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Internet Utilization and Income of Entrepreneurs in the Informal Sector

Christiana Dyah Ratnasari
Faculty of Economics and Business, Universitas Indonesia
Corresponding Author: nadyra.cedeer@gmail.com

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Abstract

The presence of the informal sector gives rise to more disadvantages in the economic development of a country, and individuals working in this sector are more vulnerable to poverty. However, technology plays an important role in decreasing the extent of informality and increasing work productivity. This study was conducted to examine the extent to which the use of the Internet in the job activity of entrepreneurs in the informal sector could increase their income. Using data from the Indonesian Labor Force Survey 2019–2020 and ordinary least square regression method, this study reveals that the use of the Internet significantly correlates with an increase in income by 11.8%. The effect was found to be 12% higher among entrepreneurs in the non-Java regions than in Java regions. Meanwhile, male entrepreneurs were noted enjoy a 14% greater benefit than female ones.

Keywords: digital economy; informal sector; entrepreneur; internet; income; e-commerce
JEL Classification: O1

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1. Introduction

Informality forms a large portion of the total economic activities around the world particularly in developing countries (La Porta & Shleifer, 2014), and more than 60% of the total work activity takes place in the informal economy (ILO, 2018). The informal sector presents benefits by helping low-skill workers get employment during economic crises (Loayza & Rigolini, 2011) and offering flexibility for women to work from home (Alatas & Newhouse, 2010); however, the growing size of the informal sector is a concern of many policymakers in developing countries since it is arguably inversely related to the tax revenues and economic growth. Informal firms typically refrain from paying official taxes, and this limits the provision of public goods and services by the government (Levy, 2008). The existence of informal firms in the same industry as formal firms leads to inefficient resource allocation in the economy (Hsieh & Klenow, 2009). Informality also could affect people's living standards as well as prevent households and economic units trapped in this sector from increasing their productivity and escaping poverty (ILO, 2014).

Formalization has been an important labor policy for many developing countries, but the transition to formality is a burdensome challenge for many policymakers. However, there is a perspective that technology utilization in the informal sector could drive more entrepreneurship and improve the working productivity of entrepreneurs. Technology has a spillover effect in decreasing the extent of informality and help informal businesses move to the formal sector (Garcia-Murillo & Velez-Ospina, 2017). For instance, the Internet as a general-purpose technology has become prevalent in our daily lives, and plays an important role in promoting economic development and stimulating digital entrepreneurship by boosting national e-commerce growth (Fathian et al.,

2008; Ho et al., 2007, 2011)known as e-commerce, which considers information and communication technology (ICT.

Indonesia represents a developing country that has a persistent number of informal sectors at around 60–70% (Rothenberg et al., 2016) and has experienced the growth of the digital economy. Cheap mobile phones and cheaper access to mobile Internet are the main drivers of large Internet users, and this benefits Indonesia's economy by adding an estimated 3.7 million jobs and USD 35 billion a year by 2025 (Das et al., 2016). On the supply side, the presence of tech start-up companies has revolutionized digital transformation in Indonesia and drives entrepreneurship from the informal sector. For instance, the company Gojek, whose name refers to *ojek* (a term for Indonesian motorcycle taxis) is helping motorcycle taxis drivers serve more passengers per day than the traditional drivers. Further, Tokopedia and Bukalapak democratize commerce across the archipelago by providing access to virtual merchants; this enables anyone to start their business under these companies' e-commerce ecosystem. On the demand side, with a large domestic market and the increase of the middle-income classes, online commerce plays a promising role in driving Indonesia's economy.

Past research commonly observed the impact of the Internet on macroeconomic indicator outcomes, such as economic growth and unemployment at the countries level. For instance, Koutroumpis (2009) found that a 10% increase in broadband penetration raised the average GDP of OECD countries by 0.25%. A study of Czernich et al. (2011) also showed that a 10% increase in Internet penetration led to a 0.9–1.5% GDP per capita growth in OECD nations. Another research revealed the different results of the influence of Internet connection in high-income countries and poor countries. Even though the Internet presents a positive impact on economic growth for all the countries, rich countries receive greater benefits from Internet broadband because of a larger investment in the Internet sector (Appiah-Otoo & Song, 2021; Myovella et. al, 2020).

