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To migrate or not to migrate: Internet use and migration intention among rural youth in developing countries (case of Malang, Indonesia)

Ar. R.T. Hidayat [a,c,*], Kenichiro Onitsuka [a], Corinthias P.M. Sianipar [a,b,*], Mrittika Basu [a], Satoshi Hoshino [a,b]

[a] Graduate School of Global Environmental Studies (GSGES), Kyoto University, Kyoto 606-8501, Japan
[b] Graduate School of Agriculture (GSA), Kyoto University, Kyoto 606-8502, Japan
[c] Faculty of Engineering, Brawijaya University (UB), Malang, East Java 65145, Indonesia

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ABSTRACT

In developing countries, the emigration of rural youth remains a persistent phenomenon, attracting research on the rural mobility of the younger generations. Meanwhile, today's digital era allows the Internet to induce information accessibility. Rural youth covers the largest share of Internet users among the rural population, implying higher possibilities for them to use the Internet for various migration-related purposes. However, literature to date has not focused on Internet use among rural youth in developing countries in conjunction with the build-up process of their migration intention. Therefore, this study aims to investigate the impact of Internet use on the build-up process of migration intention among rural youth in developing countries. This research employs four statistical analyses (Mann-Whitney U, Kruskal-Wallis, Kendall's Tau, and stepwise regression) to examine socio-demographic profiles, common/specific Internet uses, other information gatherings, and migration intention in Tambakasri Village, Malang, Indonesia. The results indicate that Internet use enables rural youth to overcome remoteness by connecting to the outside world. Although common Internet uses appear to affect the build-up process of migration intention among rural youth negatively, specific Internet uses show positive impacts. Despite the opposite trends, the adverse effects are insignificant to the positive impacts. Therefore, Internet use maintains a generally positive impact on the intention to migrate. However, they favor the Internet less to search for migration-related information due to low network quality and the activities of active migrants. They rely heavily on migration-specialized companies as their primary source of migration-related information. In general, rural youth have not utilized the Internet's full potential, suggesting a more vigorous promotion of digital literacy for rural areas in less developing countries. It should induce the awareness of rural youth on opportunities in their villages, encouraging them to develop their rural origins and promoting a better-managed flow of workforce.

1. Introduction

Regional development closely relates to humans as resources and capital (Faggian & McCann, 2009). Despite decades of technological advances to support regional development (Borbora & Dutta, 2005), research and development works maintain the recognition of humans as a central actor in any societal development. It is particularly evident in numerous internationally established regional development frameworks (Gennaioli, La Porta, Lopez-de-Silanes, & Shleifer, 2013; Sanso-Navarro, Vera-Cabello, & Ximénez-De-Embún, 2017). In contemporary development, human mobility goes beyond any spatial boundaries. People are socially dynamic by nature and tend to move physically (migrate) from one place to another for various purposes. Besides, migration is an integral part of socio-economic existence, making it possible for its pattern to evolve continuously. At this point, technological advances act as an accompanying factor to make transboundary mobility possible by delivering better, faster, and cheaper access and facilities. For example, advances in transportation technologies result in affordable transportation costs, while advances in Information and Communication Technologies (ICTs) make information barriers

* Corresponding authors at: Graduate School of Global Environmental Studies (GSGES), Kyoto University, Kyoto 606-8501, Japan.
E-mail addresses: a.r.taufiq.h@ub.ac.id, ar.hidayat.27s@st.kyoto-u.ac.jp (Ar.R.T. Hidayat), iam@cpmsianipar.com, sianipar.corinthias.8r@kyoto-u.ac.jp (C.P.M. Sianipar).

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irrelevant (Kotyrlo, 2020). Those technology-induced advantages, however, are not equally distributed between regions. In particular, developing countries struggle to ensure equal distribution within their jurisdictions. Interestingly, better internet penetrations in developing countries do not necessarily address their suffering from poor internet infrastructure in comparison to their more developed counterparts (International Telecommunication Union, 2019). The difference is further apparent in terms of the digital divide between urban and rural areas (Hadi, 2018). In conjunction with the development of better internet infrastructure, the consistent progress of internet penetration pursues gradual but consistent decreases in gaps within the rural-urban digital divide (APJII, 2018, 2020). Concerning the idea of transboundary human mobility, it is therefore critical to observe issues related to the Internet in developing countries and how its penetrations, utilizations, information it delivers, and communication it mediates can affect the mobility of people from local regions in developing countries to various destinations.

On the other hand, observing the pattern of transboundary human mobility is critical. In developing countries, most of the population still lives in rural areas (United Nations, 2019), making it critical to focus on rural migrations. Basically, the presence of international migration of rural people remains persistent in developing countries. Migrants taking the path from their rural origins typically work as international migrant workers. In fact, developing countries are the typical origins of low-skilled workers in developed countries (Benach, Muntaner, Delclos, Menéndez, & Ronquillo, 2011). In general, the migrants tend to be young (International Labour Organization, 2021), leaving them and their rural origins vulnerable. To the young rural migrants, government-designated organizations may help them improve their competencies and protect them against human trafficking (Bal & Palmer, 2020; Djazuli, 2021; Khairazi, 2021; Rahayu, 2018). To their rural origins, however, their emigration can be both a blessing and a curse. Regardless of their emigration pattern, the migration-induced reduction of rural youth interferes with rural food production (de Brauw, 2019). Despite the increasing popularity of rural-to-rural migration, there is no guarantee that young rural migrants will contribute to food production activities in their rural destinations (Bhattacharya, 2000; Winkels, 2012). Meanwhile, international migration of rural youth produces better benefits for their rural origins (Adger et al., 2019), hence reducing local food insecurity (Choithani, 2017). However, it induces a shortage of agricultural labor due to the decreasing number of rural youth engaged in farming businesses (Rigg, Phongsiri, Promphakping, Salamanca, & Sripun, 2020). In a more extended period, it adversely impacts agricultural supply chains to various markets. In other words, the emigration of rural youth also weakens food security in regions that are dependent on the rural origins for their food supply (de Brauw, 2018; Rigg, 2007). In short, focusing on the international migration of rural youth is becoming more critical for broader regional sustainability.

Managing youth mobility is essential to ensure sustainable rural development. Coupling the migration pattern of rural youth and Internet-related issues in their rural origins, it is thus essential to investigate the course of Internet-affected actions that eventually leads to their migration decision. While research on the decision to migrate has been widely conducted, research trends are recently shifting to focus on the early stages of migration (Abdelwahed, Goujon, & Jiang, 2020). However, few studies have attempted to focus on the build-up process of the migration intention for rural people (Meyer, 2018; Moon, Park, Jung, & Choe, 2010; Seyfrit, Bjarnason, & Olafsson, 2010). In general, the build-up process occurs between an absence of intention and the extent to which the intention is fully formed, regardless of any resulting decision (to migrate or not to migrate). With the rapid penetrations of the Internet and Internet-based applications, the build-up process is rapidly progressing due to the enhanced accessibility of information. As such, research on the build-up process should also consider the Internet as a significant source of information on prospective destinations that may lead to migration (Moon et al., 2010; Vilhelmson & Thulin, 2013). Of the rural population, rural youth are exposed to the Internet from a much younger age than their older counterparts, likely throughout their lives, affording a tremendous potential to build up the intention to migrate (Priatama, Onitsuka, Rustiadi, & Hoshino, 2019). The intergenerational digital divide is even more prominent in many developing economies than in their more developed counterparts (Mubarak & Nycyk, 2017). In this sense, the intergenerational digital divide arguably leads to a broader gap in the impact of Internet use on the build-up process of migration intention between rural generations in the context of developing countries. Therefore, investigating the Internet-affected build-up process of intention to migrate among rural youth becomes relevant to predicting future human mobility and eventually maintaining pathways toward the sustainability of rural regions.

Looking at the introductory narration and rising problems, a significant gap exists in the existing development literature regarding a three-way focus on migration intention, Internet use, and rural youth. The intergenerational digital divide between age groups within rural settings in developing countries also requires a separate investigation on the different subsets of the rural population. Therefore, this study aims to investigate the impact of Internet use on the build-up process of migration intention among rural youth in developing countries. Since there is a lack of evidence on the issue in question, this study intends to produce the first hypothesis regarding the impact under investigation. In that sense, this study leans toward hypothesis generation rather than hypothesis testing. To achieve the research aim within the corridor of hypothesis generation, this study addresses the following research questions:

RQ1. How do rural youth, in the context of a developing country, use the Internet to gather information regarding prospective destinations?

RQ2. What impact does Internet use have on the build-up process of their intention to migrate?

2. Literature review

2.1. Rural migration: The reasons and potential impacts

Rural areas have been facing severe challenges against their transformation progress toward a sustainable future. Among others, poverty and spatial connectivity have been recognized as the most significant challenges. Rigg (2006) has predicted a massive transformation in the rural areas. In terms of occupation, the diversification of income sources might help overcome poverty issues since it is possible to shift rural economic activities from agriculture to non-primary industries. While numerous technological advances have significantly impacted rural society and agriculture (Trendov et al., 2019), they do not entirely diminish rural emigration. In fact, villagers, especially the young ones, would become progressively more mobile in the future (Rigg, 2004). Since migration is a way to cope with economic issues in their rural origins, it might also relate to poverty-related issues. In terms of desirable income generation in the future, studies have shown that young villagers express a slight interest in rural agriculture-related activities (Rigg, 2004; Rigg et al., 2020; Tadele & Gella, 2012; White, 2012). Indeed, some who show an apparent interest in agriculture are more interested in off-farm works (Yeboah et al., 2020). Despite showing an intention to work in off-farm activities, the eventual choices of rural youth to migrate do not solve the shortage of agricultural labor force from a production perspective. Recent digital transformation in agriculture, such as the introduction of autonomous agricultural robots in climate-smart agriculture, might reduce the adverse impact of the labor shortages on rural sustainability (Said Mohamed et al., 2021). However, the transformation of digital agriculture in rural regions is still an ongoing process and has not been proven practically to prevent ongoing flows of rural youth. Since rural youth could be the prominent actors in future rural transformation, youth mobility becomes part of the emerging “generational problem” in rural development (Rigg et al.,

2020; White, 2012).

