

Identification of Determining Factors for Job Transitions that Trigger Economic Structure Changes in North Sulawesi Province

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Abstract: - The challenges of North Sulawesi Province lie in the difficulty of developing sustainable industries and economic structures in this region. With the evolution of technology and the growing government policies, factors such as online motorcycle taxi services (*ojek online*), village funds (*dana desa*), business and production incentives from the government, financial technology (fintech), and technological disruption have become increasingly crucial in reshaping the economic activities in Indonesia including the creation of new jobs, disruption in existing jobs, and job transitions. This research, however, aims to pinpoint the main drivers of job transitions after significant changes in technology and government policies. To our knowledge, this is the first study attempting to investigate what leads to a change in the profession or job of the actor of MSMEs considering individuals' demography characteristics, public insurance, and the advent of technology in business. The findings of this study suggest that the fulfillment of electricity needs, personal income, and business income are among the determinants of the job transitions of individuals in North Sulawesi Province. Additionally, factors that can drive job transitions within the same industry or sector due to the presence of new technologies include age, ownership of the National Health Insurance (BPJS/KIS), and residential and workplace or school locations. Working or studying in urban areas increases the likelihood of changing professions or jobs within the same sector or industry. On the other hand, the results suggest that the factors above, along with marital status and higher education attainment, can also drive changes in professions or jobs in different industries or sectors due to the presence of new technologies.

Key-Words: - Job transitions, profession changes, economic structures, technology disruption, survey, micro and small-medium enterprises (MSMEs).

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1 Introduction

North Sulawesi Province is a region endowed with substantial economic potential. However, the challenge lies in the difficulty of developing sustainable industries and economic structures in this area. According to BPS data, the Gross Regional Domestic Product (PDRB) per capita of North Sulawesi, based on current prices in 2021, amounted to Rp54.04 million, which is still below the national average of Rp62.26 million. Moreover, the unemployment rate in North Sulawesi reached 7.06% in August 2021, higher than the national average of 6.49%. According to the distribution map of e-commerce businesses in Indonesia, North Sulawesi falls into the fourth category out of five, with a number of businesses ranging from 31,999 to 56,666 units. Meanwhile, provinces in Java are in the top category with numbers exceeding 106,000 businesses.

With the development of technology and the growing government policies in North Sulawesi Province, factors like online motorcycle taxi services (*ojek online*), village funds (*dana desa*), business and production incentives, financial technology (fintech), and technological disruption are becoming increasingly vital in influencing the economic structure in the province.

Therefore, this research aims to pinpoint the main drivers of job transitions after significant changes in technology and government policies which potentially lead to changes in the economic structure of North Sulawesi Province. The findings of this research may serve as a basis to assist in evaluating government policies. Additionally, the results of this study are expected to contribute to our comprehension of the job transitions and the main drivers in North Sulawesi Province. To our knowledge, this is the first study attempting to investigate what leads to a change in the profession

or job of the actor of MSMEs considering individuals' demography characteristics, public insurance, and the advent of technology in business.

2 Literature Review

The impact of technological advancements depends on several elements, such as the type of industry and the involvement of labor unions in that industry. According to [1], in industries with labor unions, such as healthcare, goods delivery, and culinary retail, it was found that workers influenced the adoption process of new technologies that could benefit them. Conversely, in industries such as non-food retail and warehouses that lack labor unions and where large companies could dictate competition requirements, the prospects for workers to adopt new technologies were bleak.

On the other hand, conventional agriculture in emerging markets like Indonesia was being transformed by digital technology, as seen through the lean start-up perspective, [2]. According to [3], digital agriculture has the potential to bring significant change to farming in Indonesia, and the start-up ecosystem in Indonesia has witnessed rapid growth in agriculture technology.

