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Industrial Revolution 4.0 and Job Fore-Casting: An Analysis of Future Job Market Requirements in Pakistan

[1]Muhammad Yasir
[2*]Dr. Mehwish Ali Khan
[1]Deputy Director, NAVTTC, Centre of Excellence, Islamabad, Pakistan. Email: yasirtt4@gmail.com
[2*]Deputy Director (Academics), NAVTTC, Centre of Excellence, Islamabad, Pakistan. Corresponding Author Email: drmehwishkhan80@gmail.com

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Abstract

In this article, we examine the latest occupational forecasts to determine how emerging technologies have affected future job growth in the world, focusing particularly on Pakistan and generally on the whole world through collection of data from various job portals. The researchers have studied and reviewed more than 50 job forums, however, data was extracted randomly from only 18 selected job portals and freelancing sites. This process was done by using AI tool assistance. The job market trend shows that in wake of digitalization, AI, cloud computing, cyber security, E-businesses/services are highly demanded occupations worldwide. Moreover, the graph of bureau of emigration and overseas employment of Pakistan shows that the trends of technical skilled workforce like, electrician, plumber, welder, mason, heavy machine operators and drivers are more evident.

Keywords: Industrial Revolution, Skilled workers, Job Forecasting, digitalization

Introduction

Since ancient times, technological advancements have played a crucial role in shaping human societies. Whether it was the invention of the wheel, the discovery of fire, or the development of early agricultural tools, each breakthrough has not only improved human productivity but also reshaped economic structures. While these innovations have greatly benefited humanity by enhancing efficiency, comfort, and prosperity and posed challenges for skilled workforce specifically for third world countries, they have also had a profound impact on the labor market, particularly the skilled labor sector, and the global economy. Historical shifts, such as the advent of the steam engine or electricity, were accompanied by a reconfiguration of job markets and the need for new skill sets. This dynamic continues today, particularly as we enter the era of Industrial Revolution 4.0. Examining the new job trends, necessary skills, and future job market requirements is crucial as the world struggles with the opportunities and challenges brought about by Industrial Revolution 4.0. This study seeks to investigate how Industrial Revolution 4.0 is affecting the labor market by identifying the most in-demand occupations, competencies, and skills. This research aims to offer insights for educators, policymakers, and individuals attempting to navigate the

changing job landscape by examining job market trends and requirement.

Statement of the Problem

The rapid pace of technological advancements is transforming the global labor market, leading to the displacement of traditional jobs and the creation of new, high-tech roles. This shift has intensified the demand for a highly skilled workforce, particularly in emerging fields such as artificial intelligence, automation, and digital technologies. However, many third-world countries face a critical shortage of workers equipped with these specialized skills, which has adversely affected both their economic growth and labor market stability. This research aims to thoroughly examine the increasing need for advanced technical skills in the labor market. Additionally, it seeks to identify and recommend market-driven, need-based job opportunities that can help third-world countries adapt to the changing technological landscape, thereby enhancing workforce competitiveness and economic resilience.

Research Questions

1. What job roles are currently the most sought after across different industries particularly in Pakistan and generally in the world?
2. Which categories of jobs have demonstrated steady growth in demand over time?
3. What skills and qualifications do employers most commonly look for in the most sought-after positions?

Research Objectives

The research aims to:

1. Identify the top 10 most sought-after job roles.
2. Examine job market trends.
3. Determine the skills and qualifications needed.

Literature Review

The current project aims to present job-forecasting particularity in Pakistan and generally in the world by emphasizing on the trends being followed by the developing countries following the developed countries. The aim of the project is to find data due to the challenges posed to the skilled workforce in the wake of I.R 4.0. The researcher presents an overview of development in industrial revolution, emphasizing on different angles to which the new jobs are linked with prosperity and are in part helping catering the trends in jobs being available in the market.

Today's world has come a long way. Any specie evolves adapting to changes in the environment. Human civilization evolved with a fast pace and today it stands on the edge of so far the greatest revolutions. Humans have changed making an impact on their way of living, and needs which in turn has brought forward an altered demand for the skills and expertise that human beings have. World has transformed in the wake of industrial revolution 4.0, creating a new hub for innovative and different job pools. The literature presented here creates a thorough study that human beings have evolved and reached the stage of industrial revolution 4.0, making it a digitalized world, which pertains to the demand of new jobs and skills as driven by the evolved industries.

History of Industrial Revolution

The evolution of technology from the pre-agrarian period to AI and robotics has profoundly transformed the labor market across historical phases. In pre-agrarian societies, labor was largely communal, with survival dependent on hunting and gathering. The agrarian era introduced agricultural tools, leading to organized farming and more stable communities, allowing for the specialization of tasks. The post-agrarian phase saw advancements in agricultural tools, increasing efficiency and productivity.

The First Industrial Revolution, driven by the steam engine, mechanized production, drastically reducing manual labor needs. The Second Industrial Revolution, marked by the discovery of electricity, further boosted production capabilities and created a demand for skilled labor to operate machines. With the advent of information technology in the Third Industrial Revolution, automation began to replace human labor in repetitive tasks, emphasizing the need for digital and technical skills.

However, third-world countries face significant challenges in keeping pace with these changes. Skill deficits, inadequate infrastructure, and policy gaps are key barriers that hinder the adoption of new technologies. Many workers in these countries lack the technical education required for AI and automation-driven industries, and underdeveloped infrastructure slows the digitalization process. Without effective policies to guide this transition, these nations risk falling further behind in

the global labor market.

The current technological transformation, often referred to as the Fourth Industrial Revolution or Industry 4.0, is defined by the integration of digital technologies, artificial intelligence (AI), robotics, and the Internet of Things (IoT), Cyber security, blockchain technology and cloud computing.

These advancements promise unprecedented efficiencies in production, communication, and logistics, potentially boosting the global economy. However, as with previous industrial revolutions, the benefits are not evenly distributed across the world, and the costs are felt more acutely by specific sectors, especially skilled labor in third-world countries.

In developing nations, where industries often rely on traditional manufacturing and manual labor, the shift towards automation and AI-driven processes poses significant challenges. Unlike developed countries, which can adapt more easily by re-skilling their workforce, third-world countries face a scarcity of resources, infrastructure, and training programs needed to prepare their workers for this transformation. As a result, skilled laborers in these regions are at risk of job displacement, leading to rising unemployment, economic instability, and greater inequality. In the wake of technological advancements have historically driven human progress, they have also disrupted existing job markets and economic systems.

Evolving of Civilizations to Today's World of Skills

From the pre-agrarian era to artificial intelligence and robotics, technological advancements have significantly changed the labor market throughout history. Hunting and gathering were the main means of subsistence in pre-agrarian communities, and labor was mostly communal. Task specialization was made possible by the introduction of agricultural implements during the agrarian era, which resulted in organized farming and more stable communities. Improvements in agricultural equipment throughout the post-agrarian era increased output and efficiency.

The steam engine, which propelled the First Industrial Revolution, mechanized production and significantly reduced the need for manual labor. The invention of electricity during the Second Industrial Revolution increased manufacturing capacity even further and increased the need for qualified workers to run machinery. Automation started to supplant human work in the Third Industrial

Revolution with the introduction of information technology.

The Fourth Industrial Revolution is currently changing sectors once more because to digitalization, robots, and artificial intelligence. Complex activities are now being handled by sophisticated automation and intelligent technologies, necessitating even more specialized skills from the workforce.

Third-world nations, however, have a difficult time keeping up with these developments. The main obstacles to the adoption of new technology are policy gaps, insufficient infrastructure, and skill shortages. The digitization process is slowed down by inadequate infrastructure, and many people in these nations lack the technical expertise needed for AI and automation-driven businesses. These countries run the risk of slipping further behind in the global labor market if they don't have strong policies to steer this shift.

Human civilization and human have evolved simultaneously. Human mind has developed and has given space to development of tools, language, agriculture, permanent settlements, towns, cities, religion, trade, transportation, communication, government, law, money, literature and the arts, education, nation states, scientific and technological research. It is interesting in a way because development of civilization at every stage has evolved human mind and its relationship with life to its greatest capacity. Our mind consists of different pieces of theories placed together. These concepts are based on “mechanistic, static, inflexible equilibrium models, whereas the world we live in is alive, dynamic, organic, conscious, responsive, creative and continuously evolving”(Garry,2016).

Skill Labor Challenges and Opportunity in Perspective of Post IR 4.O World

Where the technological advancement provide luxury to human being it also posed challenges. The era of Industrial Revolution 4.0 presents both opportunities and challenges. For third-world countries, like Pakistan, the shift requires not only technological adoption but also comprehensive strategies to safeguard their skilled labor forces through education, re-skilling, upskilling and policy reforms. Otherwise, these nations risk being left behind in an increasingly digital and automated global economy.

Technology has transformed Pakistan, like other countries of the world. It has reshaped different aspects of life. Country’s job market has also been greatly

influenced by it. While this transformative journey has various promising opportunities, it also poses a great challenge to the country if they are not addressed. Labor market of Pakistan needs immediate measures on displaced jobs and in its need for skilled workforce.

Industries that were based on traditional mode of operation were labour intensive but in today's market automation and artificial intelligence has changed the entire picture of the industry. They have become an integral part of the operations in industries. There is no doubt that these transformations have made the productivity more efficient but one cannot escape the idea that it has posed an equal danger to job displacement. Low skilled workers are losing jobs rising the scale of unemployment in the country and consequently affecting the economy of the country.[1] Today is the time where we are in dire need of skilled workers, workers who are up to date with the job market and who have digitalized their skills up to the requirements of the market. This can be done by identifying the key sectors of employment present in this tech driven world where this workforce can grasp jobs according to the required skills. There is a growing gap between world supplies of labor and their demands in it. According to research that many students who graduate from universities lack the skills required by the labor market. Different data was collected from the employees of manufacturing, educational, health banking and telecommunication sector. It was found out that there was quite a difference in the demand and supply of all the skills. Hence strategies must be adopted to remove this mismatch (Khan, Sana, Irum & Muneer, 2024).