In general, migration refers to a permanent or temporal move of residence to a different place (Lee, 1966). At least four main factors are associated with migration: the place of origin, prospective destination, intervening obstacles, and personal factors (Lee, 1966). Intervening obstacles (e.g., distance) typically exist between factors connecting an original and prospective destination. Distance affects the flow of information, which is an essential factor in the migration of rural youth (Hidayat, Onitsuka, Sianipar, & Hoshino, 2022; Malamassam, 2016). Considering the physical nature of distance, it acts as an intervening obstacle to migration, making it critical to international migration. As a form of human migration, international migration typically involves a significant number of intervening obstacles as factors influencing migration may go beyond the physical. Distance, for instance, is more critical due to multiple jurisdictions and complex transportation-related considerations being reflected in the decision-making process. In addition, the international migration of rural residents involves motivational considerations, in which economic aspects appear to be a dominant driving force (Sunam, Barney, & McCarthy, 2021). For those who earn income at their destinations, international migration benefits relatives back home (Irawaty & Sri Wahyuni, 2015). Working overseas as migrant labor allows them to provide financial support through remittances to their home families (Ukhtiyani & Indartono, 2020). At times, their income and flowing remittances may also contribute to regional or national developments (Afriska, Zulham, & Dawood, 2019; Diyantoro & Muktialie, 2014). In fact, the international migration of rural people has been recognized as an excellent strategy to alleviate rural poverty and reduce unemployment rates (Abdurrahman, 2006; Wawa, 2005). However, adverse impacts of migration have also been reported, with the most significant mention of agricultural labor shortage due to the emigration of productive workforces (Rigg, 2007). Thus, migration as a motivation-driven human movement is both a positive and negative phenomenon in pursuing the sustainable development of rural regions.

2.2. Internet activity in rural areas

Despite rapid advances in information technologies in various developed and developing countries, the digital divide between urban and rural areas sustains (Lu, 2001; Salemink, Strijker, & Bosworth, 2017). However, Internet adoption and infrastructure in rural regions are typically lower than in urban areas. Practically, the circumstance affects rural digitalization progress by hindering digital transformation (Garofalakis & Koskeris, 2013). Fortunately, efforts to improve Internet availability in rural areas help transform the regions and rural communities. In general, studies have found benefits induced by the Internet to rural areas and communities in various aspects, including economic gains (Yousefi, 2011), social benefits (Correa & Pavez, 2016), and formal/structural administrative advantages (Basu, 2004). Considering the potential benefits, it is thus urgent to promote rural digitalization, which sooner or later requires a thorough digital transformation. Basically, digital transformation attempts to deliver solutions for rural regions against various challenges (M. Trendov et al., 2019; World Bank Group, 2019). In that sense, the endeavors to improve Internet adoption and infrastructure in various rural regions should therefore be continuously promoted and maintained (Handoko & Xuyao, 2021; Stojanova et al., 2021). As an intended consequence, rural activities employing digital technologies would trigger a holistic transformation all over the regions, setting the course for the rural regions and their communities toward a contemporary state of ever-evolving regional development. For example, rural communities would be able to expand their communication network with people outside the villages, making rural remoteness irrelevant (Salemink et al., 2017). Considering farming as the primary rural industry, the digital transformation of rural areas in developing countries would substantially affect farmers' activities (Deichmann, Goyal, & Mishra, 2016). Digital transformation allows farmers to pursue a market expansion for their rural produce and reduce dependencies on intermediaries who typically gain more significant economic benefits than farmers as the actual producers (Galtier, David-Benz, Subervie, & Egg, 2014; Magesa, Michael, & Ko, 2020).

People in rural areas use the Internet for various purposes (Kilpeläinen & Seppänen, 2014). Interestingly, there is an insignificant difference in the intensity of Internet use between young urban and rural Internet users (Hamza et al., 2019). However, rural dwellers use the Internet rarely for specific purposes, such as e-commerce (Haji, 2021). Furthermore, the Internet offers a contemporary medium for rural people to communicate with others residing in or outside their villages. (Gigler, 2015) suggested that the Internet does not necessarily deliver a direct influence on its users. However, consistent Internet use may eventually impact individual users. In other words, the activities of a user on the Internet are likely to determine the influence that the Internet has on them, indicating the degree of the Internet's effect in shaping their behavior (Tsitsika et al., 2009). In rural areas, digital literacy is lower than in urban areas (Braesemann, Lehdonvirta, & Kässi, 2020; Strover, 2014); however, the pattern of Internet use is basically similar (APJII, 2020). The penetration and usage of the Internet are affected by the availability and quality of Internet infrastructure services, including Internet transmission and access media. The availability of Internet infrastructure and the perceived usefulness of the Internet are two essential aspects of ICT adoption (Teo, Lim, & Lai, 1999; Wahid, 2007). Taipale (2016) found that advanced communication devices and an accessible Internet are critical to the decision-making process regarding individual mobility. Devices such as personal computers (PCs), laptops, mobile phones, and tablets are used to access the Internet (Kilpeläinen & Seppänen, 2014; Taipale, 2016). In addition, technological advances from Web 1.0 (static) to modern Web 3.0 (semantic) have made the Internet more user-centered, interactive, and distributed, increasing accessibility and intensifying Internet activities. Adequate access to the Internet, now a daily necessity, has become an influencing factor in the choice of staying or moving residences.

2.3. Positioning intention within the migration process

In the build-up process of the intention of rural people to migrate, an accessible internet allows for the delivery of migration-related information to rural people. Eventually, the combined push factors in rural areas and pull factors from prospective destinations gradually transform the continuous and multiple sharing into an unconscious intention to migrate (Sugiono, Zakhra, & Malia, 2018). For example, communication with active migrants is a critical variable in understanding the build-up process of migration intention. Practically, the communications contain information that may or may not be of interest to prospective migrants. In this sense, any information regarding a prospective destination should also be observed as an influencing factor during the build-up process of migration intention (Demiralp, 2009; Jones, 1981). At the core of the gradual process, the intention to migrate becomes a good predictor of actual migration (van Dalen & Henkens, 2013). However, migration intention is not always converted into actual migration. Focusing on migration intention is nevertheless beneficial for predicting future demography dynamics (Tjaden, Auer, & Laczko, 2019) and establishing adequate development and/or migration policies (Plopeanu, Homocianu, Florea, Ghiuță, & Airinei, 2019). Looking at the explanations, this study considers the nature of the build-up process as a gradual progression to achieve a decision. Consequently, a migration intention is measurable according to its maturity levels. As a gradual process to achieve a decision, the build-process of migration intention practically occurs during the pre-migration stage. Influencing factors hence imply the maturity levels during the pre-migration stage of prospective migrants, requiring a closer examination of the factors to measure their migration intention. The availability of a solid migration plan implies the maturity of a migration intention (Agadjanian, Nedoluzhko, & Kumskov, 2008). As aforementioned, the communication between prospective rural migrants and active/former migrants is also essential. As

another influencing factor, job placement agencies provide information regarding prospective destinations for prospective migrant workers (Pihang, 2012). Any obtained information regarding prospective destinations facilitates the formation of pull drivers of migration.

2.4. Research framework and variables

Since this study intends to focus on rural youth, the observation targets the age range of 15–24 years old, following the definition of youth suggested by the United Nations (UN Secretariat, 2013; UN-DESA, 2005). Differences do occur in defining the exact age range of youth in particular countries (UN-DESA, 2005). However, it requires a separate study involving multidimensional factors to define the age range. Therefore, this study uses the United Nations' definition to establish a leveled perception with the general understanding of youth. Besides, existing studies have found that the age range (15–24 years old) constitutes the heaviest Internet user base in rural areas (Onitsuka, Hidayat, & Huang, 2018; Priatama et al., 2019). Conceptually, this study sees the Internet as a contemporary communication and information medium that can unravel the intervening obstacles of migration. In that sense, it is reasonable to observe the particular subset of the rural population and the Internet-facilitated formulation process of their intention to migrate. Given the lack of empirical evidence on Internet-fostered outmigration from developing countries, this study targets international migration from rural areas in developing countries to destinations in more developed countries. Since studies in developing countries have not clearly explained how Internet use contributes to the migration intention of younger Internet users (Correa & Pavez, 2016; Priatama et al., 2019), this study seeks to contribute to the body of knowledge on Internet use and migration in developing countries by following the Research Framework (Fig. 1). This study targets rural youth and examines the current conditions in their respective rural areas. Internet use is categorized into common uses, which include certain usages without a specific motivation (e.g., social media, watching videos online, and communicating with people), and specific uses, which intend to satisfy information collection for motivational build-up by utilizing Internet-related applications (desktop or mobile) and/or media. Information obtained in common Internet use is perceived as unintentionally gathered. In contrast, specific internet use covers any intended activities to gather desired information, especially regarding a particular prospective destination. This study examines the effect of these uses on the build-up process of migration intention and attempts to reveal the underlying mechanisms of these effects. Overall, this study aims to clarify Internet use to solve information shortages due to the distance separating rural youth and prospective destinations.