Firm-level evidence showed that Internet access influences the increase of firms' productivity (Bertschek & Niebel, 2016; Sánchez et al., 2006) and profit growth of firms regardless of their size and export activities (Clarke et al., 2015). From the employment standpoint, a study by DiMaggio and Bonikowski (2008)yet little research has tested this premise. After discussing several mechanisms that might produce differences in earnings growth between workers who do and do not use the Internet, we use data from the Current Population Survey to examine the impact of Internet use on changes in earnings over 13-month intervals at the end of the \"Internet boom.\" Our analyses reveal robustly significant positive associations between Web use and earnings growth, indicating that some skills and behaviors associated with Internet use were rewarded by the labor market. Consistent with human-capital theory, current use at work had the strongest effect on earnings. In contrast to economic theory (which has led economists to focus exclusively on effects of contemporaneous workplace technology use revealed that web use positively correlates with the growth of earnings of employees since skills associated with Internet use are accounted for in the labor market. Meanwhile, some studies have observed the effect of the Internet on family well-being at the household level. Chang and Just (2009) examined the effect of Internet use on the well-being of farm households and revealed that the use of the Internet improves household income. Compared to non-adopters, Internet adopters of forestry and farm households were found to also have higher incomes and greater life satisfaction (Hong & Chang, 2020).

Internet use is a form of human capital since people who use it have greater access to relevant information for the labor market (DiMaggio & Bonikowski, 2008). The Internet also plays a role in income determination due to the expansion of social networks (Lin, 2002). Internet users obtain benefits since they can expand their networks and create new ties that enable them to find informal information for job opportunities. In digital entrepreneurship, an increase of income by using the Internet reflects productivity gain as a result of improved access to information and leads to efficient communication in the supply

chain management and pleasant interaction in the business-to-consumer relationship. The use of websites, marketplace, and social media opens greater markets for product promotion, while email and chat apps improve communication in the commerce business for unlimited boundaries of time and geography. As a result, cyber entrepreneurs could take advantage of the Internet since they perform more professional marketing activities than owners of traditional small firms (Siu, 2002).

However, Internet utilization in the job activity of entrepreneurs in the informal sector may present different effect regarding earnings because of socio-demographic characteristics such as gender and regional groups. Even though the gender gap of being online has disappeared (Ono & Zavodny, 2003; Weiser, 2000) and most of the online entrepreneurs now are women, men and women demonstrate different business performances. Men's capability of being professional digital entrepreneurs is superior since they are more advanced in developing strategic business partnerships and digital marketing (Sihotang et al., 2020). Meanwhile, the regional inequality factor concerning the gap of Internet infrastructure between rural–urban or isolated island–mainland areas may influence the different benefit of using Internet.

While it is rare for research at the micro level to observe the effect of Internet use on economic outcomes, studies at country and regional levels have also not been able to explain the direct benefit of the Internet on people's welfare, especially the incomes of the working individuals. Therefore, this study fills the gap by focusing on the impact of using the Internet in the informal sector. The aims are to examine the effect of Internet utilization on the business activities of entrepreneurs in the informal sector and extend the analysis to the different effects on the geographical location and gender group. This paper hypothesizes a positive correlation between Internet use and the income of entrepreneurs. Entrepreneurs who use the Internet in their business activity may earn more revenue than those who do not. Regarding the characteristics of Internet users, different effects of Internet use on the income of entrepreneurs in different locations and across gender are expected.

2. Research Method

Secondary data from the Indonesian Labor Force Survey (Sakernas 2019–2020) was used in this study to empirically analyze the effect of Internet use on the income of entrepreneurs. Meanwhile, the concept of informal sector refers to the International Conference of Labour Statisticians (ICLS) as they formulated the widely accepted concept of informality as an international standard comparison used by ILO. In ICLS 15, the definition of business in the informal sector referred to unregistered businesses of own-account workers with a small number of employees, including household businesses in the production of goods exclusively for their final use (Hussmanns, 2004). In ICLS 17, the definition of informal business added social protection entitlements for workers. From these definitions, the main key defining informality focuses on the lack of legal aspects, formal taxation, and state protection.

The indicators of entrepreneurs working in the informal sector according the ICLS 17's concept include those who run a self-employed or household business, non-registered business, administration of a small number of employees, and lack of involvement in social security programs. These indicators are considered in the Sakernas questions, but adjustment definitions were made in this study due to information limitations in the survey, particularly regarding missing values of the dependent variable of some informality indicators. Finally, informal sector is defined in a broader nuance referring to any self-employment businesses, household businesses, non-governmental businesses, or non-profit/non-non-profit institutions. Based on these criteria, the paper focused on small businesses that are operated by single individuals.