It is widely believed by policy makers and economists that the skills of the labour force today do not match the skills that jobs require. While posing different viewpoints regarding this one of the very strong arguments is that the labour market has evolved with the presence of artificial intelligence and automation, whereas the workers are still stick to the traditional setup of learning and they are not upgrading their aptitude of aligning with industrial revolution 4.0 (Handel,2003). It is strongly argued that an inflexible low skilled labour force poses a great threat to the economic growth of a society and integration.

Skilled Labor Job Forecasting Trend

One research asserts that the job creation needs due to automation by 2030 are 1uite significant. It is considered that almost replace 37.9 million of workers will be replaced by robots in 2030. Manufacturing workers are the ones most at risk and most of these jobs substituted by robots will take place in Asia. In lower-income countries, physically demanding, routine, and low-skilled entry-level jobs, which are necessary to accommodate the growing youth working-age population, are at the highest risk of being automated or reshored due to automation. This could pose a challenge for lower-income countries if the expanding youth workforce lacks adequate education and skills, or primarily engages in routine tasks. From a policy standpoint, it will be crucial to make significant investments in providing high-quality education to children who have not yet entered the labor force, enabling them to effectively compete not only with their counterparts in lower-income countries but also with robots in higher-income countries (Abeliansky, Algur, Bloom, & Prettner, 2020).

According to another research automation has the potential to generate fresh job prospects, substitute human labor in specific duties, and alter the function of employees in specific professions. The impact of automation on the labor market varies across nations based on a number of factors, including globalization, new product demand, occupational structure in employment, labor frictions, institutional differences affecting relative wages, and so forth. The rate of automation varies across nations and sectors, depending on technological and economic feasibility. When compared to developed economies, developing economies are not as skillfully prepared.The percentage of ICT professionals employed overall is lower in developing economies, as is the percentage of students enrolled in post-secondary and vocational programs. They perform better in non-routine manual skills but worse in routine-cognitive, analytical, and interpersonal skills. Developing economies must adjust to the quickly shifting skills landscape in order to compete in the digital economy (Banga & te Velde, 2018). This fast paced changes in the world of artificial intelligence robotics and machine learning has changed the face of works. Industries like Tesla are working in fully automated atmosphere, machines running in dark. This technical change is feared to leave many workers jobless (Benanav, 2020). this technological revolution will create havoc by creating mass displacement in job

market and creating “a massive new useless class, leading to social and political upheavals that no existing ideology knows how to handle” (Noah,2018, p.18). The advancements are fueled by progress in technology. The researchers, have established a specific framework for understanding these developments, which they explain through four dimensions: the rapid growth of the foundational technologies, the rising capabilities of these systems and machines, their widespread presence in economic and social spheres, and the growing interconnectedness of individuals. It implies that with the coming years the technology would grow to such a length that an average desktop will have the processing power of all the humankind combined. They will not only grow in number rather their capability will also increase with the passage of time. It will also have an increased pervasiveness in the life of human beings, not only the number and capacity of technology driven things will increase but it will be part of everything that is a human being;s life, there will be for instance, umbrella that would lit at the doorstep if there is an indication of rain, and there are multiple other examples. Lastly, the feature of connectivity, by the end of 2020, human beings will be more connected to each other through internet (Susskind and Susskind, 2018). Schwab (2017) is of the view that technology has transformative power of technology and there is a need for organizations to be agile and responsive to these changes. He calls it a digital revolution; the word Industry 4.0 was coined in 2011 by Hannover Messe. According to this research there is a great impact of this revolution on the business. Impact on there is a reduced Reduced importance of capital for starting companies, there are disruptive tech companies achieving success with minimal investment (e.g., WhatsApp, Instagram). there is a rapid growth of innovative companies (e.g., Airbnb, Uber, Alibaba) and there is a significant decrease in technology costs (e.g., storage from $10,000 to less than $0.03 per GB).

Economic Contribution of Skill Labor /Impact/Development /IR 4.0

Skill labour does not only contribute to his/her own well-being but also contributes economically for the country. One of the study analyzes how the development of new digital technologies affects workers' careers and how it changes training and skill acquisition. The authors use Natural Language Processing techniques to link curriculum updates to innovative technology.

The results of the study show that training upgrades are driven by technological

advancements, with curriculum material shifting toward less routine-intensive jobs and a higher emphasis on digital and social skills. They demonstrate that educational upgrades enable workers adjust to new demands for their expertise and earn greater earnings relative to those with obsolete abilities using administrative employer-employee data. These results emphasize the significance of shifts in the availability of within-occupational skills in satisfying changing labor market needs for workers without a college degree (Lipowski, Anna, & Ulrich, 2024).

The labor market is evolving with a fast pace as a result of shifting economic conditions, advancements in technology, and demands for certain skill sets. In the era of digitalization, a lot of data is becoming available, offering up new prospects for labor market analysis. If several stakeholders have access to timely and reliable information regarding the labor market, they will be able to make well-informed decisions. But conventional data sources and labor market analysis techniques frequently fail to capture the diversity and patterns of the dynamic labor market. Researchers have recently begun utilizing data science approaches to extract information from a variety of data sources. This survey examines current studies on labor market analytics using data science techniques that were published between 2015 and 2022 and talks about potential future research topics. To determine the data sources used for job market analysis, the types of skill extraction techniques, the methods for identifying occupations and sectors, and the applicability of the study carried out, 101 primary studies were categorized and assessed. (Rahhal, Kassou, & Ghogho, 2024).

Jobs Vanished From Job Market Due To Ir 4.0 By 2030

According to The US Bureau of Labour Statistics, these are some jobs that have a 95% or higher probability of being automated in wake of IR 4.0:

Cashiers	Billing and posting clerks
Office clerks, general	Counter and rental clerks
Secretaries and administrative assistants	Driver/Sales workers
Bookkeeping, accounting and auditing clerks	Foodservice hosts and hostesses
	Packaging/Filling machine operators
Cooks, restaurants	Operating engineers and equipment

Team assemblers	operators
Receptionists and information clerks	Bill and account collectors
Landscaping and ground sleeping workers	Loan officers
Shipping, receiving and traffic clerks	Insurance claims and policy processing clerks
Inspectors, testers, sorters, samplers, and weighers	Claims adjusters, examiners and investigators
Counter attendants, cafeteria/food concession	Parts salespersons
Tellers	Electrical and electronic equipment assemblers
Molding/ Core making /Casting machine operators	Telemarketers
Ushers, lobby attendants, and ticket takers	Dispatchers
Library assistants and technicians	Data entry keyper
Switchboard operators	Legal secretaries
	Order clerks
	Payroll and timekeeping clerks

Current Skill Occupation in Practice as World Skill Forum

Comprehensive information about the worldwide robotics market is provided by the International Federation of Robotics (IFR). Their Statistical Department prepares an annual report that offers insightful information on the growth and trends of the sector. They obtain information directly from national robotics associations and industrial robot providers across the globe as part of an extensive data collection procedure. Because of this, their reports are extremely reliable and accurate tools.

Over 541,302 industrial robots were installed worldwide in 2023, breaking pre-pandemic records, according to the 2024 World Robotics Report. Of these installations, 70% were in Asia, with the remaining 10% coming from the Americas and 17% from Europe. Significant development was also seen in the service robot industry, with sales of 158,000 professional service robots in 2022 [3]. In the meantime, the robot's market is expected to grow from $59.7 billion in 2022 to over $200 billion by 2030 (Melissa,2024).

List Of Worldskills Occupation Standard

According to the world skill forum the following occupations are currently largely in practice worldwide in various industry and are identified by world skill forum for international world skill competition. These occupations have replaced the old obsolete occupations. However, this replacement is so volatile and rigorous that in the forthcoming years, there would be many drastic changes.

Sector Name: Construction Sector:

Name of Trade Technology: Construction and Building Technology

Name of Occupation

- Bricklaying
- Cabinetmaking
- Carpentry
- Concrete Construction Work
- Digital Construction
- Electrical Installations
- Joinery
- Landscape Gardening
- Painting and Decorating
- Plastering and Drywall Systems
- Plumbing and Heating
- Refrigeration and Air Conditioning
- Stonemasonry
- Wall and Floor Tiling

Sector Name: Creative Arts

Name of Trade Technology: Creative Arts and Fashion

Name of Occupation

- 3D Digital Game Art
- Fashion Technology
- Floristry
- Graphic Design Technology
- Jewelry

- Visual Merchandising

Sector Name: Information and Communication Technology

Name of Trade Technology: Information and Communication Technology

Name of Occupation

- Cloud Computing
- Cyber Security
- Information Network Cabling
- IT Network Systems Administration
- IT Software Solutions for Business
- Mobile Applications Development
- Web Technologies

Sector Name: Manufacturing and Engineering Technology

Name of Trade Technology: Manufacturing and Engineering Technology

Nam of Occupation

- Additive Manufacturing
- Autonomous Mobile Robotics
- Chemical Laboratory Technology
- CNC Milling
- CNC Turning
- Construction Metal Work
- Electronics
- Industrial Control
- Industrial Design Technology
- Industrial Mechanics
- Industry 4.0
- Manufacturing Team Challenge
- Mechanical Engineering CAD
- Mechatronics
- Optoelectronic Technology
- Renewable Energy
- Robot Systems Integration

- Water Technology
- Welding

Sector Name: Social and personal services

Name of Trade Technology: Information and Communication Technology

Nam of Occupation

- Bakery
- Beauty Therapy
- Cooking
- Hairdressing
- Health and Social Care
- Hotel Reception
- Pâtisserie and Confectionery
- Restaurant Service

Sector Name: Social and personal services

Name of Trade Technology: Transportation and logistics services

Nam of Occupation

- Aircraft Maintenance
- Autobody Repair
- Automobile Technology
- Car Painting
- Heavy Truck Maintenance
- Heavy Vehicle Technology
- Logistics and Freight Forwarding
- Rail Vehicle Technology

List of Occupations in Response to Emerging Trends of Industrial Revolution 4.0

The following occupation are identified by world economic forum these are emerging trades created response of industrial revolution 4.0. These are mostly tech-based jobs, which will dominate the entire occupational world in the coming future.

