country.

#### **4.5.4 Migrants in wholesale and retail trade sub-sector**

The number of migrants in this sub-sector is very negligible as data shows that 805 men and 28 women went overseas in search of jobs concerning this sub-sector.

#### **4.5.5 Immigrants in wholesale and retail trade sub-sector**

There is limited information in regards to the immigrants working in this sub-sector, however, there are indications that some foreigners are working as Senior Mechanics, Denter, Auto Electricians, Engine Fitter, Machine Operator, Body Makers, and CRD based Technicians within this sub-sector. Skilled workers from India constitute around 40 percent of the total workforce in this sub-sector with as high as 80 percent of workforces from India engaged in auto workshops.

#### **4.5.6 Green occupations in wholesale and retail trade sub-sector**

The key green occupations in this sub-sector are electric vehicle driver, mail dispatcher, electric vehicle mechanic, hybrid vehicle mechanic, and salesperson that use paper bags instead of plastic bags.

#### **4.5.7 Issues associated with wholesale sub-sector**

This sub-sector has the potentiality of growth, however, there are many issues associated and they are:

- The workforce's educational status is not sufficient to understand the technical aspect of this sub-sector. Automobile industries need a workforce that is at least graduates but the current workforce doesn't meet this requirement.
- The current TVET does not support the production of the workforce that is related to wholesale and retail trades.
- The skilled workforce has a high turnover rate as those workforces are easily attracted to foreign employment.
- The labor policy has been blamed for being more focused on workers' rights but not on performance-based incentives and productivity.

The fifteenth plan estimates that the sector's average annual growth would be 10.8 percent. The sector has an important influence on the country's balance of payment and international trade. In Nepal, export is increasing at a low rate while import is increasing



at a high rate. If this trend continues, the sector's importance to the economy only grows in the future.

## 4.6 Transportation and storage sub-sector

The contribution of this sub-sector to the national GDP is 5.14 percent, the number of people employed in this sub-sector is 322379 and the share of employment is 4.55 percent to the total employment. Likewise, this sub-sector's average real GDP growth rate during 2002-2019 is 6 percent (CBS, 2020), which indicates the high potentiality of further employment opportunities within this sub-sector. The activities of the main jobs included in this sub-sector are i) Land transport and transport via pipelines, ii) Water transport, iii) Air transport, iv) Warehousing and support activities for transportation, and v) Postal and courier activities.

### 4.6.1 Workforces in transportation and storage sub-sector

Among the 322379 employed in this sub-sector, only 159,494 (49.5 percent) are employed through the formal channel whereas 162,885 (50.5 percent) are employed through the informal approach of employment indicating the almost equal share of the formal and informal approach of employment in this sub-sector.

Table 12: Employment status in transportation and storage sub-sector by age, gender, level of education and training

Status	15-24		25-34		35-44	
	Female	Male	Female	Male	Female	Male
Total Employed	682	68581	3450	101369	2548	81880
No formal education	424	8730	387	9197	0	14590
Primary level education	258	38969	123	50759	1556	39130
Secondary level education	0	20375	525	37941	136	26188
Tertiary level education	0	507	2415	3472	856	1972
With formal vocational/ professional training	584	11226	1916	21338	537	22638
Without formal vocational/ professional training	98	57355	1534	80031	2011	59242

Source: Nepal Labor Force Survey 2017-18

Of the 322379 workforces that are involved in this sub-sector, a total of 258510 (80.19 percent) are between the 15-44 age group while the remaining 63869 (19.81 percent) are above 44 years of age and in terms of gender participation, only 6680 (2.58 percent) are women and the rest 251830 (97.42 percent) are men which indicates that transportation and storage sub-sector is men dominated sub-sector. In another analysis, 33328 (12.89 percent) are without any formal education, 130795 (50.59 percent) are primary level graduates, 85165 (32.94 percent) are secondary level graduates and 9222 (3.57 percent) are tertiary graduates.

In terms of training status, table 12 given above shows that a total of 58239 (22.53 percent) have received some sort of TVET or professional training whereas 200271 (77.47 percent) have not received any training at all. Raising the issue of untrained workforces, the concerned entrepreneurs during the interaction mentioned that the workers and drivers who have to deal directly with customers and the passengers need

additional soft skills so that they can improve their communication skills. The entrepreneurs agreed that there is a high scope of employment in this sub-sector, but the workforce needs to be knowledgeable on digital technology and online payment systems. They also revealed that women are mostly involved in packaging, secretarial work, and accounting-related occupations.

#### 4.6.2 Occupations in the transportation and storage sub-sector

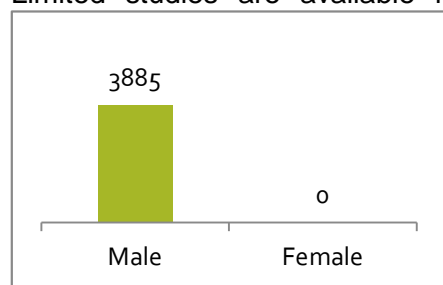
According to the sectoral experts, dispatcher, driver, and storekeeper are the key occupations in this sub-sector. Details of the major occupations and emerging jobs in the transportation sub-sector are given in Annex II.

#### 4.6.3 Emerging occupations in the transportation and storage sub-sector

The emerging occupations of this sub-sector are labor (loader, unloader), Driver, Packagers, Dispatchers, Transportation Supervisor, Online Tracker, Cargo Supervisor, Domestic and International Cargo Manager, Storekeeper, Office Secretary, Cashier, and Accountant.

#### 4.6.4 Migrants in the transportation and storage sub-sector

Limited studies are available regarding the employment opportunities in this sub-sector.



However, a labor migration report conducted by MoLESS, 2020 showed that workforce in packaging and shipping, Aviation and Cruise, Drivers, and Automotive workers are the major areas for Nepali migrant workers in 2018/19 under this sub-sector. This study also showed that 4955 migrants in packaging, shipping, and delivery, 1177 workers in Aviation and cruise, 13222 drivers, and 192 workers in Automotive have left the country in the year 2018/19. Similarly, 3885

males went for foreign employment in 2021.

#### 4.6.5 Immigrants in the transportation and storage sub-sector

There are no foreign workers in this sub-sector. According to the industries, they have linkages with foreign companies, especially for international cargo business.

#### 4.6.6 Green occupations in the transportation and storage sub-sector

The key green occupations in the transportation and storage sub-sector are electric vehicle driver, locomotive engineer, rail track layer, railroad conductor, and train operator (Camors & Lopez, 2015).

#### 4.6.7 Issues associated with transportation and storage sub-sector

Inadequate skill amongst the workforce is the major issue associated with this sub-sector. In addition to this issue, the concerned stakeholders stated that the license system is very lengthy and difficult, and as a result, many drivers and machine operators have not been able to hire certified drivers/operators on time.

Over the five years of the fifteenth plan, the government hopes to mobilize NPR 172.3 billion for road infrastructure—strategic and local road networks, rail connectivity, airports,

and urban transport management. The major investment in this sub-sector will see this sub-sector grow and as a result, the employment demand in the sub-sector will increase further.

#### 4.7 Accommodation and food service sub-sector

The contribution of the accommodation and food service activities to the national GDP is 1.7 percent. The number of people employed in this sub-sector is 370924, corresponding to 5.23 percent of the total employment. The average real GDP growth rate of this sub-sector during 2002-2019 is 4 percent (CBS, 2020). The major economic activities of this sub-sector are hotel management, food and beverage service, and other tourism-related activities. About 130000 entities are operating in this sub-sector.

Tourism statistics report 2020 mentions that there are 142-star hotels with 13900 beds, 1171 tourist standard hotels with 31950 beds registered in Nepal until 2020 totaling 1313 hotels with 45850 beds (GoN, 2020). The impact of Covid 19 severely affected this sub-sector and as a result, only the first three months of the year 2020 were open for tourist arrivals which led to the decrease of almost 80 percent (230,085) tourists in 2020.

##### 4.7.1 Workforces in accommodation and food service sub-sector

There are a total of 370924 workforces that are engaged in this sub-sector, out of which 275298 (74.22 percent) are between the 15-44 age group while the remaining 95626 (25.78 percent) are above 44 years of age. Unlike in the transportation sub-sector where the women's participation is only 2.58 percent, this is not the case in the case of the accommodation sub-sector. The number of female workforces in this sub-sector is 127030 (46.16 percent) while the remaining 148268 (53.86 percent) are men as given in Table 13.

**Table 13: Employment status in accommodation and food service sub-sector by age, gender, level of education and training**

Status	15-24		25-34		35-44	
	Female	Male	Female	Male	Female	Male
Total Employed	39856	56473	39850	43424	47324	48371
No formal education	1340	2298	6098	3374	17651	1771
Primary level education	7644	19472	9992	12107	16957	21733
Secondary level education	28519	34354	22421	23500	12251	23923
Tertiary level education	2353	349	1339	4443	465	944
With formal vocational/ professional training	2915	15820	6532	9733	3683	9824
Without formal vocational/ professional training	36941	40653	33318	33691	43641	38547

Source: Nepal Labor Force Survey 2017-18

In another analysis, the number of secondary level graduates in this sub-sector is above 50 percent, 52.64 percent, as 144968 out of 275298 workforces have met that educational qualification. Similarly, 32532 (11.81 percent) have no formal education, 87905 (31.92 percent) have a primary level of education, and 9893 (3.6 percent) have a tertiary level of education.

Out of the total 275298 workforces employed in this sub-sector, 48507 (17.62 percent) have received some sort of training while 226791 (82.38 percent) are without any training. This is in line with the study that was conducted in 2014 which also stated that almost 95percent of workers in small and medium hotels do not have any formal skills training opportunities (Pradhan, H. & et al, 2014). This study also revealed that each tourist creates 9 direct and indirect jobs.

During the interaction, it was shared that most of the workers are trained through working by doing approach and have no skill certificates. One of the sectoral experts in Pokhara stated that they hire dishwashers and simultaneously help upgrade the workforce's skills that are needed for the industry, which has led the industry to self-function as a training institute. However, even with this approach, there is a lack of skilled workforce and during the interaction, the manager of the Soaltee Hotel in Nepalgunj stated that they are facing a severe crisis of Cook, Waiter, and Waitress.

#### **Case 6: Attitude issue**

Sectoral experts in most of the locations shared that Nepali skilled workforces have attitude issues and therefore, they are compelled to hire workers from India even when there are workforces available in the country. They claimed that Nepali workforces request frequent leaves, are less devoted towards their work, and trade unions sometimes create unnecessary issues and problems which the entrepreneurs often do not face from workforces from India.

The sectoral experts also pointed out that there is a high demand for skilled workers of this sub-sector outside of the country. As a result, once the workforce gains enough experience in Nepal, they fly abroad for foreign employment. For example, the Hotel Association of Nepal revealed that graduates of Bachelors in Hotel Management (BHM), Barista, Cook, and Waiter/Waitress have a high potential for foreign employment. Meanwhile, of the total 370924 population engaged in this sub-sector, 164,236 (44.3 percent) are engaged through the formal approach while 206,688 (55.70 percent) are employed through the informal approach.

#### **4.7.2 Occupations in accommodation and food service sub-sector**

According to the sectoral experts during field visits and upon analysis of occupation standards set by NSTB CTEVT, cook, waiter/waitress, baker, housekeeper are the key occupations of this sub-sector. The details of the available occupations are given in Annex II.

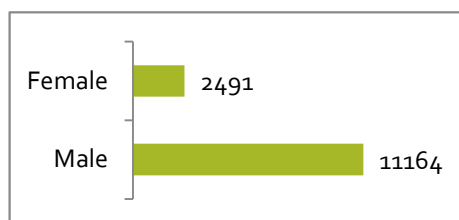
#### **4.7.3 Existing and Emerging occupations in accommodation and food service sub-sector**

The emerging occupations identified in this sub-sector during the field interaction are Cooks (Japanese, Mediterranean, Italian, Continental, Chinese, and Indian), Chef, Barista, Waiter and Waitress, Housekeeper, Housekeeping supervisor, HR officer, Business promotion officer, Front Desk Officer, Laundry Technician, Dishwashers, Gambling Inspector. During the interaction with the concerned industrialists, they agreed

that there is a need for a capacitating existing workforce with digital knowledge, and other 21<sup>st</sup> century skills related to Trekking cook, Camp Manager, ICT operators with multi-skills, Trekking guide (“Nature Tour” and “Cultural Walk”), Religious Guide, Flora and Fauna Guide, Agricultural Guide.

#### 4.7.4 Migrants’ status in accommodation and food services sub-sector

The data source of DoFE (2021) states that a total of 13,655 workforces left Nepal overseas in search of jobs related to this sub-sector out of which 11164 (82 percent) are men and the remaining 2491 (18 percent) are women.



#### 4.7.5 Immigrants in accommodation and food services

Based on the information from FGDs and meeting with HAN, there are few foreign workers in the General Manager and executive chef positions in the hotel industries. The rest of the occupations are fulfilled by Nepalese workers.

#### 4.7.6 Green occupations in accommodation and food service sub-sector

Based on the discussion with sectoral experts, the green occupations are housekeeper, waiter, cook, organic food cook, food waste collector, laundry technician, and food technician.

#### 4.7.7 Issues associated with accommodation and food service sub-sector

The unavailability of skilled workforces is the major issue with this sub-sector. In addition to this issue, the other major issues with this sub-sector are:

- Inadequacy of ICT and digital skills of the existing workers.
- The skilled workforce has a high rate of turnover as those workforces are easily attracted towards foreign employment.
- The labor policy has been blamed for being more focused on workers' rights but not on performance-based incentives and productivity.
- The absence of National Competency Standards (NCS) has led to variations in occupational standards across different establishments.
- There is no provision of providing skill certificates or licenses for the skilled occupations and therefore, this has reflected in the low productivity of the workforce.

## 4.8 Information and communication sub-sector

The contribution of this sub-sector to the national GDP is 2.22 percent with employment to 60263 workforces which is 0.85 percent of the total employment. Of the total employed, 53522 (88.80 percent) is through the formal approach whereas the remaining 6740 (11.20 percent) is through the informal approach which clearly shows the predominant nature of the informal approach in this sub-sector. The average real GDP growth rate of this sub-sector during 2002-2019 is 6 percent (CBS, 2020).

The economic activities in this sub-sector include i) Publishing activities; ii) Motion picture, video, and television program production, sound recording; iii) Programming and broadcasting activities; iv) Telecommunications; v) Computer programming, consultancy, and related activities; and v) Information service activities. The ICT sector comprises the Internet, telephone, mobile communication, IT-enabled services like system design, software development, data warehousing, data processing, and business process outsourcing services like call centers, medical transcription, animation, etc.

This sub-sector is one of the fastest-growing sub-sectors in Nepal with an average growth rate of above 10 percent in the last ten years and has potential for continued growth. Despite the high growth potential and contribution to the national economy, the sector's employability is limited. The sector employs 0.9 percent of the workforce in 2018 and has limited in its ability to mass employment. This is because of the relatively high skills needed in the sector.

### 4.8.1 Workforces in the information and communication sub-sector

Table 14 shows that out of a total of 60263 population engaged in this sub-sector, 47872 (79.44 percent) are between 15 to 44 age group while the remaining 12391 (20.56 percent) are above 44 years of age. Out of those age groups, 10521 (21.98 percent) are women and 37351 (78.02 percent) are men which shows that like other sub-sectors, this sub-sector has men in front in comparison to their counterparts.

