



# Gig Workers In The Digital Era In Indonesia: Development, Vulnerability And Welfare

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## ABSTRACT

The Industrial Revolution has brought about a transformation in the Indonesian workforce. The rapid emergence of the gig economy, accelerated by the ease and rapid advancements in technology, particularly during the pandemic, has become a notable phenomenon. Paradoxically, there are implications that need careful consideration regarding the proliferation of gig workers. The burden of job risks falls heavily on individuals, making them vulnerable to exploitation. Gig workers face various challenges, including income uncertainty, unclear employment status, and a lack of social protection and labor rights. Some online platforms have introduced policies and programs to enhance the well-being of gig workers, such as health and safety insurance, training, and other incentive programs. This study, conducted in the post-pandemic era of Covid-19, aimed to achieve three main objectives: (1) analyze the development of the gig economy in Indonesia; (2) examine the determinants and well-being of gig workers; and (3) assess the vulnerability of gig workers. The research utilized microdata from the August 2022 National Labor Force Survey (Sakernas) provided by the Central Statistics Agency. The analytical methods employed included descriptive analysis for the first objective, econometric analysis estimated through binary logistic regression and Heckman regression for the second objective, and binary logistic regression for the third objective. The implications of this study emphasize the need for easy access to social security protection for gig workers. There is a requirement for the expansion of regulations recognizing the specific rights and needs of gig workers. Additionally, initiatives for training or upskilling are necessary to alleviate the vulnerabilities faced by gig workers.

**Keywords:** *Gig Workers, Sakernas, Worker Vulnerability, Indonesia*

## 1. INTRODUCTION

The gig economy trend is increasing and growing in general society. Especially with developments in technology, the internet, and triggered by the impact of the Covid-19 pandemic. Gig workers are workers who work flexibly and are not bound by a long-term work contract with one company or employer, but rather they work for various online platforms such as online motorcycle taxis, e-commerce, food delivery applications, and others. The term "Gig" itself is a term commonly used in the world of entertainment, for example, "gig" concerts, because working without an office or permanent employer. Digital platforms will usually develop as a mediator, whose role is to supervise work and also facilitate financial transactions/payments.

The gig economy is developing as a result of a new employment model, supported by technological change, globalization, and the weakening role of trade unions. This is also an alternative, especially for someone who doesn't like the "traditional office work model" with rigid working hours settings, supported by Cini et al [1]; International Labor Organization [2]. The COVID-19 pandemic has also had a significant impact on changes in working hours in Indonesia. Several companies have adopted a work-from-home system or work in shifts to ensure sufficient physical distance between employees.

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Permana and Izzati [3] divide the typology of gig workers in Indonesia into two, namely: (1) Location-based gig economy: where it is still through face-to-face interaction, but digital platforms make workers and customers meet more efficiently, and (2) Online based – gig economy; where work is carried out without using face to face interaction (remote work). Examples: content writer, copywriter, translator, social media specialist, Accountant, graphic designer, logo designer, game engineer, designer, network analyst, security engineer, and others. This also shows that the development of gig workers can continue to be explored and not be monotonous in the transportation sector.

Even though there is still no binding definition of gig workers, there are several studies examining this type of worker. Permana and Izzati [3] estimated that gig workers using Sakernas data in 2019 reached 2.33 million people or 1.7 percent of the total workforce in Indonesia who were active in the transportation sector and other service sectors. According to a survey conducted by the Center for Employment and Labor Studies at the University of Indonesia in 2020, it is estimated that there are around 10 million gig workers in Indonesia. This number continues to increase along with the increasing number of online platforms present in Indonesia and the increasing consumer need for digital services, supported by El Hjal [4]; Van Doorn [5].

Several aspects of the novelty of this research are related to the relatively limited number of comprehensive studies related to gig workers in Indonesia, regarding their vulnerabilities and welfare opportunities, especially amidst the rapid development of digital technology in Indonesia. Apart from that, this research uses data from the 2021-2022 National Labor Force Survey, which is a period of national economic recovery after being hit by the COVID-19 pandemic which has become a stepping stone for the development of Indonesian employment in the future.