- Artificial Intelligence and Machine Learning
- Robotics Engineers
- Data Scientists and Analysts

- Cybersecurity Analysts
- IoT (Internet of Things) Specialists
- Cloud Computing Experts
- Blockchain Developers
- 3D Printing Engineers
- Renewable Energy Engineers
- Augmented Reality (AR) and Virtual Reality (VR) Developers
- Digital Transformation Consultants
- Autonomous Vehicle Engineers
- Biotechnology Engineers
- Sustainability Managers

This list reflects how IR 4.0 is reshaping the global workforce, emphasizing advanced technological skills and innovation across multiple sectors.

Newly Created Occupation from Skill Labor Market Up To 2030/28

In light of technological improvements, the MIT Work of the Future Initiative analyzes new work opportunities and skills that are necessary. The following are some important new career opportunities:

- Scientists and data analysts,
- AI and Machine Learning,
- Experts in Cybersecurity,
- Environmental and Sustainability Experts,
- Engineers for Autonomous Vehicles,
- Consultants for Digital Transformation,
- Creative Technologists (developing games, AR/VR, etc.),
- Engineers in Social Robotics and, Experts in Online Learning (MIT,2024).

Hence, by reviewing the data present it is pertinent to say that there is a rigorous shift in the jobs present, which makes it crucial for the researchers to present and analyse the shift, which will further bridge a gap between the trends going on in the world. This will help the policy makers to make ample arrangements to cater this challenge in the near future by providing skilled force which is most in demand by the industries.

Methodology Adopted

This research employs a quantitative data analysis method. Researcher has gathered data from different websites and presented them in the graph form to analyse the data and further forecast that which jobs are in trend in Pakistan particularly and in the world generally, which will further endorse the statement that developing countries like Pakistan are following the trends in job openings or not. To help in data collection, this research utilized a conversational AI tool (Meta AI) to obtain pertinent details from 18 websites, which include Rozee.pk. Jobee.pk, brightspyre.pk, NAVTTC (NEXT) Linkedin Pakistan. Pakistan Bureau of Statistics(2024), OECD, US Bureau of Statistics(2024), Indeed.com, ILO, World Bank data Bank, Gartner, compTIA, Burning Glass, Association of Builders and Developers (ABAD), International Data Corporation (IDC), Stack Overflow Developer Survey, and Bureau of Emigration and Overseas Employment Pakistan (BEOE). The AI tool aided in recognizing and gathering data, which was later examined and interpreted by the researcher. This technique is used to evaluate relevant data and trends, highlighting the challenges posed by skilled workforce in wake of IR 4.0.

Data Analysis

A thorough exploration of jobs being advertised on different national and social platforms was taken which is presented a pie chart method of illustration. This illustration gives a comprehensive outlook of what are the trends of jobs present in the labor market as observed on the dashboards of different job portals, on 25th September, 2024. Whereas the numbers will alter day to day data but it does capture the trends present on the job portals. The data of each portal which was observed is recorded below.

The researchers have collected data from different national and international websites and have compiled them. The bar charts below show the emerging trends of jobs, hence authenticating the job forecasting as put forth by the researchers, however it may also be noted that data present on these websites is very volatile, it keeps on changing every minute, which makes it difficult for a fixed figure but it does give a perception on the trend's inclination towards particular trades and fields.

A) Rozee. Pk

It is a job website that covers most of the jobs offered nationally in Pakistan and

internationally. It provides services to job seekers and employers providing them with a platform. The bar chart below shows data present on the website in year 2024.

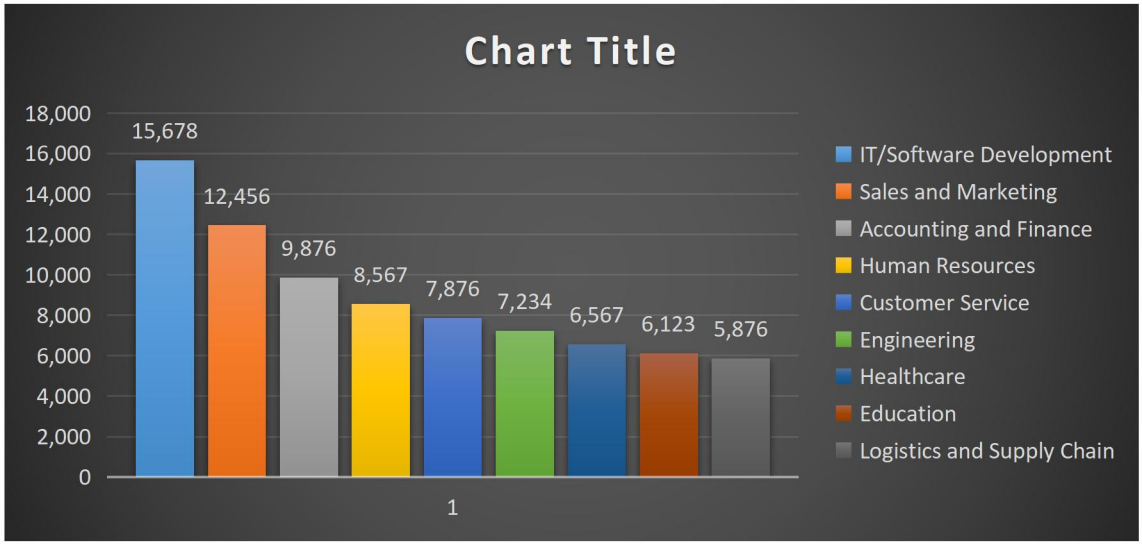

Figure 1: Rozee.pk

The bar chart compiled from rozee.pk implies there is a surge in the search of the field of IT, i.e. 15,678, which is followed by sales and marketing, i.e. 12,456. followed immediately in a slight decrease form are accounting and finance, 9,876, human resources, 8,576, customer services, 7,876, engineering 7,234, healthcare, 6,567, education, 6,123, and with logistics and supply chain with the least jobs, I,e 5,876.

B) Jobee.pk

It is a job website that provides a platform for jobs offered in Pakistan. The bar chart below provides data present on its platform present in 2004

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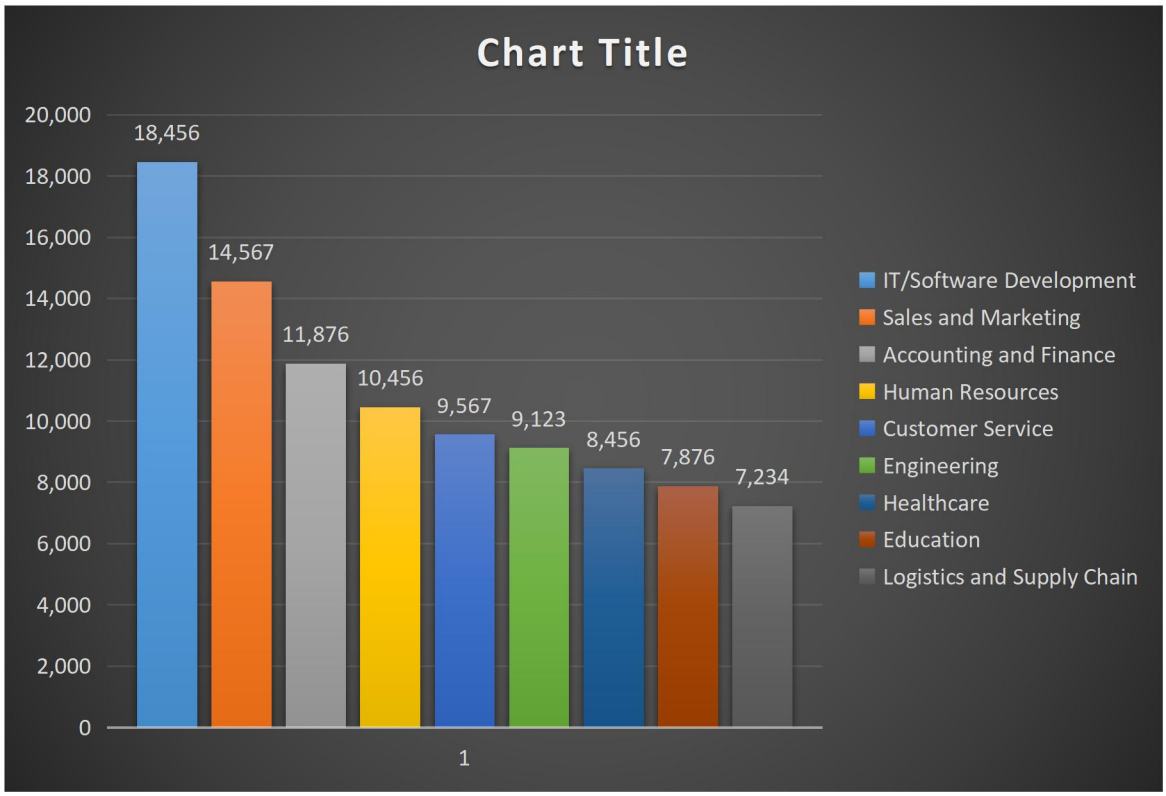

Figure 2: Jobee.com

The bar chart elaborates that Information technology has most of the jobs posted as trade, with the number of 18,456, followed by sales and marketing, 14,567, accounting and finance, 11,876, human resources 10,456, customer service, 9567, engineering, 9,123, healthcare 8,456, education, 7,876, and logistics and supply chain 7,234. This shows the trends of growth are inclined more towards the IT side of the trade, with e-commerce and digital marketing also belonging to the same trade and that they are growing rapidly.

C) Brightspyre.com

The Brights pyre is another job website in Pakistan premier since 2002. they claim that their viewership exceeds averagely 6,000,000 a month. They have also registered over one million job applications from aspiring candidates in the past five years. Pakistan.