**Table 14: Employment status in information and communication sub-sector by age, gender, level of education and training**

Status	15-24		25-34		35-44	
	Female	Male	Female	Male	Female	Male
Total Employed	4179	9153	3426	17626	2916	10572
No formal education	0	0	0	0	0	0
Primary level education	0	92	0	405	709	1871
Secondary level education	2084	6198	105	10004	1006	5049
Tertiary level education	2095	2863	3321	7217	1201	3652
With formal vocational/ professional training	2009	3052	2147	7237	1950	213
Without formal vocational/ professional training	2170	6101	1279	10389	966	10359

Source: Nepal Labor Force Survey 2017-18

Since this sub-sector requires technical expertise, there is no workforce without any formal education which is very encouraging. A total of 3077 workforces, (6.43 percent) have a primary level of education, 24446 (51.07 percent) have a secondary level of

education while 20349 (42.51 percent) have a tertiary level of occupation indicating the involvement of the relatively educated workforces in comparison to other sub-sectors.

In terms of training status, 16608 (34.69 percent) have received professional or vocational training while the remaining 31264 (65.31 percent) have not received any training. Even with the training, the sectoral experts are not satisfied. They stated that this sub-sector requires versatile workers as technology keeps changing all the time and as a result, workforce skills. As a result, the workforce's skills need to be updated.

#### **4.8.2 Occupations in the information and communication sub-sector**

The major occupations in this sub-sector are Computer technician, computer operator, computer programmer, mobile phone repairer, LCD/LED television repairer technician, Telecom Technician, Telecom lineman, etc.

The major occupations revealed during the FGDs and interaction are Computer system designers, computer programmers, Computer assistants, Computer equipment operators, Systems analysts, Software developers, Web and multimedia developers, Electronics fitters, computer service technicians, cyber security specialists, Bookbinders, hardware technicians, software technicians, news readers, press mechanics, etc. The details of the occupations in this subsector are in Annex II.

#### **4.8.3 Emerging occupations in the information and communication sub-sector**

Based on the sectoral experts, both hardware and software computer technician, web developer, mobile apps and software developer, computer programmer, mobile phone repairer, LCD/LED television repairer technician, telecom technician, and ICT based technicians are emerging occupations of this sub-sector.

#### **4.8.4 Migrants in the information and communication sub-sector**

Data reveals that only 41 Nepali left Nepal in pursuit of jobs related to this sub-sector.

#### **4.8.5 Immigrants' status in the information and communication sub-sector**

Based on the discussion with sectoral experts, there are no foreign workers in this sub-sector.

#### **4.8.6 Green occupations in the information and communication sub-sector**

The major green occupations associated with this sub-sector are ICT engineer, ICT overseer, ICT worker, Computer operator, e-commerce technician, smart and digital technician, telecommunication technician, and electronic-based occupations (OECD, 2012).

#### **4.8.7 Issues associated with information and communication sub-sector**

Specific issues of the sub-sector identified during the FGDs and interactions are:

- There is a scarcity of competent workforces such as software developers, web designers, hardware technicians, and telecommunication technicians. Similarly,

the inadequacy of skilled workers in all occupations that require ICT and digital technology

- The skilled workforce has a high rate of turnover as those workforces are easily attracted towards foreign employment, especially in developed countries.
- The labor policy has been blamed for being more focused on workers' rights but not on performance-based incentives and productivity.
- The absence of National Competency Standards (NCS) has led to variations in occupational standards across different industries.
- Many workforces do not meet the required educational qualification to meet the advancement of technology on ICT.

The fifteenth plan expects this sub-sector (alongside transportation and storage) to contribute about 7.7 percent by 2023-24. Similarly, it has targeted to reach 80 percent of the population with access to the internet by 2023/24 against 65.9 percent in 2018/19.



## 4.9 Electricity, gas, steam, and air conditioning supply

Nepal's energy sector is widely recognized as being the key to the nation's future economic growth, and the vehicle that will enable the Government of Nepal (GoN) to meet its development goals. Nepal's principal energy production includes biomass and hydroelectricity. At present, this sub-sector collectively contributes only 1.23 percent to the GDP despite posing an annual growth rate of 25.58 percent in 2019-20. This sub-sector only employs 0.5 percent of the total labor force in the country with employment to 34,234 workforces across the country. This sub-sector's average real GDP growth rate during 2002-2019 is 5 percent (CBS, 2020). Meanwhile, the supply of electricity, gas, steam, and air conditioning is the main economic activity under this sub-sector.

### 4.9.1 Workforces in the electricity and gas sub-sector

Of the total 34,234 persons employed in this sub-sector, 30993 (90.5 percent) are employed through the formal approach of employment while 3241(9.50 percent) are employed through the informal approach of employment indicating the formal sector is predominant in this sub-sector. Similarly, out of the total figure mentioned, a total of 29283 (85.54 percent) are between the 15-44 age group while the remaining 4706 (13.75 percent) are above 44 years of age.

Table 15: Employment status in electricity sub-sector by age, gender, level of education and training

Status	15-24		25-34		35-44	
	Female	Male	Female	Male	Female	Male
Total Employed	633	1754	4113	11142	1226	10415
No formal education	0	511	0	0	0	0
Primary level education	0	24	278	2266	0	2783
Secondary level education	49	552	2801	4275	1226	5657
Tertiary level education	584	667	1034	4601	0	1975
With formal vocational/ professional training	0	331	835	3065	0	3997
Without formal vocational/ professional training	633	1423	3278	8077	1226	6418

Source: Nepal Labor Force Survey 2017-18

Upon analyzing the data, it shows that 511 (2.58 percent) workforces have no formal education, 5351 (18.27percent) have a primary level of education, 14560 (49.72 percent) have a secondary level of education while 8861 (30.26 percent) have a tertiary level of education. Similarly, out of the 29283 employed workers, 8228 (28.10 percent) have received formal vocational/professional training while 21055 (71.90 percent) are without any training.

### 4.9.2 Occupations in the electricity and gas sub-sector

The research team interviewed the sectoral experts involved in electricity production, transmission, distribution, and regulations to collect information regarding various aspects of this sub-sector and its potential growth in the future. During the discussion, the sectoral experts shared that the major occupations in this sub-sector are Civil and Geotechnical surveyor, Geologists, Designer (Civil, Electrical, Mechanical, Electronics, Environmental,

Disaster), Electrical engineers, Electronics, Mechanical, Electrical safety, Lighting Arrester. In addition, the middle and low-level occupations are Overseers (Civil, Electrical, and Mechanical), Linesman, Foreman, and Overseer. The details of the occupations are in Annex II.

#### **4.9.3 Emerging occupations in the electricity and gas sub-sector**

According to the sectoral experts, A/C technician, energy auditor, electrical lineman, electrical motor re-winder, transformer repair technician, switchboard operator, cable jointer, armature re-winder, gas pipefitter, and transmission line technician, TBM machine operator, CNC operator, PLC operator are the emerging occupations of this sub-sector.

#### **4.9.4 Migrants in the electricity and gas sub-sector**

Major destination countries for A/C technician migrant workers in the year 2018/19 were UAE, Qatar, Malta, Saudi Arabia, and Kuwait. A total of 165 A/C technicians left the country for work in the year 2018/19. Data also shows that a total of 9 Nepali left Nepal in pursuit of a job related to this sub-sector.

#### **4.9.5 Immigrants in the electricity and gas sub-sector**

According to the sectoral experts, there are skilled workers from India in the field of the transmission line.

#### **4.9.6 Green occupations in the electricity and gas sub-sector**

According to the sectoral experts, hydroelectric plant technicians, engineers, production managers, wind energy operations managers, wind energy project managers, energy engineers, and wind turbine service technicians are some of the green occupations within this sub-sector.

#### **4.9.7 Issues associated with electricity and gas sub-sector**

Many of the issues associated with this sub-sector align with what has been identified in other sub-sectors. The specific issues of this sub-sector identified during the FGDs and interactions are:

- There are inadequately skilled workers in all occupations that require ICT and digital technology along with competencies for machine and heavy equipment operation in the electricity, gas, and A/C sub-sector.
- The skilled workforce has a high rate of turnover.
- Due to the lack of a skilled workforce, industries are illegally recruiting foreign workers, and therefore, information on those types of workers is completely missing.
- The absence of National Competency Standards (NCS) has led to variations in occupational standards across different industries.
- Many workforces do not meet the required educational qualification as many machines and technology workforce require at least a diploma level of education.
- There is no provision of providing skill certificates or licenses for the skilled occupations and therefore, this has reflected in the low productivity of the workforce.

The fifteenth plan expects the sector to contribute around 3.0 percent by 2023-24. The increasing electrification plans, private domestic and foreign investment in hydroelectricity development, etc. are major potential drivers of the sector's growth.

## 4.10 Water supply, sewerage, waste management, and remediation sub-sector

The contribution of this sub-sector to the national GDP is 0.58 percent and this sub-sector has created employment to 42,229 people which represents 0.60 percent of the total employment. The economic activities under the sub-sector are water collection, treatment and supply, and waste collection, treatment, and disposal activities; including materials recovery.

This sector contributes decently to the national economy but has a weak employability capacity. The average annual growth rate of the sector during the 2010-2020 period was 6.9 percent however, the year-to-year growth rate has declined steadily over the same period.

### 4.10.1 Workforces in water supply sub-sector

The composition of the age group (15-44 and above 44 years of age) is 75.43 and 24.57 percent respectively as 31895 workforces are 15 to 44 years of age while the remaining 10,374 are above 44 years. In terms of gender participation, 7020 (22 percent) are females and the rest 24875(78 percent) are males which shows that female involvement in this sub-sector is less than one-fourth of the total employment.

Table 16: Employment status in water supply sub-sector by age, gender, level of education and training

Status	15-24		25-34		35-44	
	Female	Male	Female	Male	Female	Male
Total Employed	1582	2825	3651	10884	1787	11166
No formal education	0	341	300	1851	209	3250
Primary level education	1582	2126	2762	4236	278	2747
Secondary level education	0	358	82	3202	1300	4267
Tertiary level education	0	0	507	1555	0	902
With formal vocational/ professional training	0	1169	0	9675	0	156
Without formal vocational/ professional training	1582	1656	3651	1209	1787	11010

Source: Nepal Labor Force Survey 2017-18

In terms of educational qualification, 5951 (18.66 percent) workforces among employed are without any formal educational qualification, 13731 (43.05percent) are primary level graduates, 9209 (28.87percent) are secondary level graduates and the remaining 2,964 (9.29percent) are tertiary-level graduates as given in Table 16. In terms of training, 1100 (34.49 percent) are trained while the remaining 20895 (65.51 percent) are untrained workforces working in this sub-sector. The data shows that there are no female workers who have received any training.

### 4.10.2 Occupations in the water supply sub-sector

The research team interviewed and interacted with key personnel of Kathmandu Upatyaka Khanepani Limited (KUKL) and the Municipality office to collect information regarding various aspects of this sub-sector. During the discussion, the sectoral experts shared that the major occupations in this sub-sector are Engineer (Civil, Mechanical, and Electro-Mechanical), Environmental engineers, Water Quality Technician

(Microbiologists), chemists, Water Pumps Operator, Plumber, Repair, and Maintenance Technician, Waste Collector, etc. The details of the occupations are presented in Annex II.

#### **4.10.3 Emerging occupations in the water supply sub-sector**

The sectoral experts during the interaction shared that this sub-sector has lots of potential in the future and has a high scope of employment opportunities. Such new opportunities can emerge new occupations such as Tunnel Technician, Process Engineer for water purification & sewerage water treatment, Process Overseer, Solid Waste Processor, Repair & Maintenance (Electro-Mechanical) Technician, and Green Plumber.

#### **4.10.4 Migrants in the water supply sub-sector**

Data source states that 11 Nepali left the country to pursue overseas opportunities within this sub-sector.

#### **4.10.5 Immigrants in the water supply sub-sector**

During the interaction, the sectoral experts shared that the majority of the workforce of this sub-sector is Nepali with some exceptions in the case of Tunnel technology where foreigners are working in Nepal. The sectoral experts also shared that the solid waste collectors and graders are from India. The occupations where the workforces are hard to find are Electro-Mechanical Pump Operator, Waste grader, and processor.

#### **4.10.6 Green occupations in the water supply sub-sector**

Based on the discussions with the sectoral experts, distribution Engineer, Sanitation Operator, Waste disposal Operator, Purification System Operator, Biomass technician, Biofuel technician, Wind Technician, Solar Technician, Geothermal Technician are the major green occupations under this sub-sector.

#### **4.10.7 Issues associated with water supply sub-sector**

Unavailability of skilled workforces and high turnover of staff remain the major issues of this sub-sector. In addition, these are the specific issues associated with this sub-sector and they are:

- Lack of long-term plan of both human resources and infrastructure in this sub-sector.
- There are inadequately skilled workers in all occupations that require ICT and digital technology.
- The skilled workforce has a high rate of turnover as those workforces are easily attracted towards foreign employment, especially in plumbing and sanitation.
- Due to the lack of a skilled workforce, industries are illegally recruiting foreign workers and therefore, information on those types of workers is completely missing.
- The absence of National Competency Standards (NCS) has led to variations in occupational standards across different industries.

- Many workforces do not meet the required educational qualification as many machines and technology workforce require at least a diploma level of education.
- There is no provision of providing skill certificates or licenses for the skilled occupations and therefore, this has reflected in the low productivity of the workforce.

## 5.1 Key Indicators along with economic and labor projections

Based on the analysis given in chapter 4, table 17 given below provides the key indicators of 10 economic sub-sectors that provide information on the employment share of males and females in different sub-sectors. This table also provides the percentage of employed in terms of educational qualification and training status.

Table 17: Key indicators of different economic sub-sectors (1)

Sub-sector	Indicators (in %)	Age 15-24		Age 25-34		Age 35-44	
		Female	Male	Female	Male	Female	Male
Agriculture	Employment Share	59.5	40.5	64.4	35.6	64.0	36.0
	Workforce with no education	17.0	17.5	42.6	23.6	71.4	34.9
	Workforce with basic level education	36.5	39.5	36.7	48.0	21.4	32.2
	Workforce with secondary level education	45.4	42.5	19.5	25.6	7.2	31.9
	Workforce with tertiary level education	1.0	0.4	1.1	2.9	0.0	1.0
	Workforce with formal vocational training	14.0	9.9	13.7	12.5	10.3	15.8
	Workforce without formal vocational training	86.0	90.1	86.3	87.5	89.7	84.2
Mining and Quarrying	Employment Share	13.8	86.2	31.2	68.8	32.6	67.4
	Workforce with no education	0.0	11.9	23.7	15.0	72.0	54.6
	Workforce with basic level education	88.5	58.2	62.7	54.2	25.8	38.0
	Workforce with secondary level education	11.5	29.9	13.5	29.0	2.3	7.4
	Workforce with tertiary level education	0.0	0.0	0.0	1.8	0.0	0.0
	Workforce with formal vocational training	21.3	1.9	23.9	0.4	2.3	3.7
	Workforce without formal vocational training	78.7	98.1	76.1	99.6	97.7	96.3
Manufacturing	Employment Share	33.8	66.2	43.2	56.8	31.9	68.1
	Workforce with no education	5.0	8.6	22.2	10.4	42.8	20.7
	Workforce with basic level education	34.0	50.2	36.8	47.2	37.7	51.0
	Workforce with secondary level education	60.9	39.1	39.2	30.6	16.3	22.5
	Workforce with tertiary level education	0.2	2.0	1.8	11.7	3.1	5.8
	Workforce with formal vocational training	47.8	13.7	47.9	20.4	25.8	15.6
	Workforce without formal vocational training	52.2	86.3	52.1	79.6	74.2	84.4
Construction	Employment Share	9.5	90.5	12.2	87.8	15.3	84.7
	Workforce with no education	11.6	9.9	45.6	16.4	61.6	29.3
	Workforce with basic level education	38.2	58.3	36.4	53.0	35.6	51.7
	Workforce with secondary level education	50.3	29.9	17.1	26.7	0.7	16.9
	Workforce with tertiary level education	0.0	1.9	0.9	3.9	2.1	2.1
	Workforce with formal vocational training	10.5	10.7	12.7	14.1	3.3	10.5
	Workforce without formal vocational training	89.5	89.3	87.3	85.9	96.7	89.5
Wholesale	Employment Share	45.1	54.9	48.8	51.2	45.9	54.1
	Workforce with no education	2.6	3.3	11.8	5.7	25.8	8.4
	Workforce with basic level education	20.7	26.5	29.0	24.5	39.3	37.2
	Workforce with secondary level education	68.6	64.7	52.2	53.9	35.4	48.2
	Workforce with tertiary level education	8.2	5.4	7.0	15.8	-0.5	6.1
	Workforce with formal vocational training	12.8	12.0	23.4	20.1	15.8	12.2
	Workforce without formal vocational training	87.2	88.0	76.6	79.9	84.2	87.8

Table 18 given below provides the key indicators of 5 different economic sub-sectors by gender and age group.

