Sustainable Remote Work: Creating Green Jobs through Freelancing for a Sustainable Environment

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Abstract:

Traditional employment practices contribute to environmental issues like greenhouse gas emissions, global warming, and climate change, especially because of factors related to transportation. These problems represent a threat to the environment, but they also make it harder for the labor market to adjust to shifting economic conditions, which drives up unemployment rates. Finding alternative employment models becomes more and more important in this situation. The freelance economy presents itself as a feasible solution, providing a range of employment options that can lessen negative effects on environment. This study explores the connection between freelancing and a sustainable environment, highlighting the contributions of job creation. Based on primary data collected through questionnaires, which yielded 616 responses, descriptive statistics reveal that freelancing positively impacts environmental sustainability. The average mean for freelancing participation is 5.8417, with a standard deviation of 1.92584, indicating high engagement in remote work. Respondents strongly agree that freelancing contributes to a cleaner environment while providing a stable source of income. A sustainable environment's mean value (the dependent variable) is 2.4127, and its standard deviation is 0.41473. This suggests that participants feel safe working as independent contractors and making a positive environmental impact. The high rate of freelancing lowers the carbon footprint associated with traditional employment, demonstrating the economy's potential to stabilize jobs and encourage environmentally friendly behavior. In summary, adopting a freelance career can foster creative problem-solving, and increase employment opportunities—all of which have a significant positive impact on the labor force. The freelancing sector can effectively drive economic growth while addressing climate change and its impacts by prioritizing environmental sustainability alongside job creation.

Keywords:

Freelancing, Sustainable Environment, Job Creation, Remote Work, Carbon footprints, Green Jobs

1. Introduction

Urban air pollution is a serious issue that has been linked to several known health problems, including heart and respiratory conditions. Road traffic plays a significant role in the decline of urban air quality, and its effects are influenced by a number of factors, including geography and weather conditions. In terms of the influence of automobiles, it has been shown that during strikes, when urban air quality slightly rises, the quantity of circulating vehicles negatively contributes. The COVID-19 pandemic has made remote work a popular solution for declining economic activity caused due to lockdown procedures. Furthermore, since typical house rooms had to be transformed into areas capable of widely supporting working from home, a sort of technological advancement has definitely been introduced in many households. Furthermore, because the pandemic has lasted for a long time, contemporary "remote workers" have adapted to this working model and have acquired essential technological and communication skills as well as the necessary knowledge of remote work (Maipas, 2021).

Numerous cities all over the world have seen improvements in urban air quality as a result of lockdown and in some cases the improvements were remarkable important. For example, a study in the 2 largest cities of Spain, has revealed that the lockdown measures have caused a 62% reduction in NO_2 concentration in Madrid, and a 50% reduction in NO_2 concentration in Barcelona during March 2020.[13] Moreover, another study that was conducted in the capital city of Ecuador—the city of Quioto—showed a 68% reduction in the NO_2, a 48% reduction in the sulfur dioxide (SO_2), a 38% reduction in the carbon monoxide (CO). Consequently, it becomes clear that simple changes and effective traffic management can easily control the improvement of urban air quality. Because it significantly lowers the number of cars on the road, remote work could act as an indirect traffic management control measure. It might also help reduce traffic congestion, which has a negative effect on people's health (Kavantzas, 2021).

The fifth assessment report published already in 2014 indicates that the main cause of global warming observed for over half a century is 95% human activity. Currently, one of the fundamental objectives of the European economies is to ensure a balance between economic growth and environmental protection needs. The creation of green jobs that promote environmental protection and restore it to its natural state (Matej, 2016). Green jobs are assumed to be categorized as socio-professional white, blue and now also green collar. These terms have been introduced in the American sociology to describe people working in various professions. This terminology was popularized in the United States in the 50s of the last century (Martina, 2016).

Another concept which covers green jobs that it is any kind of professional activity which helps to protect the environment and fight climate change by saving energy and raw materials, to promote renewable energy, reduce waste and pollution and protect biodiversity and ecosystems. The International Labour Organization (ILO, International Labour Organization) defines a Green Workplace (GW) as 'jobs which contribute to the protection or improvement of the environment, both in traditional sectors, e.g. in the construction industry, as well as in the sectors of green, emerging, for example in renewable energy.