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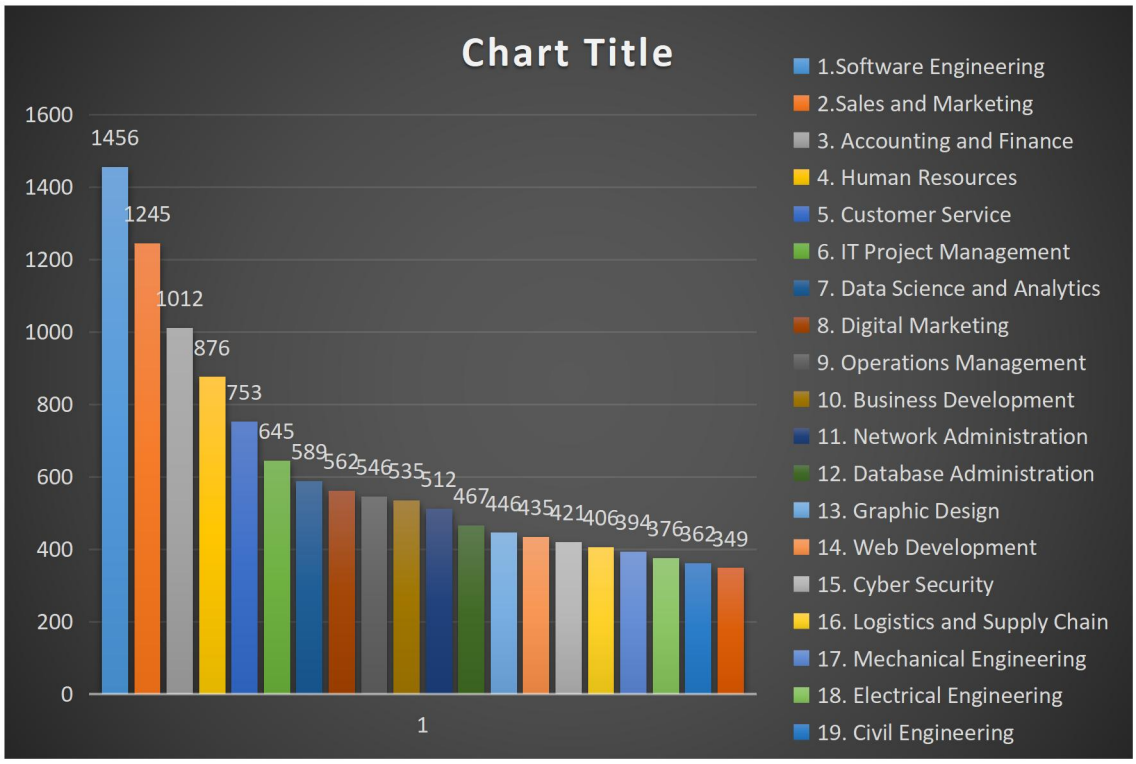

Figure 3: Bright spyre.com

This bar highlights the surge in software engineering1456, followed by sales and marketing, 1245, accounting and finance1012 human resource, 876, customerservice,753, it projects management,645, data science analytics and digital marketing with 589 and 562 respectively., the categories followed by them explicitly or implicitly reconnected with IT sector. telecommunication and IT sector. This implies that IT sector is on the gihest of demands.

D) LinkedIn Pakistan

LinkedIn is one of the world's most popular social networking online forum for professionals and businesses to connect and network. It also provides a platform for job seekers and employers. There are almost 900 million registered users worldwide and 95 % of recruiters use LinkedIn to find candidates moreover 57 million employer use LinkedIn for recruitment.

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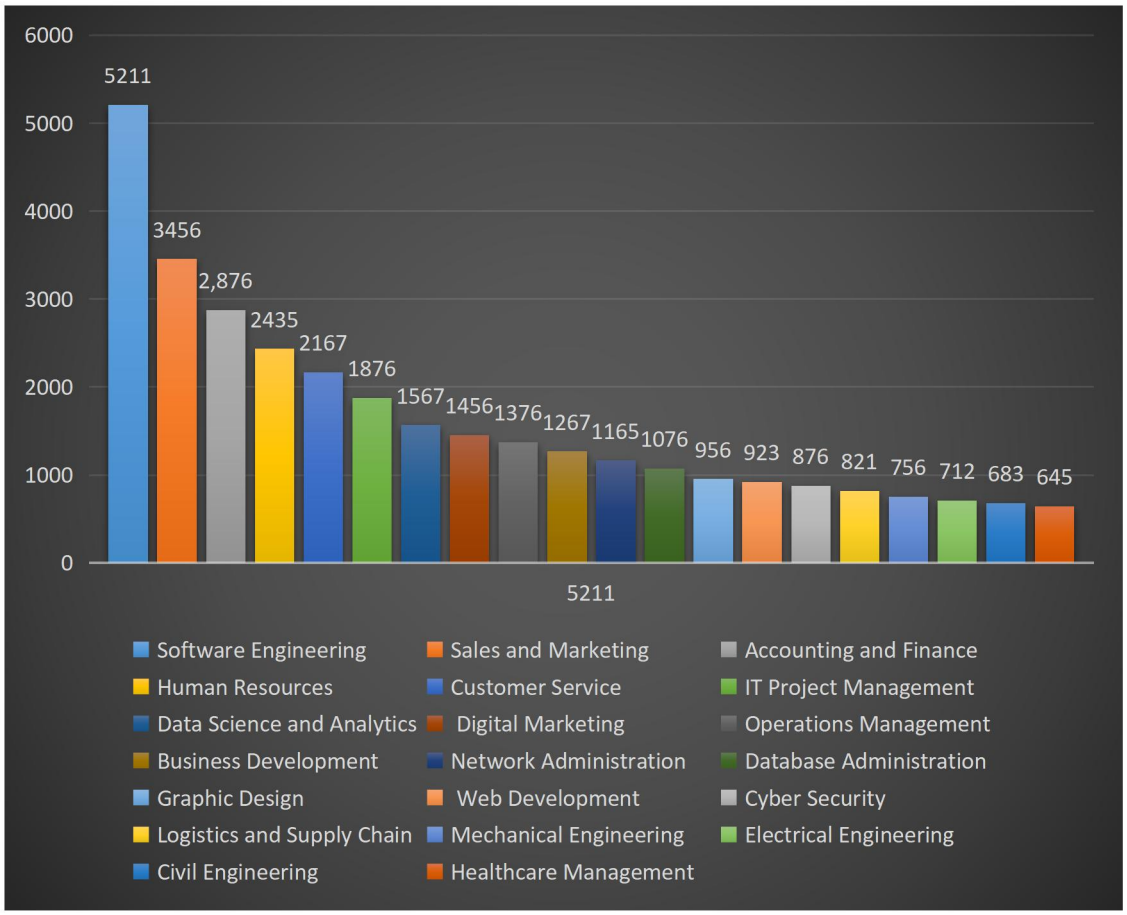

Figure 4 Linkedin.com

LinkedIn's data reveals that software engineering, 5211 is t highest of jobs posted, sales and marketing at the second number with a marked difference in 3456 of number. Accounting and finance,2876, human resources, 2435 again followed by all the it related fields like it project management, sata science and analytics, distal marketing, network administration, database administration graphic design, web development, and cyber security. hence, it shows growing demand for tech professionals (Software Engineering, Data Science, Cyber Security), and there is an increasing importance of digital marketing (Digital Marketing: 1,456 jobs). I t also implies that there is a need for skilled professionals in business operations (Operations Management: 1,376 jobs)

E) NAVTTC (NEXT)

It is also a digital platform launched by government of Pakistan to connect job seekers with employers, facilitating workforce development and employment opportunities.

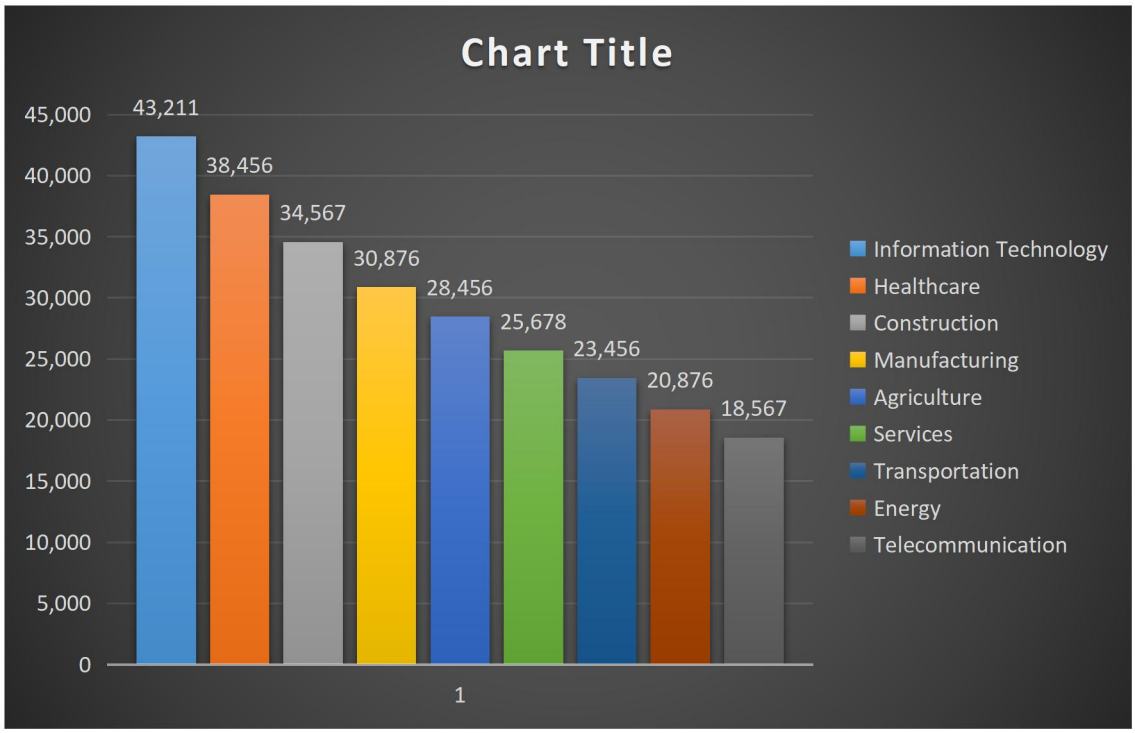

Figure 5: navttc.com

It is inferred that most of the jobs posted were Federal Jobs (4646) followed by Driver and Mobile Plant Driver (1420), Electrical and Electronic Trade Workers (317), Building and Related Trades Workers (282) and Metal, Machinery, and Related Trades Workers (158). Here, it is observed that federal jobs dominate the market, however, it is not specified that which jobs are federal in this instance, on the other hand it is noted that transportation and logistics are high in demand, followed by skilled trades like electrical, building, metal/machinery.