**Table 18: Key indicators of different economic sub-sectors (2)**

Sub-sector	Indicators (in %)	Age 15-24		Age 25-34		Age 35-44	
		Female	Male	Female	Male	Female	Male
Transportation	Employment Share	1.0	99.0	3.3	96.7	3.0	97.0
	Workforce with no education	37.8	56.8	3.6	50.1	61.1	47.8
	Workforce with basic level education	0.0	29.7	15.2	37.4	5.3	32.0
	Workforce with secondary level education	0.0	0.7	70.0	3.4	33.6	2.4
	Workforce with tertiary level education	85.6	16.4	55.5	21.0	21.1	27.6
	Workforce with formal vocational training	14.4	83.6	44.5	79.0	78.9	72.4
	Workforce without formal vocational training	0.0	0.0	0.0	0.0	0.0	0.0
Accommodation	Employment Share	41.4	58.6	47.9	52.1	49.5	50.5
	Workforce with no education	3.4	4.1	15.3	7.8	37.3	3.7
	Workforce with basic level education	19.2	34.5	25.1	27.9	35.8	44.9
	Workforce with secondary level education	71.6	60.8	56.3	54.1	25.9	49.5
	Workforce with tertiary level education	5.9	0.6	3.4	10.2	1.0	2.0
	Workforce with formal vocational training	7.3	28.0	16.4	22.4	7.8	20.3
	Workforce without formal vocational training	92.7	72.0	83.6	77.6	92.2	79.7
Information and communication	Employment Share	31.3	68.7	16.3	83.7	21.6	78.4
	Workforce with no education	0.0	0.0	0.0	0.0	0.0	0.0
	Workforce with basic level education	0.0	1.0	0.0	2.3	24.3	17.7
	Workforce with secondary level education	49.9	67.7	3.1	56.8	34.5	47.8
	Workforce with tertiary level education	50.1	31.3	96.9	40.9	41.2	34.5
	Workforce with formal vocational training	48.1	33.3	62.7	41.1	66.9	2.0
	Workforce without formal vocational training	51.9	66.7	37.3	58.9	33.1	98.0
Electricity	Employment Share	26.5	73.5	27.0	73.0	10.5	89.5
	Workforce with no education	0.0	29.1	0.0	2.2	0.0	0.0
	Workforce with basic level education	0.0	1.4	6.8	20.3	0.0	26.7
	Workforce with secondary level education	7.7	31.5	68.1	38.4	100.0	54.3
	Workforce with tertiary level education	92.3	38.0	25.1	41.3	0.0	19.0
	Workforce with formal vocational training	0.0	18.9	20.3	27.5	0.0	38.4
	Workforce without formal vocational training	100.0	81.1	79.7	72.5	100.0	61.6
Water Supply	Employment Share	35.9	64.1	25.1	74.9	13.8	86.2
	Workforce with no education	0.0	12.1	8.2	17.0	11.7	29.1
	Workforce with basic level education	100.0	75.3	75.7	38.9	15.6	24.6
	Workforce with secondary level education	0.0	12.7	2.2	29.4	72.7	38.2
	Workforce with tertiary level education	0.0	0.0	13.9	14.3	0.0	8.1
	Workforce with formal vocational training	0.0	41.4	0.0	11.1	0.0	1.4
	Workforce without formal vocational training	100.0	58.6	100.0	88.9	100.0	98.6

Table 19 given below is the key indicators on occupational status of workforces as per different sub-sector. As shown in table 19, the percentage of females in elementary



occupation is 34.7 in case of age 15-24 while this percentage is only 0.1 in case of managers.

Table 19: Key indicators on occupational status of workforces as per different sub-sector (1)

Sub-sector	Indicators (in %)	Age 15-24		Age 25-34		Age 35-44	
		Female	Male	Female	Male	Female	Male
Agriculture	Total Employed	132,255	89,898	186,948	103,280	232,273	130,863
	Managers, professionals, and technical	0.1	0.2	0.0	1.9	0.0	1.9
	Clerical, service and sales workers	0.9	1.2	0.6	3.2	0.6	3.3
	Skilled agricultural and trades work	64.4	63.7	62.2	57.0	65.5	59.8
	Plant and machine operators, and assistants	0.0	6.8	0.0	12.3	0.0	5.1
	Elementary Occupation	34.7	28.1	37.2	25.8	33.8	29.9
Mining and Quarrying	Total Employed	1,898	11,860	4,866	10,737	3,953	8,162
	Managers, professionals, and technical	0.0	0.0	0.0	2.0	0.0	1.2
	Clerical, service and sales workers	0.0	0.0	5.8	7.4	0.0	1.2
	Skilled and trades work	0.0	0.2	0.5	0.0	2.3	2.1
	Plant and machine operators, and assistants	0.0	1.9	0.0	19.3	0.0	8.7
	Elementary Occupation	100.0	97.9	93.7	71.3	97.7	86.9
Manufacturing	Total Employed	73,699	144,467	127,190	167,498	77,295	165,136
	Managers, professionals, and technical	0.0	0.4	0.1	12.6	2.4	7.2
	Clerical, service and sales workers	3.1	5.6	5.8	7.4	14.9	8.1
	Skilled and trades work	81.9	67.5	79.6	54.0	66.0	63.1
	Plant and machine operators, and assistants	4.5	9.3	6.1	12.9	2.1	12.3
	Elementary Occupation	10.6	17.1	8.4	13.1	14.6	9.3
Construction	Total Employed	19,696	188,574	34,144	244,586	35,723	197,463
	Managers, professionals, and technical	0.0	1.6	1.7	4.6	0.0	4.5
	Clerical, service and sales workers	4.7	1.6	1.6	1.9	3.2	1.6
	Skilled and trades work	14.5	42.3	4.5	57.5	10.6	65.4
	Plant and machine operators, and assistants	0.0	4.1	0.0	5.8	0.0	1.9
	Elementary Occupation	80.8	49.3	92.2	30.2	86.2	26.6
Wholesale	Total Employed	94,795	115,389	167,497	175,991	150,497	177,348
	Managers, professionals, and technical	1.4	1.0	0.1	2.0	0.0	2.8
	Clerical, service and sales workers	94.5	79.0	93.9	82.9	97.7	85.1
	Skilled and trades work	0.7	14.4	3.1	9.4	1.7	9.7
	Plant and machine operators, and assistants	0.0	2.8	0.0	3.0	0.0	0.2

	Elementary Occupation	3.5	2.8	2.9	2.7	0.6	1.6
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Like in the case of agriculture, 85.6% of females between 15-24 years of age are in elementary occupations while this percentage is 33.8 in the case of a male between the same ages. Table 20 given below provides this figure for five different sub-sectors by age and by gender.

**Table 20: Key indicators on occupational status of workforces as per different sub-sector (2)**

Sub-sector	Indicators (in %)	Age 15-24		Age 25-34		Age 35-44	
		Female	Male	Female	Male	Female	Male
Transportation	Total Employed	682	68,581	3,450	101,369	2,548	81,880
	Managers, professionals, and technical	0.0	0.9	63.2	4.8	38.9	3.2
	Clerical, service and sales workers	0.0	12.2	24.6	16.2	0.0	12.0
	Skilled and trades work	0.0	0.0	0.0	0.2	0.0	0.0
	Plant and machine operators	14.4	53.1	8.5	60.7	0.0	70.0
	Elementary Occupation	85.6	33.8	3.7	18.1	61.1	14.7
Accommodation	Total Employed	39,856	56,473	39,850	43,424	47,324	4,8371
	Managers, professionals, and technical	1.2	1.9	2.5	6.7	0.2	5.7
	Clerical, service and sales workers	67.0	59.2	80.4	79.3	81.5	82.2
	Skilled and trades work	0.5	0.0	1.7	1.8	0.5	0.0
	Plant and machine operators	0.0	1.5	0.0	0.2	0.0	0.2
	Elementary Occupation	31.2	37.4	15.3	12.0	17.8	11.9
Information and Communication	Total Employed	4,179	9,153	3,426	17,626	2,916	10,572
	Managers, professionals, and technical	31.5	30.4	88.4	68.2	41.2	41.6
	Clerical, service and sales workers	68.5	49.3	11.6	19.5	58.8	19.4
	Skilled and trades work	0.0	19.3	0.0	9.0	0.0	28.4
	Plant and machine operators	0.0	0.0	0.0	1.0	0.0	0.0
	Elementary Occupation	0.0	1.0	0.0	2.4	0.0	10.6
Electricity	Total Employed	633	1,754	4,113	11,142	1,226	10,415
	Managers, professionals, and technical	0.0	39.3	24.3	29.5	0.0	18.5
	Clerical, service and sales workers	92.3	41.8	68.9	22.6	100.0	47.0
	Skilled and trades work	0.0	18.9	0.0	4.8	0.0	7.1
	Plant and machine operators	0.0	0.0	0.0	27.3	0.0	11.8
	Elementary Occupation	7.7	0.0	6.8	15.7	0.0	15.6
Water Supply	Total Employed	1,582	2,825	3,651	10,884	1,787	11,166
	Managers, professionals, and technical	0.0	25.5	13.9	13.6	32.8	15.6
	Clerical, service and sales workers	0.0	0.0	9.4	10.1	39.5	17.7
	Skilled and trades work	0.0	12.7	0.0	13.4	0.0	15.5
	Plant and machine operators	0.0	5.0	0.0	11.5	0.0	9.6
	Elementary Occupation	100.0	56.8	76.7	45.8	27.6	41.5

## 5.2 Economic and labor projections

Table 21 given below provides the GDP and labor projections for multiple years. While projecting such a figure, it has been assumed that the labor force remains commensurate

with the size of the economic growth measured by the GDP growth rate. While calculating such figures, the projection of GDP growth has been adopted from the forecasts made by the Ministry of Finance in periodic plans. The GDP calculation for seven years has been made by analyzing the forecasts made in Sustainable Development Goal (8.1) that stipulates the goal of sustained economic growth of 7 percent. Since SDG 8.1 does not explicitly stipulate the sub-sectoral growth, this projection also assumes the same percentage for all sub-sectors.

Table 21: GDP and labor force projections (GDP in billion and labor force in million)

Sub-sector	2078/79			2079/80			2080/81			GDP Growth Rate					
	GDP	GDP Growth	Labor Force	GDP	GDP Growth	Labor Force	GDP	GDP Growth	Labor Force	2081/82	2082/83	2083/84	2084/85	2085/86	2086/87
<b>GDP at basic prices</b>	38.34	0.03	7.28	42.03	0.10	7.98	46.36	0.10	8.80	0.00	0.00	0.00	0.00	0.00	0.00
<b>Agriculture</b>	9.60	0.00	1.52	10.16	0.06	1.60	10.74	0.06	1.70	18.16	19.43	20.79	22.24	23.80	25.47
<b>Mining</b>	0.28	0.30	0.08	0.33	0.17	0.09	0.38	0.17	0.10	1.12	1.20	1.28	1.37	1.47	1.57
<b>Manufacturing</b>	2.44	0.29	1.38	2.73	0.12	1.54	3.11	0.14	1.76	18.82	20.14	21.55	23.05	24.67	26.39
<b>Electricity</b>	0.96	1.09	0.07	1.21	0.26	0.09	1.46	0.21	0.11	1.17	1.25	1.34	1.43	1.53	1.64
<b>Water supply</b>	0.26	0.25	0.05	0.33	0.30	0.07	0.43	0.30	0.09	0.95	1.02	1.09	1.17	1.25	1.34
<b>Construction</b>	3.36	0.59	1.55	3.68	0.10	1.70	4.14	0.13	1.91	20.43	21.86	23.39	25.02	26.78	28.65
<b>Wholesale</b>	5.98	0.02	1.27	6.62	0.11	1.40	7.37	0.11	1.56	16.70	17.87	19.12	20.46	21.90	23.43
<b>Transportation</b>	2.99	0.47	0.47	3.31	0.11	0.53	3.71	0.12	0.59	6.32	6.76	7.23	7.74	8.28	8.86
<b>Accommodation</b>	1.03	0.77	0.66	1.19	0.16	0.76	1.38	0.16	0.88	9.43	10.09	10.80	11.56	12.36	13.23
<b>Information and communication</b>	0.81	0.00	0.06	0.89	0.10	0.07	0.98	0.10	0.07	0.78	0.83	0.89	0.95	1.02	1.09
<b>Financial and insurance activities</b>	2.52	-0.02	0.12	2.74	0.09	0.13	3.03	0.11	0.14	1.49	1.59	1.70	1.82	1.95	2.08
<b>Real estate activities</b>	4.33	0.23	0.02	4.68	0.08	0.02	5.06	0.08	0.02	0.25	0.27	0.29	0.31	0.33	0.36
<b>Professional, scientific and technical activities</b>	0.36	-0.10	0.04	0.39	0.09	0.04	0.42	0.09	0.05	0.51	0.54	0.58	0.62	0.66	0.71
<b>Administrative and support service activities</b>	0.26	-0.10	0.06	0.28	0.09	0.06	0.30	0.09	0.07	0.73	0.78	0.83	0.89	0.96	1.02
<b>Public administration</b>	1.06	-0.63	0.05	1.15	0.09	0.05	1.26	0.09	0.06	0.62	0.67	0.71	0.76	0.82	0.87
<b>Education</b>	2.84	-0.06	0.53	3.12	0.10	0.58	3.46	0.11	0.64	6.89	7.37	7.88	8.44	9.03	9.66
<b>Human health and social work activities</b>	0.71	0.10	0.19	0.79	0.11	0.21	0.88	0.12	0.23	2.50	2.67	2.86	3.06	3.27	3.50
<b>Arts, entertainment</b>	0.19	-0.18	0.23	0.20	0.10	0.25	0.22	0.09	0.27	2.93	3.13	3.35	3.59	3.84	4.11

### 5.3 Sector and Occupation based Projection of Skilled Human Resource by 2030

Based on the available benchmark data of the year 2018/2019 from the national planning commission and government reports ((NPC, 2019) & (GoN W. T., 2019)), the occupational federations/associations and the sectoral GDP growth rate, the occupation wise human resource projection for all ten sub-sectors has been prepared. In some of the occupations which had no benchmark data, the wise-based projection built on technology and trends of the market is also considered. The details of the human resource projection are in **Annex IV**.

## CHAPTER 5

### CONCLUSIONS AND RECOMMENDATIONS

Based on the study, the following conclusions have been drawn and made key recommendations to improve the TVET system to address the demand of the labor market.