According to the ILO green jobs;

- o Contribute to reducing the consumption of energy and natural resources.
- o Reduce greenhouse gas emissions.
- o Limit the amount of waste and pollution.
- o Contribute to the protection of ecosystems and restore their original state.

In the current labor market, freelancing has grown in importance because it offers individuals searching for more sources of income with a variety of flexible options. Understanding the effects of freelance work on employment stability is crucial as the world of work keeps changing. This study highlights the dual benefits of freelancing—improving the environment and lowering unemployment, especially in developing countries. The need for traditional workplaces and daily transportation declines as more people choose remote and freelance work, which lowers carbon emissions and improves the environment. Freelancing offers the dual benefit of sustainable income and environmental protection in a rapidly evolving digital age by adopting technological advancements, promoting job creation, and aiding in the reduction of environmental impact.

Problem Statement:

This study explores the relationship between freelancing and environmental sustainability, alongside its effect on job creation. This study investigates the connection between environmental sustainability and freelancing, as well as how it affects job stability. As freelancing becomes more popular, it offers an opportunity to reduce environmental impact in addition to providing a solution for unemployment. There is a reduction in the need for daily transportation, energy consumption in workplaces, and overall carbon emissions when traditional workplace jobs shift to remote freelance work. As a result, a more environmentally and economically sustainable work model is produced. Artificial intelligence and technological advancements further allow freelancers to work productively from any location, reducing their environmental footprint. Developing countries can create jobs and encourage the growth of green jobs that support sustainable development by encouraging freelancing. This study will examine how freelancing, which has the added benefit of lowering youth unemployment and advancing environmental protection, can support more sustainable economic growth and a cleaner environment.

Research Objective:

The study has the following research objective;

- To examine how freelancing contributes to sustainable environment by reducing carbon emissions.

Research Question:

The study has the following research question;

- In what ways does freelancing reduce its impact on the environment by reducing energy use and transportation?

2. Literature Review:

While telework has recently started to appear in a variety of sectors and affect a number of occupations, it is not a new phenomenon. It has been around for decades in various configurations, including platform work, and it can take place in a variety of locations (such as the home, other working spaces, or remote working hubs). This is made possible by digital technologies. Over the past ten years, remote work has grown (Felstead and Henseke 2017). However, the Covid-19 pandemic significantly accelerated its growth and elevated it to a central topic in work-related conversations. Lockdowns and quarantines pushed a number of industries and sectors that had not previously employed remote work to a significant degree to implement it. Given that remote work appears to be popular among employers and employees alike, there is currently a sizable conversation about the advantages and difficulties of continuing to operate at high levels even when not required to do so (Sisli and Kara 2022).

One of numerous discussions related to remote work that is still in its early stages but is receiving a lot of attention is how it affects the environment, specifically climate change, and the greening of the economy more widely. At first glance, the connection between remote work and the green transition would seem to be abundantly clear: fewer commuters mean lower carbon emissions, which benefits the environment. The goal of the initial research on the environmental effects of remote work has been to quantify these effects (Sostero et al. 2020). It turns out that this narrow perspective of telework and home-to-work rides on non-telework days is adopted. Nonetheless, this relationship is mediated by several variables and context-related factors, making research on it exceedingly complex. Behavior of employees also matters. For example, flexible work arrangements brought about by remote work and shorter commutes may result in more people traveling for leisure or engaging in other recreational activities that have an ecological impact of their own (Cerqueira et al. 2020). Furthermore, while evaluating the total environmental effects of remote work, rising home energy consumption as a result of a rise in the number of people working from home must also be taken into consideration.

The comprehensive global analysis conducted by IEA (2020) suggests that the lockdowns during the first phase of Covid-19, gasoline use dropped by more than nine million barrels a day (plus six million barrels of diesel). Moreover, many large cities around the globe consequently witnessed striking drops, such as 65 to 95 per cent, in rush hour congestion. These effects of comprehensive restrictions and lockdowns are indicative of effects of the reductions in mobility through remote work, but can only be seen as a starting point.