E) PAKISTAN BUREAU OF STATISTICS 2024

The official Pakistani organization responsible for gathering, evaluating, and disseminating statistical data is the Pakistan Bureau of Statistics (PBS). The PBS is in charge of performing censuses, creating studies on the social and economic elements of the nation and giving researchers, decision-makers, and planners statistical data. It also helps in investigating to enhance statistics.

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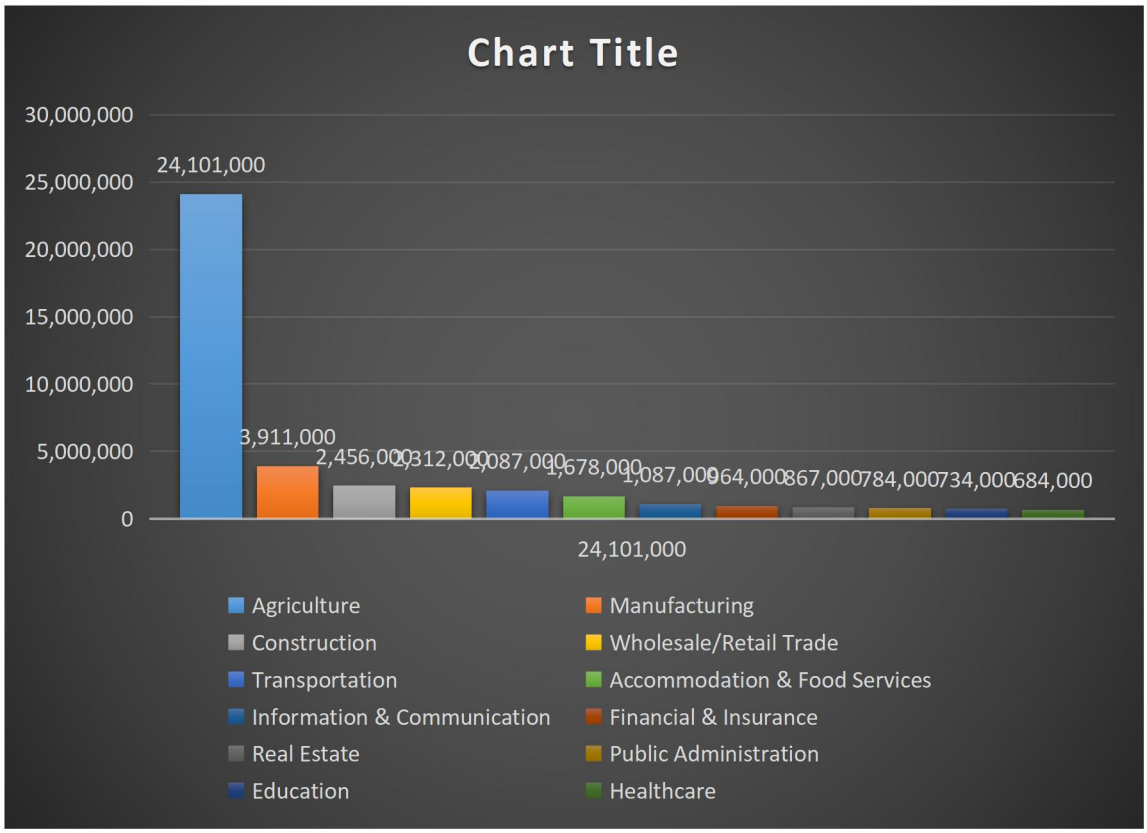

Figure 6: Pakistan Bureau of Statistics 2024

The graph compiling the statistical data of PBS shows a surge in the agriculture field, I.e. 24,101,000, followed by manufacturing, 3,911,000, construction, 2456,000. retail trade, 2,312,000 followed by transportation, food services and IR with, 734000, in number.

G) Organization for Economic Co-operation and Development (OECD)

An international organization called the Organization for Economic Co-operation and Development (OECD) seeks to create better policies for better lives. We use our more than 60 years of expertise and wisdom to develop policies that promote equality and well-being while fostering prosperity and opportunity.

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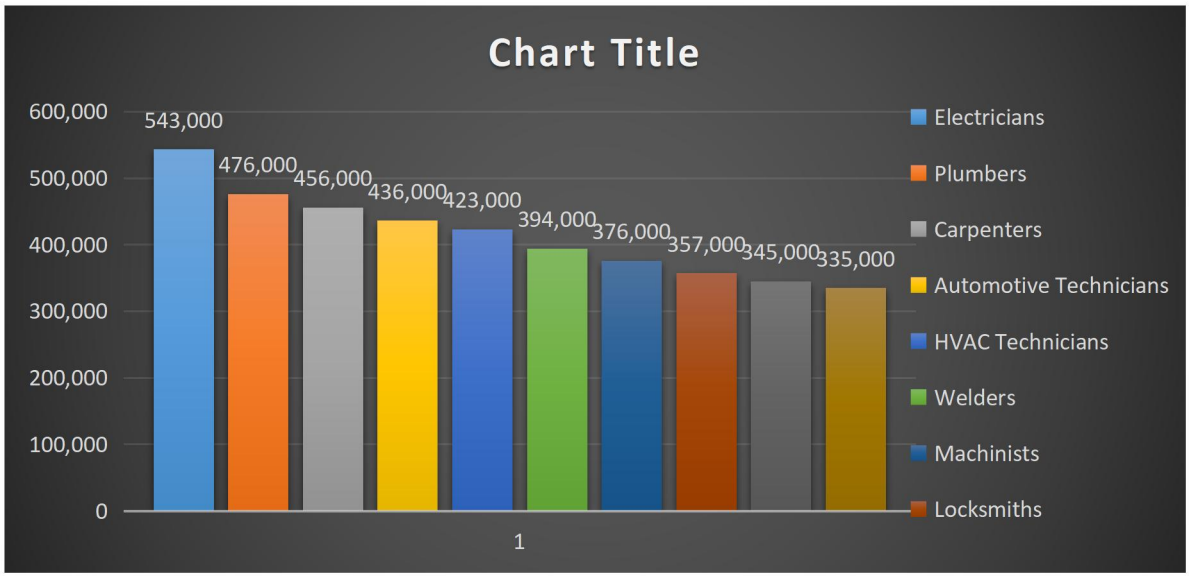

Figure 7: OECD

OECD employment outlook report 2024 highlights that the Electricians have the highest number of jobs I.e. 543,000, Construction trades I.e. Electricians, Plumbers, Carpenters, Glaziers, they account for 1.82 million jobs (43% of total). whereas Automotive and HVAC technicians also have significant job numbers I.e. 436,000 and 423,000, respectively. Welders and Machinists have substantial job counts too, I,e. 394,000 and 376,000. It implies that here is a growing demand for skilled trades people and there is an increased focus on infrastructure development. The graph also implies that advancements in technology drive demand for specialized trades.

H) US Bureau Of Statistics

The main organization in the US in charge of gathering and evaluating statistical data is the Bureau of Labor Statistics, United States (BLS) founded in 1884. The goal of BLS is to collect, analyze, and disseminate essential economic data to the public, researchers, and policymakers. It mainly provides; Statistics on the labor market (wages, unemployment, and employment), Price and inflation indexes (CPI, or consumer price index), measures of efficiency and productivity, statistics on occupational safety and health and, data on pay and benefits.

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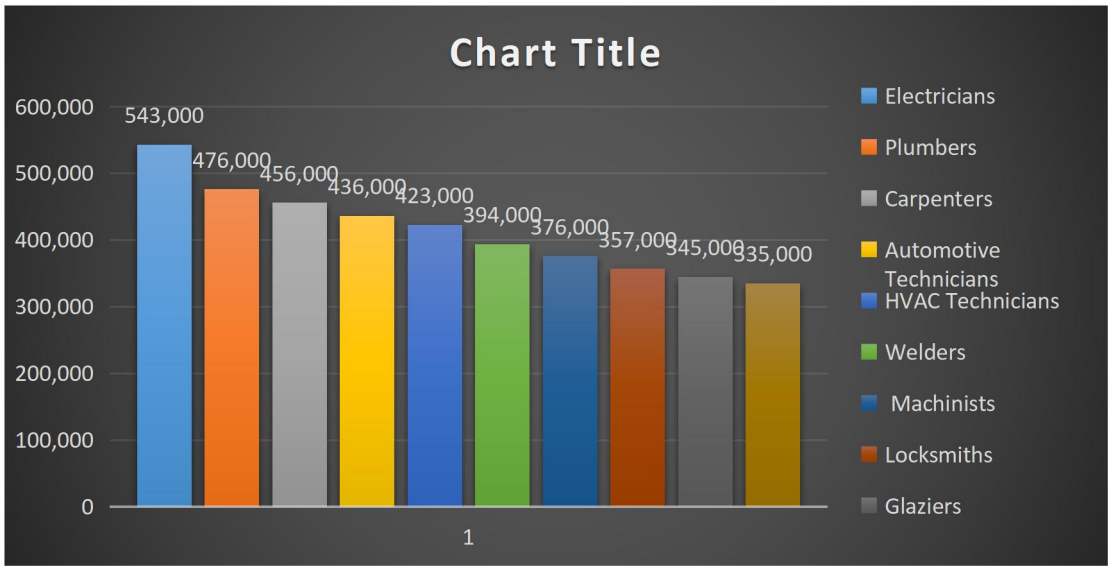

Figure 8: US Bureau of Statistics

The table on US (BLS) highlights that Electricians, Plumbers, and Carpenters have the highest job openings, whereas the construction trades dominate the job market. Automotive and HVAC technicians also have significant job openings. It also highlights that manufacturing trades (Welders, Machinists) have substantial job openings.