## 2. LITERATURE REVIEW

Research on gig workers is an interesting topic to research considering its significant development in this digital era, moreover, there is still little research that discusses gig workers comprehensively in Indonesia. Globally, the gig economy is one group of workers that has a dominant position in the current workforce landscape. Along with technological advances, the growth of the platform-based economy, changes in work patterns and preferences, make gig workers one of the subjects of attention of researchers and governments in this era of economic uncertainty. Therefore, a comprehensive understanding of workers in the gig economy is very important.

### 2.1. Overview of Gig-Economy Workers

Gig workers are workers engaged in temporary (limited time), flexible, and on-demand work mediated through digital platforms, supported by Woodcock & Graham[6]. These workers consist of a collection of people who have complex lives and work in relationships with one another, supported by Woodcock & Graham [6]. Individuals involved in this work tend to work for short periods, are not tied down, or are usually called freelance, supported by Lord et al[7]. They are part of the gig economy which refers to a new phenomenon in the world of employment that does not have a binding work contract like formal sector workers and has a tendency to work independently, supported by Healy et al [8].

To provide a deeper understanding of the dynamics of gig workers, it is necessary to identify several types of jobs that exist in this ecosystem, including rideshare drivers, food delivery workers, online platform workers or freelancers, and creative and arts workers. According to Kerikmae [9], rideshare drivers are individuals who use their vehicles to transport passengers using a ridesharing application platform. In Indonesia itself, several ridesharing application platforms also provide food delivery and goods delivery services, for example, Gojek and Grab which have gained popularity in Indonesia, supported by Yuana et al[10]. In addition, there are also online platform workers, also known as freelancers, who are individuals who engage in remote gig work through online employment platforms, such as Fiverr, Upwork, and Freelance.com, supported by Wood et al [11]. Wood et al. [11] adds that this platform will connect workers with employers and facilitate the provision of various digital services. How much they earn depends on their performance and the rating they get from their employer, so the higher the rating they get, the greater their chances of being involved in a job which will affect their access to future job opportunities. Lastly are creative and arts workers which refers to individuals who engage in self-initiated artistic and creative work for professional or non-professional purposes, often on a freelance basis, supported by Duarte et al [12]. These workers identify themselves as artists, writers, photographers, and are involved in a variety of creative projects.

Qiao Si, et al [13] explained that several factors influence a person's decision to choose to work as a gig worker, one of which is economic factors. Gig workers are more likely to come from lower-income neighborhoods and have fewer job opportunities, suggesting that economic considerations play a role in their decision to work. Apart from that, the

flexibility factor is a special attraction for them, because it allows them to have autonomy over their work, so they are free to choose when, and where to work, and also have the potential to earn additional income. [14] also explained that many gig workers prioritize flexibility and autonomy as factors that influence them in choosing this job. Gig workers understand that there is a trade-off between benefits and flexibility, they may not accept traditional worker benefits in exchange for desired job flexibility. A wide choice of service markets, products, and various types of work are also factors in choosing a person to do gig work.

However, there is still relatively little discussion regarding the risks of gig workers and there is no law in Indonesia that specifically regulates regulations for these gig workers. According to Woodcock and Graham [6], there is a difference between “traditional” workers and gig workers. Not many gig workers have adequate social security coverage because gig workers do not have access to “traditional” job benefits such as health insurance, occupational safety, and pensions. Income uncertainty and instability are also often experienced by gig workers, as they rely heavily on short-term projects or contracts and may experience fluctuations in job availability and income. In addition, the potential to control and supervise online platform algorithms is very limited, making gig workers have to comply with platform algorithms that determine their work assignments and performance evaluations.

Research conducted by Koutsimpogiorgos [15] explains that the classification of gig workers as contract workers or independent workers can have significant implications for their rights, social security, and working conditions. Gig workers also often don't have access to retirement plans, paid leave, paid sick leave, and vacation time. As a result, they have to work all the time, which increases work safety risks such as fatigue and other health problems, supported by Lord et al [7]. Additionally, a lack of social protection leaves gig workers vulnerable to financial instability and limited access to essential services. As a result, gig workers often face irregular and unpredictable income streams that make it difficult to plan and budget effectively. This fluctuating income causes financial insecurity and difficulty in meeting their basic needs, supported by Koutsimpogiorgos et al [15].