#### **Economy**

1. Despite the agriculture-based economy of Nepal, the primary sector's contribution to GDP is declining, the secondary sector's contribution is stable and the tertiary sector's contribution has been increasing during the last decade. Therefore, it is recommended to apply commercial, and technology-based agriculture farming, and develop the agricultural, forestry, and mining sub-sector value chain. Similarly, the promotion of the manufacturing industries which have competitive advantages in Nepal, and improving the quality of the tertiary sector is necessary to create adequate jobs in the economy.
2. Agriculture, forestry, fishery, wholesale and retail trade, manufacturing, and construction sub-sector have high employability and thus can absorb a larger share of the workforce entering into the labour market every year. However, the majority of the workers are either laborers or lower-level skilled workers. The economy can benefit from the TVET system that can produce all three levels—basic, medium, and higher—of skilled workforce.
3. The contribution of remittance to the economy is considerable. Yet, its contribution to GDP is declining due to the reduced flow of migrant workers, even before COVID-19 the pandemic hit. Thus, the country shall take this opportunity to enhance youth skills and explore ways to send a skill-based quality workforce to the foreign market to address high demand in the new normal. It is recommended to revise TVET courses of highly demanded occupations based on recipient countries' needs

#### **Agriculture sub-sector**

4. Despite the declining trend of agricultural contribution to GDP, this sub-sector still has a high contribution to GDP and employment. The GDP and labor force projection indicates that this sub-sector has high potential in the future. Similarly, among the employed people in agriculture, around 92 percent are in the informal sector. Therefore, it is recommended to design competency-based training (CBT) programs to address both formal and informal sector employment.
5. Nepal has a demographic dividend and it will remain for another 10 years. As a result, among the total population employed in the agriculture sub-sector, 57 percent are from the age group of 15-44. However, only 14 percent have formal vocational skills training among the employed population in the agriculture sub-sector. Thus, the opportunities of the agriculture-based CBT programs need to be provided to all who are in or willing to go for agriculture; forestry, and fishery-related occupations.
6. There is a high percentage of elementary and skilled agriculture trade workers among the employed persons. Data shows a low percentage of the workforce involved in plant and machinery operation and managerial level positions. Therefore, it is urgently needed to focus technology-based and higher-level agricultural training programs on all three types: skilling, reskilling and upskilling.
7. There are several occupations in agriculture; forestry, and fishery sub-sector. However, the competencies related to technology, value chain, and entrepreneurship are almost missing in the different occupations. Therefore, these competencies should be incorporated in curriculum development, program implementation, and evaluation.
8. The migrant workers in the agriculture sub-sector are less than other sub-sectors. The majority of them are in Israel and South Korea. Therefore, the workers need to be equipped with competencies based on the demand of such countries to enhance employability skills in foreign employment.
9. JT and JTA programs are general agriculture and are implemented by all agriculture-based technical institutes. These programs are not occupation-specific. Therefore, it is recommended to design and implement location-specific crops/fruits specific JT/JTA programs. For example, tea and cardamom specialized JTA in Ilam.

### **Manufacturing sub-sector**

10. Manufacturing is the third-largest sub-sector for employment. The majority of the workforce is in the informal sector and only one-fourth have a sort of training program. Therefore, it is recommended to provide both diploma and CBT-based skills training programs in emerging occupations and regular types of occupations, especially in mechanical, garment, food, and dairy technology.

11. The projection matrix shows the GDP growth rate will be high by 2030, and this sub-sector will be the second-largest in labor force participation. Therefore, it is highly recommended to manage more TVET programs in manufacturing.
12. Many workforces are in the skilled and trade work category and followed by elementary occupations. On the other hand, there are almost none in higher-level occupations. Similarly, 89.7 percent of the employed workforce do not have formal vocational skills training. Therefore, it is recommended to conduct skills training programs for existing workers as well.
13. Indian workers occupy the key skilled occupations in the manufacturing industries due to the scarcity of competent Nepalese workers. Therefore, TVET programs may consider implementing programs focusing on medium and higher-level skills such as CNC operators, PLC technicians, boiler operators, machine operators, G category welders, garment tailors.
14. There are migrant workers in this sub-sector. The majority of them are laborers. It is recommended to enhance the skills with global competitiveness and focus on sending more skilled workers to make more productivity.

### **Construction sub-sector**

15. Construction is the fourth-largest employment-providing sub-sector in Nepal. Out of total employment, 98 percent are in the informal sector and only 11.5 percent of employees have a sort of training program. Similarly, the projected labor force participation and GDP growth are higher than other sub-sectors. Therefore, it is recommended to produce more skilled workforces in this sub-sector.
16. There is a high percentage of elementary and skilled agriculture trade workers among the employed persons. Data shows that there is a low percentage of the workforce involved in plant and machinery operation, and managerial level positions. Therefore, it is urgently needed to focus on technology-based and higher-level training programs in all three types: skilling, reskilling, and upskilling.
17. There are many migrant workers in the construction sub-sector, and most of them are unskilled. Similarly, there are immigrant workers in mason, electrician, plumber, heavy equipment operator, tile marble fitter, gypsum board installer, and asphalt technicians. Therefore, it is recommended to produce basic, medium, and higher-level skilled workers in different occupations in this sub-sector.

### **Wholesale and retail trade; repair of a motor vehicle and motorcycle sub-sector**

18. Wholesale and retail trade; repair of a motor vehicle and motorcycle sub-sector is the second largest employment providing sub-sector. Out of the total employed

population, 58.6 percent are in the informal sector. Similarly, only 16.55 percent have received some sort of vocational training. Similarly, the projected GDP growth and labor force participation are in increasing trend in this sub-sector. Therefore, it is highly recommended to implement more CBT programs.

19. The majority of the workforces are clerical, service, and sales workers. The involvement of the workforces in skilled and trade work, and managerial levels are very low. Therefore, it is recommended to conduct three types of skills programs: skilling, reskilling, and upskilling.

20. Most of the skilled workers in auto mechanic-related occupations are from India. There is a high scarcity of skilled workers in this sub-sector. Thus, it is recommended to conduct CBT programs on hybrid engine fitter, fuel pump fitter, denter and painter, auto electrician, motor mechanic, etc.

### **Accommodation and food services sub-sector**

21. Accommodation and food services are other important sub-sector for employment opportunities. Out of the total employed people, about 18 percent have received a sort of training. Therefore, it is recommended to manage CBT programs to enhance the skilled workforce in the sub-sector.

22. The projected GDP and labor force growth is in increasing trend in this sub-sector. It indicates that the employment ratio will be increased. Similarly, 74.9 percent of workforces are clerical, services, and sales workers, followed by elementary occupations. The skilled category and managerial levels are very low. Therefore, it is recommended to conduct more skilling, reskilling and upskilling programs in this sub-sector.

### **Mining and quarrying sub-sector**

23. The mining and quarrying sub sector's contribution to both GDP and employment is less than one percent. However, this sub-sector has a high scope if the potentials are explored and utilized properly. One of the key hindering factors for the development of this sub-sector is the lack of a skilled workforce in most occupations. Therefore, it is recommended to develop a competent workforce in all the occupations within the sub-sector.

24. Among the employed workforces, 91.08 percent are without any formal vocational training program. Similarly, 91.25 percent of workforces are in elementary-level occupations. It indicates that there are no skilled and professional level workforces in this sub-sector. Therefore, TVET programs are needed for all levels based on the market needs and size.



### **Electricity, gas, and A/C sub-sector**

25. GDP and labor force projected growth rate is increasing but a very low ratio. Therefore, it is recommended to conduct medium and advanced training programs to enhance productivity and replace immigrant workers.
26. An aggregate of 82.33 percent of workforces have formal vocational training. Out of the total employed, 62.1 percent are in clerical, services, and sales workers. There is a very low elementary, skilled, and managerial ratio. It indicates that CBT programs are needed at all levels and upskilling programs for the existing workers.

### **Transportation and storage sub-sector**

27. The GDP's projected growth rate is at a declining rate; however, the labor force participation rate is in an increasing trend. It indicates that employment opportunities are growing in this sub-sector. Therefore, skilled workforces need to be trained for the emerging occupations within this sub-sector.
28. On average, out of total employed workforces, 36.17 percent of workforces are in the elementary level and 34.45 percent are in plant and machine operator categories. There are almost none in higher-level employment. Among them, about 62 percent of workforces have formal vocational training. It indicates that there is a high scope of reskilling and upskilling in this sub-sector.

### **Information and communication sub-sector**

29. The GDP contribution and labor force participation size seem small in this sub-sector. However, the projected GDP growth rate and labor force rate are highly increasing trends. Therefore, it is recommended to produce all levels of competent skilled workforces.
30. The majority of the workforces are in higher-level occupations. Therefore, it is recommended to produce competent skilled workforces for basic and medium level as well.

### **Water supply, sewerage, and waste management sub-sector**

31. The GDP's projected growth rate is at a declining rate; however, the labor force participation rate is in an increasing trend. It indicates that employment opportunities are growing in this sub-sector. Therefore, skilled workforces need to be trained for the emerging occupations within the basic and medium levels.

32. Among the total employed workforces, 91 percent are without vocational training and the majority of them are in elementary level occupations. Therefore, skilling, reskilling, and upskilling are needed to enhance the employability of the workforce.

### **TVET Management**

33. Industry-institute linkages seem very weak in the TVET system. Industry involvement is limited with TVET institutions. It is observed that most of the industries are unaware of TVET programs. Therefore, it is recommended to develop policy and implementation guidelines on industry-institute linkages with mandatory industry advisory committee (IAC).

34. Industries are positive about apprenticeship programs. The industry-based TVET programs are appropriate to impart work-relevant competencies. Therefore, it is recommended to develop apprenticeship and on-the-job training (OJT) or internship laws for the benefits of the employer, institute, and student.

35. NSTB develops occupational skills standards; however, no national competency standards (NCS). As a result, it has led to variations in occupational standards across different industries. Therefore, it is recommended to develop NCS of all occupations and either revise or develop new curricula based on market needs and incorporating 21<sup>st</sup>-century skills.

36. There are either training certificates or occupational skills certificates issued by training institutions and NSTB. However, the majority of the workers in the industries have not received such certificates. As a result, employers have been recruiting based on individual faith. Therefore, it is recommended to issue a skills certificate or skills passport to make standardized and ensure quality-based systematic employment in both domestic and foreign employment.

37. There are many TVET institutions implementing almost similar traditional programs. However, the industries are not getting a competent workforce based on present market needs. Therefore, it is recommended to bring a merger policy to focus on niche TVET programs relevant to the market demand.

38. There is a mismatch between competencies required by industries and competencies acquired by TVET graduates during training. As a result, employers are not getting a competent workforce. Most of the graduates lack competencies in ICT and digital technology, entrepreneurship, occupational health and safety, communications, and social behaviors. Similarly, most of the industries are developing their workforce by themselves as a training institute. Therefore, it is recommended to incorporate 21<sup>st</sup>-century skills in the curriculum and develop the implementation system.

39. There are inadequately skilled workers in most of the occupations. A competent workforce is scarce in some of the occupations which require higher-level education and innovative skills. Based on the contribution to GDP, employment opportunities, future scope, and suggestions from the industries, a human resource projection needs to be made based on the sub-sectoral workforce projection of this report and other relevant evidence.
40. There is a high turnover of skilled workers due to the opportunities in both domestic and foreign employment. Therefore, the TVET system may consider producing more graduates in highly demanded occupations both in existing and in new occupations. Similarly, it is recommended to discontinue the traditional programs with less demand and start new and innovative programs with high demand such as LMC technicians, machine operators, hybrid auto mechanics, etc.
41. Accountants and storekeepers are highly demanded occupations. There are no formal professional training opportunities in the public system. Therefore, it may be fruitful by conducting 3-6 months of professional accounting and storekeeping training for the graduates of bachelor in commerce.
42. It is observed that on-the-job training (OJT) is not mandatory for all diploma-level programs. There is almost non-industrial placement in the short-term vocational skills training programs. Therefore, it is recommended to make the OJT/internship program mandatory in all diploma level programs and to enhance work-based practical exposure for the short-term vocational skills as well.
43. At present, there are TVET teacher in-service training programs through TITI. However, there is no provision of the pre-training or competency assessment system for the TVET teacher. Therefore, it is recommended to make compulsory industrial exposure, pre-service training, and competency assessment system for the TVET instructors/teachers.

### **Migrant workers**

44. Construction, manufacturing, and food & accommodation sub-sectors are in front for foreign employment. Data shows that about 94 percent are unskilled workers. Therefore, it is recommended to train a more skilled workforce as per the requirement of the recipient countries to make foreign employment more productive and reliable.

### **Immigrant workers**

45. There is a high dominance of Immigrant workers in medium and higher-level skilled occupations related to the machine operator, manufacturing production including garment, auto mechanic, construction, food technology, wholesale and retail trades, electricity and gas, and waste management. Therefore, it is recommended to develop

CBT courses to address the demand for medium and higher-level skilled workers in the occupations where foreign workers are in. It may consider developing six months and above courses with a minimum entry requirement of relevant Diploma or higher secondary level (Grade 12) education in science.

### **Green Occupations**

46. There are green technologies and occupations in the labor market; however, there are very few green skills and green occupations related to TVET programs, such as solar PV technicians, nursery assistants, organic farming, herbal production, etc. Therefore, it is recommended to incorporate green skills in all TVET courses and develop a curriculum giving high priority to green occupations in all sub-sectors.

### **Gender in Occupations**

47. Female participation in non-traditional occupations is discouraging. The main reasons for low female participation are inadequate education and competencies and the work environment. Thus, the TVET system may provide adequate learning opportunities to the females and need to motivate employers to create a female-friendly working environment.

### **Further Research on Labour Market**

48. There is no scientific labor market information system in Nepal. Different organizations like CTEVT, Labour Department, and other agencies have been conducting studies as per their needs on a piecemeal basis. Therefore, it is recommended to establish a sustainable labor market information system in CBS integrating with NLFS.

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## Annexes

### Annex I: Checklist for FGD and Interview

#### Checklists for Focus Group Discussions

*This checklist is prepared to collect data and information from FGDs conducted in the field to conduct a labor market analysis of Nepal.*

**Name of Focus Group:**

**Coordinator:**

**Email:**

**Date of FGD:**

**Participants Pax:**

**Telephone:**

#### Questions

1. What are the emerging economic sub-sectors? Ranking of 1-5 will be asked by providing a table of 18 sub-sectors.
2. What are the types of jobs (highly skilled, skilled, semi-skilled, and unskilled) available in the sector? (Name the sector for which FGD is being conducted).
3. What is the Major skills-based occupation in the sector? Please list the occupations in descending order of priorities. Also, list the levels of skills.
4. Could you mention the percent share of unskilled, semi-skilled, skilled, and highly skilled workers in the sector?
5. What type of problems/issues you are facing in the sector regarding the skilled workforce? Please list the major Problems? Also discuss, how they are addressed?
6. What is the growth potential of the sector? Is the sector fast-growing, growing but at a slow pace or decreasing, or will remain constant until 2030?
7. What is the number of workforces employed in each occupation now? What is the number/percentage of males and females?
8. How many of them are foreign workers? Male and female.
9. What is the number of additional workforces required in each occupation now? What is the number of males and females?
10. What will be the number of workforces required by 2025 and 2030 in each occupation of the sector mentioned above?
11. Please mention if the sector is being unable to the economic growth to its full potential due to the scarcity of workers?

12. Please mention the emerging new occupation and the required potential numbers of skilled workers in the occupation. Also, discuss why it is emerging? And also new emerging occupations for young women/women.
13. Are you getting the required workforce including women easily in each occupation? Discuss each occupation as stated above.
14. Please, name the occupations you are facing a high scarcity of skilled workforce. How many additional workers you can absorb on it?
15. In your experience and understanding, which occupation/s have the high employment potential in the foreign country employment market? Also, mention the potential number.
16. What are the green occupations in this sector? Is there any plan to introduce green technology?
17. How can you (industries) implement a practical partnership with TVET institutions to manage skills development programs?
18. Are there any big industries coming into this sector by 2030? If yes, how many skilled workers can absorb?



