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Analyzing the Impact of ICT on Blue Social Capital: The prevalence of Digital Poverty in the Maritime Community

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ABSTRACT

This quantitative study investigates the complex relationship between Information and Communication Technology (ICT) and blue social capital within maritime communities, particularly in the context of digital poverty. Through the examination of social trust, networks, community capacity, resilience, and civic engagement, this research aims to uncover their combined influence on collaborative efforts. The primary objective of this study is to identify how the integration of ICT tools shapes the formation and utilization of blue social capital, thereby affecting maritime community development. This study incorporates a sample of 215 individuals, carefully selected to ensure the statistical robustness of the findings, involving participants aged 18 and above. By employing descriptive and inferential analyses of survey data, this study examines the relationship between ICT usage and indicators of blue social capital. The results emphasize significant associations between blue social capital components and the overall progress of maritime communities. This research provides valuable insights for policymakers and practitioners, offering guidance on leveraging ICT to strengthen social capital and drive sustainable development in maritime communities across Pahang, Terengganu, and Kelantan.

1. Introduction.

In the context of maritime community development, amidst the increasingly apparent challenge of digital poverty, blue social capital emerges as a crucial component (Ahmed, 2018). Digital poverty, characterized by limited access to and proficiency with digital technologies, poses significant barriers to social and economic advancement within coastal communities. This study acknowledges the intersectionality of digital poverty with social capital dynamics and aims to explore how bridging this digital divide can enhance community development efforts.

As maritime communities strive to adapt to rapid technological advancements and navigate the complexities of the digital age, addressing digital poverty becomes imperative. Access to reliable internet connectivity, digital literacy programs, and affordable technology resources are essential prerequisites for fostering inclusive participation in the digital ecosystem (Center for Research and Development of Informatics and Information and Public Communication Applications, 2018). By addressing digital poverty, maritime communities can unlock the transformative potential of Information and Communication Technology (ICT) to bolster social capital and drive sustainable development.

Furthermore, understanding the nuances of digital poverty and its impact on blue social capital is crucial for devising effective interventions. For instance, individuals facing digital poverty may experience social exclusion due to limited online interaction opportunities, hindering their ability to forge social networks and access vital community resources. By addressing digital inequities and promoting digital inclusion initiatives, maritime communities can mitigate these barriers and foster a more equitable distribution of social capital (Claridge, 2015).

In addition to digital access and literacy, considerations of digital privacy and security are paramount in safeguarding the integrity of blue social capital within maritime communities. As digital platforms increasingly serve as spaces for community

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engagement and information exchange, ensuring data privacy and protecting against cyber threats are essential for maintaining trust and confidence in online interactions (Ahmed, 2018).

Ultimately, by recognizing the intertwined nature of digital poverty and blue social capital, this study seeks to offer actionable insights and policy recommendations for promoting inclusive and sustainable development in maritime communities. By harnessing the potential of ICT to bridge digital divides and strengthen social connections, coastal regions can build resilience, foster collaboration, and empower communities to thrive in the digital era.

2. Research Problem.

In the maritime community, the emergence of digital poverty poses a multifaceted challenge to equitable participation and development. Digital poverty, characterized by limited access to digital technologies, inadequate digital literacy, and socioeconomic disparities, hampers individuals' ability to engage effectively in online interactions and utilize digital platforms for community development Bailey, Hasan, Islam, and Quyoum (2023). This presents a pressing research problem: How does digital poverty impact social capital formation and community development within maritime communities, and what strategies can be implemented to address these challenges?

According to Afzal, Khan, Daud, Ahmed, and Butt (2023), despite the growing reliance on digital platforms for communication and collaboration, maritime communities face persistent disparities in digital access and skills, exacerbating existing inequalities and hindering collective efforts for community development. The research problem centers on understanding the nuanced ways in which digital poverty shapes individuals' participation in online interactions, influences social relationships and networks, and affects community cohesion and resilience within the maritime context.