The use of new technology opens a gate to produce new, cheaper goods, capital accumulation and enhances international competitiveness, [4]. Based on an article by [5], while new technologies required a change in old strategies, they also opened new opportunities. In agriculture, this technology offered increased productivity. In the service sector, new technology was also crucial for economic development as the roles of the primary and secondary sectors were declining. Services such as tourism have proven to be a more resilient source of income against automation for countries that successfully created desirable tourist destinations. Service exports offered more growth benefits than manufacturing-based export growth.

In the financial sector, the advent of new technology provided convenience for people to obtain loans easily and quickly. According to [6], fintech has caused a significant alteration in the banking sector. While fintech continued to grow, credit tended to lag. People who once considered interest rates as the standard for borrowing from conventional banks now prefer to borrow from non-banking institutions or fintech platforms that offer easy access.

A paper by [7], showed that the power of interest rates in changing loan rates was lower in the fintech era compared to the pre-fintech era. Furthermore, in many cases, the power of interest

rates statistically weakened in the fintech era. [8], explained that compared to loans from banks, non-bank or marketplace lenders had features such as online application processes, quick responses, higher approval rates, better credit analysis, and a better customer experience. Studies by [6] and [7], indicated changes in the amount of credit disbursed and changes in the credit composition after the Indonesian government launched the financial technology program in 2016.

In the transportation sector, technological advancements offered new hope for many communities, particularly in terms of employment and income. Ride-hailing drivers tended to arise from lower-income environments with less regular employment opportunities, [9].

Over the past decade, ride-hailing has become a major force driving the development of smart mobility worldwide. This development provided passengers with flexible travel arrangements, short travel times, no parking hassle, and increased comfort, [10] and [11]. Additionally, this service also had the potential to benefit cities by reducing private car ownership and increasing the number of public transportation passengers by solving first-last-mile problems, [12] and [13]. On the other hand, some studies found that ride-hailing could increase vehicle traffic, raise energy consumption, compete with public transportation, and worsen transportation inequalities, [14] and [15]. Individuals with higher education and higher incomes were more likely to use ride-hailing services, [16] and [17]. Unfortunately, the supply side of this business was disproportionately less noticed, [18] and [19]. Transportation network companies systematized drivers with no traditional employment relationships. In contrast, they offer an online platform to match supply and demand, [20]. Each ride-hailing driver affiliated with the platform decided when and where to drive their car for work. Therefore, platforms claimed that drivers were not part of the company's employment but individual business partners who directly negotiated with passengers. They were also referred to as gig workers with non-fixed workplaces or employers, [21]. Ride-hailing platform companies generate profits by retaining a certain percentage of the overall fare as their commission. This disruptive impact was not only experienced by fellow business players in the transportation sector, but the emergence of new job opportunities in this sector stimulated workers in other sectors to move to the transportation sector.

On the other hand, to foster new businesses within the community, the Indonesian government

was actively releasing various productive programs for the community, such as the Village Fund program. This program encouraged people to engage in various businesses supported by the Village Fund. One of the priorities of this program was the establishment, development, and capacity building of Village-Owned Enterprises (BUM Desa) or Joint Village-Owned Enterprises, which would manage productive economic activities and the development of tourism villages, [22].

Moreover, this program was observed to suppress population migration from rural areas to cities, [23], enabling rural communities to develop their local economies. However, it was also observed that the presence of online motorcycle taxis still attracted attention from lower-income communities in rural areas to seize job opportunities with higher incomes in the cities, [9]. Government incentive programs for businesses were also being promoted at the national and regional levels. This program helped the community start businesses (start-ups) and stimulated the growth of existing businesses, for example, with government subsidy programs, [24]. The presence of factors such as online motorcycle taxis, village funds, business incentive programs, fintech, and technological disruption had an impact on changing the economic structure of a country and region.

The factors described above were grouped into three categories: private factors, namely online motorcycle taxis; government factors, namely village funds and business incentives; and external driving factors, namely the development of fintech and technological disruption. This research will analyze the strength of these three categories in changing the economic structure of North Sulawesi, which has not been previously studied.