I) Indeed.com

Indeed, is a global job matching and hiring platform and the top employment portal in the world1. Indeed, puts job searchers first by allowing them to post resumes, search for opportunities, investigate companies, and more. As a result, more individuals get recruited on Indeed than on any other website. Indeed, is revolutionizing employment and job matching with AI-powered technology. We open up fresh chances for millions of people every day.

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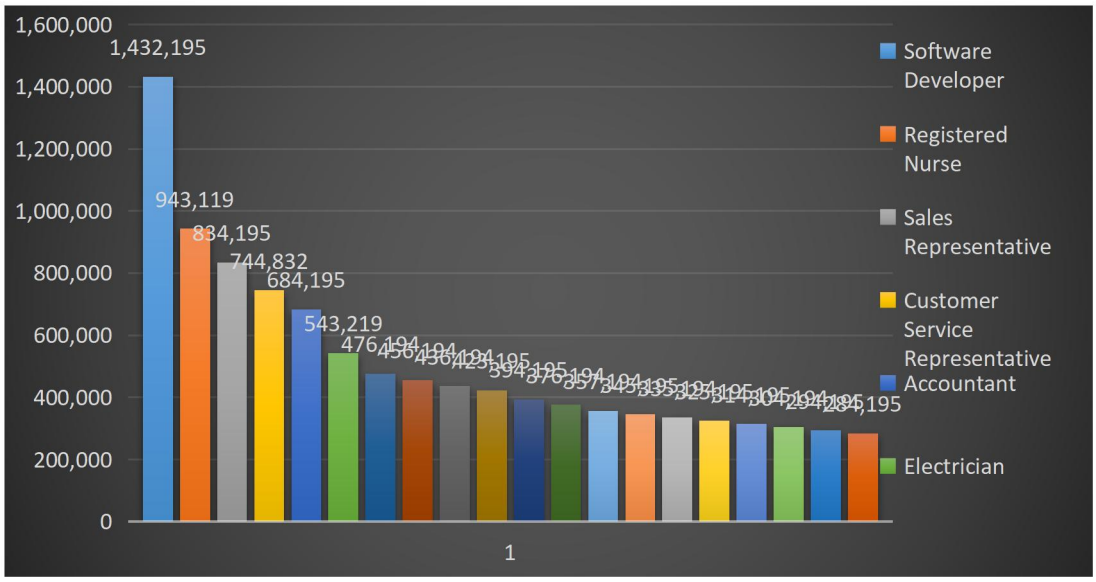

Figure 9: Indeed.com

It is implied that indeed overall offers jobs for 543,000 electricians which makes it 14% of the total, 476,000 plumbers, which makes it 12% of the total, 456,000 carpenters, or 12% of the total, 436,000 automotive technicians (11% of the total) 423,000 HVAC technicians (11% of the total), 394,000 welders (10% of the total) and 376,000 machinists (10% of the total). It implies that the most in-demand occupations are carpenters, electricians, and plumbers and that the majority of jobs are in construction trades and there are a lot of employment openings for HVAC, automotive technicians and in manufacturing trades, such as machinists and welders.

J. International Labour Organization (ILO)

The International Labour Organization (ILO) is a specialized agency of the United Nations (UN) which promotes social and economic justice by establishing international labor standards. The ILO is created in 1919.

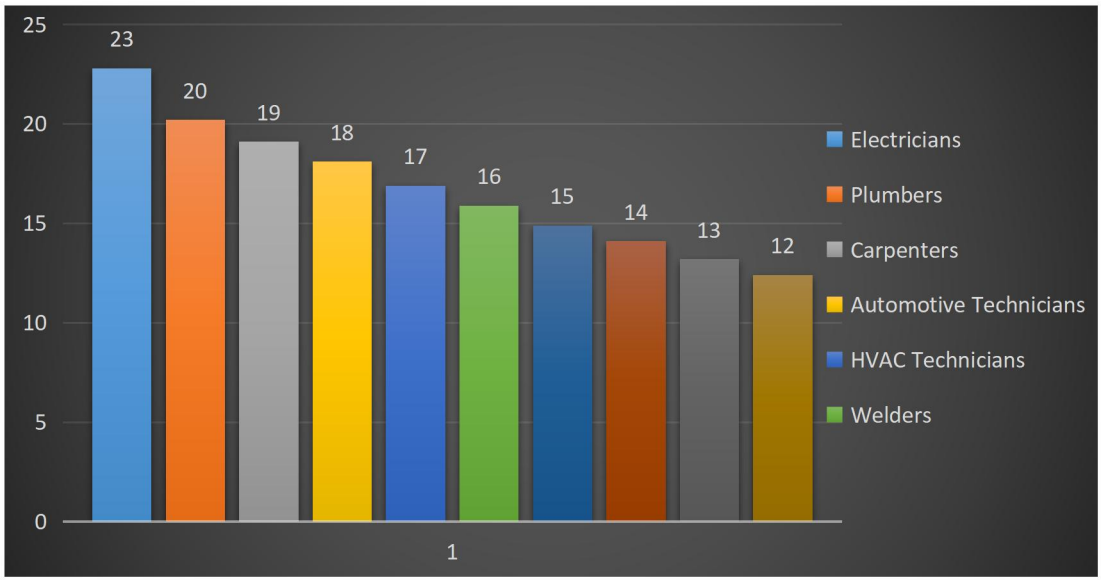

Figure 10: ILO

The number of people working in different skilled trades is displayed in the data. Locksmiths, Glaziers, and Installers of Telecommunications Equipment have the lowest employment numbers, while electricians, plumbers, and carpenters have the highest. Career counseling, industry trends, and workforce development can all benefit from the data.Top 3 Trades as presented in the table are Electricians: 23 (15% of total), Plumbers: 20 (13% of total) and Carpenters: 19 (12% of total) which comprises of total employment of 147 million job openings.

K. World Bank Data Bank

The World Bank Data Bank is a comprehensive online repository of development data, providing free and open access to Global development data, Time-series data (annual, quarterly, monthly), Cross-country comparable data, Sector-specific data and Indicator-specific data.

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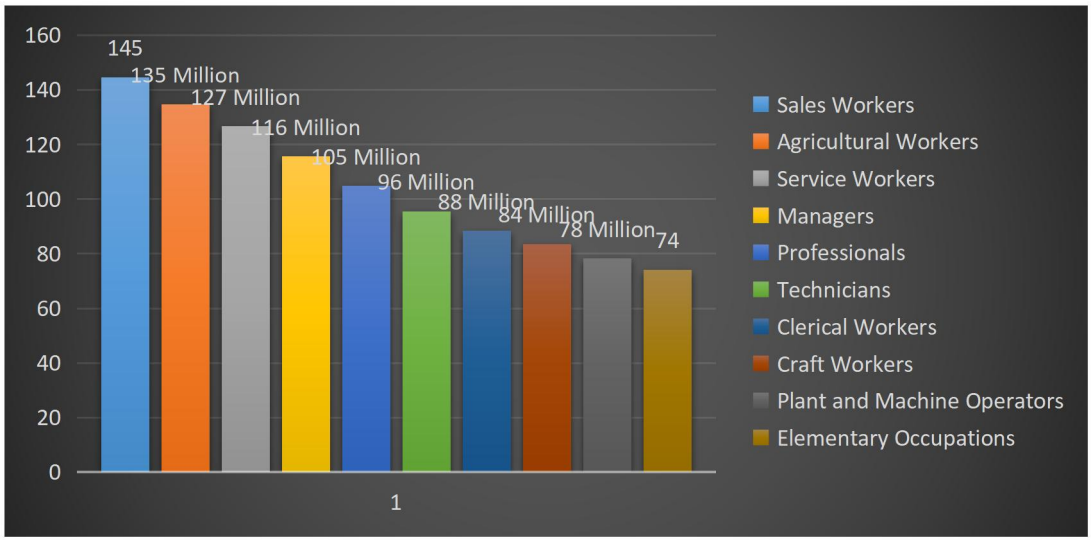

Figure 11: World Bank Data Bank

The table on the data bank of world bank highlights that Sales Workers and Agricultural Workers comprise nearly 30% of the global workforce. Whereas service Workers and managers account for over 25% of total employment. Moreover, it is stated that professionals and technicians make up around 21% of the workforce and clerical workers, craft workers, and plant and machine Operators represent approximately 26% of total employment.

L. Gartner

Gartner, Inc. is an American technology research and advisory firm based in Stamford, Connecticut that conducts technology research and shares its findings both through private consulting and executive programs and conferences. Its clients include large corporations, government agencies, technology companies, and investment firms.

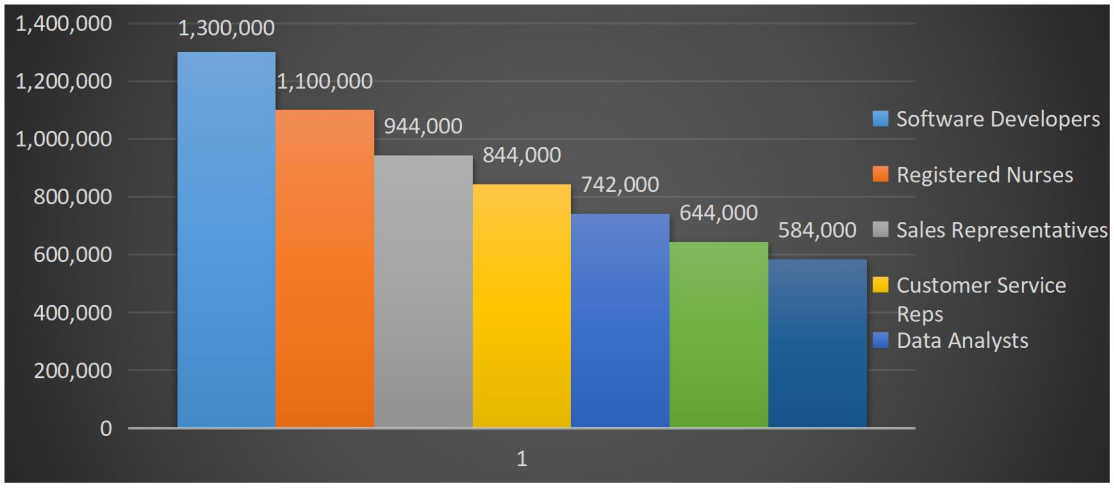

Fig 12: Gartner

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M. CompTIA

The Computing Technology Industry Association, more commonly known as CompTIA, is an American non-profit trade association that issues professional certifications for the information technology (IT) industry. It is considered one of the IT industry\'s top trade associations. [1] Based in Downers Grove, Illinois, CompTIA issues vendor-neutral professional certifications in over 120 countries. The organization produces industry studies to follow trends and changes in industry.