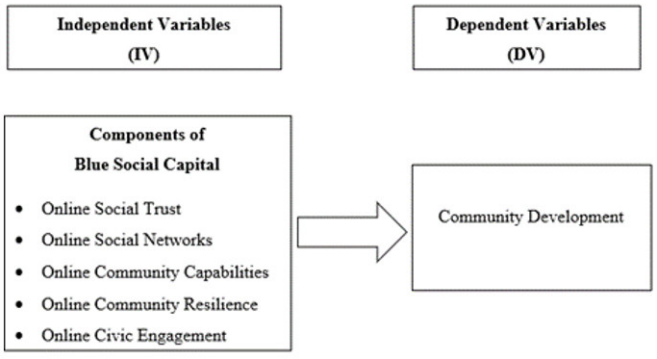
Furthermore, the research problem encompasses the exploration of potential interventions and strategies to mitigate the impact of digital poverty and promote digital inclusion within maritime communities. By investigating innovative approaches to enhancing digital literacy, expanding access to digital resources, and fostering community-led initiatives, this research aims to identify actionable solutions to bridge the digital divide and facilitate equitable participation in online civic engagements and collaborative efforts for community development.

The research problem revolves around the complex dynamics of digital poverty in maritime communities and its implications for social capital formation, community cohesion, and resilience. By examining the interplay between digital poverty, social capital, and community development, this study seeks to inform policy interventions, community-based initiatives, and capacity-building efforts aimed at promoting digital inclusion and advancing equitable development in maritime contexts (Xie, 2023).

3. Blue Social Capital Components.

Comprising interconnected components, such as Online Social Trust, Online Social Networks, Online Civic Engagement, Online Community Capabilities, and Online Community Resilience, blue social capital plays a crucial role in shaping the fabric of maritime communities, particularly amidst the challenges of digital poverty. This exploration aims to analyze the nuanced elements constituting Blue Social Capital and illuminate its significance, particularly concerning the intricate dynamics of ICT integration in the development of maritime communities, while addressing the impacts of digital poverty.

Figure 1: Components of Blue Social Capital on Community Development Framework.



Source: Author.

1. *Online Social Trust* in the maritime context refers to the degree of confidence and reliability individuals place in digital interactions within their community, even amidst digital poverty. Trust in social media and its impact on enhancing social relationships conducted by Hatamleh et al. (2023), the authors delve into the intricate dynamics of online interactions. They explore how trust plays a pivotal role in shaping social connections within digital platforms. It plays a pivotal role in shaping collaborative efforts and fostering a sense of trustworthiness in online engagements, contributing to the overall fabric of maritime communities.
2. *Online Social Networks* represent the intricate web of relationships and interactions within virtual maritime communities, addressing the impacts of digital poverty on connectivity. Kaplan and Haenlein's (2010) study provide a comprehensive examination of social media within the maritime community. Delving into the intricacies of digital platforms, the authors analyze how social media impacts communication, collaboration, and networking among maritime professionals. This component delves into the structure and dynamics of online connections, highlighting their role in facilitating information exchange, collaboration, and community-building within the maritime domain.
3. *Online Community Capabilities* encompass the collective skills, knowledge, and resources available within the virtual maritime community, despite challenges posed by

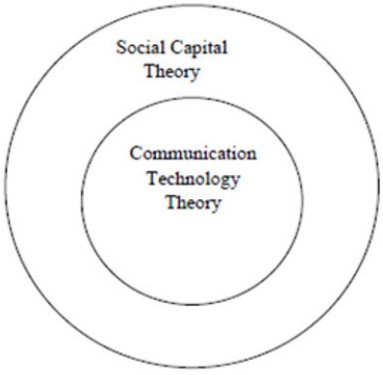
digital poverty. As Sharifah Dawood (2019), by delving into the obstacles marginalized groups encounter in accessing and utilizing digital technologies, we uncover prevalent socio-economic disparities in rural areas. Addressing these digital inequalities becomes paramount within broader initiatives aimed at promoting inclusive development and ensuring fair access to opportunities in rural regions. This aspect evaluates how the community harnesses digital tools and platforms to enrich its capabilities, encouraging innovation, learning, and adaptability in confronting challenges.