We set income of entrepreneurs as the dependent variable, and the main interest variable is Internet use, which is a dummy variable irrespective of whether the respondents actually use the Internet for their main job activities. The control variables which are dummy

variables describe the attributes of informal entrepreneurs and working conditions. These variables represent gender, age, education, head of households status, working experience, place of living, working field, and the type of device used to access the Internet.

Ordinary least squares regression was used to investigate the association between Internet use and income. The model by Chang and Just (2009) was adopted for the choices of income as the dependent variable, the dummy variable of Internet use as the variable of interest, as well as the alternative of control variables that represent sociodemographic factors. Further, employment characteristics such as working experience and working industry classification were used as additional variables. The analysis at the national and regional levels between Java and non-Java regions with the model is presented as follows:

$$LnINCOME_i = \alpha + \beta_1 INTERNET + \beta_2 EDUCATION + \beta_3 GENDER + \beta_4 HH + \beta_5 AGE + \beta_6 AGSQ + \beta_7 WORKING + \beta_8 URBAN + \beta_9 INDUSTRY + \beta_{10} TECH + \varepsilon_i$$

and the analysis on the differences between gender groups is as follows:

$$LnINCOME_i = \alpha + \beta_1 INTERNET + \beta_2 EDUCATION + \beta_3 HH + \beta_4 AGE + \beta_5 AGSQ + \beta_6 WORKING + \beta_7 INDUSTRY + \beta_8 TECH + \beta_9 URBAN + \beta_{10} JAVA + \varepsilon_i$$

The variable of interest, INTERNET, represents Internet use; its value is 1 if entrepreneurs use the Internet and 0 if they do not. The control variables that represent the role of human capital are age, gender, and education. AGE is a continuous variable, and its squared term is defined as AGSQ. GENDER specifies the gender of entrepreneurs, female and male. Entrepreneurs' education is categorized into five categories: no education, elementary school graduates, junior high school graduates, senior high school graduates, and university graduates. The variable HH represents the status of an individual as a head of household or a family member.

The variables that represent employment characteristics are WORKING (working experience in months) and INDUSTRY as working field classification (agriculture, manufacturing, trade, and services). The effect of local economic conditions is captured by the variable URBAN, which indicates the place of living of entrepreneurs, located in urban or rural areas. The JAVA variable depicts the regional classification as Java and non-Java regions. Last, the variable of TECH represents the main device that the entrepreneurs use to access the Internet via smartphones or computers.

3. Results and Discussion

3.1 Results

3.1.1 Descriptive Statistics

The data on informal entrepreneurs in 2019-2020 comprised 34 provinces and 531 cities/municipalities. The observations in this study include 35,790 informal entrepreneurs, 44% of whom are mainly concentrated in Java and Bali and 60% of whom live in urban areas. Entrepreneurs who use the Internet for business activity represent around 58% of the total observations or 20,780 people. The average age of the entrepreneurs is 40 years, with 43% of them having completed the senior high school level but only 10% having undergone tertiary level education. The average working experience in the current job is around 7.5 years.

The proportions of entrepreneurs working in the service, manufacturing, and trade sectors who used the Internet are 67.87%, 62.34%, and 54.13%, respectively. This shows that the Internet mostly supports business activities in the service industry and trade sector, but the agriculture sector is less likely to use it. Meanwhile, based on gender, women's participation in online entrepreneurship was found to be almost the same as men. Almost 60% of the men in the informal sector engage in Internet-based business, and women's participation was found to be 1% less than the men's.

Regional characteristics show that entrepreneurs in the western part of Indonesia participate more in digital online business than

entrepreneurs in the eastern part. 72% of the informal entrepreneurs in Java and Bali were found to use the Internet for their main job activity, and around 55% of the self-employed people in Kalimantan use the Internet for economic purposes, followed by almost half of the entrepreneurs in Sumatra and Sulawesi. Meanwhile, 35% of entrepreneurs in Nusa Tenggara, Maluku, and Papua utilize the Internet for business purposes.

Generally, the income group below five million rupiah per month dominates the distribution of income. The mean income of total informal entrepreneurs is approximately 2.5 million rupiah per month, and the mean income of Internet adopters and non-Internet adopters is about 2.6 million rupiah and 2.3 million rupiah, respectively. The income of the non-Internet users was found to be greater than the income of Internet users at the lower-income points. However, at higher income points, the income of Internet users starts to increase exceeding the income of non-adopters. This indicates that high-income groups enjoy more benefits of Internet adoption than low-income groups.