Fig. 1 also shows the presence of observed variables that influence the build-up process of intention to migrate. Besides common and specific Internet uses as the primary independent variables, this study observes other critical variables related to the build-up process of migration intention among rural youth. Theoretically, literature on either migration or the Internet considers socio-demographic profiles of respondents essential to understanding the behavior of actors involved (Adams, 2016; Onitsuka et al., 2018; Priatama et al., 2019; Teo et al., 1999). This study, therefore, treats demographic variables as controlled variables. Demographic data include gender, age, education, occupation, and income. Meanwhile, this study measures the user experience

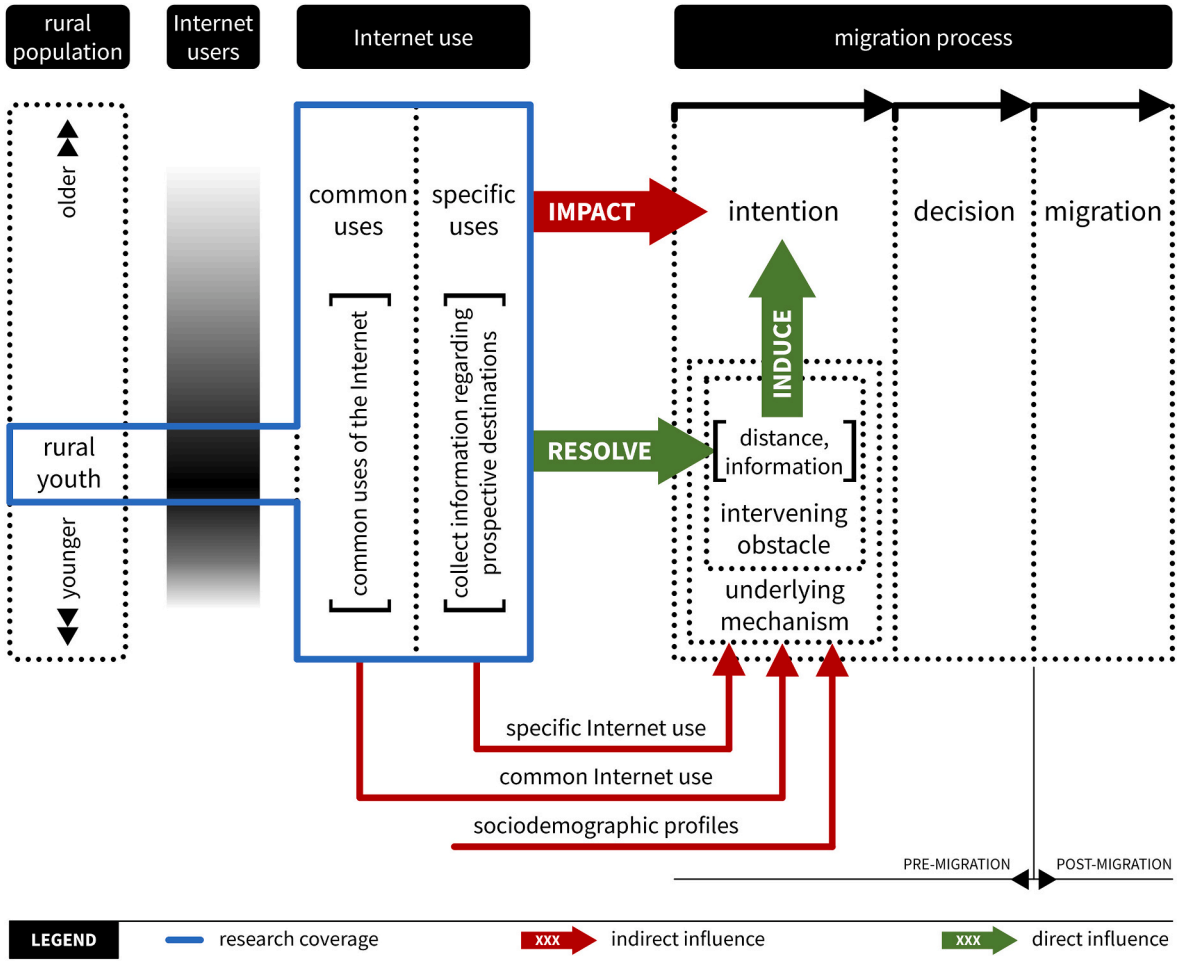

Fig. 1. Research positioning, framework, and variables.

over the Internet by observing daily use duration, time spent using the Internet since first use, and types of Internet use (Aker, Clemens, & Ksoll, 2011; Gigler, 2015; Tsitsika et al., 2009; Ukwandu & Iroh, 2011). The duration of daily use (hours/day) and time spent accessing the Internet since first use (years) are taken as the determining factors of Internet impact, particularly for rural youth (Ayaz & Karatas, 2016; Roberts, Anderson, Skerratt, & Farrington, 2017). As for the types of information on prospective destinations, this study includes job-related information (job vacancies and wages) and settlement conditions (living conditions, health, and educational services) (Demiralp, 2009; Jones, 1981). Unless described otherwise, all terms referring to "collecting information" or "information gathering" refer to the collection of information on prospective destinations. Then, this study measures migration intention by considering the maturity of the build-up process of migration intention (Agadjanian et al., 2008). This study thus ascertains the degree of "desire to migrate" and "firm plan to migrate" with a subjective range of strength. To address the first research question (RQ_1), this study involves four variables: migration intention, common internet use, specific internet use, and two socio-demographic characteristics of respondents (i.e., gender and age sub-group). Besides, this research observes the correlation between Internet use (both common and specific uses) and the two socio-demographic characteristics. Meanwhile, this study addresses the second research question (RQ_2) by involving three variables: migration intention, common Internet use, and specific Internet use. This research intends to observe their correlations to generate the first hypothesis on the contribution of either common or specific Internet uses to the build-up process of migration intention.

3. Methodology

3.1. Research design

Founded on the research questions (RQ_1 and RQ_2) and Research Framework (Fig. 1), this study designs the research process to have three stages (Fig. 2). The creation of different sub-stages attempts to produce the intended result(s) of their respective stage. In general, the three research stages are *Sampling*, *Data Gathering*, and *Analysis*. The first stage (Sampling) aims to build a representative pool of respondents. Consequently, the first Sampling sub-stage focuses on selecting a case study. In the research location, the second Sampling sub-stage is the selection of respondents. This study targets individuals as the unit of analysis, by which the "respondents" refer to individuals who fall into the target subset of the population. The selection of respondents applies probability sampling by employing simple random sampling. It allows this study to adequately understand the observed population from selected respondents (Malhotra & Birks, 2007). Besides, this research gathers population estimates from the general profile of the selected case and additional interviews with village officers (chief and deputies). Next, the second research stage (*Data Gathering*) focuses on collecting required data based on observed variables (Fig. 1) for being processed in the following stage. At first, this study develops a set of questionnaires tailored to the selected subset of the population in the case study location. The questionnaire development derives the questions from observed variables, which have been produced from literature reviews. The questionnaires are distributed to respondents selected in the Sampling stage through in-person delivery. This study first applies a one-week waiting time to provide an adequate time frame for respondents to fill up the questionnaires. After that, their responses are gathered through the in-person collection. During the collection, this research employs face validation (Connell et al., 2018) to ensure that the gathered data meet the requirements of the data analysis process. Then, the third research stage (*Analysis*) employs statistical methods to process the gathered data. This study selects the methods by following the characteristics of research objectives brought by each research question. At first, this Analysis stage applies group comparison analyses. After that, this research conducts a stepwise multiple regression analysis to predict the interaction of dependent and independent variables. In case of rising concerns over the statistical results (e.g., counterintuitive results), this study applies additional interviews with a limited number of respondents. The added interviews intend to clarify additional information that is unable to capture by the questionnaires. Then, this Analysis stage ends with the final interpretation of the statistical results and added interviews (if any).

3.2. Case study

The migration of rural youth is exceptionally prominent in many developing economies, including Indonesia. In fact, it is encouraged by the government for various reasons(Hugo, 2000). For instance, the international migration of rural youth for work-related purposes is essential for poverty alleviation in their rural origins. Among Southeast Asian countries, Indonesia is a prominent sender of international migrant workers (World Bank, 2017), with Malaysia, Hongkong, Taiwan, South Korea, the Arab Peninsula, and Japan as the main destinations(Bachtiar, 2011; Tsay, 2016). However, the migration of rural youth also produces a shortage of agricultural labor in Indonesia (Arvianti, Masyhuri, Waluyati, & Darwanto, 2019). Among governmental efforts to manage migration, the Village Fund program (*Dana Desa*) intends to strengthen economic circulation in rural areas; however, it has not succeeded in resolving the labor shortage in rural agriculture (Arifin et al., 2020). The rapid increase in Internet accessibility compounds it. The government and internet providers have committed to widening Internet coverage across the archipelagic country (Junaidi., 2017; Kautsarina, Rafizan, Setiawan, & Sastrosubroto, 2017). Basically, better internet infrastructure allows villagers to utilize the Internet for various uses, including email, social media, personal communication, and playing games. (Onitsuka et al., 2018; Priatama et al., 2019).

Similar to their urban counterparts, most rural Internet users are of younger generations (APJII, 2020). The intensive Internet use by rural youth increases their interactions with people living outside their villages (Priatama et al., 2019). Recent reports have recorded consistent increases in internet penetration in rural Indonesia (Agustina & Pramana, 2019; Amin, 2018). According to Statistics Indonesia (2021)), rural residents who access the Internet between 2014 and 2020 continued to increase at an average annual rate of 5.3%. The Association of Internet Service Providers in Indonesia (*Asosiasi Penyedia Jasa Internet*

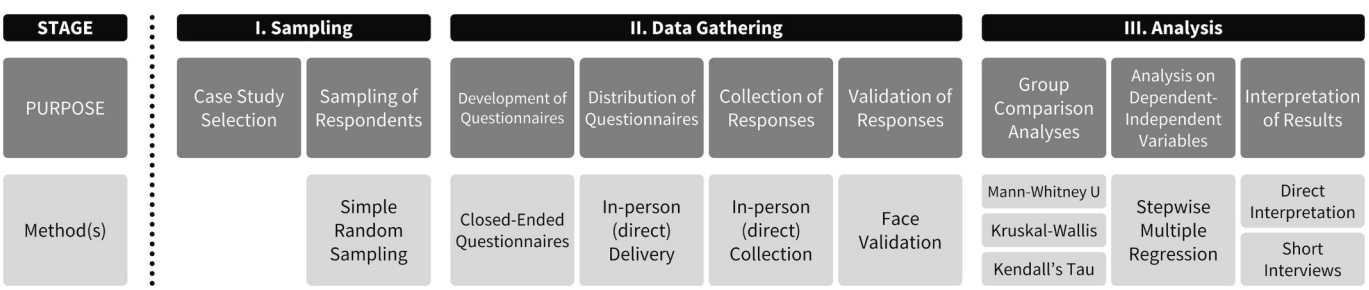

Fig. 2. Research design.