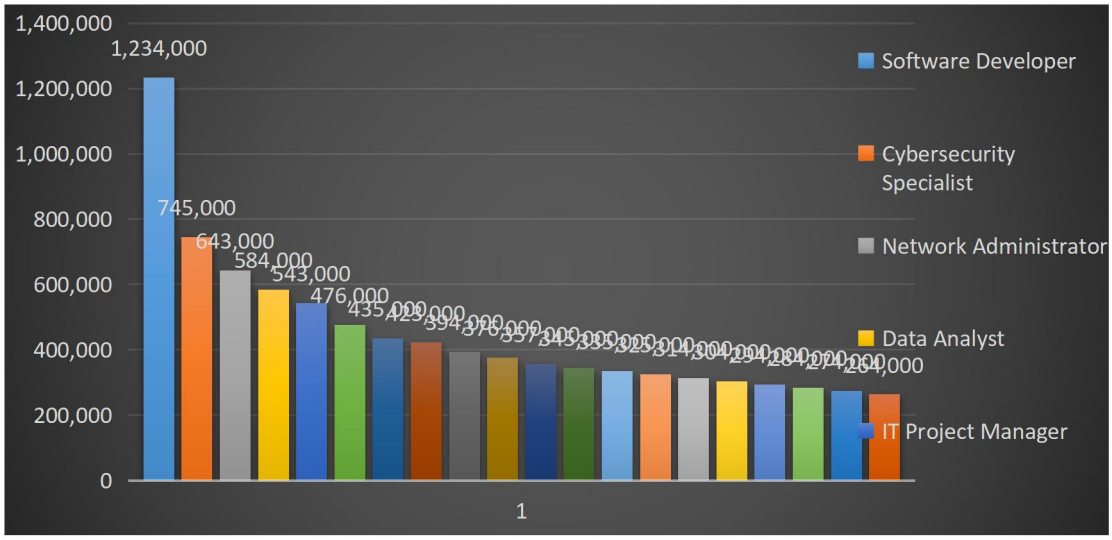

Fig 13: CompTIA

The table above shows that the technology sector is growing rapidly due to the increasing demand for digital solutions, and recent data shows that several tech jobs are in high demand, reflecting the expansion of the industry. Software developers top the list with a staggering 1,234,000 job openings, highlighting the need for skilled professionals to design, develop and support software applications. Cybersecurity professionals also top the list with 745,000 job listings, highlighting the importance of protecting our digital infrastructure. Demand is also growing for network administrators (643,000) and data analysts (584,000) as businesses rely on efficient networks and data-driven decision-making. IT project managers (543,000) are called upon to oversee projects and ensure deadlines are met. Experts of web developers (476,000), database administrators (435,000), and cloud computing (423,000) are very demanded because the importance of online presence, data management, and cloud - based services is growing. Emerging technologies such as artificial intelligence and automatic learning have created new opportunities with engineers in this desired field

(394,000 openings). To support the growth of AI and database applications, you need a network engineer (376,000) and a data scientist (325,000). Support technicians (357,000), IT support specialists (345,000), digital marketing specialists (335,000), commercial analysts (314,000), designer UX (274,000), and computer consultants (264,000). These numbers show a variety of technical career abilities available for the rapid expansion and technical results of the industry.

N. Burning Glass

Burning Glass Technologies is a leading provider of labor market analytics and data. They deliver cutting-edge technology and data-driven insights to help organizations, educators, and governments understand the rapidly changing job market.

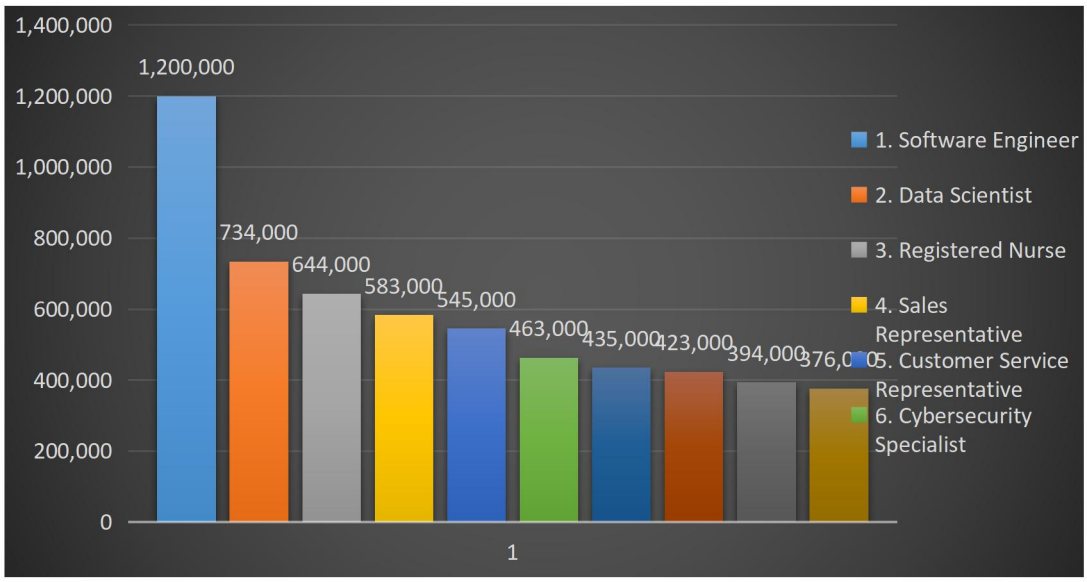

Fig 14: Burning Glass

The above table shows that the job market is characterized by diverse in-demand professionals across various industries. Recent data reveals the top 10 most sought-after careers. Software Engineers lead the list with 1,200,000 openings, driving technological advancements. Data Scientists follow with 734,000 openings, underscoring the importance of data-driven insights. The healthcare sector emerges strong with Registered Nurses in high demand at 644,000. Sales Representatives (583,000) and Customer Service Representatives (545,000) are crucial for business growth. Cybersecurity Specialists (463,000) and IT Project Managers (435,000) ensure secure and efficient technology infrastructure. Marketing Managers (423,000) and Web Developers (394,000) fuel digital transformation.

O. Association of Builders and Developers (ABAD)

The Association of Builders and Developers (ABAD) is a premier trade association in Pakistan, representing the country's builders and developers.

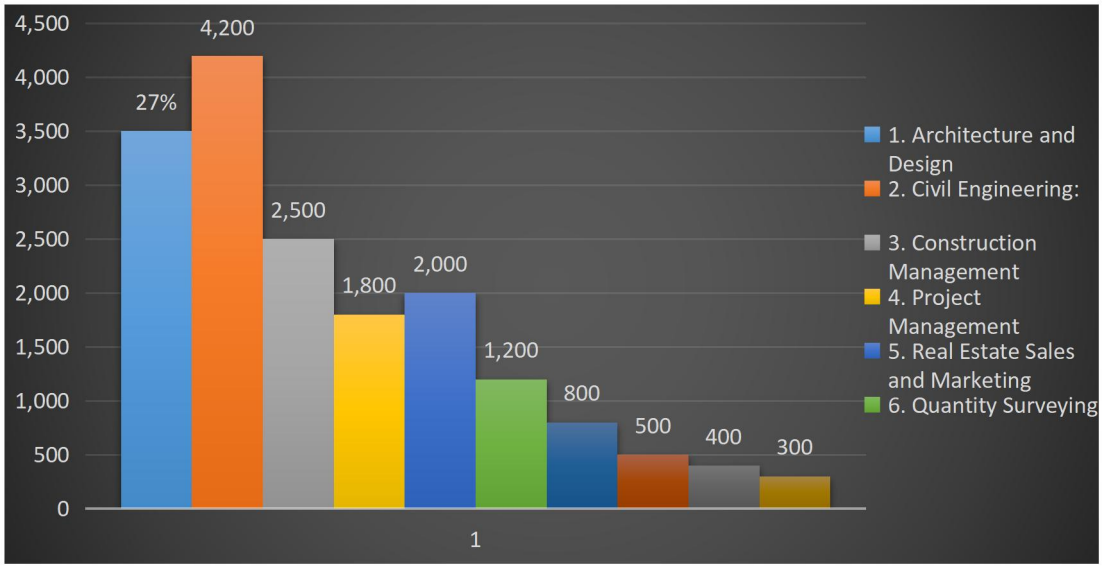

Figure 15: ABAD

The table above shows that the built environment industry encompasses various disciplines, each playing a vital role in shaping cities and infrastructure. Recent data reveals the demand for professionals across these fields. Architecture and Design professionals are in demand at 3,500, while Civil Engineers lead with 4,200 openings. Construction Management follows with 2,500, emphasizing the need for efficient project execution. Project Management professionals are sought after at 1,800, ensuring timely delivery. Real Estate Sales and Marketing experts are also in demand at 2,000, driving property transactions. Specialized fields like Quantity Surveying (1,200), Interior Design (800), Landscape Architecture (500), Urban Planning (400), and Building Services Engineering (300) support the industry's diverse needs.

P. International Data Corporation (IDC)

IDC is a leading provider of industry forecasts and insights into global tech markets, with a strong focus on IT and emerging technologies like AI, IoT, and cloud computing. Their research expertise spans various domains.