3 Methodology

This study takes place from February 2023 until December 2023 in North Sulawesi province, sampling two hundred and forty respondents from two regencies and four cities. These six areas are selected because these areas are mostly exposed to digital technology. Practically, online activities are part of their daily lives. The areas include Manado City, Tomohon City, Bitung City, Kotamobagu City, North Minahasa Regency, and Minahasa Regency. The selection of these areas is also based on their proximity to the provincial capital of North Sulawesi, Manado City. Proximity is crucial for this study as it reflects the availability of telecommunication facilities in each area. In other words, the farther away a city from the provincial

capital, the more restricted telecommunication facilities are. Specifically, Kotamobagu City, despite its distance from the provincial capital, it was chosen because of its city status, assuming that economic activities in Kotamobagu City are like other cities in the province.

In this study, the respondents are the actors (i.e. the owners or individuals who have the rights to lead the businesses) of small and medium enterprises (SMEs). SMEs are chosen because they are the keys to various social and economic issues in society. The more SMEs, the more people are employed, the less unemployment, the less crime, and at the same time, the higher the average income and the lower the poverty rate. Additionally, they are more likely to get exposed to technological advancements. The model used in this study is based on the logistic regression model to evaluate the influence of the factors that may lead to job transitions. Job transitions may proxy the structural changes in an economy. Let y be the decision whether an individual chooses either to stay in the same profession or job ($y = 0$) or to switch to a new one ($y = 1$) in a logistic regression model, $y = \frac{e^{a+bX}}{1+e^{a+bX}}$. Then, let $p\{y = 1\}$ be the probability of “switching to a new profession or job”. Let x be the predictor variable, and b be its corresponding coefficient that determines the emphasis predictor variable x has on the outcome Y (or p). Also, let a be the intercept. Therefore, one can rewrite the previous model to a linear form of logistic regression model, $\text{logit}(p) = a + bX$ where $\text{logit}(p)$ is simply $\log(p/1 - p)$, and $p = P\{Y = 1\}$.

4 Problem Solution

The following are the key variables used in the model of this study (the codes Bs and Cs (e.g. B47, C1 and so on) indicate specific questions or statements used in the survey for this study).

1. B47. Does the presence of new technology make you change the type or profession of your job in the same industry/sector?
2. B48. Does the presence of new technology make you change your job from one sector/industry to another?
3. B49. Suppose with new technology there is an opportunity in a new job type, but the income is the same as the old job. Will you switch to the new job?
4. B50. Suppose with new technology there is an opportunity in a new job type, but the

income is higher than the old job. Will you switch to the new job?

5. B61. In which sector or industry was your previous job/business?
6. B62. In which sector or industry is your current job or business?
7. B63. Is technology one of the reasons you have EVER switched to a new job/business/profession?

The predictor variables used in this study are:

1. C1. Current city of residence.
2. C2. Current residential location.
3. C3. Location where currently working/attending school.
4. C4. Gender.
5. C5. Marital status.
6. C6. Employment status.
7. C7. Personal income (in Rupiah).
8. C8. Net income/Net profit of Business (in Rupiah).
9. C9. Religion.
10. C10. Number of two-wheeled motor vehicles owned (string).
11. C11. Number of four-wheeled motor vehicles owned.
12. C12. Do you have a vehicle specifically for business?
13. C13. Highest education ever taken.
14. C14. Do you have a public insurance (BPJS) or Health Indonesian Card (KIS)?
15. C15. Age.
16. C16. How many Voltage Ampere (VA) electric metres are in your residence?
17. C17. What type of residence do you have?
18. C18. Average monthly electricity expenditure.
19. C19. Do you feel your monthly electricity expenditure is expensive? (0 = very cheap, 9 = very expensive).
20. C20. With current electricity usage/consumption, do you feel your electricity needs are fulfilled? (0 = very unfulfilled, 9 = very fulfilled).