Indonesia – APJII) has reported parallel trends (APJII, 2018, 2020). There is about 12.5% gap between Internet penetration in urban and rural areas (Fig. 3). Of which, the most significant share is among people aged 15–24 years old (Fig. 4). The age range observed in this study (15–24 y.o.), which follows the definition of rural youth suggested by the United Nations (UN Secretariat, 2013; UN-DESA, 2005), perfectly overlaps with the country-wide survey. In that sense, this study fulfills both the global consensus and local conditions for the observed age range of youth and young Internet users.

Among 34 provinces in Indonesia, the East Java province claims the country's largest share of international migration from rural regions (Center for Data and Information, 2020). Despite the presence of two large cities in the region (i.e., Surabaya and Malang) and Jakarta (Indonesia's capital city) as the primary destinations of regional/national migration, rural youth in East Java consistently record significant international moves. Among East Java's two largest regions, Surabaya has been developed as a metropolitan area, causing significant developments in areas surrounding the city. However, Malang is surrounded by rural areas. Malang is divided into Malang City (primarily business and educational districts) and Malang Regency (primarily rural areas), indicating that the entire Greater Malang region is in a transitional period from its rural past. In fact, rural Malang has been contributing the highest number of international outmigration in East Java (Center for Data and Information, 2020). Among districts in rural Malang, Sumbermanjing Wetan covers the highest proportion of international outmigration (36%) and is well-known as a migrant-sending region. The number of international migration events is expected to continue annually.

Furthermore, Sumbermanjing Wetan District encompasses 15 villages, with Tambakasri Village being the highest contributor of international outmigration (±10%). Considering its significance toward international outmigration flows within the greater regions, this study considers Tambakasri Village as the case study (Fig. 5). Geographically, Sumbermanjing Wetan District is in the southeastern part of the Malang Regency, while Tambakasri Village is in the western part of the district. According to (Statistics Indonesia (2019)), Tambakasri Village is the home to 10,424 villagers (2699 households). It holds the fourth largest farmland area in the district, accounting for 8.4% of its total farmland. The village is a 2170 ha hilly area lacking road infrastructure, located approximately 73 km from the capital area of the Malang Regency. Production forests and farmland dominate the village's land use, while settlements are distributed along the village's main road. In terms of Internet infrastructure, two base transceiver stations (BTS) serve the Internet network in the village, while the availability of fixed-line communication networks is limited.

3.3. Data collection

This study measures the usage intensity of respondents and the gathering of each information type in a 5-step ordinal scale (never, once every few weeks, once per week, 2–6 days per week, every day). Considering the subjective range between "desire to migrate" and "firm plan to migrate," this study measures migration intention as ordinal data by applying a 5-scale Likert scale (Likert, 1932) to discover the degree of intention. This study employs the Likert scale because it allows an equidistant state between responses, making it able to transform qualitative personal traits into a quantitative measurement(Sullivan & Artino, 2013). At two extreme poles, score 1 represents "have no intention at all," while score 5 represents a "very strong intention." Score 3 represents an unstable intention, wherein respondents can lose their migration intention effortlessly. Then, scores 2 and 4 represent lower degrees than scores 1 and 5, respectively, yet they have distinctive degrees of intention to score 3. Consequently, the questionnaires include a brief explanation to guide respondents to transform their personal traits into scores.

In terms of sampling technique, this study employs simple random sampling (Krejcie & Morgan, 1970) among prospective respondents (15–24 y.o.). Simple random sampling allows us to understand the population easily, and the result is projectable (Malhotra & Birks, 2007). This study inquires village leadership to conduct random sampling on the field. Village officers taking care of residential data assign random numbers to individual residents within the observed age group. Then, the simple random sampling selects randomly selected numbers to represent the observed subset of the village population. To avoid duplications, every number selected is excluded from the pool. In this study, the sampling applies a 95% confidence level at a 100% return rate. The population of rural youth in the case location is 1531 people. Applying Eq. 1 (Krejcie & Morgan, 1970), this study requires a minimum of 308 valid returned responses (respondents). To avoid an inadequate number of valid responses, this research increases the minimum to 325 respondents. In short, the sampling randomly selects 325 persons from the observed group (15–24 y.o.).

$$s = \frac{X^2 NP(1-P)}{d^2(N-1)} + X^2 P(1-P) \quad (1)$$

where s = required sample size

X^2 = The table value of chi-square for 1 degree of freedom at the desired confidence level (3.841)

N = Population size

P = Population proportion (assumed to be 0.5; this value provides the maximum sample size)

d = The degree of accuracy expressed as a proportion (0.05)

For data gathering, this study distributes close-ended questionnaires to 325 respondents. One week after that, the surveyor gathers all responses. At the time, the surveyor asks the respondents whether they have difficulty completing the questionnaires. To achieve a 100% return rate, this study provides assistance for respondents who consider it necessary. After obtaining the results of statistical analyses, this study conducts short interviews with nine randomly selected respondents (three persons per age sub-group) to gather in-depth interpretation and clarification of the statistical results. The additional interviews use the Indonesian language (Bahasa Indonesia) for clarity purposes. The interviews result are translated into English in this article for presentation purposes.

3.4. Methods of analysis

As mentioned previously, the Internet does not directly influence the behavioral changes of its users. Consequently, this study considers that information gathering and reception through the Internet, either intentionally or unintentionally, are inadequate to directly explain the build-up process of migration intention. This study utilizes regression analyses to measure Internet uses that can significantly induce the build-up process of migration intention. Mainly, this research employs four statistical analyses to answer the research questions. Given the non-normally distributed nature of the ordinal data type, this study applies non-parametric tests (Heiman, 2010). This study implements the Mann-Whitney *U* test (McKnight & Najab, 2010; Rosner & Grove, 1999), the Kruskal-Wallis test (McKnight & Najab, 2010; Ostertagová, Ostertag, & Kováč, 2014), and the Kendall's Tau tests (Samara & Randles, 1988; Sen, 1968) to address research question 1 (RQ_1). Taking into account the primary data on the Internet use intensity (common and specific uses), this work uses these tests to compare Internet use and migration intention between genders and age sub-groups (common/specific Internet uses and gender; common/specific internet uses and age sub-groups; specific Internet uses and migration intention). The comparisons should deliver a better understanding of the respondents' characteristics. To address research question 2 (RQ_2), this study employs stepwise multiple regression (Henderson & Denison, 1989; Wilkinson, 1979). Stepwise multiple regression allows the prediction of all possible independent variables that are critical to the dependent variable, which

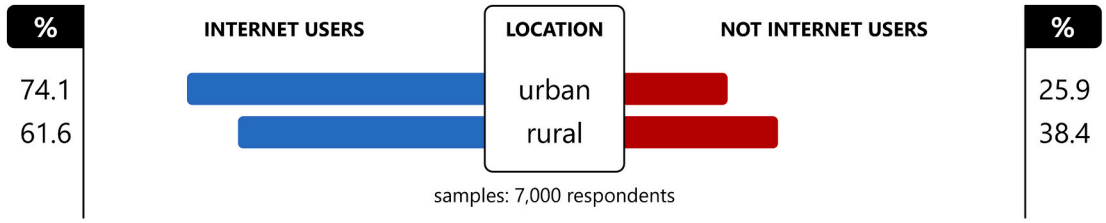

Fig. 3. Internet penetration in urban and rural areas. Self-compiled using data from APJII (2018).

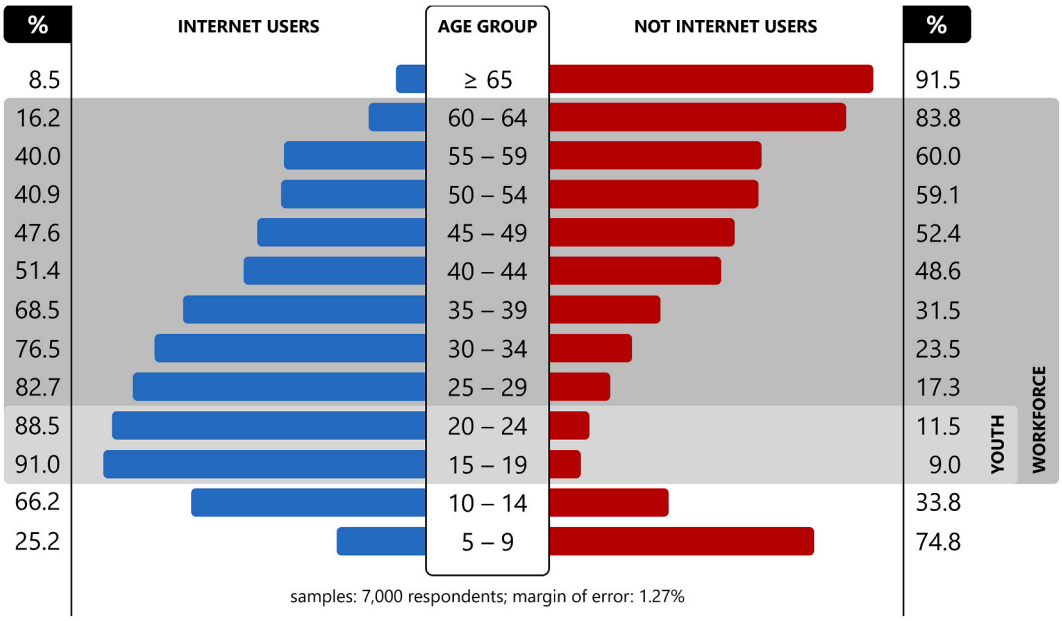

Fig. 4. Distribution of Internet penetration among age groups. Self-compiled using data from APJII (2018).

may not be observable by other multiple regression methods (Draper & Smith, 1998). The independent variables are those related to Internet use, including its intensity and duration, and activities to collect information, while migration intention acts as the dependent variable. Then, the independent variables regress the accumulated scores of migration intention. Table 1 shows targeted data for the pre-analysis processing and analyses. Data on gender and Internet use are taken as is with no changes applied. In practice, data on Internet use include intensity (six types of Internet use) and duration (daily usage duration and usage accumulation). The three groups divide respondents according to their maturity and educational levels. Data on information-gathering activities and migration intention cover five and two variables, respectively. The pre-analysis processing follows practical steps for each statistical test being used. For example, the pre-analysis processing for Kendall's Tau test transforms the variables of information-gathering activities into one new scale-type variable. The footnote of Table 1 explains the procedures of the pre-analysis processing.