3.1.2 Regression Analysis

Table 1 shows the output of regression estimations. At the national level, the general model was statistically significant at $\alpha = 1\%$ to reject the null hypothesis with the average R squared 16.8%. The t-test of the partial model also shows that variables of interest and control variables were significant at the corresponding α value. The variable of Internet use shows a positive sign, and the use of the Internet is associated with an increase in expected income of informal entrepreneurs by 11.8%, holding all variables constant.

Table 1. Regression on National, Java, and Non-Java Region

Ln Income	National	Java	Non-Java
INTERNET	0.112*** (0.010)	0.073*** (0.018)	0.182*** (0.013)
EDUCATION (no education = base value)			
primary	0.087***(0.023)	0.052 (0.040)	0.134***(0.029)
junior	0.118***(0.023)	0.063 (0.039)	0.171***(0.029)
senior	0.230***(0.022)	0.208***(0.039)	0.233***(0.027)
advanced	0.409***(0.026)	0.416***(0.043)	0.378***(0.032)
AGE	0.062*** (0.003)	0.054*** (0.004)	0.070*** (0.003)
AGSQ	-0.000*** (0.000)	-0.001*** (0.001)	-0.001*** (0.000)
GENDER	0.435*** (0.013)	0.456*** (0.019)	0.434*** (0.018)
HH	0.145***(0.129)	0.133***(0.016)	0.140***(0.017)
WORKING	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
URBAN	0.138*** (0.010)	0.225*** (0.016)	0.110*** (0.013)
TECH	0.123** (0.058)	0.291*** (0.110)	0.070 (0.066)
INDUSTRY (agriculture = base value)			
manufacturing	0.041* (0.023)	0.125*** (0.048)	0.080*** (0.027)
trade	0.277*** (0.019)	0.394*** (0.045)	0.286*** (0.022)
service	0.201*** (0.019)	0.354*** (0.045)	0.177*** (0.022)
_cons	11.900*** (0.13)	11.522*** (0.243)	11.857*** (0.154)
R-squared	0.168	0.182	0.172
Observations	29,730	13,157	16,573

Note. Robust standard error in the parentheses (***p< .01, **p< .05, *p< .1)

In the estimation at the regional level, Java and non-Java groups showed a statistically significant model at α = 1% to reject the null hypothesis. The partial t-test of the variable of interest of each group showed significant results at α = 1%; however, the estimations revealed different Internet effects on expected income. In Java, the use of the Internet was found to correlate with increasing the income of the entrepreneurs by 7.6%. However, the population of non-Java regions showed a greater effect of Internet use with around 20% of increasing expected income.

Meanwhile, it can be seen in Table 2 that the effect of Internet utilization on the main job activity of male informal entrepreneurs is associated with increasing higher income than the use of the Internet in female entrepreneurs. The effect of Internet utilization on the male group is around 20% and on the female group is about 6%.

Table 2. Regression on Gender

Dependent variable: ln income	Female	Male
INTERNET	0.058***(0.019)	0.186***(0.012)
EDUCATION (no education = base value)		
primary	0.119*(0.046)	0.103***(0.026)
junior	0.163***(0.044)	0.121***(0.026)
senior	0.226***(0.045)	0.248***(0.025)
advanced	0.424***(0.049)	0.302***(0.030)
AGE	0.085***(0.006)	0.039***(0.003)
AGSQ	-0.001***(0.000)	-0.001***(0.000)
HH	0.080***(0.025)	0.240***(0.015)
WORKING	0.002***(0.000)	0.001***(0.015)
URBAN	0.186***(0.019)	0.132***(0.012)
TECH	0.116(0.113)	0.147**(0.062)
JAVA	-0.147***(0.018)	-0.109***(0.011)
INDUSTRY (agriculture = base value)		
manufacturing	0.121(0.075)	0.173***(0.026)
trade	0.477***(0.074)	0.274***(0.021)
service	0.462***(0.075)	0.175***(0.020)
_cons	11.22***(0.259)	12.769***(0.144)
R-squared	0.131	0.104
Observations	10,351	19,379

Note. Robust standard error in the parentheses (***p< .01, **p< .05, *p< .1)

3.2 Discussion

As predicted, the use of the Internet in business activity correlates with increases in income. While the use of the Internet was found to be more common in the business activity of the formal sector, the finding revealed that the informal sector could also obtain the benefit of Internet use as a result of digital entrepreneurship opportunities. The positive finding is similar to the previous studies at the household level, in which Internet use was found to improve the income of farm households (Chang & Just, 2009; Hong & Chang, 2020). The finding is also consistent with the results from the macro-level perspectives, which revealed that the benefit of the Internet in increasing economic growth at the country level

(Czernich et al., 2011; Koutroumpis, 2009) could be enjoyed by working individuals, including entrepreneurs in the informal sector.