Table 1 suggests the factors that can lead to a change in profession or job:

1. Electricity needs fulfilment (C20): When business owners feel that their electricity needs are fulfilled, they are likely to change their profession or job. This suggests that electricity consumption plays a role in someone's job change. In this case, one unit increase in the individual's perception that its electricity needs are being met, the

$logit(p)$ which is the logit of probability that the individual decides to switch to a new profession or job increases by 0.140. In other words, as $logit(p) = \log(p/1 - p)$ increases by 0.140, $(p/1 - p)$ will increase by $\exp(0.140) = 1.15$. This is a fifteen percent increase in the odds of switching to a new profession or job, assuming *ceteris paribus*.

2. Personal Income (C7): When there is an increase in personal income, business owners are likely to change their profession or job. This suggests that with an increase in income, business owners have more options for businesses or jobs that require larger capital. Like in electricity needs case, one rupiah increases in the personal income, the $logit(p)$ which is the logit of probability that the individual decides to switch to a new profession or job increases by 0.118. Then, the $\exp(0.118) = 1.13$ which means that this is a thirteen percent increase in the odds of switching to a new profession or job, assuming *ceteris paribus*.
3. Business Income (C8): When there is an increase in business income, business owners are likely to change their profession or job. This suggests that with an increase in income, business owners have more options for businesses/jobs that require larger capital. Again, one rupiah increases in the business income, the $logit(p)$ which is the logit of probability that the individual decides to switch to a new profession or job increases by 0.235. Then, the $\exp(0.235) = 1.27$ which means that this is a twenty-seven percent increase in the odds of switching to a new profession or job, assuming *ceteris paribus*.

Table 1. Determinants of Profession or Job Change

VARIABLES	(1)	(2)	(3)
C20	0.140*		
	(0.0791)		
C7		0.118*	
		(0.0697)	
C8			0.235***
			(0.0726)
Constant	-0.864	-0.209	-0.467**
	(0.589)	(0.247)	(0.227)
Observations	240	240	240

Standard errors in parentheses
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The dependent variable of the model in Table 1 is based on the difference between variables B61 and B62. If the responses to questions B61 and B62 are different, one can conclude that the respondents have shifted their jobs or professions from one sector or industry to another sector or industry. Therefore, the value of the dependent variable is 1 when the responses are different meaning there is a job transition, and 0 when the responses are similar meaning there is no job transition.

Based on the results in Table 2, it can be concluded that the following factors can drive a change in profession or job within the same industry or sector due to the presence of new technology.

1. Age (C15): As age increases, the likelihood of changing professions or jobs within the same sector or industry decreases. One-year increases in the individual's age, the $logit(p)$ which is the logit of probability that the individual decides to switch to a new profession or job decreases by 0.127. Then, the $exp(0.127) = 1.14$ which means that this is a fourteen percent decrease in the odds of switching to a new profession or job, assuming *ceteris paribus*.
2. Public Insurance (BPJS) or Health Indonesian Card (KIS) (C14): Interestingly, with the presence of BPJS/KIS, someone is more likely to change professions or jobs within the same sector/industry. For the individual who owns a public insurance or health Indonesian card, the $logit(p)$ which is the logit of probability that the individual decides to switch to a new profession or job increases by 0.460. Then, the $exp(0.460) = 1.58$ which means that this is individuals have fifty-eight percent higher in odds of switching to a new profession or job compared to those who do not own public insurance or health Indonesian card, assuming *ceteris paribus*.
3. Residential location (C2): By residing in urban areas, someone is more likely to change professions or jobs within the same sector or industry. For the individual who resides in urban areas, the $logit(p)$ which is the logit of probability that the individual decides to switch to a new profession or job increases by 0.940. Then, the $exp(0.940) = 2.56$ which means that these individuals have one hundred fifty-six percent higher odds of switching to a new profession or job compared to those who reside in rural areas, assuming *ceteris paribus*.