Badia et al. (2021) find that, as a result of lockdowns and homeworking following the Covid-19 pandemic, urban air quality improved significantly in Barcelona as average levels of NO2 – the main pollutant generated by traffic emissions – dropped sharply. Their modelling framework suggests a positive relationship between the number of remote work days per week and NO2: while two such days per week leads to a 4 per cent drop in NO2, four days can lead to a 10 per cent drop. Similar effects are found in a study in India measuring air quality in New Delhi (IEA 2020).

Comprehensive global analysis during the first phase of lockdowns revealed that one day of working from home has been found to be associated with an increase in household energy consumption in the range of 7 to 23 per cent, depends upon a number of factors including the energy efficiency of dwellings to start with but also how many people are remotely working in the same household. It is also shown that the share of energy consumption while teleworking during the working week resembles the average energy demand of Sundays, when most people are off and at home (IEA 2020). Bachelet et al. (2021) use the German Microcensus, together with corresponding energy and carbon prices, to suggest that, while telework increases annual heating energy expenditures by 110 euros per worker, it decreases annual transport expenditure by 840 euros per worker.

The results of a study conducted in Canada by Lachapelle et al. (2018) indicate that if remote working boosts economic growth and productivity, it is also likely to result in higher production and income and, consequently, higher consumption patterns (such as more leisure travel and consumption of goods beyond necessities, etc.). The need for energy will rise as a result. In this instance, remote work might ultimately result in a deeper overall ecological footprint through increased consumption and greater energy demand, even though it would theoretically reduce emissions with less commuting as a first-order effect. In addition, it's common knowledge that rising usage of home heating and telecom infrastructure has a negative effect on the climate. The development of strategies by businesses to cut back on office space—and consequently, energy consumption—is also important.

Previous studies have already demonstrated how dynamically IT equipment has been using energy over the last few years. Although research on this subject is still in its infancy, Efoui-Hess (2019) demonstrates that even prior to the pandemic, digital technologies accounted for almost 4% of global carbon emissions—more than commercial aviation—and their influence was growing annually by 8%. Put differently, the ICT resources that are essential for working remotely also constitute substantial emissions sources. Similarly, Obringer et al. (2021) note that the energy consumption of data centers and the internet contributes to the carbon footprint of internet use, which varies from 28 to 63 grams of CO_2 equivalent per gigabyte. The most energy-intensive internet service is found to be videoconferencing, one of the most widely used tools. But as technology develops in this area, it continues to improve, and along the road, more energy-efficient solutions are provided (Obringer et al. 2021).

The primary advantage of remote work is primarily associated with its capacity to decrease mobility. It is a well-established fact (EEA 2022) that a significant portion of transportation-related greenhouse gas emissions are attributed to commutes from home to work. Over half of all emissions in the US are produced by personal vehicles, with the transportation sector accounting for the largest portion of these emissions (Schupak 2021).

As the amount of remote work increases, so does the conversation about its role in sustainable mobility (Aguiléra and Pigalle, 2021). This is because remote or hybrid work is frequently mentioned as one of the main ways to reduce carbon emissions because it reduces the amount of time people spend commuting from home to work.

Bachelet et al.'s (2021) study on the environmental effects of remote work estimates that the reduction in emissions from car travel amounts to 4.5 million tons of CO_2, or 3% of carbon emissions in Germany's transportation sector. The figures differ according to workers' residential locations and income supports. According to ADEME (2020), if every employee in France worked one day remotely each week, 271 kg of CO2 could be avoided annually. This calculation takes into account various channels through which emissions occur (such as transport mode) and adds them all up. As per Beck et al. (2020), telecommuting significantly contributes to the decrease in automobile-based commuting. They agree with the ADEME report when they point out that the quantity of days worked from home is important.

In an industrial suburban area of the German city of Hannover, research by Krasilnikova and Levin-Keitel (2022) reveals that 59% of workers in the area have the potential to reduce car traffic through remote work. In addition to being home to several of the top domestic and international corporations, the area is also well-connected to residential areas. According to the study, the majority of teleworkers work from home one to three days a week, with only 5% working from home full-time. According to the authors' calculations, working remotely for an additional two days can reduce CO2 emissions by 11%.