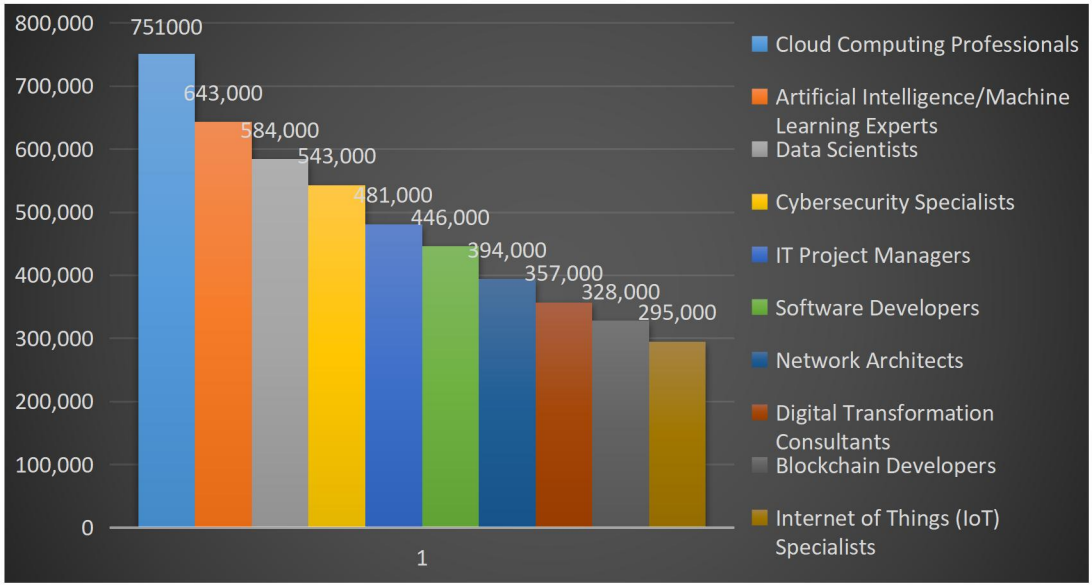

Figure 16: IDC

The tech industry is experiencing rapid growth, driven by emerging technologies and digital transformation. According to recent data, certain tech professionals are in high demand, shaping the industry's future. Cloud Computing Professionals lead the list with 751,000 openings, reflecting the widespread adoption of cloud services. Artificial Intelligence/Machine Learning Experts follow closely with 643,000 openings, as companies invest in AI-driven solutions. Data Scientists are also highly sought after, with 584,000 openings, underscoring the importance of data-driven decision-making. Cybersecurity Specialists are in high demand with 543,000 openings, highlighting the critical need for secure digital infrastructure. IT Project Managers round out the top five with 481,000 openings, ensuring successful project execution. Software Developers, Network Architects, Digital Transformation Consultants, Blockchain Developers, and Internet of Things (IoT) Specialists also rank among the most in-demand professionals. These roles support the development and integration of emerging technologies.

Q. Stack Overflow Developer Survey

The Stack Overflow Developer Survey is an annual survey that provides valuable insights into the world of programming and development. This year, over 65,000 developers from 185 countries participated in the survey, sharing their thoughts on

coding, technologies, tools, AI, and their experiences at work.It is basically an annual survey of developers worldwide, providing insights into programming languages, technologies, tools, and industry trends.

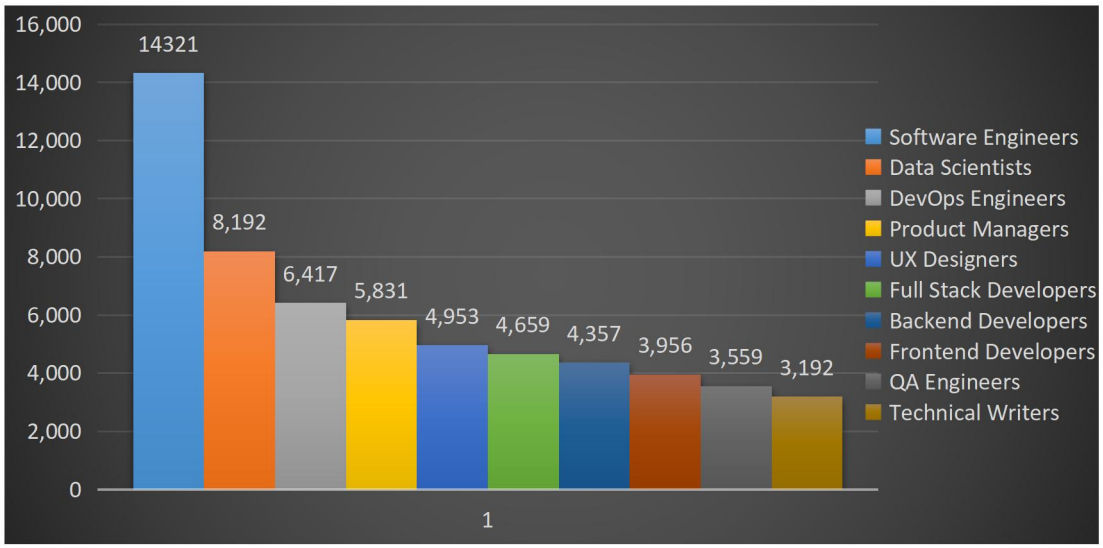

Figure 17: STACK

The data in this graph highlights the demand for various tech professionals, with Software Engineers leading the list at 14,321. Data Scientists and DevOps Engineers follow, with 8,192 and 6,417 openings, respectively. Product Managers, UX Designers, Full Stack Developers, Backend Developers, and Front end Developers are also in high demand, with openings ranging from 3,956 to 5,831. QA Engineers and Technical Writers have relatively lower but still significant demand, with 3,559 and 3,192 openings.This summary provides insights into the tech industry's labor market, helping organizations and individuals understand in-demand skills and role.

R. Bureau of Emigration and Overseas Employment Pakistan (BEOE)

The Bureau of Emigration and Overseas Employment (BEOE) is Pakistan's one of the top organizations. It is in charge of controlling and promoting cross-border travel. The Ministry of Overseas Pakistanis and Human Resource Development oversees the BEOE. Its duties include promoting managed migration, safeguarding the rights of Pakistani workers overseas, and making sure the nation's immigration rules are properly implemented. The BIOE, which focuses on foreign employment, is essential in helping Pakistani people find employment abroad while simultaneously protecting their welfare and interests.

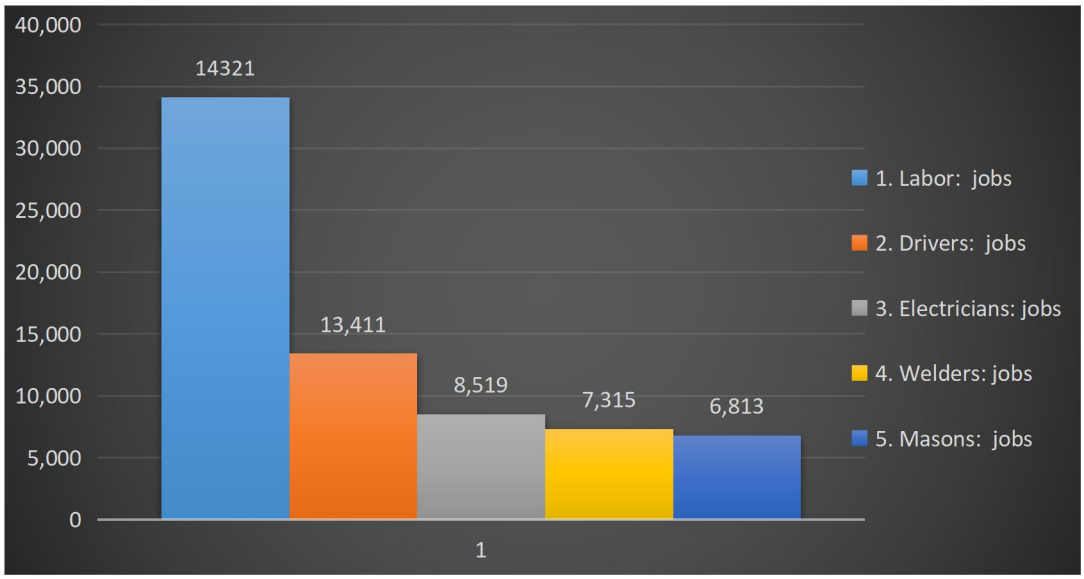

Figure 18: BEOE

The above graph displays the top 5 in-demand occupations. It is interpreted that Labor occupations predominate: With 34,116 job vacancies, or almost 44% of all job openings, labor jobs are in the greatest demand. There is a significant need for skilled personnel in the following fields, as seen by the high demand for drivers, electricians, welders, and masons. There appears to be a great demand for manual work, as evidenced by the fact that there are much more job opportunities in the labor category than in the other categories. The demand for skilled workers in masons, electricians, and welders is comparatively similar, suggesting a steady need for these professions.

Conclusion

A statistical analysis of the employments offered online, particularly in Pakistan, highlights that the most placed jobs in the market are engineering, finance, advanced technology (artificial intelligence and data analytics), and skilled professions, like construction, metal/machinery, electrical), logistics and transportation. Experts in cutting-edge technology (like renewable energy), in the field of development (e.g., international development, project management), consulting positions (such as IT or management consulting), and healthcare professionals are also in high demand. There are also future prospects in service-oriented sectors. Jobs are abundantly offered in digital marketing or e-commerce. This brief overview gives an insight into the future job trends and helps in forecasting the jobs for future in Pakistan. Hence, it is suggested that the stake holders be it government sector or private sector must pay

attention to the policies and requirements to enhance his sector. So that they are fully prepared for future. It is also suggested to the job seekers that muse hone their talents in these techniques and skills which are in high demand and will further be required in future, for better and secure future prospects.

Demand Driven Trades

The study of all job portal show that the highly demanded jobs globally are software, Data Scientist, sale marking, health care, logistic and supply chain, health care constriction where the Pakistan market show that that the highly demanded jobs are IT health care construction manufacturing agriculture and soon on. Where in gulf market the Pakistani labor, driver, electrician, welding and masons are highly demanded. The ILO data show that the highly demanded jobs for technician's worldwide are electrician plumber carpenter auto mechanic technician welder and machinist. The world bank data shows that highly demanded technician jobs are sale worker agriculture worker service worker clerical worker craft worker plant and machine operator.

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