4. *Online Community Resilience* signifies the maritime community's inherent ability to adjust, rebound, and prosper within the digital domain, particularly in response to the challenges posed by digital poverty, as discussed by Millat and Garesché (2020). This concept delves into how the community, through its interactions and engagements in virtual spaces, cultivates resilience to withstand disruptions, effectively shares resources, and collectively manages the intricacies brought about by ICT. It highlights the community's adaptability and resourcefulness in leveraging digital tools to navigate and thrive in the face of various digital barriers and challenges.
5. *Online Civic Engagement* refers to the proactive involvement of individuals within virtual spaces, aiming to enhance the collective well-being of maritime communities, even in the presence of digital poverty (Epifantsev, Shah, Anjaneyalu & Kumar, 2024). This component delves into the mechanisms through which digital platforms facilitate community members' participation in civic activities, enabling them to exchange insights and collaboratively address issues affecting the maritime environment. Despite the challenges posed by digital poverty, such as limited access to technology and connectivity, online civic engagement underscores the resilience and adaptability of community members as they navigate and overcome these barriers. Through leveraging digital tools and fostering inclusive participation, maritime communities demonstrate their commitment to collective action and problem - solving, ultimately contributing to the sustainable development of coastal regions.
6. *Digital poverty* emerges as an increasingly apparent challenge. Digital poverty refers to the lack of access or limited ability to access ICT among maritime communities (Sharifah Dawood, 2019). This may be due to economic factors, inadequate infrastructure, or a lack of knowledge about technology. Its effects include limited access to digital education, employment opportunities, and healthcare services.

   Community development needs to consider the need to improve access to and the ability to use digital technology in efforts to combat digital poverty and empower maritime communities holistically. By taking steps to reduce the digital divide, maritime communities can enhance their potential for economic, social, and cultural development, as well as promote equal access to digital opportunities crucial in an increasingly globalized world.
7. *Community Development:* In addition to combating digital poverty, community development also becomes a crucial focus in supporting the growth and stability of maritime communities. Community development encompasses efforts to strengthen local institutions, enhance the capacity of residents, and develop economic and social initiatives that benefit the entire community (A. E., & Garesché, E. Z., 2020). Through integrated community development, maritime communities can enhance their ability to overcome challenges, improve quality of life, and achieve sustainable growth in an increasingly digital era.

4. Social Capital and Communication Technology Theory.

Figure 2: Social Capital and Communication Technology Theory.



Source: Author.

To comprehensively address the challenges presented by digital poverty, this study adopts an integrative approach by incorporating both Social Capital Theory (Pierre Bourdieu, 1985) and the Communication Technology framework (MacKenzie & Wajcman, 1985). Social Capital Theory emphasizes the pivotal role of social relationships and networks in fostering mutual support and value within communities. In the context of this research, the aim is to investigate how the utilization of technology can augment social capital, particularly in communities affected by digital poverty.

Moreover, the study delves into concepts of trust and collaboration, seeking to establish a foundational understanding of how technological interactions can either bolster or undermine trust dynamics and collaborative efforts among individuals and groups. Within the realm of collective decision-making, Social Capital Theory provides valuable insights into how technology platforms shape the decision-making capacities and collective actions of community members (Thang et al., 2016).

Simultaneously, Communication Technology Theory sheds light on the multifaceted role of technology in communication processes. By examining the impact of technological advancements on communication patterns, especially within the context of this thesis, the study aims to discern how specific technological developments reshape the nature of interactions among community members (Setiawan, 2018).

Additionally, by investigating technology's influence on social capital, the study utilizes Communication Technology Theory to comprehend how technology acts as a conduit for either strengthening or weakening social capital within communities.

This comprehensive exploration seeks to deepen our understanding of how technological interactions shape the formation, maintenance, or potential reduction of social capital within communities, with a particular focus on addressing digital poverty. To achieve the objectives of the study, rigorous scrutiny of relevant literature and adherence to robust research methodologies are paramount.

5. Research Methodology.

Figure 3: Map of the coastal areas of Kelantan, Pahang, and Terengganu.

Source: Google Maps.

