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EXPLORATION OF THE UTILIZATION OF INFORMATION TECHNOLOGY IN TRANSMIGRATION PLANNING

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Abstract

This study aims to explore the level of use and integration of information technology in transmigration planning in the East Kobalima region of East Nusa Tenggara, Indonesia. This study used exploratory qualitative research methods such as literature searches and online media content analyses, interviews and preliminary field observations. Findings show that there are many potentials uses for technology. Current conditions show limited application of information technology to administrative functions, unstable connection, low levels of digital literacy, and that no integrated systems exist between the various institutions involved. On the other hand, increasing investment in infrastructure, and increasing involvement of youth with technology, offer an opportunity for developing contextually relevant, participatory, and adaptive solutions to transmigration planning through the use of digital information systems. The outcome of the study is a conceptual basis to create contextually relevant, participatory, and adaptive information systems for transmigration planning in the East Kobalima area.

Keywords: East Kobalima, ICT adoption, Information systems, Qualitative study, Transmigration planning.

1. Introduction

The transmigration program is a government policy to reduce population density in the areas of origin while supporting the development of disadvantaged, remote, and border areas [1]. Transmigration is also part of broader efforts toward sustainable development and equitable distribution [2]. Several cases show positive results, including the adoption of innovation in West Sumatera [3], infrastructure improvements in Mexico [4], and poverty reduction and social integration in Guizhou, Chine [5]. However, other cases highlight persistent challenges, such as limited labor absorption [6], weak socio-cultural integration [7], disasters and conflict risks [8], policy and resource management failure [9], and negative health impacts [10]. One of the obstacles today is the lack of accurate, up-to-date data that is accessible to stakeholders [11], even though effective planning requires environmental assessments, socio-cultural analyses, demographic projections, and mapping of regional potential [12]. Nevertheless, the adoption of ICT in transmigration planning is still limited, especially in remote areas such as East Kobalima, Malaka Regency, East Nusa Tenggara [13].

East Kobalima is a subdistrict on the Indonesia-Timor Leste border, characterized by difficult geography, uneven basic infrastructure, and highly cultural diversity. Although designated as a potential transmigration area due to its availability of land and strategic location, its readiness has not been assessed, especially in terms of data-and-technology-based planning. In this context, information technology can strengthen planning and decision-making, such as through GIS for mapping, infrastructure, and disaster risk [14], digital platforms for community participation [15, 16], and mass or social media to monitor public dynamics [17]. However, the challenges faced in adopting ICT are limited infrastructure, weak organizational readiness, and uneven digital skills among local human resources [18, 19]. Institutions also face fragmented data flows and lack of integrated systems to accommodate the needs of digital platforms that are in line with administrative processes [20].

However, previous studies do not focus on how ICT is used to support transmigration planning in border regions or how infrastructural, institutional, and socio-cultural factors interact to shape readiness in these contexts. This gap is important because the quality of transmigration planning depends on data integration, digital participation, and coordinated decision-making across agencies. This study examines the current use of ICT in East Kobalima, identifies the relevant actors, and analysis the barriers and opportunities for developing context-appropriate information systems to support transmigration planning. Digital technology in public-sector development is often examined through ICT4D, e-governance, and socio-technical perspectives, which emphasize alignment between technology, institutional capacity, and community context. These perspectives provide a useful lens for understanding ICT readiness in border-region transmigration planning such as East Kobalima [21, 22].

2. Method

This study uses a qualitative exploratory design due to limited formal data and the need for contextual understanding. Data was collected through document analysis, media review, field observations, and interviews across six villages in East Kobalima. Areas of fieldwork have been chosen on the basis of their relationship

to the transmigration scheme. The selected areas were Kapitan Meo, Tniumanu, Harekakae, Naet, Weoe, and Weain. These are amongst the largest grouping of settlements situated within the Eastern Kobalima Region. The sample for this survey included Officials from the Village, Staff Member from Department of Transmigration, Staff Members from Village Community Empowerment Agency, Employees of Regional Planning Office, Farmers' group, and transmigrant. They are involved with ICT and Administration activities. Data was analyzed using open coding followed by thematic analysis to identify patterns related to infrastructure readiness, ICT practices, socio-cultural barriers, and development opportunities. Triangulation across documents, media, observations, and interviews was used to ensure validity.