## ***2.2. Growth of Gig-Economy Workers***

In Indonesia itself, the development of gig workers was marked by the emergence of digital labor platforms in the mid-2010s, providing new job opportunities for informal workers in urban areas. Certain sectors in the gig economy workers, such as motorbike taxis and household work, have presented business opportunities for technology entrepreneurs seeking to digitize these sectors. This job utilizes the internet in various ways to find work, especially through digital employment platforms, supported by Octavia et al [16].

Likewise, research by Nuraeni [17], explains that the development of the gig economy has occurred especially in industries such as transportation, skilled labor, creative industries, and start-ups. This is supported by developments in information technology which have an impact on changes in work relations. According to data obtained from the 2021 National Labor Force Survey (Sakernas), there are 77 million of the 131 million workforce who work in the informal sector and the majority are gig-economy workers. However, behind this massive development, there are still challenges faced in the context of gig-economy employment regulations and law. The research results show that Employment Law No. 13 of 2003 needs to be revised to specifically address changes in the labor market and to accommodate the changing nature of work in the digital era, as well as provide social protection for gig economy workers. The government must provide a strong legal basis to ensure that workers in the gig economy have the right to improve their skills and receive social benefits and allowances without burdening employers. This can be achieved by expanding existing social protection systems and making them more realistic to implement.

## ***2.3. Vulnerabilities of Gig-Economy Workers***

Bajwa et al [18] categorizes the vulnerabilities of gig workers into three categories, namely occupational vulnerabilities, precarity, and platform-based vulnerabilities. Occupational vulnerabilities related to the type of work performed by gig workers are usually specific to what work is performed, such as the possibility of being involved in an accident by workers in the transportation sector, including gig workers in the household sector who may face danger when entering a home they have never visited before. Likewise, the health vulnerabilities faced by gig workers are similar to those faced by precarity workers, including limited opportunities for training and career progression, low wages, minimal job security, and income uncertainty. This group also faces health risks related to psychological distress and lack of health and social insurance coverage. Lastly are platform-based vulnerabilities in gig workers that impact worker health and well-being. In line with Woodcock and Graham [6], the study explains that algorithms created by online platforms determine prices and access to work, with the result that gig workers' ability to negotiate prices, especially in the transportation sector, is limited.

Taylor et al [19] argues that the vulnerability of gig economy workers is caused by worker misclassification, lack of bargaining power, psychosocial risks, and inadequate management and safety training. In addition, unlimited working hours and low commission rates cause a lack of satisfaction and balance between their work and life.

A study conducted in Chile explained that gig workers during the COVID-19 pandemic, especially in the transportation sector, had to work without adequate resources such as masks or gloves, this of course increased the risk of contracting the virus. Apart from that, unpaid waiting time further limits their income. In these times, online platforms tend to distance themselves from any responsibility and only offer limited emergency funds for workers who contract COVID-19. As a result, gig workers are forced to maximize their working time, but there is no incentive and support from online platforms. These factors ultimately contribute to increasing the vulnerability of gig workers, supported by Arriaga et al [20].

#### ***2.4. Well-being of Gig-Economy Workers***

The welfare of gig economy workers is an issue that is receiving increasing attention because gig workers often face challenges in terms of economic and social welfare. In contrast to the importance of this issue, research looking at the well-being of gig workers is still very limited. A study by Keith et al [21] proposes a framework and research agenda for understanding health and well-being in the gig economy. Characteristics of the gig economy and gig workers, such as demands and resources, can influence how gig workers work, which in turn affects workers' health and well-being. This study does not directly present specific results or research findings. Instead, the researchers focused on the proposed framework, characteristics, and emphasized the need for further research on the well-being of gig-economy workers.

Another study by Lobel [22] proposes four pathways for systematic reform of employment law protections that have the potential to guarantee the rights and obligations of gig workers. This study recognizes the changing characteristics and challenges faced by gig workers and the lack of protection afforded them. This emphasizes the need to consider the welfare and protection of gig workers in an ever-evolving work environment. However, this paper does not provide specific results or findings, only like the previous paper, provides a framework and highlights the importance of addressing gig worker welfare in the context of employment law protection.

For a closer look at the well-being of gig workers, the International Labor Organization, supported by Leenoi et al [23] tries to research this topic using the case study of Thailand. Research results show that 80% of gig workers in Thailand experience uncertainty in the income they earn. They also have no security at work because their employment status is unclear. This research highlights initiatives undertaken in Thailand to improve working conditions for gig workers compared to other countries. Examples of initiatives implemented include savings plans, paid sick leave, insurance facilities, and platforms that provide opportunities for gig workers to provide feedback on job provider platforms. The recommendations provided in this research aim to improve working conditions for gig workers in Thailand and address issues related to employment status, social security, and wages.