The research focal point centers on Kelantan, Pahang, and Terengganu, aligning with the investigated title of study. These states, particularly the coastal communities, have been recipients of substantial ICT support aimed at elevating their quality of life. The population encompasses not only fishermen but also individuals engaged in diverse activities such as farming, labor, and entrepreneurship. Despite the geographical diversity, the researcher opts for administering the questionnaire through the WhatsApp application and email.

The focus area in this study:

i. Terengganu (Kuala Nerus, Setiu, and Marang)

ii. Pahang (Pekan, Felda Tersang 3, and Pantai Balok)

iii. Kelantan (Tumpat, Pasir Puteh, and Bachok)

The utilization of snowball sampling in this study is driven by several factors. Firstly, the study focuses on a specific population - maritime communities residing on the East Coast of Peninsular Malaysia. Given the predetermined nature of this population and the potential challenges in accessing it through traditional sampling methods, snowball sampling emerges as a suitable approach.

Additionally, the distribution of questionnaires, facilitated through Google Forms, relies on the assistance of *Pusat Internet Komuniti* (PIK) managers in the study area. These managers play a pivotal role in ensuring that questionnaires reach every location within the maritime communities, enhancing the feasibility and efficiency of data collection. Furthermore, the involvement of PIK managers adds credibility to the sampling process as they possess authentic data about respondents, including residence, age, gender, and background.

Moreover, snowball sampling allows for the active participation of the local community in disseminating questionnaires to other potential respondents, enabling widespread distribution until the desired sample size is attained. This approach fosters inclusivity by not imposing age and gender restrictions on questionnaire accessibility, ensuring equal participation opportunities for all community members. Overall, snowball sampling proves to be a pragmatic and effective method for reaching and engaging with the targeted population in this study, thereby enhancing the representativeness of the collected data.

6. Result and Discussion.

Table 1: Results of Reliability Analysis.

Name of International Organization	Eligibility	Type of Internship
International Maritime Organization(IMO) (IMO, 2023)	Master and PhD Students	Research related
International Tribunal for the Law of the Sea (ITLOS) (ITLOS, 2023)	Master and PhD Students & recent graduates	Both research and work related
International Seabed Authority (ISA) (ISA, 2023)	Master and PhD Students & recent graduates	Work related
Intergovernmental Oceanographic Commission (ICO) of UNESCO (UNESCO, 2023)	Master and PhD Students & recent graduates	Work related

Source: Author.

The reliability analysis focused on one dependent variable, community development, and five independent variables, namely: online social trust, online social networks, online civic engagement, online community capabilities, and online community resilience. All items were interpreted following the general guidelines established in the conducted study.

Table 1 presents the reliability measure results, indicating good reliability for online civic engagement and online community resilience with scores of 0.795 and 0.733, respectively. Similarly, online social capabilities (0.714), online social networks (0.711), and online social trust (0.700) demonstrated reliable measures. The dependent variable of community development achieved a reliability result of 0.758, also considered good.

Based on the reliability analysis outcomes, all items are deemed acceptable and reliable for evaluating the variables, surpassing the established threshold of 0.60 for consistency reliability measures.

In addition to assessing the reliability of the variables, it's crucial to contextualize these findings within the broader scope of digital poverty. While the reliability analysis highlights the robustness of the measures used to evaluate community development and its contributing factors, it's essential to acknowledge the potential impact of digital poverty on these variables.

Digital poverty, characterized by limited access to or proficiency in digital technologies, can significantly influence individuals' and communities' abilities to engage effectively online. Certainly, individuals facing digital poverty often encounter significant barriers that impede their full participation in online civic engagement and utilization of online community capabilities. Evidence suggests that limited access to reliable internet connections is a primary challenge for individuals affected by digital poverty. According to a report by the Alliance for Affordable Internet (A4AI), approximately half of the global population lacks access to the internet, with the majority residing in low-income countries where internet costs remain prohibitively high (Alliance for Affordable Internet, 2020). Moreover, even when internet access is available, disparities in connection quality and reliability persist, particularly in rural and underserved areas.