## Annex II: Sector Wise Occupations

Sector: Agriculture; Forestry and Fishing

S. N	Occupation	S. N	Occupation
1	Agriculture Engineer	35	Goat Keeper
2	Argo processor	36	Hatchery machine operator
3	Agriculture equipment operator	37	Hatchery technicians
4	Agriculture Technician	38	Herbal Farm Worker
5	Agriculture workers	39	Herbal producer
6	Agronomist	40	Herbal Technician
7	Apiculture Technician	41	Junior Technical Assistant (Dairy)
8	Assistant Slaughter Technician	42	JTA (Vegetable)
9	Banana Farming Technician	43	Khoto Collector
10	Bee Keeper	44	Livestock Technician
11	Cardamom Processor	45	Mushroom Grower
12	Cash crop producer	46	Nursery Assistant
13	Cattle Raiser	47	Off Season Vegetable Producer
14	Coffee Plantation Worker	48	Orchard Management Assistant
15	Coffee Processor	49	Packaging technician
16	Coffee Technician	50	Plantation technicians
17	Community Agriculture Assistant	51	Post-Harvest Technician (Fruits)
18	Community Forestry Facilitator	52	Post-Harvest Technician (Veg)
19	Community Livestock Assistant	53	Poultry supervisor
20	Compost producer	54	Poultry Technician
21	Conservation scientist	55	Programmer (hatchery)
22	Dairy and Sweets Technician	56	Riverbed Farming Technical Assistant
23	Experienced Leader Farmer	57	Seed Producer (Vegetable)
24	Farm Manager	58	Seed production (Crops)
25	Feed machine operator	59	Tea Plantation Worker
26	Fish harvester	60	Tea Processor
27	Fishery technicians	61	Tea technician
28	Floriculturist	62	Veterinary
29	Flower Decorator	63	veterinary expert (doctor)
30	Forest and conservation technician	64	Veterinary Junior Technical Assistant
31	Forester	65	Village Animal Health Worker
32	Fruit processor	66	Water resource engineer
33	Gardener	67	Wildlife Technician
34	Garden designer	68	Zookeeper

## Sector: Construction

S. N	Occupation	S.N	Occupation
1	Asphalt Technician	28	Hand Tube Well Technician
2	Backhoe Loader Operator	29	Heavy Equipment Electrician
3	Bar Bender	30	Heavy Equipment Mechanic
4	Batching Plant Operator	31	Heavy Equipment Operator
5	Bitumen Distribute Operator	32	Mason
6	Bitumen Surface Road Worker	33	Micro-hydro installer
7	Blasterer	34	Motor Grader Operator
8	Brick Layer Mason	35	Paver Operator
9	Brick Molder	36	Pipe Fitter
10	Brick Pathera	37	Plasterer
11	Building Painter	38	Plumber
12	Bulldozer Operator	39	Rat Trap Mason
13	Carpentry and Interior Decorator	40	Rig machine operator
14	Chips-Marble Polisher	41	Road Mason
15	Concrete Layer	42	Road Roller Operator
16	Construction Carpenter	43	Scaffolder (Bamboo)
17	Construction Worker	44	Scaffolder (Tubular)
18	Crane Operator	45	Short Crating Machine Operator
19	Decorative Concrete Product Producer	46	Shuttering Carpenter
20	Drafting Technician	47	Solar electrician
21	Driller	48	Steel fixture
22	Electrician	49	Stone Layer Mason
23	Excavator Operator	50	Surveyor
24	Furniture Maker	51	Tile Marble fixer
25	Gabion weaver	52	Wheel Loader Operator
26	Grader Operator	53	Wooden Furniture Polisher/ Finisher
27	Gypsum installer		

Sector: Mining & Quarrying

S. N	Occupation	S. N	Occupation
1	Auger Operator	13	Metallurgy Overseer
2	Crane Operator	14	Mine Inspector
3	Cutting and Drilling Machine Operator	15	Mine Supervisor
4	Driller	16	Mine Surveyor
5	Excavator	17	Mineral Processor
6	Field Assistant	18	Mining Engineer
7	Geologists	19	Mining Overseer
8	Ground Water Engineer	20	Plant Setter
9	Heavy Equipment Operator	21	Quarry Inspector
10	Lab Assistant/Technicians for mineralogy and soil test	22	Remote Sensing Expert
11	Mechanical Driller	23	Rigger
12	Metallurgy Engineer	24	Sub Overseer

Sector: Manufacturing

S. N	Occupation	S. N	Occupation
1	A/C technician	36	Manager
2	Accountant	37	Mechanical Engineer
3	Aromatic and Medical Plant Processing Technician	38	Mechatronics Technician (Mechanical and electronics)
4	Aluminum Fabricators	39	Melter
5	Assistant Leather Goods Technician	40	Metal Sculpture
6	Assistant Manager (Production)	41	Metallurgist
7	Bamboo Furniture Maker and Artisan	42	Milling Machine operator
8	Bamboo Handicraft Maker	43	Mithila Artist
9	Bamboo Stick Maker	44	Nepali Hand Made Paper Maker
10	Banana Fiber handicraft Producer	45	Packager
11	Binder	46	Paper Cutter
12	Boiler Operator	47	Paubha Artist
13	Cane and Bamboo Product Producer	48	Plasma Cutter
14	Chemist	49	PLC Technician
15	CNC Machine Repairer	50	Problem diagnostic Expert
16	Cold Storage Technician	51	Production Officer
17	CNC Operator	52	Production Supervisor
18	Cutting master	53	Project Coordinator
19	Designer	54	Project Manager
20	Electro-mechanical Engineer	55	Pulverization Technician

S. N	Occupation	S. N	Occupation
21	Engineer	56	Quality Controller
22	Fabricator	57	Repousse / Embosser
23	Finishing	58	Senior coordinator
24	Fire Fighting Technician (mid-level)	59	Shoe Maker
25	Fire pump assembler	60	Sliding Machine Operator
26	Food Engineer	61	Steam Drier Operator
27	Furniture Maker	62	Stick Incense Roller
28	Industrial electrician	63	Stitcher
29	Industrial Heavy Motor Re-winder	64	Tailor
30	Knitter	65	Thangku Artist
31	Laser Welding Machine Operator	66	Tharu Handicraft Maker
32	Lathe Operator	67	Upper Shoe Stitcher
33	Machine Fitter	68	Weaver
34	Machine Operator	69	Welder
35	Machine Trouble shooter	70	Wood Carver

Sector: Accommodation & Food Services

S. N	Occupation	S.N	Occupation
1	Baker	19	Indian Cuisine Cook
2	Barista	20	Laundry Technicians
3	Bartender	21	Marketing Officer
4	Bell Boy	22	Mountain Guide
5	Camp Manager	23	Nature Guide
6	Care Giver	24	Nepali Cuisine Cook
7	Chef	25	Religious Guide
8	Chinese Cuisine Cook	26	Security Guard
9	Commis (III, II, I)	27	Small Hotel & Lodge Assistant
10	Continental Cook	28	Sweets & Snacks Maker
11	Dishwasher	29	Tour Officer
12	Front Desk Officer	30	Tourists Driver
13	Gambling Inspectors	31	Travel Desk Manager
14	Homestay Operator	32	Travel Manager
15	Housekeeping Cleaner	33	Trekking Cook
16	HR Officer	34	Trekking Guide
17	ICT Operators	35	Trekking Officer
18	Information & PR Supervisor	36	Waiter/Waitress

Sector: Wholesale and retail trade; repair of motor vehicles and motorcycles

S. N	Occupation	S. N	Occupation
1	Assistant Manager	27	Light Vehicle Electrical Mechanic
2	Auto Electrician	28	Light Vehicle Engine Mechanic
3	Auto Mechanic	29	Light Vehicle Service Mechanic
4	Body Maker	30	Light Vehicle Steering and Suspension Mechanic
5	Body Mechanic	31	Light Vehicle Transmission Mechanic
6	Car Mechanic	32	Loader
7	Cashier/Accountant	33	Machine Operator
8	Chief Executive Officer	34	Middle & Heavy Vehicle Service Mechanic
9	Charging Station Technician	35	Motorcycle Mechanic
10	Chassis and Springs Maker	36	Packager
11	Cleaner	37	Auto Painting Technician
12	Denter Painter	38	Pump Set Operator & Repair Technician
13	Deputy Manager	39	Receptionist
14	Dispatcher	40	Refrigeration Technician
15	Drivers (with additional soft skills),	41	Sales Person
16	Engine Fitter	42	Security Guard
17	Enterprise development facilitator	43	Electric Vehicle Mechanic
18	Enterprise Development officer	44	Service Advisor
19	Floor In charge	45	Spare Parts Sales Person
20	Fuel Injector	46	Store Keeper
21	Fuel pump Mechanic	47	Supervisor
22	Heavy Vehicle Electrical Mechanic	48	Tractor Mechanic
23	Heavy Vehicle Mechanic	49	Tire repairer
24	Housekeeper	50	Vehicle servicing
25	Junior Auto Mechanic	51	Vehicle Welder
26	Light Vehicle Brake Mechanic		

Sector: Information and communication

S. N	Occupations	S. N	Occupations
1	Cable installer	16	LCD/LED Television Repair Technician
2	CC Camera installer	17	Manager
3	Communication center operator	18	Mobile Phone Repair Technician
4	Computer assistant	19	News reader
5	Computer Hardware Technician	20	Press mechanic
6	Computer Operator	21	Radio Repair Technician
7	Computer Programmer	22	Software developer
8	Computer Repair & Maintenance Technician	23	Software technician
9	Computer service technician	24	Systems analysts
10	Computer system designer	25	Tape Recorder Repair Technician
11	Cyber security specialist	26	Telecom Lineman
12	Digital press operator	27	Telecom Technical Helper
13	E. Book designer	28	Telecom Technician
14	Electronics fitter	29	Web and multimedia developer
15	FM Radio Technical Assistant	30	Wireless TV and network installer

Sector: Transport and Storage

S.N	Occupations
1	Accountant
2	Cargo Supervisor
3	Cashier
4	Dispatcher
5	Domestic and International Cargo Manager
6	Driver
7	Labor
8	Loader/Unloader
9	Office Secretary
10	Online Tracker
11	Packager
12	Store keeper
13	Transportation Supervisor

Sector: Electricity, gas, steam, and air conditioning supply

S. N	Occupation	S. N	Occupation
1	Armature Rewinding	17	Geotechnical surveyor
2	Cable Jointer	18	Industrial Electrician
3	Civil Engineer	19	Lighting Arrester
4	Civil Surveyor	20	Linesman
5	CNC based machine operator	21	Machine Operator
6	Designer	22	Mason
7	Electrical Appliances Repairer	23	Mechanical Engineer
8	Electrical Engineer	24	Meter Reader
9	Electrical Lineman	25	Micro Hydro Assistant
10	Electrical Motor Repairer/Rewinder	26	PLC Controller
11	Electrical Safety Technician	27	Steel Fixer
12	Electrician	28	Supervisor
13	Electronics Engineer	29	Switch Board Operator
14	Energy Auditor	30	TBM machine Operator
15	Forewarn Technician	31	Transformer Repair Technician
16	Geologist		

Sector: Water supply; sewerage, waste management

S. N	Occupations
1	Chemist
2	Driver
3	Engineer (Civil, Mechanical and Electro-Mechanical)
4	Environmental engineer
5	Foreman/Sub-Overseer
6	Heavy Equipment Operator
7	Labor
8	Machine Operator
9	Plumber
10	Repair and Maintenance Technician
11	Segregation Plant Operator
12	Waste/Garbage Collector
13	Water Pump Operator
14	Water Quality Technician

### Annex III: FGDs and Meetings

<b>Focus Group Discussions (FGDs) and Meeting for Labour Market Study</b>				
<b>S. N</b>	<b>Date</b>	<b>Particulars</b>	<b>Pax</b>	<b>Sectors</b>
1	12.09.2021	Hotel and Tourism related Provincial Associations in Biratnagar	12	Hotel and Accomodation
2	12.09.2021	Bamboo Furniture Maker	1	Manufacturing
3	12.09.2021	Agriculture Farmers/Entrepreneurs	8	Agriculture, Forestry and Fisheries
4	12.09.2021	Morang Udhyog Sangh	3	Manufacturing
5	13.09.2021	Contractor Association of Province 1	7	Construction
6	13.09.2021	Rijal Tashi (Druk) Industry, Itahari	3	Manufacturing
7	14.09.2021	Birgunj Chamber of Commerce and Industries	5	Manufacturing, Hotel and Accomodation
8	15.09.2021	HAN, TAAN and NATA Pokhara	15	Hotel and Accomodation (Tourism)
9	15.09.2021	Pokhara Chamber of Commerce and Industry	18	Manufacturing, Hotel, Gas Supply, Auto Repair, garments, Agriculture, Health
10	15.09.2021	Machhapuchhre Metal Pvt. Ltd, Pokhara	3	Manufacturing
11	15.09.2021	Saddham Furniture	1	Manufacturing
12	20.09.2021	Industries in Butwal Managing Apprenteship Programs of ENSSURE	4	Manufacturing and Automotive Repair
13	20.09.2021	Butwal CCI	8	Agriculture, Transportation, Manufacturing
14	20.09.2021	Butwal Automobile Association	8	Automotive and Vehicle repair
15	21.09.2021	Rupandehi Udhyog Sangh	9	Manufacturing,
16	22.09.2021	Surkhet CCI	23	Construction, Agriculture, Hotel, Service
17	23.09.2021	Nepalgunj CCI	25	Manufacturing, Health, Agriculture, Automotive
18	27.09.2021	Bhatbhateni Group	1	Wholesale and Retail Trade
19	27.09.2021	Almunium Fabricator Association Nepal	9	Manufacturing
20	03.10.2021	Makawanpur CCI	9	Manufacturing, Automotive, Hotel,
21	03.10.2021	Chairperson,AERC, FNCCI	1	Agriculture
22	04.10.2021	Chitwan CCI	7	Service (Radio & Communication), Manufacturing, Hotel
23	04.10.2021	Poultry Entrepreneur	1	Agriculture, Forestry and Fisheries
24	04.10.2021	Hotel Entrepreneurs of Chitwan	4	Hotel and Accomodation
25	22.10.2021	HAN, Kathmandu	6	Hotel and Accomodation
26	24.10.2021	Geology and Mining Department	3	Mining
27	24.10.2021	FCAN	10	Construction
28	03.11.2021	KUKL	2	Water Supply, Swearage and Waste
29	14.11.2021	Kailali Chamber of CI	40	Agriculture, Construction, Hotel, Wholesale, ICT, Manufacturing



## Annex IV: Occupation Wise Human Resource Projection by 2030

Sector: Agriculture, Fishery, and Forstry

S. No	Occupation	Workforce in 2075/2018	Workforce Projection											
			2076/2019	2077/2020	2078/2021	2079/2022	2080/2023	2081/2024	2082/2025	2083/2026	2084/2027	2085/2028	2086/2029	
			Sectoral GDP Growth (Actual)			GDP Growth Rate as per 15th Plan				Growth Rate as per SDG Target 8.1				
			5.2%	2.2%	2.6%	-0.4%	5.8%	5.8%	7.0%	7.0%	7.0%	7.0%	7.0%	
1	Cattle Raiser	2799299	2943743	3009388	3088836	3074939	3253076	3440918	3681783	3939507	4215273	4510342	4826066	
2	Goat Keeper	1718991	1807691	1848002	1896790	1888256	1997646	2112996	2260906	2419169	2588511	2769707	2963586	
3	Rice Producer	1672811	1759128	1798357	1845833	1837528	1943980	2056231	2200167	2354179	2518972	2695300	2883971	
4	Agriculture workers (Beans and Oil Based Crops)	1523337	1601941	1637664	1680899	1673336	1770276	1872497	2003571	2143821	2293889	2454461	2626273	
5	Cash crop producer (Niche areas)	769558	809267	827314	849155	845334	894306	945946	1012162	1083014	1158825	1239942	1326738	
6	Argo processor	766430	805978	823951	845703	841898	890671	942101	1008048	1078612	1154114	1234903	1321346	
7	Off Season Vegetable Producer	533000	560503	573002	588129	585483	619401	655167	701029	750101	802608	858791	918906	
8	Poultry and Bird Farmer	230117	241991	247387	253918	252776	267420	282861	302662	323848	346517	370774	396728	
9	Pig Farmer	144816	152289	155685	159795	159076	168291	178009	190469	203802	218069	233333	249667	
10	Bee Keeper	50000	52580	53753	55172	54923	58105	61460	65763	70366	75292	80562	86201	
11	Gardener	43500	45745	46765	47999	47783	50552	53471	57213	61218	65504	70089	74995	
12	Dairy and Sweets Technician	39407	41440	42365	43483	43287	45795	48439	51830	55458	59340	63494	67939	
13	Veterinary Junior Technical Assistant	35500	37332	38164	39172	38996	41255	43637	46691	49960	53457	57199	61203	
14	Herbal Farm Worker	29608	31136	31830	32670	32523	34408	36394	38942	41668	44585	47706	51045	
15	Coffee Plantation Worker	26719	28098	28724	29483	29350	31050	32843	35142	37602	40234	43051	46064	
16	Fish Farmer	23478	24689	25240	25906	25790	27284	28859	30879	33041	35354	37829	40477	
17	Seed production (Crops)	17757	18673	19090	19594	19505	20635	21827	23355	24990	26739	28611	30614	
18	Experienced Leader Farmer	16540	17393	17781	18251	18169	19221	20331	21754	23277	24906	26650	28515	
19	Poultry Technician	15277	16065	16424	16857	16781	17753	18779	20093	21500	23005	24615	26338	
20	Tea Plantation Worker	14014	14737	15066	15463	15394	16286	17226	18432	19722	21103	22580	24161	