In Indonesia itself, research was conducted by CfDS UGM together with Fair Work, supported by Nugroho et al [24] highlighting welfare issues in gig work in Indonesia. Research findings show low employability on gig platforms, especially in terms of decent wages, health insurance, and unclear partnership status. These platforms also have difficulty proving they pay decent wages and provide protection against employment risks. To address this issue, better regulation and collaboration between governments, platforms, and gig workers is needed. The rapid growth of the gig economy emphasizes the urgency of the issue of gig worker well-being, which will continue to increase as the number of gig workers grows worldwide. Therefore, serious attention and joint efforts are needed to find a fair and sustainable solution for the millions of gig workers in Indonesia.

### **3. METHOD**

In answering the research problems described in the previous section, this research will utilize micro data and macro data collected by the Central Statistics Agency (BPS). This research uses a quantitative and associative approach. So, in this research, an analysis will be carried out on a sample from a population. The data that will be used in this research is secondary data sourced from the 2021 and 2022 National Labor Force Survey (Sakernas). Sakernas is carried out by the Central Statistics Agency (BPS) periodically. This survey collects continuous basic employment data and obtains estimates of data on the number of employed people, the number of unemployed, and other employment indicators, as well as representative developments at the national level, provinces, and districts/cities. This survey uses employment concepts based on the 13th International Conference of Labor Statistics (ICLS) and ICLS-19. Apart from that, the

August 2022 Sakernas also implemented a questionnaire that refers to the concept of employment based on the International Labor Organization (ILO) Labor Force Survey (LFS) questionnaire module.

The period for carrying out this survey is twice a year, namely in February and August. There are differences in sample size in the two survey periods. In February, the samples recorded only reached around 25 percent of the total samples at Sakernas in August. The difference in sample size is based on the need to estimate the indicators produced, where in the February Sakernas estimates of employment indicators could only be carried out at the provincial level, whereas in the August Sakernas estimates of employment indicators could be carried out at the district/city level with a sample size of 30,000 Census Blocks (BS), or around 300,000 households spread throughout Indonesia. Therefore, this research will use secondary data sourced from Sakernas August, to answer research objectives more specifically and precisely on target.

## 4. RESULT AND DISCUSSION

### 4.1. Characteristics of Gig Worker

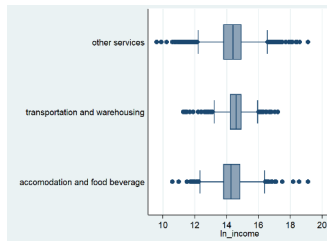
Based on the cross-tabulation results of several worker characteristics, there are several contrasting differences between the characteristics of gig and non-gig workers in Indonesia. Young workers from the millennial and gen-z dominate the proportion of gig workers. Meanwhile, in non-gig jobs, older workers, namely the boomer generation and gen-X, still dominate the structure of non-gig workers by generation. Furthermore, the dominance of urban workers among gig workers is greater than the dominance among non-gig workers. These two characteristics are in line with several previous research findings which state that gig work is identical with work for young people and those living in urban areas, supported by Caro et al [25] ; Wheatley [26].

Apart from these two characteristics, gig workers in Indonesia are dominated by men, are married, not college graduates, have work experience, do not participate in the *kartu prakerja* program, and are not recent migrants. A complete description of the characteristics can be seen in table 1 below.