The authors argue that the role of companies in supporting, enabling and fostering remote work is crucial to its success. An enabling company culture does not only include digital work but a broader shift in business models and human resource policy. Strong cooperation between companies and the city, and on a regional level, could then be helpful as a precondition for the implementation of new local shared workspaces located close to employees' places of residence. Such spaces have the potential to manage current vulnerabilities on the way to expanding mobile work.

On the other hand, remote work has the potential to reduce travel and traffic while also increasing time spent in non-urban areas, which can resurrect social life and serve as hubs for meetings, shopping, and cultural events. It has also been demonstrated that, depending on how local businesses handle various forms of remote work, remote working may revolutionize sustainable mobility.

Theoretical Framework

Elkington (1997) introduced the Triple Bottom Line (TBL) framework, which focuses on three interrelated dimensions—economic, social, and environmental—to provide a comprehensive method of assessing sustainability. According to this framework, in order to succeed over the long run, sustainable practices must strike a balance between social justice, economic viability, and environmental responsibility. The TBL framework provides a useful lens for examining how freelancing promotes inclusivity and flexibility (social), creates jobs (economic), and lessens the environmental impact through remote operations (environmental) in the context of sustainable remote work. By encouraging green jobs that reduce environmental impact—such as commuting less and using less energy—freelancing and remote work are in line with the TBL framework. Furthermore, freelancing promotes social sustainability by facilitating inclusivity and work-life balance, especially for those with limited resources, and economic stability by providing income opportunities. The objectives of establishing a sustainable environment while promoting social and economic advancement are in line with this numerous analysis. This study illustrates how sustainable remote work, especially in the freelancing industry, can serve as a catalyst for attaining environmental, economic, and social sustainability by utilizing the TBL framework. The combination of these factors emphasizes how crucial freelance work and remote work are to the global advancement of sustainable practices.

Research Framework:

Research framework comprises of what type of data and variables we took for the study. In this study the independent variable is Freelancing and dependent variables are Sustainable Environment. The study examines how the job creation driven by the freelancing impacts sustainable environment, alongside effects on job creation.

Freelancing (I.V)	⟶	Sustainable Environment (D.V)
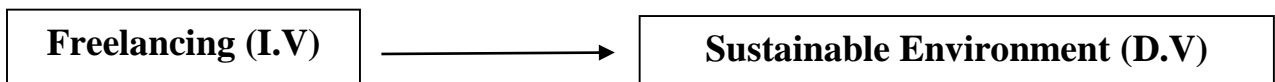
Nature of Data:

This research utilizes primary data, which means that we collect data from firth hand rather than relying on secondary sources. Primary data was conducted through structured questionnaire from specific area. We collected 616 respondent's data on the basis of survey we conduct on google form to explore the positive relation between freelance economy and sustainable environment and with its alongside effect on creation of jobs especially for the developing country like Pakistan.

Nature of Variable:

This research examines freelancing as the independent variable and sustainable environment as dependent variable. Now we explain each variable in detail;

Freelancing as Independent Variable

Working as a freelancer involves employing different platforms to complete projects as an independent contractor or employee. Freelancers have the ability to work on multiple projects at once, which expands their sources of income and gives them access to international markets.

Sustainable Environment as Dependent Variable
The preservation of ecological equilibrium and the reduction of environmental harm are the main goals of a sustainable ecosystem. In order to reduce commuting, carbon emissions, and resource consumption from traditional offices, freelancers encourage remote work, which helps with all of these goals. Working from different locations is made possible by technological advancements like artificial intelligence (AI), which increase the efficiency of freelance work. Freelancing promotes environmentally friendly behaviors that support a sustainable environment, open up possibilities for green jobs, and increase workers' flexibility to economic fluctuations

3. Methodology:

Research Design:
With the objective to explore the effect of freelancing on sustainable environment, this study uses a quantitative descriptive design. This study, which aims to explore how the freelance economy can address environmental challenges with its alongside effects of youth unemployment challenges in a developing country, is based on primary data gathered through questionnaires. The study used a cross-sectional design, indicating that open-ended questions were used to gather data at a single point in time. The data are interpreted using descriptive statistics, which shed light on the connections between freelancing and more sustainable environment.