21	Mushroom Grower	13525	14223	14540	14924	14857	15717	16625	17789	19034	20366	21792	23317
22	Turpentine (Khoto) Collector	12500	13145	13438	13793	13731	14526	15365	16441	17591	18823	20140	21550
23	Community Agri Assistant	9654	10152	10379	10653	10605	11219	11867	12697	13586	14537	15555	16644
24	Community Livestock Assistant	8999	9463	9674	9930	9885	10458	11062	11836	12664	13551	14500	15515
25	Nursery Assistant	8707	9156	9360	9608	9564	10118	10703	11452	12254	13111	14029	15011
26	Assistant Slaughter Technician	8245	8670	8864	9098	9057	9582	10135	10844	11603	12416	13285	14215
27	Poultry supervisor	7985	8397	8584	8811	8771	9279	9815	10502	11237	12024	12866	13766
28	Feed machine operator	7428	7811	7985	8196	8159	8632	9131	9770	10454	11185	11968	12806
29	Livestock Technician	6350	6678	6827	7007	6975	7379	7805	8352	8936	9562	10231	10948
30	Veterinary Assistant	5056	5317	5435	5579	5554	5876	6215	6650	7115	7613	8146	8717
31	Fish harvester	4746	4991	5102	5237	5213	5515	5834	6242	6679	7147	7647	8182
32	Agriculture equipment operator	4740	4985	5096	5230	5207	5508	5826	6234	6671	7138	7637	8172
33	Agriculture Technician	4148	4362	4459	4577	4556	4820	5099	5456	5838	6246	6683	7151
34	Flower Decorator	4045	4254	4349	4463	4443	4701	4972	5320	5693	6091	6517	6974
35	Junior Technical Assistant (Dairy)	3940	4143	4236	4348	4328	4579	4843	5182	5545	5933	6348	6793
36	Orchard Management Assistant*	3607	3793	3878	3980	3962	4192	4434	4744	5076	5432	5812	6219
37	Village Animal Health Worker	3560	3744	3827	3928	3911	4137	4376	4682	5010	5361	5736	6138
38	JTA (Vegetable)	3550	3733	3816	3917	3900	4125	4364	4669	4996	5346	5720	6120
39	Forest and conservation technician	3310	3481	3558	3652	3636	3847	4069	4353	4658	4984	5333	5707
40	Herbal producer	2960	3113	3182	3266	3251	3440	3638	3893	4166	4457	4769	5103
41	Forester	2761	2903	2968	3047	3033	3209	3394	3631	3886	4158	4449	4760
42	Fruit processor	2635	2771	2833	2908	2894	3062	3239	3466	3708	3968	4246	4543
43	Farm Manager	2528	2658	2718	2789	2777	2938	3107	3325	3558	3807	4073	4358
44	Floriculturist	2091	2199	2248	2307	2297	2430	2570	2750	2943	3149	3369	3605
45	Fishery technicians	1786	1878	1920	1971	1962	2076	2195	2349	2513	2689	2878	3079
46	Cardamom Processor	1745	1835	1876	1925	1917	2028	2145	2295	2456	2628	2812	3008
47	Community Forestry Facilitator	1650	1735	1774	1821	1812	1917	2028	2170	2322	2485	2659	2845
48	Tea Processor	1401	1473	1506	1546	1539	1628	1722	1843	1972	2110	2257	2415
49	Compost producer	1266	1331	1361	1397	1391	1471	1556	1665	1782	1906	2040	2183

50	Apiculture Technician	775	815	833	855	851	901	953	1019	1091	1167	1249	1336
51	Seed Producer (Vegetable)	769	809	827	849	845	894	945	1011	1082	1158	1239	1326
52	Banana Farming Technician	640	673	688	706	703	744	787	842	901	964	1031	1103
53	Coffee Processor	614	646	660	678	674	714	755	808	864	925	989	1059
54	Packaging technician*	614	646	660	678	674	714	755	808	864	925	989	1059
55	Veterinary expert (doctor)	576	606	619	636	633	669	708	758	811	867	928	993
56	Agronomist	455	478	489	502	500	529	559	598	640	685	733	784
57	Hatchery technicians	450	473	484	497	494	523	553	592	633	678	725	776
58	Garden designer	350	368	376	386	384	407	430	460	493	527	564	603
59	Herbal Technician	296	311	318	327	325	344	364	389	417	446	477	510
60	Coffee Technician	267	281	287	295	293	310	328	351	376	402	430	460
61	Agriculture Engineer	236	248	254	260	259	274	290	310	332	355	380	407
62	Hatchery machine operator	200	210	215	221	220	232	246	263	281	301	322	345
63	Tea technician	146	154	157	161	160	170	179	192	205	220	235	252
64	Programmer (hatchery)	45	47	48	50	49	52	55	59	63	68	73	78
65	Conservation scientist												
66	Plantation technicians*												
67	Post-Harvest Technician (Fruits)*												
68	Post-Harvest Technician (Veg)*												
69	Riverbed Farming Technical Assistant*												
70	Water resource engineer												
71	Wildlife Technician*												
72	Zookeeper*												

## Sector: Construction

S. No	Occupation	Workforce in 2018	Workforce Projection											
			2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
			Sectoral GDP Growth (Actual)			GDP Growth Rate as per 15th Plan			Growth Rate as per SDG Target 8.1					
			7.5%	-5.0%	5.6%	58.5%	9.5%	12.5%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
1	Asphalt Technician*	1749	1880	1786	1885	2989	3273	3682	3939	4215	4510	4826	5164	5525
2	Backhoe Loader Operator	154	166	157	166	263	288	324	347	371	397	425	455	487
3	Bar Bender/Steel Fixer	32235	34646	32917	34748	55083	60317	67856	72606	77689	83127	88946	95172	101834
4	Batching Plant Operator	15	16	15	16	26	28	32	34	36	39	41	44	47
5	Bitumen Distribute Operator	25	27	26	27	43	47	53	56	60	64	69	74	79
6	Bitumen Surface Road Worker	1995	2144	2037	2150	3409	3733	4200	4494	4808	5145	5505	5890	6302
7	Blasterer	335	360	342	361	572	627	705	755	807	864	924	989	1058
8	Brick Layer Mason	146228	157166	149323	157626	249874	273615	307818	329365	352421	377090	403486	431730	461952
9	Brick Molder	2500	2687	2553	2695	4272	4678	5263	5631	6025	6447	6898	7381	7898
10	Brick Pathera	7500	8061	7659	8085	12816	14034	15788	16893	18076	19341	20695	22143	23693
11	Building Painter	46520	50000	47505	50146	79493	87046	97927	104782	112117	119965	128362	137348	146962
12	Bulldozer Operator	1856	1995	1895	2001	3172	3473	3907	4180	4473	4786	5121	5480	5863
13	Carpentry and Interior Decorator	156265	167954	159573	168445	267025	292396	328946	351972	376611	402973	431181	461364	493660
14	Chips-Marble Polisher	4578	4920	4675	4935	7823	8566	9637	10312	11033	11806	12632	13516	14462

15	Concrete Layer	15650	16821	15981	16870	26743	29284	32944	35250	37718	40358	43183	46206	49440
16	Construction Carpenter	32630	35071	33321	35173	55758	61056	68688	73496	78641	84146	90036	96338	10308 2
17	Construction Worker	73228 1	78705 6	74778 2	78935 8	12513 19	13702 10	15414 91	16493 95	17648 53	18883 93	20205 80	21620 21	23133 62
18	Crane Operator	75	81	77	81	128	140	158	169	181	193	207	221	237
19	Decorative Concrete Product Producer	2089	2245	2133	2252	3570	3909	4397	4705	5035	5387	5764	6168	6599
20	Drafting Technician	9945	10689	10156	10720	16994	18609	20935	22400	23968	25646	27441	29362	31417
21	Driller	545	586	557	587	931	1020	1147	1228	1313	1405	1504	1609	1722
22	Electrician	32798	35251	33492	35354	56045	61370	69042	73874	79046	84579	90499	96834	10361 3
23	Excavator Operator	655	704	669	706	1119	1226	1379	1475	1579	1689	1807	1934	2069
24	Furniture Maker	17556 0	18869 2	17927 6	18924 4	29999 6	32850 0	36956 3	39543 3	42311 3	45273 1	48442 2	51833 2	55461 5
25	Gabion weaver	14586	15677	14895	15723	24924	27293	30704	32854	35153	37614	40247	43064	46079
26	Grader Operator	346	372	353	373	591	647	728	779	834	892	955	1022	1093
27	Gypsum installer	4682	5032	4781	5047	8001	8761	9856	10546	11284	12074	12919	13823	14791
28	Hand Tube Well Technician	3818	4104	3899	4116	6524	7144	8037	8600	9202	9846	10535	11272	12062
29	Heavy Equipment Electrician*	9	10	9	10	15	17	19	20	22	23	25	27	28
30	Heavy Equipment Mechanic*	37	40	38	40	63	69	78	83	89	95	102	109	117
31	Heavy Equipment Operator	1860	1999	1899	2005	3178	3480	3915	4189	4483	4797	5132	5492	5876
32	Mason	14628 1	15722 3	14937 7	15768 3	24996 4	27371 4	30792 9	32948 4	35254 8	37722 7	40363 3	43188 7	46211 9
33	Micro-hydro installer	330	355	337	356	564	617	695	743	795	851	911	974	1043

34	Motor Grader Operator	150	161	153	162	256	281	316	338	362	387	414	443	474
35	Paver Operator	75	81	77	81	128	140	158	169	181	193	207	221	237
36	Pipe Fitter	29645	31862	30273	31956	50657	55470	62404	66773	71447	76448	81799	87525	93652
37	Plasterer	73228	78705	74778	78936	12513 2	13702 1	15414 9	16493 9	17648 5	18883 9	20205 8	21620 2	23133 6
38	Plumber	32268	34682	32951	34783	55139	60378	67926	72681	77768	83212	89037	95270	10193 8
39	Rat Trap Mason	7545	8109	7705	8133	12893	14118	15883	16994	18184	19457	20819	22276	23836
40	Rig machine operator	230	247	235	248	393	430	484	518	554	593	635	679	727
41	Road Mason	67986	73071	69425	73285	11617 4	12721 2	14311 4	15313 2	16385 1	17532 1	18759 4	20072 5	21477 6
42	Road Roller Operator	354	380	361	382	605	662	745	797	853	913	977	1045	1118
43	Scaffolder (Bamboo)	9545	10259	9747	10289	16310	17860	20093	21499	23004	24614	26337	28181	30154
44	Scaffolder (Tubular)	12365	13290	12627	13329	21129	23137	26029	27851	29801	31887	34119	36507	39062
45	Short Crating Machine Operator	385	414	393	415	658	720	810	867	928	993	1062	1137	1216
46	Shuttering Carpenter	17867	19203	18245	19260	30531	33432	37611	40244	43061	46075	49300	52751	56444
47	Solar electrician	3360	3611	3431	3622	5742	6287	7073	7568	8098	8665	9271	9920	10615
48	Stone Layer Mason	65426	70320	66811	70526	11180 0	12242 2	13772 5	14736 6	15768 2	16871 9	18053 0	19316 7	20668 8
49	Surveyor	5640	6062	5759	6080	9638	10553	11873	12704	13593	14544	15562	16652	17817
50	Tile Marble fixer	7540	8104	7700	8128	12884	14108	15872	16983	18172	19444	20805	22261	23820
51	Wheel Loader Operator	240	258	245	259	410	449	505	541	578	619	662	709	758
52	Wooden Furniture Polisher/ Finisher	7260	7803	7414	7826	12406	13585	15283	16352	17497	18722	20032	21435	22935

Sector: Mining & Quarrying

S. No	Occupation	Workforce in 2075/2018	Workforce Projection											
			2076/2019	2077/2020	2078/2021	2079/2022	2080/2023	2081/2024	2082/2025	2083/2026	2084/2027	2085/2028	2086/2029	2087/2030
			Sectoral GDP Growth (Actual)			GDP Growth Rate as per 15th Plan			Growth Rate as per SDG Target 8.1					
			Baseline	17.6%	-2.2%	7.5%	30.1%	17.0%	17.0%	7.0%	7.0%	7.0%	7.0%	7.0%
1	Excavating Worker	56957	66993	65499	70405	91625	107191	125437	134218	143613	153666	164423	175932	188247
2	Driller	2061	2424	2370	2548	3315	3879	4539	4857	5197	5560	5950	6366	6812
3	Field Assistant	1761	2071	2025	2177	2833	3314	3878	4150	4440	4751	5084	5439	5820
4	Quarry Inspector	1478	1738	1700	1827	2378	2782	3255	3483	3727	3988	4267	4565	4885
5	Mineral Processor	743	874	854	918	1195	1398	1636	1751	1873	2005	2145	2295	2456
6	Mine Surveyor	656	772	754	811	1055	1235	1445	1546	1654	1770	1894	2026	2168
7	Geologists	646	760	743	799	1039	1216	1423	1522	1629	1743	1865	1995	2135
8	Cutting and Drilling Machine Operator	645	759	742	797	1038	1214	1420	1520	1626	1740	1862	1992	2132
9	Sub Overseer	489	575	562	604	787	920	1077	1152	1233	1319	1412	1510	1616
10	Lab Assistant/Technicians for mineralogy and soil test	455	535	523	562	732	856	1002	1072	1147	1228	1313	1405	1504
11	Mine Inspector	455	535	523	562	732	856	1002	1072	1147	1228	1313	1405	1504
12	Rigger	269	316	309	333	433	506	592	634	678	726	777	831	889
13	Metallurgy Overseer	265	312	305	328	426	499	584	624	668	715	765	819	876
14	Mine Supervisor	263	309	302	325	423	495	579	620	663	710	759	812	869
15	Mining Overseer	236	278	271	292	380	444	520	556	595	637	681	729	780
16	Heavy Equipment Operator	155	182	178	192	249	292	341	365	391	418	447	479	512
17	Crane Operator	63	74	72	78	101	119	139	148	159	170	182	195	208
18	Mining Engineer	63	74	72	78	101	119	139	148	159	170	182	195	208
19	Remote Sensing Expert	43	51	49	53	69	81	95	101	108	116	124	133	142
20	Auger Operator	25	29	29	31	40	47	55	59	63	67	72	77	83
21	Plant Setter	14	16	16	17	23	26	31	33	35	38	40	43	46
22	Ground Water Engineer													
23	Metallurgy Engineer													