**Table 1.** Characteristics of Gig and Non-Gig Worker in Indonesia, 2022 (percent)

Characteristics	Gig Worker	Non Gig Worker
<i>Generation</i>		
Boomer Generation	5.3	15.93
Gen-X	29.37	33.21
Gen-Y / Millenials	48.2	36.44
Gen-Z	17.13	14.43
<i>Sex</i>		
Female	39.74	38.91
Male	60.26	61.09
<i>Marital Status</i>		
Unmarried	30.44	26.65
Married	69.56	73.35
<i>Area of Residence</i>		
Rural	23.43	46.65
Urban	76.57	53.35
<i>Graduate from University</i>		
No	82.94	88.12
Yes	17.06	11.88
<i>Work Experience</i>		
No	36.16	43.59
Yes	63.84	56.41

Specific on the income of gig workers, there is a consistent pattern in all business fields. The income of gig workers is mostly concentrated below the median income value; details can be seen in the box-plot diagram in figure 1. Furthermore, the median nominal income value of gig workers in each sector can be seen in table 2. These two findings above lead to an indication that generally, the income amount of gig workers in Indonesia is still under the average provincial minimum wage standard. As a comparison, data from the Statistics Indonesia shows that the average minimum wage in all provinces in Indonesia in 2022 is 2.72 million rupiahs.



**Figure 1** Box-Plot Diagram of Gig Worker's Income by Sector, 2022

**Table 2.** Median Value of Gig Worker's Income by Sector, 2022 (rupiahs)

Sector	Median Value of Income
Transportation and Warehousing	2400000
Accommodation and Food & Beverage Service	2000000
Other Services	1920000
All Sector	2000000

**Table 3.** Determinant of Gig Worker in Indonesia, 2022

Variables	All Model		Male		Female	
	Coef.	Odds Ratio	Coef.	Odds Ratio	Coef.	Odds Ratio
<i>Generation</i>						
Gen-X	0.832***	2.285	0.734***	2.084	1.017***	2.765
Gen-Y / Millenials	1.262***	3.539	1.046***	2.847	1.625***	5.078
Gen-Z	1.261***	3.560	0.983***	2.674	1.654***	5.227
Married	-0.117***	0.899	-0.139***	0.870	-0.157***	0.855
Urban	0.881***	2.422	0.912***	2.490	0.843***	2.323
University	0.303***	1.301	0.328***	1.388	0.183***	1.201
Experience	0.290***	1.370	0.310***	1.363	0.319***	1.376
<i>Kartu Prakerja</i>	0.552***	1.737	0.510***	1.666	0.598***	1.818
Recent Migrant	0.118***	1.134	0.131***	1.140	0.116***	1.123
<i>Sector</i>						
Transportation and Warehousing	1.843***	7.023	2.021***	7.545	0.914***	2.493
Accommodation and Food & Beverage Service	0.749***	1.981	0.803***	2.232	0.611***	1.843
Digitalization Index	1.693***	5.401	2.032***	7.626	1.263***	3.537
Economic Growth	-0.031***	0.970	-0.039***	0.961	-0.020***	0.980
Constant	-10.268***	0.000	-11.414***	0.000	-8.861***	0.000
No. of Observation	498,451		296,056		202,395	
Pseudo R <sup>2</sup>	0.1027		0.1302		0.0741	

Source: Processed by Author

Source: Sakernas 2022, processed

#### 4.2. Gig Worker's Determinant

Generally, in the model for all workers and specific model for male and female workers, there is a parallel direction of influence from worker characteristics on gig workers. Complete description as in Table 3. When compared with the boomer generation, Gen-Z workers have the highest tendency than other generations to become gig workers. Moreover, gig work is a type of work that offers flexibility, supported by Allon et al [27]; Peetz [28]. This condition is in accordance with the characteristics of Gen-Z, which prefers to work freely, as well as Gen-Z's better digital abilities compared to other generations, supported by Caro et al [25]; Mahato et al [29].

Married workers are less likely to be gig workers. In contrast, unmarried workers are more likely to be gig workers. This finding is in line with research from, supported by Hill et al [30], that gig workers are dominated by unmarried workers. The uncertainty of employment continuity and financial stability in the form of guarantees of income, causing married workers are more likely not to become gig workers.

In the characteristics of the area of residence, workers who live in urban areas show positive and significant estimation results. These estimation results are in line with research conducted by Wheatley [26] that gig work is concentrated in urban areas. Furthermore, in Indonesia, there is still a gap in access to digitalization in rural and urban areas which can explain this finding. The gig economy, which is based on internet use, will

increase the opportunities for urban workers to become gig workers compared to workers in rural areas.

The next characteristic is education. Workers who have graduated from college level are more likely to become gig workers. This finding is in line with Adermon et al [31] that several university graduates have become gig workers. Workers with higher education will have better skills than those at other levels of education. These skills become a capital to choose jobs that offer flexibility.