Sampling:
The sample used in this study is an example of purposive sample method and consists of 616 responses were collected using Google Form who came from a variety of work backgrounds, including full-time employees and freelancers. The target population consists of people who work in Pakistan in both traditional and gig workers. A convenience sample is used in the study because participants were selected online via professional platforms, social media, and email invitations. This method made it simple to gather a sizable number of responses from a variety of professions and job segments.

Data Collection:
With multiple-choice questions, the questionnaire was created to collect data on participants' experiences with freelancing (an independent variable) and sustainable environments (a dependent variable). With the collection of 616 responses, patterns and relationships could be found for statistical analysis. Participants talked about job creation are affected by freelancing. They discussed how technology is changing the nature of work and opening up new career opportunities. In particular, they discussed how technology is promoting environmental sustainability through reducing carbon emissions and commuting time. The survey was distributed through digital means, such as email and social media sites like Facebook and Instagram, to ensure frequent response and immediate collection of data.

4. Results and Discussions
Frequency Distribution Tables
**Demographics**

Table # 01 AGE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-22	163	26.5	26.5	26.5
	22-26	191	31.0	31.0	57.5
	26-30	189	30.7	30.7	88.1
	30-35	62	10.1	10.1	98.2
	35-40	11	1.8	1.8	100.0
	Total	616	100.0	100.0	
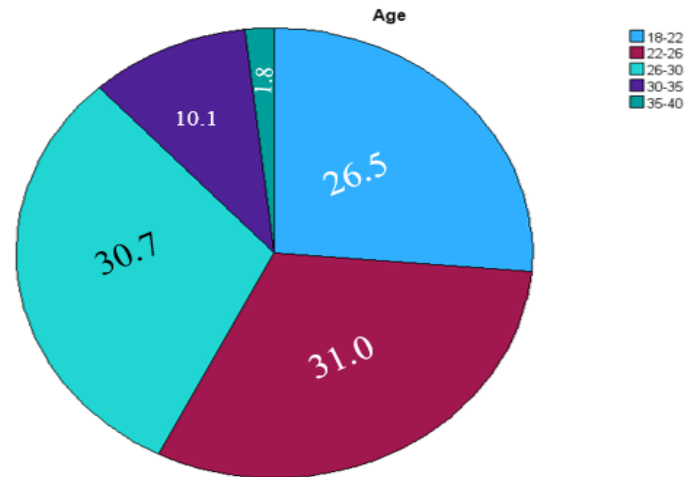
A total of 616 responses to the survey were gathered, and the respondents' age distribution was broken down into five different age groups. The first age group, which included people between the ages of 18 and 22, accounted for 26.5% of the respondents, or roughly 163 out of the 616 participants who took the survey. With 31.0% of all responses, the second age group—those between the ages of 22 and 26—had the highest participation rate. This corresponds to roughly 191 responders in this age range. The third age group—those between the ages of 26 and 30— came in second highest responses with 30.7%, or about 189 participants. The fourth age group, which included people between the ages of 30 and 35, accounted for 10.1% of survey respondents, or about 62 people. Lastly, the fifth age group, which consists of people in their 35s to 40s, accounted for approximately 11 participants or 1.8% of all responses. The majority of survey participants are in the younger age groups, with a particular percentage of respondents falling into this group, especially those between the ages of 18 and 30.