Furthermore, the lack of digital literacy skills exacerbates the challenges faced by individuals experiencing digital poverty. Research conducted by the Pew Research Center found that a substantial proportion of adults in the United States lack basic digital skills necessary for navigating online platforms and engaging in online activities effectively (Anderson & Kumar, 2021). Without adequate digital literacy, individuals may struggle to access relevant information, communicate with others, and participate in online discussions or community initiatives.

Overall, these challenges underscore the importance of addressing digital poverty to ensure equitable access to online civic engagement opportunities and online community capabilities. Efforts to bridge the digital divide through initiatives such as affordable internet access programs, digital skills training, and community-based support networks are essential for promoting inclusivity and enabling meaningful participation in the digital sphere.

Therefore, while the reliability of the variables related to community development is established, it's imperative to recognize the potential disparities in online engagement and participation that may arise due to digital poverty. Addressing digital poverty and ensuring equitable access to digital resources and skills development programs are essential steps in promoting inclusive community development initiatives.

The findings of the study indicate that engaging in Despite a correlation coefficient of 0.305 not being exceptionally strong, the finding of a positive correlation between online social trust and community development within maritime communities holds significance. In these communities, characterized by geographical dispersion and physical isolation, online platforms serve as crucial avenues for fostering connections, communication, and collaboration among members.

Table 2: Results of Pearson's Correlation Analysis.

	CD	ST	SN	CE	CC	CR
CD	1	.305**	.427**	.563**	.421**	.442**
ST		1	.511*	.384**	.253**	.282**
SN			1	.577**	.418**	.316**
CE				1	.295**	.275**
CC					1	.332**
CR						1

Note: CD=Community development, ST=Onlie social trust, SN=Oline social networks, CE=Online civi engagement, CC=Online Community Capabilities, CR=Online Community Resilience. ** Correlation significant at the 0.01 level (2-tailed).

Source: Author.

This finding suggests that engaging in online interactions plays a meaningful role in cultivating social trust, a cornerstone of blue social capital. The ability to develop social trust through online channels is particularly valuable in maritime settings, where traditional face-to-face interactions may be limited by geographical constraints. Furthermore, the citation of Strand (2020) reinforces the significance of this finding by highlighting the robust avenues provided by online platforms for community engagement and support, thereby adding credibility and contextual relevance to the correlation observed. Overall, while the correlation coefficient may not be high, the finding underscores the potential of online interactions to contribute positively to the development and resilience of maritime communities.

However, it's crucial to acknowledge the impact of digital poverty, characterized by limited access to digital tools and resources due to economic or social disparities, on participation in these online interactions. Furthermore, the practical significance of ICT-driven trust and cooperation is evident in the increased collaboration and mutual reliance among maritime community members. As trust deepens, it becomes a catalyst for productive collaborations and strengthened relationships, ultimately fostering greater community cohesion. The correlation coefficient of 0.563 between online civic engagement and community development underscores the tangible connection between active online participation and subsequent community growth.

Digital poverty also can act as a barrier to meaningful civic engagement within maritime communities. Individuals facing digital poverty may struggle to access online platforms where civic discussions occur or lack the digital skills necessary to contribute effectively to community initiatives (Norris (2001). Efforts to address digital poverty through initiatives such as digital skills training programs or community-based internet access projects can empower marginalized members to participate more actively in civic engagements, thereby strengthening social bonds and fostering community development.

The study also emphasizes ICT's crucial role in fostering active civic engagement within maritime communities, evident through correlation coefficients that highlight the strength of these links. Online platforms provide spaces for unrestricted expression, dynamic participation in discussions, and contributions to community concerns – a practical reality rather than

just a theoretical concept (Dhawan, 2020).

However, digital poverty can exacerbate existing inequalities in access to these online platforms and limit the participation of marginalized individuals in civic activities. Efforts to address digital poverty by providing affordable internet access and enhancing digital literacy can democratize access to online civic spaces and ensure that all community members can contribute to collective decision-making processes.