Furthermore, workers who have previous work experience, as well as workers who have taken part in training programs under the *kartu prakerja* program, are more likely to be gig workers. These findings relate to the skills possessed by experienced workers as well as workers with additional skills obtained from participating in the *kartu prakerja* program with several types of digital capability enhancement, supported by Caro et al [25]. Some of the training available under the *kartu prakerja* scheme is in line with types of gig work such as computer application training, freelance photography, and so on.

Recent migrant workers are more likely to become gig workers. In general, a worker decides to migrate for obtaining better job opportunities in the migration destination area. The ease of entering gig jobs can increase the tendency of recent migrants to work as gig workers in their migration destination. In line with these findings, several studies show that migrant workers become gig workers to gain greater employment opportunities, supported by Chen et al [32]; Lata et al [33]; Van Doorn [34].

The character of the business sector also has a significant influence on the status of gig workers. Transportation sector workers will increase a person's tendency to become a gig worker up to 7 times compared to workers in other sectors. This finding is in line with several previous studies related to gig workers which stated that transportation sector workers made the largest contribution to gig workers overall, supported by Rachmawati et al [35]; Stanton et al [36].

Looking at regional characteristics, workers who live in provinces with a high digital literacy index are more likely to become gig workers. A higher digital literacy index shows that people have better access to digital technology, both as gig workers and consumers of services provided by gig workers. Study shows similar results that in gig work, there is a need for demand and supply of services produced by gig workers, supported by Allon et al [27].

However, the estimation results which show a negative influence of the rate of economic growth on gig workers indicate that the acceleration of economic growth in the region is not supported by gig jobs but by non-gig workers with higher productivity such as formal entrepreneurs and formal workers with contracts.

Specifically for the male worker model, the characteristics of workers with the greatest tendency to become gig workers are the transportation and warehousing sectors. The types of work in this sector are generally specific to male workers, such as package delivery workers, platform drivers, and so on.

Meanwhile, in the female worker model, the characteristic with the greatest tendency to become a gig worker is generation-Z. The high tendency of female Gen-Z workers to become gig workers is related to the ability of Gen-Z women who are more adaptive to technological changes compared to women in other generations. This adaptability will make it easier to become a gig worker which is directly related to the use of digitalization in work.

### **4.3. Vulnerability Of Gig Workers**

The discussion proceeds by analyzing gig workers' income utilizing the Heckman selection bias model and Ordinary Least Square (OLS) model for comparison. Estimates from Table 4 indicate that gig economy workers tend to experience a decline in income, especially in the post-pandemic era in Indonesia. This finding is corroborated by the



OLS model, which yields similar results. From this analysis, it is evident that gig economy employment has not significantly improved individual income. Gig workers often lack stable income guarantees or traditional employment rights such as healthcare benefits, leaves, or pensions, supported by Woodcock et al [37]. In the context of a fluctuating economy, this vulnerability exposes them to shifts in market demand or unstable economic conditions. The low income of gig workers can be attributed to uncertain demand or the unpredictability of task availability, resulting in inconsistent and unsustainable earnings. Additionally, intense competition in the gig job industry frequently drives down their service prices to remain competitive, ultimately reducing the income earned by gig workers. These results align with previous research indicating a decline in income for gig economy workers, supported by Hafeez et al [38]. Furthermore, this study investigates gig workers' vulnerability to excessive working hours (Table 4, Column 4). Estimations reveal that workers in the gig economy sector are more likely to work excessively, exceeding the standard full-time workweek (>48 hours), compared to their counterparts outside the gig economy sector. This overexploitation of working hours often stems from the high flexibility offered in this sector, supported by Anwar et al [39]. Gig workers typically enjoy high schedule flexibility, which unfortunately means they often lack fixed contracts or work schedules. Consequently, gig workers are often perceived to have unlimited working hours, supported by Taylor et al [40]. Hence, they tend to extend their working hours to achieve the desired income. Additionally, in various gig job sectors, the competition for jobs or clients is exceptionally fierce. In such scenarios, workers tend to extend their work hours to secure as many jobs and as much income as possible, supported by Horton et al [41].