4. Work or School location (C3): By working or attending school in urban areas, someone is more likely to change professions or jobs within the same sector/industry. For the individual who works or go to school in urban areas, the $logit(p)$ which is the logit of probability that the individual decides to switch to a new profession or job increases by 0.889. Then, the $exp(0.889) = 2.43$ which means that these individuals have one hundred forty-three percent higher in odds of switching to a new profession or job compared to those who work or go to school in rural areas, assuming *ceteris paribus*.

The dependent variable of the model in Table 2 is B47 (i.e. does the presence of new technology make you change the type or profession of your job in the same industry/sector?).

Table 2. Factors Driving Profession/Job Change in the Same Industry/Sector Due to New Technology

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
C15	-0.127** (0.0555)				-0.127** (0.0555)	
C14		0.460** (0.207)				0.460** (0.207)
C2			0.940*** (0.297)			
C3				0.889*** (0.301)		
Constant	- 1.033*** (0.280)	0.570 (0.487)	0.214 (0.255)	0.189 (0.262)	-1.033*** (0.280)	0.570 (0.487)
cut1	1.883*** (0.320)	3.485*** (0.549)	3.163*** (0.342)	3.128*** (0.346)	1.883*** (0.320)	3.485*** (0.549)
Obs	240	240	240	240	240	240

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

On the other hand, Table 3 suggests the following factors that can drive a change in profession or job in a different industry or sector due to the presence of new technology (B47). The directions and interpretation of the magnitudes of age (C15), public insurance (C14), residential location (C2), and work or school location (C3) in Table 3 are the same as the variables in Table 2

On the other hand, individuals who are married tend to refrain from changing their jobs in a different industry or sector (C5). For the individual who are married, the $logit(p)$ which is the logit of probability that the individual decides to switch to a new profession or job decreases by 0.378. Then, the $exp(0.378) = 1.46$ which means that these

individuals have forty-six percent higher in odds of switching to a new profession or job compared to those who work or go to school in rural areas, assuming *ceteris paribus*.

Individuals with a higher level of education tend to refrain from changing their jobs to a different industry or sector (C13). One-level increases in the individual's education attainment, the *logit(p)* which is the logit of probability that the individual decides to switch to a new profession or job decreases by 0.239. Then, the $\exp(0.239) = 1.27$ which means that this is a twenty-seven percent decrease in the odds of switching to a new profession or job, assuming *ceteris paribus*.

Table 3. Factors Driving Profession/Job Change in a Different Industry/Sector Due to New Technology

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
C2	0.555*					
	(0.295)					
C3		0.500*				
		(0.300)				
C5			-0.378*			
			(0.226)			
C15				-0.0907*		
				(0.0548)		
C13					-0.239*	
					(0.122)	
C14						0.365*
						(0.208)
Constant	0.0429	0.0085	-	-	-	0.457
cut1	(0.256)	(0.263)	1.006**	0.769***	1.155***	
Constant	3.223***	3.182**	2.172**	2.406***	2.031***	3.636***
cut2	(0.366)	(0.369)	(0.451)	(0.353)	(0.466)	(0.567)
Obs	240	240	240	240	240	240

Standard errors in parentheses
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The dependent variable of model in Table 3 is B48 (i.e. does the presence of new technology make you change your job from one sector/industry to another?).

Table 4 indicates that there are two different groups of factors that emerge with the advent of new technology that brings new jobs with income like the old jobs.

1. Negative factors include marital status (C5) and age (C15).
2. Positive factors include residential location (C2), work or school location (C3), and public insurance (C14).