3. Results and Discussion

The interview results obtained from several sources indicate that the use of information technology in the East Kobalima transmigration area is very limited. Even the Village Community Empowerment Agency stated that information technology is still not utilized in the training and marketing of superior commodities. There is no digital interaction between residents and the government. This is exacerbated by inadequate information technology infrastructure and very limited digital literacy. Several places visited to confirm that this situation is occurring. This study also uses open coding. The data obtained is labelled or coded to mark pieces of information. Those have certain meanings and notes based on the results of the literature study.

The analyses of the four criteria show similar patterns across all four criteria: (i) Infrastructure will continue to be the most significant barrier; (ii) Administrative methods are primarily based on a manual process of coordination resulting in an inefficient flow of data and delayed decisions; (iii) ICT projects are hampered by socioeconomic constraints (e.g. low digital literacy rates, generational differences in the way technology is viewed, and varying levels of acceptance of ICT); (iv) These barriers also provide new opportunities for youth engagement, increased smartphone use, and greater interest among community members in using ICT to manage their resources effectively.

Based on the labels used in data collection, there are several complexities associated with the use of information technologies in East Kobalima, especially within the framework of transmigration planning. These results are presented in five main themes as shown on Fig. 1.

It was found that most villages in East Kobalima already have access to the internet with the quality and speed that still fluctuates. Some villages near the sub-district center have more stable access, while villages directly adjacent to Timor Leste have weak connectivity. The existence of infrastructure projects such as Base Transceiver Station Universal Service Obligation from the Ministry of Communication and Information Technology has opened up basic access to information technology for remote villages. On the other hand, power outages often occur for up to four days, and even in some areas, they do not have adequate electricity infrastructure. This certainly affects the accessibility of using information technology which impacts internet accessibility.

However, even though infrastructure is starting to become available, the utilization rate is still low. Village offices generally only have one computer device

with a limited internet connection. Not all village devices are able to operate digital information systems, so the use of technology is often limited to sending data to districts or provinces via email or WhatsApp.

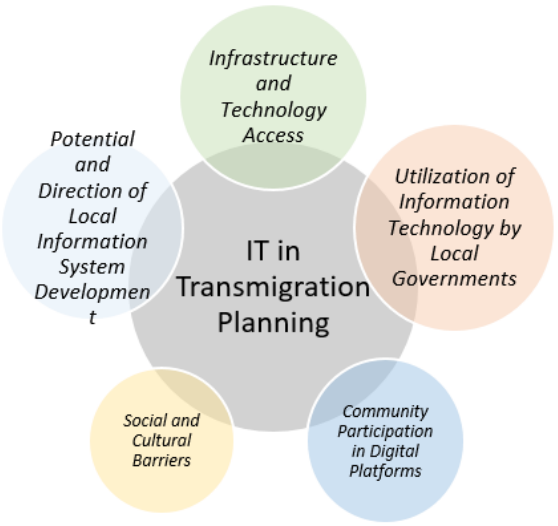

Fig. 1. Themes for information technology in transmigration planning.

Interviews with several village and sub-district officials show that the use of information technology is still administrative and reactive. There is no information system integration specifically developed to support transmigration planning. Regional spatial data, land availability, socio-economic profiles of communities, and regional readiness indicators are still mostly managed standalone, not integrated between related agencies [23]. The village information system developed by the government has also not been optimized.

Some villages use web-based and spreadsheet platforms or visit participants directly to collect data on their citizens, including for population census programs, social assistance, and health. There is no integration between the application and the regional planning system or the transmigration data collection system.

Society, especially the younger generation, shows high potential in adopting information technology. It was found that social media is used as a medium for sharing information and knowledge, policy criticism, and limited discussion forums about village development. However, such participation is still informal and not systematically connected to the transmigration planning process.