## Sector: Manufacturing

S. No	Occupation	Workforce in 2018/2019	Workforce Projection											
			2019/2020	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025	2025/2026	2026/2027	2027/2028	2028/2029	2029/2030	
			Sectoral GDP Growth (Actual)			GDP Growth Rate as per 15th Plan			Growth Rate as per SDG Target 8.1					
			6.5%	-8.6%	3.9%	28.5%	12.0%	14.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
1	Fabricator (Cloth)	240434	256110	234162	243177	312508	350012	399018	426949	456835	488814	523031	559643	598818
2	Wood Carver and Product Makers	120308	128152	117169	121680	156372	175139	199660	213636	228591	244592	261713	280033	299636
3	Aluminum Fabricators	84236	89728	82038	85197	109487	122627	139796	149581	160052	171256	183244	196071	209796
4	Welder	65456	69724	63748	66203	85078	95288	108629	116233	124369	133075	142390	152358	163023
5	Jewellery Maker	46472	49502	45260	47002	60403	67652	77124	82522	88299	94480	101093	108170	115742
6	Metal Sculpture	42987	45790	41866	43477	55873	62578	71340	76334	81677	87395	93512	100058	107062
7	Furniture Maker	35043	37328	34129	35443	45548	51014	58156	62227	66583	71244	76231	81567	87277
8	Weaver (Handmade cloths and woolen products)	34560	36813	33658	34954	44920	50311	57355	61370	65666	70262	75180	80443	86074
9	Industrial electrician	32240	34342	31399	32608	41905	46933	53505	57250	61257	65545	70134	75043	80296
10	Packager	28265	30108	27528	28587	36738	41147	46908	50191	53705	57464	61487	65791	70396
11	Tailor	26605	28340	25911	26909	34580	38730	44153	47244	50551	54089	57875	61927	66262
12	Carpet Weaver	24560	26161	23919	24840	31922	35753	40759	43612	46665	49932	53427	57167	61168
13	Handembroider	22202	23650	21623	22455	28857	32321	36846	39425	42185	45138	48297	51678	55296
14	Melter	18982	20220	18487	19199	24672	27633	31502	33707	36067	38591	41293	44183	47276
15	Machine Operator*	13225	14087	12880	13376	17189	19252	21948	23484	25128	26887	28769	30783	32938
16	Stitcher	12430	13240	12106	12572	16156	18095	20628	22072	23618	25271	27040	28933	30958
17	Assistant Leather Goods Technician	11308	12045	11013	11437	14698	16462	18766	20080	21486	22990	24599	26321	28163



18	Cutting master	10225	10892	9958	10342	13290	14885	16969	18157	19428	20788	22243	23800	25466
19	Lathe Operator	8947	9530	8714	9049	11629	13025	14848	15888	17000	18190	19463	20825	22283
20	Nepali Paper Maker	8560	9118	8337	8658	11126	12461	14206	15200	16264	17403	18621	19925	21319
21	Finishing Inspector	8026	8549	7817	8118	10432	11684	13320	14252	15250	16317	17459	18682	19989
22	Tharu Handicraft Maker	7865	8378	7660	7955	10223	11449	13053	13966	14944	15990	17109	18307	19588
23	Production Supervisor	7638	8136	7439	7725	9928	11119	12676	13563	14513	15528	16615	17778	19023
24	Shoe Maker	7307	7783	7116	7390	9497	10637	12126	12975	13884	14855	15895	17008	18199
25	Milling Machine operator	6845	7291	6666	6923	8897	9965	11360	12155	13006	13916	14890	15933	17048
26	Upper Shoe Stitcher	6540	6966	6369	6615	8500	9521	10854	11613	12426	13296	14227	15223	16288
27	Stick Incense Roller	6534	6960	6364	6609	8493	9512	10844	11603	12415	13284	14214	15209	16273
28	Assistant Manager (Production)	6326	6738	6161	6398	8222	9209	10498	11233	12020	12861	13761	14725	15755
29	Quality Controller	6254	6662	6091	6325	8129	9104	10379	11105	11883	12715	13605	14557	15576
30	Electrical Appliances Repair Technicians	5494	5852	5351	5557	7141	7998	9118	9756	10439	11170	11951	12788	13683
31	Bamboo Furniture Maker	4770	5081	4646	4824	6200	6944	7916	8470	9063	9698	10376	11103	11880
32	Binder	4625	4927	4504	4678	6011	6733	7676	8213	8788	9403	10061	10765	11519
33	Knitter	4546	4842	4427	4598	5909	6618	7544	8073	8638	9242	9889	10581	11322
34	Steam Drier Operator	4520	4815	4402	4572	5875	6580	7501	8026	8588	9189	9833	10521	11257
35	Metallurgist	4449	4739	4333	4500	5783	6477	7383	7900	8453	9045	9678	10356	11081
36	Machine Fitter	4307	4588	4195	4356	5598	6270	7148	7648	8183	8756	9369	10025	10727
37	Paper Cutter	4232	4508	4122	4280	5501	6161	7023	7515	8041	8604	9206	9851	10540
38	Production Officer	4226	4502	4116	4274	5493	6152	7013	7504	8030	8592	9193	9837	10525
39	Thangku Artist	3650	3888	3555	3692	4744	5313	6057	6481	6935	7421	7940	8496	9091
40	Industrial Motor Re-winder	3407	3629	3318	3446	4428	4960	5654	6050	6473	6927	7411	7930	8485
41	Bamboo Handicraft Maker	3250	3462	3165	3287	4224	4731	5394	5771	6175	6607	7070	7565	8094
42	Paubha Artist	2650	2823	2581	2680	3444	3858	4398	4706	5035	5388	5765	6168	6600
43	Mithila Artist	2465	2626	2401	2493	3204	3588	4091	4377	4684	5011	5362	5738	6139
44	Designer	2425	2583	2362	2453	3152	3530	4024	4306	4608	4930	5275	5645	6040
45	Pulverization Technician*	2354	2507	2293	2381	3060	3427	3907	4180	4473	4786	5121	5479	5863

46	A/C technician	2134	2273	2078	2158	2774	3107	3542	3789	4055	4339	4642	4967	5315
47	Fire Fighting Technician*	1506	1604	1467	1523	1957	2192	2499	2674	2861	3062	3276	3505	3751
48	Banana Fiber handicraft Producer	1460	1555	1422	1477	1898	2125	2423	2593	2774	2968	3176	3398	3636
49	Cane and Bamboo Product Producer	1325	1411	1290	1340	1722	1929	2199	2353	2518	2694	2882	3084	3300
50	Repousse /Embosser	1255	1337	1222	1269	1631	1827	2083	2229	2385	2551	2730	2921	3126
51	Laser Welding Machine Operator*	804	856	783	813	1045	1170	1334	1428	1528	1635	1749	1871	2002
52	Plasma Cutter*	650	692	633	657	845	946	1079	1154	1235	1321	1414	1513	1619
53	Aromatic and Medical Plant Processing Technician	634	675	617	641	824	923	1052	1126	1205	1289	1379	1476	1579
54	Bamboo Stick Maker	625	666	609	632	812	910	1037	1110	1188	1271	1360	1455	1557
55	Mechatronics Technician (Mechanical and electronics)	504	537	491	510	655	734	836	895	958	1025	1096	1173	1255
56	Boiler Operator*	345	367	336	349	448	502	573	613	656	701	750	803	859
57	Cold Storage Technician	325	346	317	329	422	473	539	577	618	661	707	756	809
58	Fire pump assembler*	200	213	195	202	260	291	332	355	380	407	435	466	498
59	Machine Trouble shooter	175	186	170	177	227	255	290	311	333	356	381	407	436
60	Problem diagnostic Expert*	145	154	141	147	188	211	241	257	276	295	315	338	361
61	PLC Technician*				100	129	144	164	176	188	201	215	230	246
62	Chemist				650	835	1073	1380	1773	2278	2928	3763	4835	6214
63	CNC Machine Repairer*				20	26	33	42	55	70	90	116	149	191
64	CNC Operator*				354	455	585	751	966	1241	1595	2049	2633	3384
65	Electro-mechanical Engineer													
66	Engineer													
67	Food Engineer													
68	Mechanical Engineer													
69	Project Coordinator													
70	Project Manager													
71	Senior coordinator													
72	Sliding Machine Operator*													



Sector: Accommodation & Food

S. No	Occupation	Workforce in 2075/2018	Workforce Projection											
			2076/2019	2077/2020	2078/2021	2079/2022	2080/2023	2081/2024	2082/2025	2083/2026	2084/2027	2085/2028	2086/2029	2087/2030
			Sectoral GDP Growth (Actual)			GDP Growth Rate as per 15th Plan			Growth Rate as per SDG Target 8.1					
			9.9%	-37.0%	11.2%	76.6%	16.0%	16.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
1	Baker	16798	18464	11638	12942	22858	26516	30758	32911	35215	37680	40318	43140	46160
2	Barista	1225	1347	849	944	1667	1934	2243	2400	2568	2748	2940	3146	3366
3	Bartender	26332	28944	18243	20287	35832	41565	48215	51590	55202	59066	63201	67625	72358
4	Bell Boy	3930	4320	2723	3028	5348	6204	7196	7700	8239	8815	9433	10093	10799
5	Camp Manager	465	511	322	358	633	734	851	911	975	1043	1116	1194	1278
6	Care Giver	26321	28932	18236	20278	35817	41548	48195	51569	55179	59041	63174	67596	72328
7	Chef	1339	1472	928	1032	1822	2114	2452	2623	2807	3004	3214	3439	3679
8	Chinese Cuisine Cook	2348	2581	1627	1809	3195	3706	4299	4600	4922	5267	5636	6030	6452
9	Commis (III, II, I)	3953	4345	2739	3045	5379	6240	7238	7745	8287	8867	9488	10152	10863
10	Continental Cook	10976	12065	7604	8456	14936	17326	20098	21505	23010	24621	26344	28188	30161
11	Dishwasher	289123	317804	200312	222747	393432	456381	529401	566459	606111	648539	693936	742512	794488
12	Front Desk Officer	27896	30663	19327	21492	37960	44034	51079	54655	58481	62574	66954	71641	76656
13	Gambling Inspectors	805	885	558	620	1095	1271	1474	1577	1688	1806	1932	2067	2212
14	Homestay Operator	226	248	157	174	308	357	414	443	474	507	542	580	621
15	Housekeeping Cleaner	178259	195942	123502	137335	242571	281382	326402	349250	373698	399857	427847	457796	489842
16	HR Officer	1320	1451	915	1017	1796	2084	2417	2586	2767	2961	3168	3390	3627
17	ICT Operator	2320	2550	1607	1787	3157	3662	4248	4545	4864	5204	5568	5958	6375
18	PR Supervisor	1214	1334	841	935	1652	1916	2223	2379	2545	2723	2914	3118	3336
19	Indian Cuisine Cook	33289	36591	23063	25647	45299	52547	60954	65221	69786	74671	79898	85491	91476
20	Laundry Technicians	4530	4979	3139	3490	6164	7151	8295	8875	9497	10161	10873	11634	12448

21	Marketing Officer	3650	4012	2529	2812	4967	5762	6683	7151	7652	8187	8761	9374	10030
22	Mountain Guide	462	508	320	356	629	729	846	905	969	1036	1109	1186	1270
23	Nature Guide	321	353	222	247	437	507	588	629	673	720	770	824	882
24	Nepali Cuisine Cook	145256	159665	100637	111908	197661	229287	265972	284590	304511	325827	348635	373039	399152
25	Religious Guide	256	281	177	197	348	404	469	502	537	574	614	657	703
26	Security Guard	175000	192360	121245	134824	238136	276238	320435	342865	366866	392547	420025	449427	480886
27	Small Hotel Assistant	20215	22220	14005	15574	27508	31909	37015	39606	42378	45345	48519	51915	55549
28	Sweets & Snacks Maker	18083	19877	12528	13932	24607	28544	33111	35429	37909	40562	43402	46440	49691
29	Tourist Guide	4241	4662	2938	3267	5771	6694	7766	8309	8891	9513	10179	10892	11654
30	Tour Officer	4735	5205	3281	3648	6443	7474	8670	9277	9926	10621	11365	12160	13011
31	Tourists Driver	12735	13998	8823	9811	17329	20102	23319	24951	26697	28566	30566	32705	34995
32	Travel Desk Manager	3743	4114	2593	2884	5093	5908	6854	7333	7847	8396	8984	9613	10285
33	Travel Manager	3743	4114	2593	2884	5093	5908	6854	7333	7847	8396	8984	9613	10285
34	Trekking Cook	5486	6030	3801	4227	7465	8660	10045	10748	11501	12306	13167	14089	15075
35	Trekking Guide	17766	19528	12309	13687	24176	28044	32531	34808	37244	39851	42641	45626	48820
36	Trekking Officer	2797	3074	1938	2155	3806	4415	5121	5480	5864	6274	6713	7183	7686
37	Waiter/Waitress	244865	269156	169649	188649	333207	386520	448362	479747	513329	549262	587711	628850	672870

## Sector: Wholesale &amp; Retail Trades; repair of Motor vehicles and motorcycles

S. No	Occupation	Workforce in 2075/2018	Workforce Projection											
			2076/2019	2077/2020	2078/2021	2079/2022	2080/2023	2081/2024	2082/2025	2083/2026	2084/2027	2085/2028	2086/2029	2087/2030
			Sectoral GDP Growth (Actual)			GDP Growth Rate as per 15th Plan			Growth Rate as per SDG Target 8.1					
			Baseline	8.1%	10.7%	5.3%	2.2%	10.7%	11.3%	7.0%	7.0%	7.0%	7.0%	7.0%
1	Assistant Manager	5264	5691	5083	5350	5468	6052	6736	7208	7713	8252	8830	9448	10110
2	Auto Electrician*	3540	3827	3418	3598	3677	4070	4530	4847	5187	5550	5938	6354	6799
3	Auto Mechanic	13226	14299	12770	13443	13737	15207	16925	18110	19378	20734	22186	23739	25401
4	Body Maker*	4523	4890	4367	4597	4698	5200	5788	6193	6627	7091	7587	8118	8686
5	Body Mechanic (Repairer)	3540	3827	3418	3598	3677	4070	4530	4847	5187	5550	5938	6354	6799
6	Car Mechanic	14260	15416	13768	14494	14811	16396	18249	19526	20893	22355	23920	25595	27386
7	Cashier/Accountant	9350	10108	9028	9503	9712	10751	11965	12803	13699	14658	15684	16782	17957
8	Chief Executive Officer	22132	23927	21369	22495	22988	25447	28323	30305	32427	34696	37125	39724	42505
9	Charging Station Technician*				160	164	181	201	216	231	247	264	283	302
10	Chassis and Springs Maker	2350	2541	2269	2389	2441	2702	3007	3218	3443	3684	3942	4218	4513
11	Cleaner	14250	15406	13759	14484	14801	16385	18236	19512	20878	22340	23904	25577	27367
12	Denter Painter	4522	4889	4366	4596	4697	5199	5787	6192	6625	7089	7585	8116	8685
13	Deputy Manager	5645	6103	5450	5738	5863	6491	7224	7730	8271	8850	9469	10132	10841
14	Dispatcher	14258	15414	13767	14492	14809	16394	18246	19523	20890	22352	23917	25591	27383
15	Driver	36245	39184	34996	36840	37646	41674	46383	49630	53104	56821	60799	65055	69609
16	Engine Fitter	1365	1476	1318	1387	1418	1569	1747	1869	2000	2140	2290	2450	2621
17	Enterprise development facilitator	1035	1119	999	1052	1075	1190	1325	1417	1516	1623	1736	1858	1988
18	Enterprise Development officer	745	805	719	757	774	857	953	1020	1092	1168	1250	1337	1431
19	Floor In charge	2432	2629	2348	2472	2526	2796	3112	3330	3563	3813	4080	4365	4671
20	Fuel Injector	1426	1542	1377	1449	1481	1640	1825	1953	2089	2236	2392	2559	2739
21	Fuel pump Mechanic	965	1043	932	981	1002	1110	1235	1321	1414	1513	1619	1732	1853