4. Results and analysis

4.1. Population estimates and the characteristics of respondents

Rural youth dominate the composition of the population in Tambakasri Village. During the conduct of this study, there are 1531 people in the observed age group (15 to 24 y.o.), or 14.97% of the total village population. The subset of the population consists of 749 females and 783 males. Commonly, those in the range of 15 to 18 years old are attending junior or senior high schools. Of the cohort, however, <5% apparently stop attending school and either begin engaging in various jobs or become unemployed. Higher education appears to be luxurious, which only 2% of rural youth (18–24 y.o.) can afford. Meanwhile, the labor force of Tambaksri Village (18–56 y.o.) consists of 5498 individuals. Of the labor force, the unemployment rate reaches 23.85%. Among rural youth, the unemployment rate reaches ±15%, which is significantly less than the total unemployment rate of the village. For the younger generation, however, the higher unemployment rates of older generations result in fewer job opportunities. The limited job opportunity inspires them to migrate to other regions, including the city, or work as international migrants. In fact, the majority of employed young labor force work at private companies. Besides the limited job opportunities, the inadequate working experiences of rural youth result in low wage ranges. Roughly, those with junior or senior high school diplomas obtain a monthly allowance from their parents between IDR 100,000–150,000 (±USD 7–10.5[1]). Meanwhile, rural youth with a university degree receive higher salaries (IDR 800,000–1,000,000; ±USD 56–70[1]). Furthermore, non-student young workers typically obtain higher monthly income, ranging between IDR 800,000–1,200,000 (±USD 56–84[1]). Then, young entrepreneurs gain as much as IDR 4,000,000 (±USD 279[1]) monthly income, which is the highest among occupations. However, only a few entrepreneurs can reach the maximum figure (< 10 persons).

Of the 325 respondents (100% return rate), 315 appear to be active Internet users. This study thus excludes the rest (10 persons) from the analysis. Table 2 illustrates the demographic profiles of the 315 respondents. Of the selected respondents, 54.3% are females, and 45.7%

[1] USD 1 = IDR 14,315 (currency exchange rate as of 11 March 2021)

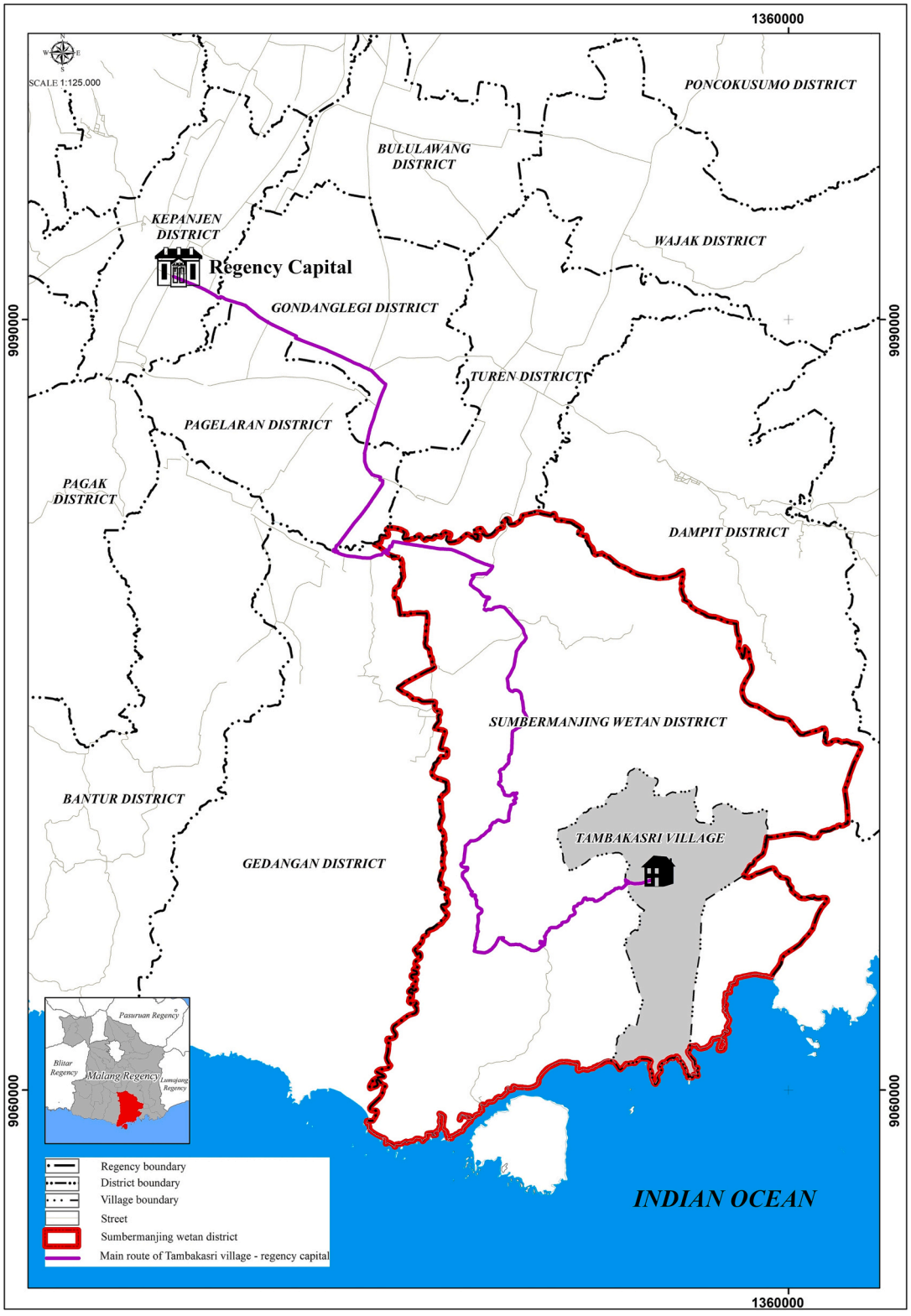

Fig. 5. Research location.

are males. Applying the classification technique of Steinberg (2020), this stage divides them into three age sub-groups: middle adolescence (Group I: 15–18 y.o.; a few high school students), late adolescence (Group II: 19–22 y.o.; mostly graduate and a few undergraduate students), and young adults (Group III: 23–24 y.o.; primarily graduate students). Despite the largest share of Group I among the selected respondents, their occupational distribution remains the same. Approximately 36.5% of the selected respondents are still active students. Most people in Groups II and III have occupations, while only a few are university students. However, some school-age respondents (Group I) have stopped attending school and either started working or become unemployed. The unemployment rate reaches 10.2%, which is clearly higher than the average rate for Malang Regency (3.7%) (Statistics Indonesia, 2020). Furthermore, the average income of all selected

Table 1
Data analysis techniques.

Analysis	Data						Note
	Gender	Age sub-group	Common Internet use		Specific Internet uses (activities to collect information)	Migration intention	
			Intensity	Usage duration			
	1 ➔ male 2 ➔ female	1 ➔ 15–18 2 ➔ 19–22 3 ➔ 23–24	1 ➔ never 5 ➔ every day	Daily [hours/day]; Accumulation [years]	1 ➔ never 5 ➔ everyday	1 ➔ not at all 5 ➔ very strong	
Mann-Whitney U test	*		*	*	**		
Kruskal-Wallis test		*	*	*	**		RQ_1
Kendall's Tau Test					***	****	
Stepwise multiple regression			*		*	****	RQ_2

*) No changes apply to the variables.
**) Used variable. Use the Internet to collect five types of information regarding a destination. 0 ➔ no (answer ➔ 1); 1 ➔ yes (answer ➔ 2–5).
***) Used variable. The sum of questions is based on yes/no data transformation (see note **). For example, score 3 means an internet user utilizes the Internet to collect 3 (of 5) kinds of information.
****) Sum of 2 questions.

Table 2
Demographic profiles of respondents.