In some cases, reporting in the East Kobalima area is conveyed in the mass media and social media space in the formation of regional identity [24], one of which is covered by mass media, for example, from RRI Kupang to attract the attention of local governments. This kind of practice shows the existence of social capital and local capacity that can be utilized in the development of participatory information systems.

There is still an assumption that information technology is a tool owned by the government or the educated, so that people do not feel the need to use it in the public decision-making process. Important decisions are often still taken through

customary deliberation without involving digital documentation. These findings underscore that human factors such as organizational culture, communication, and management commitment remain central to ICT adoption [25]. Other studies similarly show that organizational readiness, including security and privacy management, strongly affects system effectiveness [26].

In addition, there is a significant digital gap between the older and younger generations. Digital access and literacy are still low, especially in rural and remote areas. This affects the representation of certain groups in participatory digital platforms. Despite limited use of IT, there is substantial opportunity to develop an information subsystem that is applicable to border regions based on their needs and contexts. The study also highlights the necessity for greater coordination between institutions, to increase awareness of digital literacy, to streamline information systems at the community level and to create an accessible modular open-source system that works within the limitations of the communities. To support these efforts, a slow, steady implementation process with a clear set of governance standards and sufficient resources is required.

Besides that, further discussion provided insights into the importance of transformative ways of thinking about using IT, not only as a tool for technical advancement but also as a mechanism for facilitating the process of societal change. Therefore, the transmigration planning information system developed in East Kobalima should be developed adaptively to accommodate the particularities of regional complexity and needs.

ICT is currently underdeveloped in transmigration planning. This is due to insufficient infrastructure between single-use systems, low levels of digital literacy, and lack of coordination between agencies. It is important to take a comprehensive approach and develop long-term planning frameworks that are aligned with the National Development Program [27, 28].

Future research should focus on developing modular and accessible models for integrating ICT into community-based systems and developing policy frameworks for integrating ICT into local laws regarding infrastructure development, system interoperability, human resource development and training, digital literacy, and participatory mechanisms. Those to ensure the sustainability and structural nature of their implementation [29]. In addition, while ICT will continue to be a tool for administrative purposes, it also provides an opportunity for strategic engagement through build participation, accountability and transparency in transmission initiatives [30, 31]. Many of the findings from past research that examine similar contexts where ICT adoption in rural and peripheral areas have generally faced barriers due to the lack of infrastructure and differences in digital network abilities between the two areas [13, 20].

Figure 2 shows the proposed system uses a client-server workflow involving three actors: villagers, village office, and district office. All user access platforms through web or PWA interfaces, with villagers able to fill forms offline and sync then once internet is available. Submitted data is transmitted through the internet to the server for storage and processing.

However, other research that examined the positive relationship between institutional coordination and ICT investment in planning and development processes [15, 30], results from this study indicate that the relationship between cross-agency integration in East Kobalima continues to be one that remains

fragmented. This research also augments existing literature in ICT4D by demonstrating that informal digital practices of the community can be employed to improve community participation in participatory planning processes in transmigration related border areas [14].

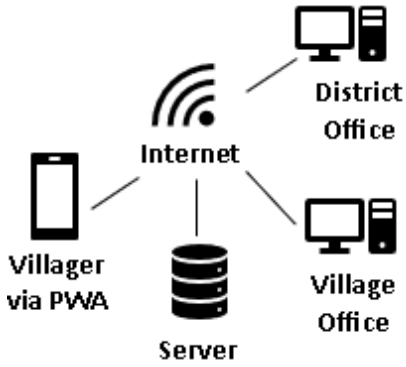

Fig. 2. The proposed system.

4. Conclusion

This study shows that ICT adoption in East Kobalima's transmigration planning is still limited, but emerging infrastructure, youth involvement, and local interest create opportunities for context-adaptive and participatory systems. The study contributes by linking ICT4D and e-governance perspectives to border-region readiness, offering practical guidance for improving literacy, data integration, and participation, and demonstrating the value of multi-source qualitative inquiry. Future research should prototype and evaluate digital tools, expand stakeholder perspectives, and design more detailed system architectures.

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