Table # 02 GENDER

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	285	46.3	46.3	46.3
	Male	331	53.7	53.7	100.0
	Total	616	100.0	100.0	
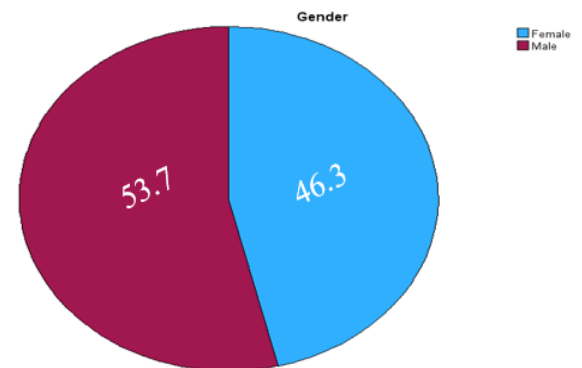
The gender distribution of the 616 respondents to the survey was as follows: 53.7% of respondents were male, or about 331 people, and 46.3% of respondents, or about 285 people, were female. Although there were slightly more male than female, there was a fairly equal distribution of participation by gender. Amazingly, even though male dominated, female also made up a sizable portion of the participant base, indicating high levels of engagement from both genders

Table # 03 OCCUPATION

Occupation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	9-5 Worker	132	21.4	21.4	21.4
	Free Lancer	298	48.4	48.4	69.8
	Other	53	8.6	8.6	78.4
	Self Employed	133	21.6	21.6	100.0
	Total	616	100.0	100.0	
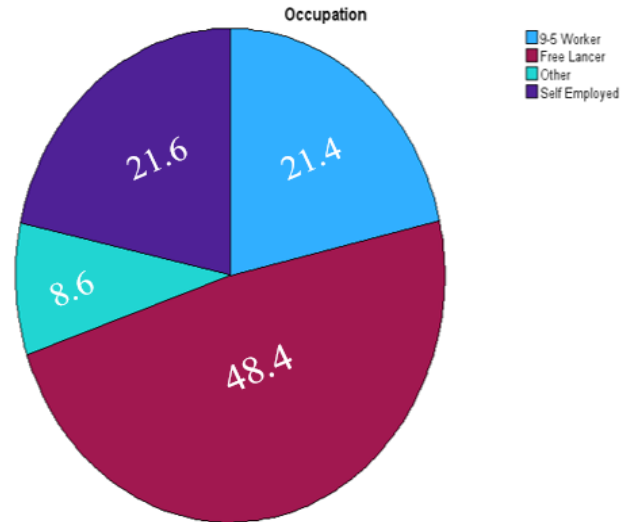
Four main groups were created based on the occupations of the survey participants. Freelancers highlight the biggest group of respondents (48.4%), which is indicative of the growing trend of independent work. After that, 21.6% of participants reported being self-employed, indicating their involvement in business ownership. A sizable percentage of traditional employment was indicated by the 21.4% of respondents who worked from 9 to 5. Lastly, 8.6% of the respondents were classified as "others," which could refer to a variety of unconventional or uncommon job types. With a focus on freelance and independently-employed jobs, this distribution emphasizes the variety of work arrangements among survey respondents.

Descriptive Statistics

Table # 04 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Freelancing	616	1.25	12.25	5.8417	1.92584
Sustainable Environment	616	1.20	3.40	2.4127	.41473
Job Creation	616	1.00	3.00	2.3601	.37728
Valid N (listwise)	616				

Interpretation

The descriptive stats indicate that the freelancing has a noticeable effect on sustainable environment and other factors. The average value (mean) for freelancing (I.V) is 5.8417, with a standard deviation of 1.92584, shows people are highly engage in independent work, and many workers feel confident and secure in their job. Responses indicate a strong agreement that freelancing offers a sustainable environment with its alongside effect on job creation. Means that freelancing not only provide job security but it also reduces the carbon footprints by decreasing the transportation as they are the major source of polluting environment. The sustainable environment (D.V) has a mean value of 2.4127 and a standard deviation of 0.41473. It indicates that the majority of freelancers have favorable opinions about how their work positively affects the environment as they are produce less carbon footprints as compared to the 9 to 5 workers, and their answers are fairly consistent. Despite gig-based work's flexibility, respondents appear to agree that freelancing promotes a more sustainable environment. For the considering, job creation denoted as (JC) the mean value is 2.3601 with a standard deviation of 0.37728 indicate that people believes that gig base work helps in the creation of jobs and their answers are fairly consistent. In conclusion the descriptive stats show that freelancing has a positive impact on sustainable environment while considering its role of job creation and lowering the youth unemployment.