Based on generational analysis, it is evident that Generation X, which tends to be older than other generations, shows an inclination towards increased income. This can be attributed to Generation X being the first generation accustomed to modern technology and information technology advancements. They possess the ability to adapt to new technology swiftly, granting them an advantage in technology-related jobs, often associated with higher pay scales. Additionally, the relatively productive age of Generation X often leads them to attain higher positions in their careers. Their substantial experience and proven track record in the workplace enable them to command higher incomes. For Generation Y, our findings indicate a likelihood of higher incomes. This is rooted in Generation Y having greater access to higher education. Higher educational attainment tends to unlock better employment opportunities and higher wages.

Regarding Generation Z, although the findings suggest a potential increase in income, the coefficient value is comparatively smaller when compared to previous generations. This is because many individuals in Generation Z are still in the educational phase or have just entered the job market. Generation Z has grown up with easy access to online education and the ability to learn independently. They can access online training and certifications, enhancing their skills and supporting their career growth as well as income potential. However, concerning the aspect of working hours, the estimations indicate that all three generations are prone to excessive working hours. This phenomenon arises due to the changing dynamics of work in the modern era. The continuous evolution of digital technology and connectivity has created a working environment that is consistently active, making it challenging for employees to separate work time from personal time. Jobs requiring online engagement and constant responsibilities often compel Generation X, Y, and Z to work beyond the stipulated hours, supported by Hyman et al [42]; Hansen [43]. Moreover, heightened competition demands across various sectors compel workers to demonstrate dedication and productivity by spending extra time in the workplace. Additionally, the concept of flexible work arrangements can lead employees, particularly from Generations X, Y, and Z, to extend their working hours. These generations often perceive schedule flexibility as an advantage, enabling them to work from home or set their own work schedules. Paradoxically, this flexibility often blurs

**Table 4.** Results of Estimated Income and Working Hours for Gig Workers

Variables	In_income (vulnerability)		Excessive Work Hours (vulnerability)	
	Heckman	OLS	Coef.	Odd Ratio
Gig Worker	-0.032***	-0.032***	0.369***	1.446
<i>Generation</i>				
Gen-X	0.339***	0.355***	0.490***	1.632
Gen-Y / Millennials	0.316***	0.328***	0.675***	1.964
Gen-Z	0.226***	0.178***	0.581***	1.787
Man	0.510***	0.524***	0.527***	1.694
Married	-	-	0.031***	1.031
Urban	0.340***	0.337***	0.770***	2.159
University	0.585***	0.589***	-0.672***	0.511
Experience	-0.027***	-0.023***	0.109***	1.115
Kartu Prakerja	-0.138***	-0.136***	0.091***	1.095
Recent Migrant	-	-	0.197***	1.217
<i>Sector</i>				
Transportation and Warehouse	0.035***	0.031***	0.393***	1.481
Accommodation and Food & Beverage Service	0.142***	0.142***	0.694***	2.002
Digitalization Index	0.349***	0.348***	0.510***	1.666
Economic Growth	0.007***	0.007***	0.000	1.000
<i>Constant</i>	12.515	12.197	-3.972***	0.019
<i>No. of Observation</i>	415700	415700	498451	498451
<i>Pseudo R<sup>2</sup></i>			0.0604 <sup>1</sup>	

the boundaries between work and rest. Employees frequently feel compelled to work beyond official working hours to complete tasks or meet company expectations.

Gender differences are also scrutinized in this study. Our findings indicate that male workers tend to experience increased income and are prone to excessive working hours. This tendency might be attributed to some men choosing careers in industries or fields that typically offer higher salaries. Kim et al [44] elucidates that women often receive lower wages than men. Moreover, male workers might lean towards working longer hours to meet job demands. Additionally, the financial burden felt by men as family breadwinners sometimes compels them to seek higher-paying jobs to support their families. This can lead men to feel the need to work longer hours or pursue additional employment opportunities, supported by Angrave et al [45]. The marital status variable was not observed in the Heckman analysis in this study as it was considered a factor that does not influence income. However, concerning the analysis of working hours, the research indicates an intriguing pattern. Married individuals tend to have excessive working hours. This can be explained by the responsibility felt by married individuals to support their families, especially if they are the primary breadwinners in the household.

Furthermore, the study delved into the analysis of residential areas, distinguishing between urban and rural regions. Estimations revealed that individuals residing in urban areas have a higher likelihood of earning larger incomes compared to their rural counterparts. However, a notable aspect emerged: despite their higher income, urban residents tend to face overworking issues, engaging in excessive working hours. This aligns with previous research indicating that urban workers often experience overtime, supported by Lyon et al [46].