Indicator	*n*	%	Confidence level (CI) 95%	
			Lower bound	Upper bound
Gender				
Male	144	45.7	1.49	1.60
Female	171	54.3		
Age				
15–18	137	43.5	18.79	19.41
19–22	132	41.9		
23–24	46	14.6		
Education				
No education	15	4.8	2.88	3.04
Elementary school	49	15.6		
Junior high school	184	58.4		
Senior high school	67	21.3		
Occupation				
Unemployed	32	10.2	5.51	6.09
Junior high school student	1	0.3		
Senior high school student	108	34.3		
Undergraduate student	6	1.9		
Homemaker	1	0.3		
Farmer	42	13.3		
Private company employer	77	24.4		
Entrepreneur	48	15.2		
Income (IDR)				
< 200,000	146	10.2	454,880.51	539,608.37
200,001–400,000	0	0.0		
400,001–600,000	4	1.3		
600,001–800,000	44	14.0		
> 800,001	121	38.4		
Mean ➔ IDR 497,200				

respondents is IDR 497,000 (±USD 35[1]), of which the averages for students (and non-student workers are IDR 124,626 (±USD 9[1]) and IDR 711,500 (±USD 50[1]), respectively. For high-school students, income refers to their pocket money; hence their low average income results from small pocket money from their parents. Interestingly, university students have a similarly low average income (IDR 125,666.7; ±USD 9[1]). In general, the average income for each observed group is much lower than the average income of the entire Malang Regency (IDR 2,781,564; USD 194[1]) (Statistics Indonesia, 2020).

4.2. Internet use among rural youth

Table 3 shows the intensity of Internet use among the respondents. Six common Internet uses are covered: communicating with friends, communicating with relatives, emailing, using search engines, accessing social media, and watching online videos. Results show that few respondents utilize messaging applications, including WhatsApp and LINE, to communicate with emigrated relatives or friends. Respondents stated various ways to communicate with active migrants (friends/relatives), including voice calls, SMS, and messaging applications (WhatsApp/LINE). They prefer conventional voice calls and SMS over chat applications. They also state that, in general, active migrants rarely contacted them. Contacts from relatives occur more often than friends, which may be due to the tight working schedules of active migrants. During holiday periods, active migrants may choose to accept overtime shifts. Communication between respondents and active migrants often occurred late at night or early in the morning. Internet network quality during these times is unknown; hence, the preference for conventional voice calls and SMS.

However, unstable Internet networks do not prevent respondents from using the Internet. Their primary motivations are entertainment (in general) and educational purposes (for students). Table 3 shows the intensity of Internet use. The time spent on Internet use shows diverse answers. The shortest Internet usage duration is 2 h per day, and the longest is 12 h per day (S.D. 3.318; CI: lower bound 7.15, upper bound 7.84). On average, respondents spent 7.5 h per day surfing the Internet. It represents the accumulated daily duration and does not represent continuous usage. The unstable Internet network appears to contribute to their daily usage durations, resulting in longer (delayed) information exchanges. They have used the Internet for two to four years (S.D. 0.653; CI: lower bound 3.11, upper bound 3.26).

This study clarifies the following notions by employing comparison tests (Table 4). In terms of media, respondents are heavy social media users and actively use search engines and emails. Mainly, they intensively access social media daily, which, according to information gleaned from the brief interviews, is likely to be influenced by free social media access from Internet providers. In addition, almost half of the respondents are students who intensively use emails and search engines to seek information. They also use media for educational purposes. Respondents mostly install compact versions of applications, such as Facebook Lite, to reduce the amount of data exchange and, consequently, the consumption of data quotas.

This study conducts the Mann-Whitney *U* test to investigate common Internet use and time spent on the Internet between men and women. There is a significant difference in the use of emails between genders. The mean rank of female Internet users (169.33) is considerably higher

Table 3
Internet use intensity.

Common internet uses	Usage intensity* (%)					CI** 95%	
	Never	Once every few weeks	Once per week	2–6 days per week	Everyday	Lower bound	Upper bound
Communication with friends	100.0	–	–	–	–	1.00	1.00
Communication with relatives	74.0	26.0	–	–	–	1.21	1.31
Using email	19.0	18.7	24.4	36.8	1.0	2.69	2.95
Using search engines	0.3	28.6	10.8	26.7	33.7	3.51	3.78
Accessing social media	–	–	–	16.5	83.5	4.79	4.88
Watching videos online	18.1	39.4	42.5	–	–	2.16	2.33

* Note:) The share of respondents for each intensity range.
**) represent data on intensity ranges (Never ➔ 1; Everyday ➔ 5).

Table 4
Results of statistical analyses for common Internet use.

Variables	Between gender (Mann-Whitney U test)		Among age sub-groups (Kruskal-Wallis tests)	
	U score	*p*-value	H score	*p*-value
Daily use duration	12,263.5	0.950	9.785	0.000*
Accumulation usage	11,789.0	0.477	94.404	0.000*
Communication with friends	12,312.0	1.000	0.000	1.000
Communication with relatives	11,601.0	0.245	0.395	0.267
Using email	10,375.0	0.012*	1.298	0.618
Using search engines	11,690.0	0.420	0.417	0.549
Accessing social media	11,646.0	0.198	0.638	0.145
Watching videos online	11,406.0	0.224	0.198	0.872

*) significant at $p \leq 0.05$.

than that of male respondents (153.68). However, there are no statistically significant differences between the genders in other activities. Furthermore, female respondents spent more time (~7.53 h/day) using the Internet than male respondents (~7.46 h/day). In contrast, male respondents have used the Internet for about 3.22 years on average, which is longer than women (~3.16 years). However, the Mann-Whitney U test reveals that these differences are insignificant. Furthermore, this research employs the Kruskal-Wallis test to compare Internet use and time spent among age sub-groups. Both indicators of time spent on Internet usage significantly differ among the age sub-groups. Younger respondents spent more time surfing the Internet (~9.12 h/day). Since their first access to the Internet, they have used it longer than other age sub-groups (~3.84 years).

4.3. Searching for information on prospective destinations

In responses to Research Question 1 (RQ_1), Table 5 shows the patterns of specific Internet use, indicating information-gathering activities, including collecting information on jobs, wages, health services, educational services, and living conditions. The number of respondents employing specific Internet use is moderate (47%–60%). The most frequent usage is to collect job information, which is performed by 60% of the respondents. Approximately 97.8% of respondents use the Internet at a low intensity to collect information. They collect information only once every few weeks. About 1.9% of respondents utilize the Internet to collect five types of information, while the majority (35.2%) use the Internet to collect three types of information. Almost half of the respondents (47%) utilize the Internet to collect information on health services.

In terms of gender, the patterns are different. The results of the Mann-Whitney U test (Table 6) show no statistically significant differences between genders in usage patterns of information gathering through the Internet. Asymptotic significance values range from 0.111 to 0.979 between genders. In addition, there are no statistically significant differences among age sub-groups in using the Internet for information collection, which is indicated by the results of the Kruskal-Wallis test (Table 6). Asymptotic significance range from 0.163 to 0.970 among age sub-groups. The Kendall's Tau test is conducted to investigate the correlation between migration intention and information-gathering activities (Table 6). The activities are not significantly correlated with migration intention.

According to the Research Design (Fig. 2), this study adds short interviews to help interpret the statistical results from the questionnaire surveys. During the interviews, the interviewees reveal in-depth information about pre-migration, especially how they get the desired information on prospective destinations. In general, international migration for work is quite popular among villagers to secure income generation. In that sense, prospective migrants seek information earnestly while the government facilitates the regulatory process. The nine randomly-selected interviewees (three from each sub-group) state similar situations:

"If we want to be an international migrant worker, we usually go to a Labor Services Company [Perusahaan Jasa Tenaga Kerja Indonesia – PJTKI] *to gather information about job opportunities* [availability] *and how to apply for them. Our relatives and friends who are active migrants and ex-migrant recommend us to go there* [PJTKI company]. *The company* [PJTKI] *said they would provide us with all necessary support for the preparation, migration, and return processes. They would also provide us with necessary information about the job and location where we will live* [in the destination]. *In short, they will take care of everything."*

Table 5
The pattern of Internet use for collecting information regarding prospective destinations.

Specific Internet use	Job vacancy	Wage	Health services	Education services	Living conditions
Total	60.0%	51.4%	47.0%	52.7%	52.7%
Gender					
Male ($n = 144$)	64.6%	46.5%	47.2%	53.5%	52.8%
Female ($n = 171$)	56.1%	55.6%	46.8%	52.0%	52.6%
Age					
15–18 ($n = 137$)	56.2%	56.9%	43.8%	51.1%	52.6%
19–22 ($n = 132$)	64.4%	47.7%	53.0%	56.1%	52.3%
23–24 ($n = 46$)	58.7%	45.7%	39.1%	47.8%	54.3%

Table 6
Results of statistical analyses for specific Internet use.

Specific internet use	Between genders (Mann-Whitney U test)		Among age sub-groups (Kruskal-Wallis tests)		Migration intention Kendall's Tau test	
	U score	*p*-values	H score	*p*-values	Tau score	*p*-values
Job vacancy	11,272.5	0.128	1.911	0.385	–	–
Wage	11,200.5	0.111	2.991	0.224	–	–
Health services	12,258.0	0.938	3.624	0.163	–	–
Education services	12,136.5	0.801	1.174	0.556	–	–
Living condition	12,294.0	0.979	0.061	0.970	–	–
Overall activity to collect information		–	–	–	0.040	0.382

The information indicates the substantial role of PJTKI in the entire migration-related process. PJTKI supplies all necessary information, making respondents as prospective migrants likely depend on the PJTKI-supplied information. PJTKI also attempts to convince prospective migrants regarding their job security and personal safety during the migration phases. To do so, prospective migrant workers must register at the PJTKI database before going abroad (migration). It is part of obligatory national regulations applicable for any PJTKI companies operating in Indonesia.

"We received information that international migrants must be registered in PJTKI [database]*; otherwise, we can not go."*

Despite the ubiquitous role of PJTKI, the social network between prospective and active migrants also serves as an actual source of information for prospective migrants. However, information gathering means and processes between prospective and active migrants differ from those of PJTKI-driven information supply.