Even though a cross-country analysis suggested that Internet gives more benefits on economic growth to advanced countries than less developed countries (Appiah-Otoo & Song, 2021; Myovella et al., 2020), the different effect of Internet use in the regional level may indicate that geographical factors could explain the digital divide (Sujarwoto & Tampubolon, 2016) relatively few studies examine the mechanisms by which spatial inequality explains the existing digital divide in a developing country. Applying the normalisation and stratification thesis in diffusion theory, this study examines the ways in which spatial inequality is related to the Internet divide in Indonesia, a developing country that is currently growing in its use of Information and Communication Technology (ICT. Notably, the effect of using the Internet was found to be greater in the non-Java regions, although Java occupies better Internet infrastructure than non-Java regions. A better establishment of the Internet infrastructure could support a better ecosystem for digital business growth, which is more prevalent in Java than non-Java regions; therefore, in a broad sense, entrepreneurs in Java may receive greater benefits of digital entrepreneurship participation.

Nevertheless, the Internet effect could be lower in the Java regions due to several reasons. The better Internet infrastructure and digital business ecosystem improve the equal opportunity for everyone in Java to run online businesses, and this leads to an increase in the supply of digital entrepreneurs. When the supply rises, the entrepreneurs should consider competition factors that may affect the profit they could gain. As more entrepreneurs participate in online businesses, Internet utilization may not result in a greater impact on increasing the income per capita of entrepreneurs. In contrast, in the non-Java regions with digital business ecosystems not as good as Java's, the entrepreneurs have unequal opportunities to run online businesses, unless those who can invest in the online business support technology. Consequently, the online entrepreneurs in non-Java regions may face lower competition and receive greater profit that would produce a larger effect on increasing their income.

Another result shows that the effect of Internet utilization on the male group was found to be higher than on female group. This finding explains that women entrepreneurs tend to enjoy fewer business benefits of Internet use than their male counterparts, even though the participation of both group in digital business is nearly the same. While discriminant factors may influence employment in the formal sector, the income of entrepreneurs is not decided by employers since it depends on their solely effort to manage the businesses and risks. Men and women entrepreneurs then make independent tradeoffs that affect how much income they could gain. However, the digital business competencies of men are superior to those of women as they have had more opportunities to develop skills such as digital promotion and business collaboration (Sihotang et al., 2020).

Additionally, the household effect may also explain this factor since the current data shows that the majority of male entrepreneurs are heads of households. For illustration, around 70% of online male entrepreneurs were heads of households, while almost 90% of women entrepreneurs who used the Internet in their business activities were family members (non-head of household). Consequently, men who take more responsibility as a breadwinner are more serious in working and tend to devote more time in working than women. Based on this research data, males who use the Internet in their job spend about 46 hours per week on average, while females work around 34 hours per week. Therefore, the probability of male entrepreneurs generating earnings is significantly greater than that of female entrepreneurs.

4. Conclusions

This study investigated the extent to which Internet use affects the income of entrepreneurs in the informal sector. The results show that the use of the Internet in entrepreneurial business is important and positively correlates with increasing income. The extended analysis

revealed that the effect of using the Internet is more vibrant for the entrepreneurs in the non-Java regions, and male entrepreneurs enjoy more benefits from online business than their female counterparts.

There are policy implications based on this study's findings. The government needs to increase the use of the Internet for business purposes, especially in the informal sector entrepreneurship by narrowing the inter-regional digital divide and improving the quality of access Internet for all. This effort requires collaboration from multiple stakeholders to decline barriers of Internet inclusion, such as by deploying Internet infrastructure to rural areas, increasing Internet connectivity across the archipelago, and improving the affordability of Internet fees. Another policy implication is to increase public digital literacy and upgrade skills in digital entrepreneurship through training on utilizing the Internet in businesses.

Even though this research used micro-level data, the study has limitations related to implementing longitudinal data and tackling potential bias from unobservable variables. Therefore, future studies may use longitudinal data and include sources of potential bias variables, such as the skills of entrepreneurs in using the Internet. Another consideration would be to employ causal effect analysis to evaluate the impact of Internet use on income. Meanwhile, a further examination of the aspect of income equality may be also important, such as to what extent Internet utilization influences the income gaps of individuals.

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