Education also emerged as a crucial factor under examination. Our findings indicate that individuals with higher education levels, such as tertiary education or university degrees, have the potential to attain higher incomes compared to those with lower educational backgrounds. Additionally, the analysis of working hours variables indicates that higher education levels are associated with fewer working hours. This implies that individuals with higher education tend to maintain more regular working schedules. These findings underscore the pivotal role of education in creating economic opportunities and shaping individuals' work patterns.

On the other hand, our findings indicate that an individual's work experience can potentially reduce their income levels. This outcome also reveals that an increase in work experience can lead to an increase in the individual's working hours. This phenomenon can be explained by the fact that individuals with more experience are often associated with

older age, reducing their productivity and resulting in decreased income. However, they must continue to work longer hours to meet their family's needs.

In the context of the government's role through the Kartu Prakerja training program, our findings suggest that participation in the program can actually lead to a decrease in income for its participants. This outcome signifies that the impact of Kartu Prakerja on income enhancement remains insignificant. Furthermore, intense competition in the job market may force participants to seek additional employment or work longer hours to compete with other applicants.

The employment status as a migrant worker demonstrates a significant and positive impact on excessive working hours. In other words, migrant workers tend to work excessively long hours. This phenomenon may be attributed to the high economic pressures faced by migrant workers, compelling them to seek additional income by working longer hours. Furthermore, the desire to prove oneself in a new work environment can also drive them to demonstrate commitment through hard work and excessive working hours.

We also conducted an analysis of crucial sectors within our study, namely the transportation and warehousing sector, as well as the food and beverage service sector. Our findings revealed positive and significant outcomes regarding income in both sectors. This indicates that the transportation and food and beverage service sectors play a vital role in supporting the economy, as evidenced by their substantial income contributions. However, on the flip side, the analysis of working hours suggests that both of these sectors still have the potential for The impact of digitization factors illustrates the significant influence of technology and digitalization on the labor market. Research findings indicate a positive correlation between the level of digitization and individual income growth. This discovery reflects the positive impact that digital technology advancements can have on individual income levels. These results align with prior research indicating that digitization can enhance profits, income, and contribute to the sustainability of employment, supported by Fedorova et al [47]. On the other hand, concerning working hours, digitization exerts a notable influence by increasing individual working hours, often surpassing the required standards. This phenomenon emerges due to the continuous adoption of technology, triggering more intensive work demands.

Lastly, it is crucial to examine the economic growth conditions within the context of this study. Our estimations show that economic growth has the potential to enhance individual incomes. This phenomenon arises from the burgeoning economic landscape, creating job opportunities with better compensation. However, it is regrettable that its impact on working hours does not exhibit significant changes. This might indicate that while economic growth provides higher income opportunities, it does not directly affect working hour demands. This highlights the necessity of further evaluating how economic growth can be linked to sustainable work standards, ensuring that economic success reflects individual well-being and balance in work-life. exploitation with excessive working hours.

## CONCLUSION

This study aims to analyze the dynamics of gig workers in the Indonesian labor market, specifically focusing on the characteristics, well-being, and vulnerabilities of gig workers during the economic recovery period after the crisis caused by the Covid-19 pandemic. Our estimations reveal that Millennials/Generation Y and Generation Z have a higher likelihood of engaging in gig economy jobs compared to previous generations. Residing in urban areas, having higher education, work experience, and participating in the Kartu Prakerja program also increase the chances of individuals entering the gig economy. Additionally, being a migrant enhances the probability of joining the gig economy. The sectors most likely to absorb gig economy jobs are transportation and warehousing, as well as accommodation and food services. Digitalization also plays a crucial role in the growth of gig workers.

Furthermore, this research evaluates the vulnerability of gig workers concerning income and excessive working hours. Our findings indicate that gig workers tend to experience a decrease in income and face excessive working hours. Therefore, despite the gig economy offering high flexibility and low entry barriers, gig workers are exposed to significant risks, including income instability and overexploitation of working hours. Hence, a robust governmental role is essential in crafting policies that safeguard the rights of gig workers, provide stable income assurances, and regulate working hour limits to ensure the sustainability and well-being of gig workers.

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