"We also ask about working as international migrant workers to our friends or family who are active migrants when they return home for vacations. Sometimes we ask them when they are still at their work locations [prospective destinations]*."*

However, the communication between the respondents (prospective migrants) and active migrants faces various difficulties. In general, the difficulties include technical (internet connection) and personal (time availability) aspects of the communication process.

"*The connection in this village is not that good. And not all areas have similar quality of connection. Moreover, our relatives and friends* [active migrants] *live in different time zones. They have the* [free] *time to call or send messages to us during the weekend, late night, or early morning* [in our time zone]. *Because of connection quality and time availability, we do not have much time to discuss it* [migration-related information]. *Mainly we talk about their and our conditions* [in general]*."*

Aside from active migrants, former migrants (those who have returned to the village after the end of their contracts) also act as a significant source of information. Their experience as migrant workers is valuable. Since former migrants have already returned home, it is highly convenient to gather more information from former migrants than from active migrants.

"Still, we more often ask ex-migrant [former migrant] *who are already at home* [returned]*, and we can ask them many times by just going to their houses."*

Looking at the added interviews, three primary information sources they refer to when applying for overseas jobs include PJTKI companies, active migrants, and former migrants. In practice, rural youth are required to visit PJTKI offices nearby to obtain information from the migration-specialized companies; hence, no online communication is required. In addition, respondents obtain information from active migrants while the migrants are still living abroad or returning to the village on short vacations. In these cases, either long-distance or face-to-face communication options are available. Face-to-face communication is preferred to obtain information from former migrants when they have permanently returned to the village.

4.4. Internet use and the build-up process of migration intention

On the other hand, this study responds to Research Question 2 (RQ_2) by treating migration intention as the dependent variable. The results shown in Table 7 indicate that the model can explain 24.5% of the variance in migration intention. With the β scores ranging from −1.030 to 0.521, five independent variables contribute significantly to the build-up of migration intention. These variables are daily usage duration, period of use since first access, communication with family, watching videos online, and searching for information on educational services. Other variables are excluded because they fail to pass the significance test. Notably, the interpretation excludes communication with

Table 7
Internet use and activity to collect information in regression with migration intention.

		Unstandardized B	Coefficient std. error
Dependent variable	**Migration intention** (Constant)	9.694	0.983
Independent variables	**Internet use**		
	Daily duration of Internet use	−0.106	0.038
	Accumulated duration of Internet use since the first time	−1.030	0.174
	Communication with friends	–	–
	Communication with relatives	−0.977	0.307
	Receiving and sending email	–	–
	Using search engines	–	–
	Accessing social media	–	–
	Watching videos online	0.521	0.183
	Activity to collect information		
	Job vacancy	–	–
	Wage	–	–
	Health service	–	–
	Education service	0.474	0.231
	Living conditions	–	–
R		0.507	
R^2		0.257	
Adjusted R^2		0.245	

friends since it has zero variance. Meanwhile, watching videos online (0.521) and searching for information on educational services (0.474) positively affect migration intention. Then, daily usage duration, accumulated internet use, and intensity of communication with relatives appear to negatively influence migration, with β scores ranging from −1.030 to 0.106.

As Table 7 indicates, both common and specific Internet use significantly affect the build-up process of migration intention. Among common Internet uses, three out of eight variables are significant: watching videos online, daily usage duration, and accumulated period of Internet use. However, watching videos online had a positive correlation, while daily usage direction and the accumulated period of Internet usage deliver a negative effect. Under specific Internet use (activity to collect information), only searching for educational services in prospective destinations significantly affects the build-up process of migration intention.

5. Discussion

5.1. Searching for prospective destinations: Internet use among rural youth

The unemployment issue of rural youth is a prominent problem in Indonesia (Aprilia, Nugroho, & Mutisari, 2019). Limited job opportunities in rural areas have forced them to migrate and become migrant workers. Therefore, it is compelling to consider the migration phenomenon in villages as a logical result of lower-income levels. Consequently, the migration affects critical sectors in rural areas, including agriculture as the primary rural industry (Rigg, 1998). The absence of proper Internet utilization for the primary rural industry gradually attracts rural youth to non-farming industries (Rigg et al., 2020). As a result, the non-primary industries gain an extremely competitive labor market, delivering a stronger push to rural youth toward the labor market outside their rural origins. In the process, rural youth build up their intention to migrate by accumulating influences from prospective destinations. Those attractive influences may include amenities and services, including housing quality, education, and health services (Jones, 1981). Since the emergence of the Internet, the influences might spread virtually beyond physical information dissemination. In that sense, the information gathering could also be observed by investigating the Internet use by prospective migrants. Answering the first research question (RQ_1), this research discovers information gathering activities using the Internet to obtain sufficient information regarding prospective destinations. In general, this study finds out that the information gathering on prospective destinations is essential (Table 7) regardless of their demographical properties, confirming existing studies (Vilhelmson & Thulin, 2013). In terms of the Internet users, however, younger villagers typically use the Internet longer than other age groups because they considerably have more free time than older villagers. Within the observed subset of the rural population (rural youth), this result also clarifies Onitsuka et al.s' finding (2018) on the significant difference among younger villagers (< 25 y.o.). This study generally reveals that common internet use among young villagers is almost uniform regardless of gender and age (Table 4). Two exceptions appear for the emailing activity between gender and the daily usage duration as well as accumulation among age sub-groups. Actually, the email-gender pair is consistent with previous findings, which suggested that females spend more time using the internet for emailing activities than males (Boneva, Kraut, & Frohlich, 2001; Weiser, 2000). Looking at Table 5, the number of rural youths who utilize the Internet to collect information is high (97.8%). However, their usage intensity is considerably low. In other words, most of them are occasional users. They rarely use the Internet for information gathering purposes, indicating that it is not their primary source of migration-related information.

Looking at the statistical results (Tables 3; 5 and 7), rural youth prefer the Internet less for information gathering on prospective destinations. In other words, the presumption regarding alternative (non-Internet) information sources is relevant. In that sense, there must be another information source(s) the prospective young migrants have been relying on. To clarify the finding, this study conducts short interviews with randomly selected respondents (3 persons per observed age sub-group). The interviews reveal that, in the study area, rural youth consider two primary sources of information on prospective destinations. The sources are migration-specialized companies (institutional) and active/former migrants (personal). This study reveals the existence of migration-specialized companies operating in the observed rural area. The companies provide trustable information for the respondents regarding prospective destinations, making the companies an integral part of the migration process (Huriani & Annibras, 2020). Companies specializing in the migration process become the primary information source since they are certified, regulated, and endorsed by the government. In practice, prospective migrants would access information directly from the physical offices of those companies. Offline activity is considered an integral part of an international migration process (Huriani & Annibras, 2020), making online communication less necessary. Regarding active/former migrants, prospective young migrants among rural youth gather information from both active and former migrants. Rural youth may gather information from active migrants either through SNS (online) when those migrants are in their current places of stay or through in-person communication when those active migrants are briefly returning to the villages for vacations. Short interviews with respondents reveal active migrants as the second primary source of information, providing up-to-date information about their current places of stay. Their current work locations act as prospective destinations for the rural youth. The experiences of active migrants may differ from the experiences of former migrants due to the different periods of stay, making the information provided by former migrants less relevant for the ongoing information gathering. The findings confirm the position of active migrants as part of a more extensive active social network rather than merely a passive source of information (Manchin & Orazbayev, 2018). For prospective migrants, the broader social network is vital during the build-up process of migration intention (Spaan & van Naerssen, 2018). In the case of face-to-face communication with former migrants, Internet-based interaction is also less necessary. In terms of communication methods, rural youth gather information from active migrants through direct conversations, conventional voice calls, and SMS. These methods appear to contribute significantly to the migration of rural youth, confirming findings in the literature on the general trends of rural migration (Irawaty & Sri Wahyuni, 2015).

In addition, the short interviews reveal that the Internet network quality in remote rural area is generally unstable, which commonly happen in rural areas in Indonesia (Onitsuka et al., 2018). The low quality of Internet connection delivers technical obstacles to the communication between rural youth and active migrants. The problem is particularly beyond the reach of rural youth and unresolvable from their own side since it lies in the broader cross-country Internet infrastructure. To clarify the results of statistical analyses (Table 3), short interviews reveal that the Internet network quality ranges from low to medium quality, while network coverage is also not equally distributed. Apparently, it has induced a stronger hesitance to use the Internet for communications with active migrants. In terms of Internet use, rural youth spend significant amounts of time surfing the Internet (7.5 h/day). In comparison to common Internet use, however, they spend less time surfing the internet to collect information about prospective destinations. The use of the Internet for information gathering, especially regarding migration-related information, is consistently constrained and therefore limited. Compounded by the busy schedules of active migrants, conventional voice calls and SMS are preferable for information exchanges between active migrants and rural youth. On a closer examination, the preferable choices of information sources and collection methods can explain the low intensity of Internet usage for information gathering. Despite the Internet-induced possibilities to obtain

information from active migrants, rural youth still put migration-specialized companies as their most preferable information source. This indicates that additional information-gathering activities are merely supplementary to that gleaned from specialized companies. Therefore, communication between rural youth and active migrants is generally less frequent. In conclusion, the increasing internet penetration rate in rural areas is partially actual and appears in the high internet use duration. It is, however, not followed by purposeful uses of the Internet for activities that may build migration intention and eventually bolster the migration process.