22	Heavy Vehicle Electrical Mechanic	456	493	440	463	474	524	584	624	668	715	765	818	876
23	Heavy Vehicle Mechanic	742	802	716	754	771	853	950	1016	1087	1163	1245	1332	1425
24	Housekeeper	9546	10320	9217	9703	9915	10976	12216	13071	13986	14965	16013	17134	18333
25	Junior Auto Mechanic	4687	5067	4525	4764	4868	5389	5998	6418	6867	7348	7862	8413	9001
26	Light Vehicle Brake Mechanic	985	1065	951	1001	1023	1133	1261	1349	1443	1544	1652	1768	1892
27	Light Vehicle Electrical Mechanic	1235	1335	1192	1255	1283	1420	1580	1691	1809	1936	2072	2217	2372
28	Light Vehicle Engine Mechanic	3542	3829	3420	3600	3679	4073	4533	4850	5190	5553	5942	6357	6802
29	Light Vehicle Service Mechanic	5689	6150	5493	5782	5909	6541	7280	7790	8335	8919	9543	10211	10926
30	Light Vehicle Steering and Suspension Mechanic	2345	2535	2264	2383	2436	2696	3001	3211	3436	3676	3934	4209	4504
31	Light Vehicle Transmission Mechanic	1789	1934	1727	1818	1858	2057	2289	2450	2621	2805	3001	3211	3436
32	Loader	62356	67413	60207	63380	64767	71696	79798	85384	91361	97756	10459 9	11192 1	11975 5
33	Machine Operator	1896	2050	1831	1927	1969	2180	2426	2596	2778	2972	3180	3403	3641
34	Middle & Heavy Vehicle Service Mechanic	9587	10365	9257	9744	9958	11023	12269	13127	14046	15030	16082	17207	18412
35	Motorcycle Mechanic	28403	30706	27424	28869	29501	32657	36348	38892	41614	44528	47644	50980	54548
36	Packager	15632	16900	15093	15889	16236	17974	20004	21405	22903	24506	26222	28057	30021
37	Auto Painting Technician	2564	2772	2476	2606	2663	2948	3281	3511	3757	4020	4301	4602	4924
38	Pump Set Technician	1896	2050	1831	1927	1969	2180	2426	2596	2778	2972	3180	3403	3641
39	Receptionist	1564	1691	1510	1590	1624	1798	2001	2142	2291	2452	2624	2807	3004
40	Refrigeration Technician	1790	1935	1728	1819	1859	2058	2291	2451	2623	2806	3003	3213	3438
41	Sales Person	118214 7	12780 19	11413 99	12015 51	122785 4	135922 0	151281 0	16187 06	17320 16	18532 57	19829 85	21217 94	22703 19
42	Security Guard	8960	9687	8651	9107	9306	10302	11466	12269	13128	14047	15030	16082	17208
43	Electric Vehicle Mechanic	245	265	237	249	254	282	314	335	359	384	411	440	471
44	Service Advisor	896	969	865	911	931	1030	1147	1227	1313	1405	1503	1608	1721
45	Spare Parts Sales Person	28403	30706	27424	28869	29501	32657	36348	38892	41614	44528	47644	50980	54548
46	Store Keeper	42587	46041	41119	43286	44234	48966	54499	58314	62396	66764	71437	76438	81789

47	Supervisor	15460	16714	14927	15714	16058	17776	19784	21169	22651	24237	25933	27749	29691
48	Tractor Mechanic	750	811	724	762	779	862	960	1027	1099	1176	1258	1346	1440
49	Tire repairer*	5460	5903	5272	5550	5671	6278	6987	7476	8000	8560	9159	9800	10486
50	Vehicle servicing Station Manager	750	811	724	762	779	862	960	1027	1099	1176	1258	1346	1440
51	Vehicle Welder	4568	4938	4411	4643	4745	5252	5846	6255	6693	7161	7663	8199	8773

Sector: Information & Communication

S. No	Occupation	Workforce in 2075/2018	Workforce Projection											
			2076/2019	2077/2020	2078/2021	2079/2022	2080/2023	2081/2024	2082/2025	2083/2026	2084/2027	2085/2028	2086/2029	2087/2030
			Sectoral GDP Growth (Actual)			GDP Growth Rate as per 15th Plan			Growth Rate as per SDG Target 8.1					
			Baseline	7.1%	2.3%	1.5%	0.4%	9.6%	9.6%	7.0%	7.0%	7.0%	7.0%	7.0%
1	Cable installer	6957	7447	7619	7729	7760	8505	9322	9974	10673	11420	12219	13074	13990
2	CC Camera installer	3619	3874	3963	4021	4037	4424	4849	5189	5552	5940	6356	6801	7277
3	Communication center operator	9654	10335	10572	10726	10769	11803	12936	13841	14810	15847	16956	18143	19413
4	Computer assistant	32560	34855	35657	36174	36320	39807	43628	46682	49950	53446	57188	61191	65474
5	Computer Hardware Technician	8256	8838	9041	9172	9209	10093	11062	11837	12665	13552	14501	15516	16602
6	Computer Operator	82458	88271	90302	91611	91981	100810	110488	118222	1264983	135353	144827	154965	165813
7	Computer Programmer	4501	4818	4929	5001	5021	5503	6031	6453	6905	7388	7905	8459	9051
8	Computer Repair & Maintenance Technician	6301	6745	6900	7000	7029	7703	8443	9034	9666	10343	11067	11842	12671
9	Computer service technician	4560	4881	4994	5066	5087	5575	6110	6538	6995	7485	8009	8570	9170
10	Computer system designer	3245	3474	3554	3605	3620	3967	4348	4652	4978	5327	5699	6098	6525
11	Cyber security specialist	965	1033	1057	1072	1076	1180	1293	1384	1480	1584	1695	1814	1940
12	Digital press operator	4681	5011	5126	5201	5222	5723	6272	6711	7181	7684	8222	8797	9413
13	E. Book designer	2365	2532	2590	2628	2638	2891	3169	3391	3628	3882	4154	4445	4756
14	Electronics fitter	7562	8095	8281	8401	8435	9245	10133	10842	11601	12413	13282	14211	15206



15	FM Radio Technical Assistant	4879	5223	5343	5421	5442	5965	6538	6995	7485	8009	8569	9169	9811
16	LCD/LED Television Repair Technician	9018	9654	9876	10019	10059	11025	12083	12929	13834	14803	15839	16948	18134
17	Manager	8975	9608	9829	9971	10012	10973	12026	12868	13768	14732	15763	16867	18048
18	Mobile Phone Repair Technician	7714	8258	8448	8570	8605	9431	10336	11060	11834	12662	13549	14497	15512
19	News reader	3762	4027	4120	4180	4196	4599	5041	5394	5771	6175	6607	7070	7565
20	Postal & Courier Service Worker	4631	4957	5072	5145	5166	5662	6205	6640	7104	7602	8134	8703	9312
21	Press mechanic	2658	2845	2911	2953	2965	3250	3562	3811	4078	4363	4668	4995	5345
22	Radio Repair Technician**	1256	1345	1375	1395	1401	1536	1683	1801	1927	2062	2206	2360	2526
23	Software developer	461	494	505	512	514	564	618	661	707	757	810	866	927
24	Software technician	4610	4935	5049	5122	5142	5636	6177	6609	7072	7567	8097	8664	9270
25	Systems analysts	2546	2725	2788	2829	2840	3113	3411	3650	3906	4179	4472	4785	5120
26	Tape Recorder Repair Technician**	2450	2623	2683	2722	2733	2995	3283	3513	3759	4022	4303	4604	4927
27	Telecom Lineman	3657	3915	4005	4063	4079	4471	4900	5243	5610	6003	6423	6873	7354
28	Telecom Technical Helper	9645	10325	10562	10716	10759	11792	12924	13828	14796	15832	16940	18126	19395
29	Telecom Technician	1292	1383	1415	1435	1441	1580	1731	1852	1982	2121	2269	2428	2598
30	Web and multimedia developer	2871	3073	3144	3190	3203	3510	3847	4116	4404	4713	5043	5396	5773
31	Wireless TV and network installer	13214	14146	14471	14681	14740	16155	17706	18945	20271	21690	23209	24833	26572

Sector: Transport and Storage

S. No	Occupation	Workforce in 2075/2018	Workforce Projection											
			2076/2019	2077/2020	2078/2021	2079/2022	2080/2023	2081/2024	2082/2025	2083/2026	2084/2027	2085/2028	2086/2029	2087/2030
			Sectoral GDP Growth (Actual)				GDP Growth Rate as per 15th Plan				Growth Rate as per SDG Target 8.1			
			Baseline	8.8%	-13.4%	6.1%	47.3%	11.0%	12.0%	7.0%	7.0%	7.0%	7.0%	7.0%
1	Accountant	5135	5585	4839	5135	7565	8398	9405	10064	10768	11522	12328	13191	14115
2	Airport Logistic Technician*	2564	2789	2416	2564	3778	4193	4696	5025	5377	5753	6156	6587	7048
3	Cargo Supervisor	7256	7892	6837	7256	10690	11866	13290	14220	15216	16281	17421	18640	19945
4	Cashier	5135	5585	4839	5135	7565	8398	9405	10064	10768	11522	12328	13191	14115
5	Dispatcher	15866	17257	14950	15865	23375	25947	29060	31095	33271	35600	38092	40759	43612
6	Domestic and International Cargo Manager	3650	3970	3439	3650	5378	5969	6685	7153	7654	8190	8763	9377	10033
7	Driver	296265	322247	279163	296248	436488	484508	542643	580628	621272	664761	711294	761085	814361
8	Labor	518505	563978	488574	518475	763915	847956	949701	1016180	1087312	1163424	1244864	1332004	1425245
9	Loader/Unloader	196254	213465	184925	196243	289142	320951	359461	384624	411547	440356	471181	504163	539455
10	Office Secretary	5135	5585	4839	5135	7565	8398	9405	10064	10768	11522	12328	13191	14115
11	Online Tracker	5630	6124	5305	5630	8295	9207	10312	11034	11806	12633	13517	14463	15476
12	Packager	149311	162406	140692	149302	219980	244181	273480	292624	313107	335025	358477	383570	410420
13	Store keeper	5135	5585	4839	5135	7565	8398	9405	10064	10768	11522	12328	13191	14115
14	Transportation Supervisor	10883	11837	10255	10882	16034	17798	19933	21329	22822	24419	26129	27958	29915

## Sector: Electricity, Gas &amp; Air Condition

S. No	Occupation	Workforce in 2075/2018	Workforce Projection											
			2076/2019	2077/2020	2078/2021	2079/2022	2080/2023	2081/2024	2082/2025	2083/2026	2084/2027	2085/2028	2086/2029	2087/2030
			Sectoral GDP Growth (Actual)			GDP Growth Rate as per 15th Plan			Growth Rate as per SDG Target 8.1					
			9.6%	25.6%	7.7%	109.0%	26.0%	21.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
2	Cable Jointer	29743	32601	40941	44110	92203	116174	140579	150419	160948	172215	184270	197169	210971
23	Mason	23540	25802	32402	34910	72974	91946	111260	119049	127382	136299	145840	156049	166972
12	Electrician	20132	22067	27711	29856	62409	78634	95153	101813	108940	116566	124726	133457	142799
28	Steel Fixer	14587	15989	20079	21633	45220	56976	68945	73771	78935	84460	90372	96698	103467
26	Micro Hydro Assistant	14562	15961	20044	21596	45142	56878	68826	73644	78799	84315	90217	96533	103290
15	Forewarn Technician	9743	10679	13411	14449	30203	38055	46050	49273	52722	56413	60362	64587	69108
9	Electrical Lineman	9733	10668	13397	14434	30172	38016	46002	49223	52668	56355	60300	64521	69037
25	Meter Reader**	9456	10365	13016	14023	29314	36934	44693	47822	51169	54751	58584	62685	67073
20	Industrial Electrician	7584	8313	10439	11247	23510	29623	35845	38355	41039	43912	46986	50275	53794
29	Supervisor	4560	4998	6277	6763	14136	17811	21553	23061	24676	26403	28251	30229	32345
17	Gas supply logistic worker	4322	4737	5949	6410	13398	16881	20428	21858	23388	25025	26777	28651	30656
10	Electrical Motor Repairer/Rewinder*	3846	4216	5294	5704	11923	15022	18178	19450	20812	22269	23828	25495	27280
16	Gas stove and pipe repairer	3133	3434	4313	4646	9712	12237	14808	15845	16954	18140	19410	20769	22223
7	Electrical Appliances Repairer	2949	3232	4059	4373	9142	11519	13938	14914	15958	17075	18270	19549	20918
22	Machine Operator	2564	2810	3529	3802	7948	10015	12119	12967	13875	14846	15885	16997	18187
4	Civil Surveyor	2365	2592	3255	3507	7331	9238	11178	11961	12798	13694	14652	15678	16775
18	Geologist	2360	2587	3248	3500	7316	9218	11154	11935	12771	13665	14621	15645	16740
30	Switch Board Operator	2350	2576	3235	3485	7285	9179	11107	11885	12717	13607	14559	15578	16669
19	Geotechnical surveyor	1564	1714	2153	2319	4848	6109	7392	7910	8463	9056	9690	10368	11094
11	Electrical Safety Technician	1540	1688	2120	2284	4774	6015	7279	7788	8333	8917	9541	10209	10923
5	CNC based machine operator	1245	1365	1714	1846	3859	4863	5884	6296	6737	7209	7713	8253	8831

21	Lighting Arrester	1240	1359	1707	1839	3844	4843	5861	6271	6710	7180	7682	8220	8795
1	Armature Rewinding	1230	1348	1693	1824	3813	4804	5814	6220	6656	7122	7620	8154	8725
32	Transformer Repair Technician	465	510	640	690	1441	1816	2198	2352	2516	2692	2881	3083	3298
27	PLC Controller	125	137	172	185	387	488	591	632	676	724	774	829	887
31	TBM machine Operator	89	98	123	132	276	348	421	450	482	515	551	590	631
3	Civil Engineer													
6	Designer													
8	Electrical Engineer													
13	Electronics Engineer													
14	Energy Auditor													
24	Mechanical Engineer													

Sector: Water supply; sewerage, waste management

S. No	Occupation	Workforce in 2018	Workforce Projection											
			2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
			Sectoral GDP Growth (Actual)			GDP Growth Rate as per 15th Plan			Growth Rate as per SDG Target 8.1					
			1.2%	2.2%	1.6%	25.0%	30.0%	30.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
1	Waste/Garbage Collector*	42560	43079	44005	44714	55903	72675	94475	101088	108164	115735	123837	132505	141781
2	Labor	27895	28235	28842	29307	36640	47633	61921	66256	70894	75856	81166	86848	92927
3	Plumber	21629	21893	22364	22724	28410	36934	48012	51373	54969	58817	62934	67339	72053
4	Repair and Maintenance Technician	14256	14430	14740	14977	18725	24343	31645	33861	36231	38767	41481	44384	47491
5	Driver	6548	6628	6770	6879	8601	11181	14535	15553	16641	17806	19053	20386	21813
6	Water Pump Operator	6543	6623	6765	6874	8594	11173	14524	15541	16629	17793	19038	20371	21797
7	Foreman/Sub-Overseer	3598	3642	3720	3780	4726	6144	7987	8546	9144	9784	10469	11202	11986
8	Machine Operator	2465	2495	2549	2590	3238	4209	5472	5855	6265	6703	7172	7674	8212

9	Water Quality Technician	1954	1978	2020	2053	2567	3337	4337	4641	4966	5314	5686	6084	6509
10	Segregation Plant Operator	1163	1177	1202	1222	1528	1986	2582	2762	2956	3163	3384	3621	3874
11	Heavy Equipment Operator	945	957	977	993	1241	1614	2098	2245	2402	2570	2750	2942	3148
12	Chemist	543	550	561	570	713	927	1205	1290	1380	1477	1580	1691	1809
13	Engineer (Civil, Mechanical and Electro-Mechanical)													
14	Environmental engineer													