Table 4. Factors Driving Job Change with the Same Income When New Technology Introduces New Jobs

VARIABLES	(1)	(2)	(3)	(4)	(5)
C2	1.374***				
	(0.366)				
C3		1.593***			
		(0.392)			
C5			-0.391*		
			(0.237)		
C15				-0.140**	
				(0.0576)	
C14					0.635***
					(0.224)
Constant cut1	1.444***	1.642***	-0.294	-0.252	1.823***
	(0.335)	(0.364)	(0.411)	(0.278)	(0.541)
Constant cut2	4.538***	4.751***	2.739***	2.800***	4.890***
	(0.487)	(0.508)	(0.518)	(0.423)	(0.658)
Observations	240	240	240	240	240

Standard errors in parentheses
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The dependent variable of the model in Table 4 is B49 (i.e. Suppose with new technology there is an opportunity in a new job type, but the income is the same as the old job. Will you switch to the new job?).

On the other hand, Table 5 shows almost similar results as in Table 4 except the public insurance is no longer affecting the dependent variable. Therefore, the two groups of factors are as follows.

1. Negative factors include marital status (C5) and age (C15).
2. Positive factors include residential location (C2), work or school location (C3), and public insurance (C14).

The dependent variable of model in Table 5 is B50 (i.e. suppose with new technology there is an opportunity in a new job type, but the income is higher than the old job. Will you switch to the new job?).

Table 5. Factors Driving Job Change with Different Income When New Technology Introduces New Jobs

VARIABLES	(1)	(2)	(3)	(4)
C2	0.497* (0.286)			
C3		0.481* (0.291)		
C5			-0.396* (0.211)	
C15				-0.0928* (0.0528)
Constant cut1	-1.280*** (0.268)	-1.285*** (0.273)	-2.316*** (0.405)	-2.057*** (0.299)
Constant cut2	1.002*** (0.261)	0.994*** (0.266)	-0.0303 (0.370)	0.225 (0.261)
Observations	240	240	240	240

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Meanwhile, Table 6 indicates that those who have previously decided to switch from one profession to another are likely to change their jobs when new technology introduces new jobs with different incomes.

Table 6. Correlation Between the Decision to Change Professions and the Willingness to Change Jobs with Different Incomes When New Technology Introduces New Jobs

VARIABLES	(1)
Difference of B61 and B62 (Changing profession = 1, otherwise 0)	0.445* (0.247)
Constant cut1	-1.425*** (0.209)
Constant cut2	0.858*** (0.191)
Observations	240

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The dependent variable of model in Table 6 is B50 (i.e. suppose with new technology there is an opportunity in a new job type, but the income is higher than the old job. Will you switch to the new job?).

5 Conclusion

This study has brought several inferences. The fulfilment of electricity needs, personal income, and business income are identified as determining

factors for someone's job transitions. Additionally, various factors influencing the transitions of professions or jobs within the same industry due to the advent of new technology include age, ownership of public insurance (BPJS) or Indonesian Health Card (KIS), residential location, and workplace or school location. Individuals working or studying in urban areas are more likely to change professions or jobs within the same sector/industry.

Additionally, marital status and higher education level can drive the transitions of professions or jobs in different industries or sectors due to the introduction of new technology. Finally, when categorised into two types of factors based on their direction of impact on the likelihood of changing professions or jobs, the factors can be grouped as follows.

1. Negative Factors: These factors decrease the likelihood of switching professions or jobs and include marital status, educational level, and age.
2. Positive Factors: These factors increase the likelihood of switching professions or jobs and encompass residential location, workplace or school location, ownership of public insurance (BPJS), or Indonesian Health Card (KIS). These factors also affect the decision to change professions and the willingness to change jobs with different incomes when new technology introduces new jobs.

The results of this study suggest that policymakers should consider these factors for adjustments in economic structures, whether through providing incentives, technological advancements, or creating new job opportunities in order to maintain the stability of the economy.

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- Hizkia H. D. Tasik designed the survey and was responsible for the data tabulation, methodologies, and analyses.
- Jullie J. Sondakh developed the models.
- Stanly W. Alexander was responsible for the development of problems, survey design, and supervision.

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Conflict of Interest

The authors have no conflicts of interest to declare.

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