5.2. *Internet-affected development of the migration intention of rural youth*

To answer the second research question (RQ_2), this study proves the Internet-affected build-up of migration intention among rural youth. The Internet may turn rural youth into prospective migrants by opening the gate of information on potential destinations. The Internet allows users to obtain information intentionally or unintentionally through online activities (Stevenson, 2008). Studies have reported the direct or indirect effects of Internet use and practices, which eventually lead to migration (Cooke & Shuttleworth, 2018; Moon et al., 2010; Vilhelmson & Thulin, 2013). This study finds that more significant exposure to information on prospective destinations induces behavioral changes among rural youth. The information-induced behavior is in line with previous studies (Prasetyo, Atmaja, & Handoyo, 2019). In addition, Internet use patterns affect the intentions of rural youth to remain in or migrate out of the village, supporting the findings of existing literature (Onitsuka et al., 2018; Priatama et al., 2019). Table 7 reveals the limited use of the Internet as a determining factor in predicting the build-up process of migration intention. In particular, certain variables of Internet use, including daily usage duration, accumulated use of the Internet, and communication with relatives, appear as significant constraints to the build-up process.

Furthermore, social media platforms have been referred to as a determining factor for the international migration of rural youth (Christinawati, Pudjiharjo, & Pratomo, 2013). However, this study reveals that the platforms used do not necessarily induce a significant push toward only one spectrum of migration decisions (to migrate or not to migrate). The effect does not apply due to existing communication between active migrants and rural youth (prospective migrants). Instead, the statistical results show that communication with relatives and established communication with active migrants significantly impede migration intention. It means that communication with active migrants who are also relatives promotes a negative push toward the intention to migrate, hence inducing an intention to remain. In contrast, communication with friends produces a positive push toward the intention to migrate. The higher preference for communication with friends may occur considering the general attraction among the circle of friends, which induces a stronger positive push than more rational reasoning from relatives. Furthermore, this study discovers that information exchanges through communication/interactions with relatives (both physically and virtually) occur more often than with friends. During communication, an active migrant provides information on actual situations in their destinations based on their own perceived conditions (Wissink, Düvell, & Mazzucato, 2017). To some extent, information from active migrants clarifies and correct information from migration-specialized companies. Rural youth consider information from companies to be full of marketing purposes, triggering concerns about the contrast with actual situations. However, increased communication with relatives weakens the build-up process of migration intention. As communication with relatives is considered part of common Internet use, information revealed by active migrants creates unintentional impacts on rural youth. This is supported by Wissink et al. (2017)), who suggested that information from social networks could either spur or impede the intention to migrate.

Watching videos online and seeking information on educational services in prospective destinations positively affect the build-up of migration intention (Table 7). Watching videos online is part of common Internet use, indicating a solid motivation for online entertainment. While watching videos online, rural youth are exposed to tremendous flows of information created by content creators, including active migrants. The finding is parallel to an existing study (Arora & Lata, 2020), which discovered the significant contribution of video-sharing websites (e.g., YouTube) to users' intention to visit the reported destinations. Content creators express themselves and tend to share vast information regarding activities and locations (Griffith & Papacharissi, 2009). Gradual and continuous exposure eventually supports the build-up process of migration intention. This finding is supported by (Kietzmann, Hermkens, McCarthy, & Silvestre, 2011), who suggested that video-sharing websites might function as an influencing force. Video could strongly sway thinking processes more than other social media content. In addition, this study demonstrates that information gathering through the Internet is less favorable and less intense (RQ_1). Gathering information on educational services in prospective destinations contributes positively and significantly to the build-up process of migration intention. Migration-specialized companies do not provide information on educational services, forcing prospective migrants to find the information themselves. Follow-up interviews reveal that rural youth consider pursuing higher education while working in a prospective destination. It supports the findings of existing research (Iqbal & Gusman, 2015).

This study reveals that Internet uses (both common and specific) positively affect the build-up process of migration intention among rural youth. Statistically speaking, a significant impact appears in 5 of 9 observed Internet uses. Internet uses for watching videos and collecting information on educational services in prospective destinations show relatively high scores. On the other hand, communication with relatives, which impedes the build-up process of migration intention, had a lower score. Daily usage duration and accumulated period of internet use act as constraints to the build-up process, implying a lesser effect than the effects of watching videos online and collecting information on educational services. The daily usage duration of rural youth does not increase dramatically and tends to be stable, as the average daily usage is relatively high ($\pm$ 7.5 h/day). Communication with relatives produces similar results. The intensity of communication with active migrants is more significant. At the same time, it has a shorter communication window than watching videos online or collecting information on educational services, confirming prior studies on the propensity of the younger generation for entertainment-centered Internet use (Priatama et al., 2019).

Although the opposite impacts between common and specific Internet use, treating all Internet use variables (common and specific) as a unified entity suggests a considerable increase in the intention to migrate due to all observed Internet uses. In conjunction with the labor force issue in rural areas, the strengthening impacts of Internet use on the build-up process of migration intention of rural youth have suggested that rural community expects potential losses of their labor force in the future. Considering agriculture as the primary sector in rural areas (Wiggins & Proctor, 2001), the potential losses in the rural labor force imply further losses in the agricultural labor force. It is parallel to what scholars have predicted, in which numerous rural areas in developing countries would soon suffer from aging farmers (Rigg et al., 2020). In fact, it is similar to the ongoing trends for other rural areas in more developed regions (Fried & Tauer, 2016; Haga, 2018). To ensure the sustainability of rural society and agriculture, the positive influence of Internet use on the intention to migrate among rural youth consequently requires a counter-effort to build positive influences of the Internet use toward the intention to stay. The efforts may focus on common Internet uses since these uses have generally shown negative impacts on the intention to migrate. To spin-off the effects, the counter efforts may promote common Internet uses for agricultural activities, targeting the

most critical sector in rural areas to maintain the tractions of rural youth to their rural origins.

6. Conclusion and suggestions

The general impact of Internet use on rural communities has been widely investigated. Since the role of the Internet in rural digitalization is an emerging phenomenon, studies have been focusing on how the Internet could generally help rural transformation move smoothly forward. However, the particular impact of Internet use on rural migration, especially during the build-up process of migration intention among rural youth, lacks empirical evidence. Despite the rapid improvement of Internet accessibility in rural areas, existing studies have not yet addressed the contribution of Internet use to the build-up process of migration intention. This study aims to provide empirical evidence of the effect of Internet use on the build-up process. To fill in the research gap, this study focuses on international migration by considering intervening obstacles that could be solved through the use of the Internet. First, this study investigates the use of the Internet to collect information on prospective destinations. The Internet is intended to provide alternative communication methods to obtain information. The Internet enables rural youth to compensate for their remoteness and connect with the rest of the world, reducing the digital divide. The increasing number of information sources and communication methods reduces the intervening obstacles for migration and information deficiency. Answering the first research question (RQ_1), rural youth utilize the Internet at a low intensity to collect information regarding prospective destinations. However, the Internet is less favorable for acting as the primary source of information relevant to migration. Besides, the low network quality and the activities of active migrants dampen its potential. Rural youth remain heavily relying on migration-specialized companies as their primary source of information on migration. In general, the impact of Internet use appears inevitable due to the high daily usage. Despite its soaring usage intensity, the Internet has not replaced traditionally favorable sources for collecting information regarding prospective destinations. Regarding migration intention, Internet use generally delivers a positive influence on the build-up process, which answers the second research question (RQ_2). Common Internet use, however, statistically contributes negative impacts to the build-up of migration intentions. Among the common uses, only one (i.e., watching videos online) appears favorable for rural youth, producing positive effects on migration intention. Meanwhile, specific Internet use contributes positive influences to migration intention. Despite the opposite trends, negative influences from common Internet use are insignificant compared to positive influences from specific Internet use. Thus, Internet use as a singular group of variables maintains its positive impact on the intention to migrate.

In general, Internet penetration in rural areas is increasing, implying the expected benefits of internet use for its users. This study, however, discovers that rural youth have not been using the Internet and its functions to their full potential. The low Internet adoption fostered by the lack of Internet infrastructure has been impeding digital transformation in rural regions. In that sense, a widening digital divide between rural and urban areas makes the outmigration of the rural population, especially rural youth, more possible to continue. Therefore, this study suggests the establishment of a village telecenter as a means to actively promote digital literacy in rural areas. In fact, government-promoted telecenters in rural Indonesia are commonly suggested to increase the digital literacy of rural Internet users. The increase in digital literacy allows prospective migrants to utilize the Internet optimally for information gathering during their migration process. Better knowledge of prospective destinations is beneficial for risk aversion at any migration destination. It should spur the build-up process of migration intention. However, it should be balanced out with the provision of information on opportunities in the village, which should induce rural youth to develop their villages and create a managed flow of human resources. Mainly, temporal migration could be a safer way to lower the negative impact of migration on the availability of labor in villages. Despite the outgoing flow of rural youth, this study also suggests future studies focus on returnee migrants to discover their contributions to human resource development toward rural youth. As this study reveals the tendency of rural youth to pursue better education while working in destination areas, the involvement of returnees in the development of rural human resources should fulfill the desire of rural youth for better education and enhance their skills to achieve a better livelihood. In the longer term, the development of telecenters could foster the adoption of the Internet to support economic activities. Since economic reasons are a strong driver for rural emigration, the conjunction of Internet use and economic activities has been suggested to reduce migration intention. In general, studies on rural e-commerce have demonstrated that using the Internet (e.g., through social media) to broaden markets could produce positive results. It would be fascinating to see similar studies conducted in rural areas, which considerably have more obstacles to Internet use than their urban counterparts. The conjunction might also reduce the dependency of rural producers, especially smallholder farmers, on intermediaries. Eventually, the reduced dependency induced by the Internet-economy conjunction could eliminate the market monopoly, which the intermediaries currently control.

CRediT authorship contribution statement

Ar. R.T. Hidayat: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization, Project administration, Funding acquisition. **Kenichiro Onitsuka:** Conceptualization, Resources, Writing – review & editing, Supervision, Project administration, Funding acquisition. **Corinthias P.M. Sianipar:** Methodology, Validation, Visualization, Supervision, Funding acquisition, Writing - original draft, Writing - review & editing. **Mrittika Basu:** Writing – review & editing, Supervision. **Satoshi Hoshino:** Validation, Writing – review & editing, Supervision.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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