Correlation Analysis

The potential of freelancing to promote environmental sustainability is demonstrated by the moderately positive correlation (0.50) found between freelancing (independent variable) and a sustainable environment (dependent variable). As freelance work becomes more popular, it lessens the need for daily commutes, cuts down on vehicle emissions, and uses less energy than traditional office setups. This change is in line with the ideas of a sustainable environment since it reduces pollution and increases resource efficiency.Freelancing is a groundbreaking model in Pakistan, where environmental degradation and urban pollution are major problems. Freelancing can contribute to a significant shift toward sustainability by promoting remote work and lessening the burden on urban infrastructure. Even though the correlation is modest, it highlights how freelancing can support larger environmental initiatives and is therefore essential to long-term ecological stability.

The potential for freelancing to lessen the burden on natural resources is also demonstrated by the moderately positive (0.50) correlation between freelancing and a sustainable environment. Freelancing reduces the need for large-scale commercial infrastructure, such as office buildings, which usually consume a lot of energy and resources, by facilitating remote work. By lessening the effects of construction on the environment and deforestation, this change indirectly supports sustainable urban development.

Freelancing in Pakistan provides a way to have a diversified workforce, which reduces traffic jams and makes it possible to use resources more evenly across different areas. This indicates how long-term plans for attaining both environmental sustainability and just economic growth may include freelancing as a key element.

5. Conclusion

The outcomes of the research indicate that freelance work, particularly in developing countries like Pakistan, makes significant improvements to a sustainable environment. The freelance business model provides a flexible work schedule that enables people to take advantage of multiple career opportunities and protect the environment. Freelancing encourages environmentally friendly behaviors like less commutes and lower carbon emissions by letting employees select their own projects and create their own schedules. This helps to maintain a more sustainable environment even in times of economic downturn. Globally, there are numerous advantages for freelance work, such as giving businesses access to a global talent pool and facilitating the blending of specialized skills from around the globe. This encourages innovation and competitiveness in addition to improving business operations.

Freelancers can reach a wider audience and foster growth opportunities in their fields while supporting environmental sustainability by working with foreign clients. However, a lot of developing countries deal with serious issues like economic stagnation, high unemployment, and a lack of jobs while dealing with environmental problems like global warming due to emissions of greenhouse gas. These problems highlight the necessity of finding other sources of employment. By providing flexible and adaptive work options that adjust to shifting market conditions and individual needs, the freelancing model tackles these issues. It promotes a sustainable environment and works well for areas that are having trouble creating enough jobs and have unstable economies. In addition to creating jobs, the freelance model encourages environmentally friendly behaviors by allowing remote work, which cuts down on carbon emissions and commute time.

This twofold benefit gives people steady sources of income while also promoting a more sustainable environment. Technological advances, especially in the field of artificial intelligence (AI), boost the benefits of freelancing by increasing productivity and enabling businesses to take advantage of a wide range of international skill sets. This encourages sustainability and makes it easier to create green jobs. It also allows local businesses to operate from a global network. Overall, the findings suggest that freelancing can be reliable means of income and employment, especially for those in developing nations. In addition to helping to create green jobs and support a sustainable environment, it gains from ongoing technological advancements. Companies should take advantage of freelancing's potential to solve the labor shortage and boost the economy. Freelancing stands out as a crucial alternative source of employment in light of the problems with traditional employment, offering chances for advancement and environmental sustainability.

Policy Implication:

The primary implication is;

1) **Promote Freelancing for Green Jobs:**

    Promoting remote work should be a priority for policymakers looking to lower carbon emissions. The government can contribute to the reduction of transportation-related emissions and the creation of a healthier and cleaner environment by encouraging businesses to implement flexible work arrangements. Offering incentives to businesses that use remote freelancers can promote the creation of jobs and the sustainability of the environment.

Future Recommendations

Future research should concentrate on teaching freelancers about environmentally friendly procedures and tools. By providing remote workers with skills that promote sustainability, like energy-efficient solutions and green project management, the freelancing industry can grow while protecting the environment. In addition to generating jobs, this dual strategy makes sure that economic expansion is consistent with greener, cleaner techniques.

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