Additionally, the data analysis reveals a moderate positive relationship between online community capabilities (CC) and community development (CD) with a correlation coefficient of 0.421. This suggests that communities with stronger online community capabilities are more likely to exhibit higher levels of community development, highlighting the positive impact of effective digital platform utilization for building social networks, trust, and collaborative actions.

Similarly, the correlation coefficient of 0.442 between online community resilience (CR) and community development signifies a moderate positive relationship. This implies that communities demonstrating greater online community resilience are more likely to experience higher levels of community development. Importantly, the results for CC and CR are relatively close, indicating the similar influence of both online community capabilities and resilience on community development.

In both cases, these findings underscore the importance of online community strengths in fostering community development, highlighting the valuable role of digital platforms in facilitating community growth and resilience. However, it's essential to recognize that communities facing digital poverty may struggle to harness the full potential of digital platforms for building community capabilities and resilience. Efforts to address digital poverty by providing access to digital resources and supporting community-led initiatives can enhance the capacity of marginalized communities to leverage digital platforms effectively for community development (Sanders & Scanlon, 2021).

7. Discussion on Research Problem.

The research problem introduced leads to various critical issues in the context of digital poverty and community development within maritime communities. In this discussion, we will delve into the implications of the research problem and explore some aspects that need to be considered.

Firstly, it is important to understand that digital poverty not only affects access to digital technology but also leads to imbalances in digital skills and literacy (James, 2019). This has a negative impact on participation in online interactions and the use of digital platforms for community development. In the context of maritime communities, where dependence on digital technology is increasing for communication, trade, and development, digital poverty can hinder the community's ability to progress.

Secondly, the issue of digital poverty also affects the formation of social capital within maritime communities. Social capital, which encompasses the concept of social networks, trust, and shared norms, is a critical foundation for effective cooperation and community development Matthews (2015). However, the imbalance in digital access and skills leads to imbalances in social capital formation, exacerbating the gap between individuals and groups within the community.

Furthermore, the implications of digital poverty on community development are also significant to understand. Digital poverty can hinder community development efforts in several ways, including impeding participation in development processes, reducing access to information and resources, and inhibiting innovation and progress within the community.

Therefore, in investigating the issue of digital poverty and community development in the context of maritime communities, it is essential to better understand how the interaction between digital poverty, social capital formation, and community development occurs. A holistic and integrated approach that considers the diversity of factors influencing the situation, including social, economic, cultural, and political factors, is needed to better understand the challenges and opportunities in developing inclusive, resilient, and exceptional maritime communities in the digital era.

Conclusions.

In conclusion, this study has provided valuable insights into the intricate relationship between Information and Communication Technology (ICT) and blue social capital within maritime communities, particularly in the context of digital poverty. By integrating perspectives from Social Capital Theory and Communication Technology Theory, we have illuminated the profound impact of ICT on shaping the dynamics of blue social capital within communities facing digital disparities.

The findings underscore the significant role of ICT in strengthening blue social capital within maritime communities grappling with digital poverty. Through strategic utilization of ICT, resilient relationships and collaborations are fostered, transcending geographical barriers, and nurturing the growth of social capital. Online interactions facilitated by ICT platforms play a pivotal role in shaping social trust, promoting collaboration, and reinforcing community cohesion, even amidst digital inequalities.

Furthermore, ICT empowers maritime communities by providing access to essential information and resources, enriching collective knowledge, and enhancing decision-making capacities. Active civic engagement facilitated through ICT channels empowers community members to contribute meaningfully to discussions and initiatives, fostering a sense of ownership and belonging.

The integration of ICT emerges as a key driver for enhancing blue social capital amidst digital poverty, strengthening the social fabric, and laying the foundation for sustainable community development. This study provides compelling evidence of the significant influence of ICT on blue social capital, reaffirming established theories and highlighting the positive outcomes of ICT in empowering communities.

By aligning theoretical frameworks with empirical findings, this study underscores the importance of strategic ICT utiliza-

tion in advancing blue social capital within maritime communities, particularly those grappling with digital poverty. It emphasizes the transformative potential of ICT in addressing social inequalities and fostering inclusive development pathways for maritime communities.

These insights hold valuable implications for policymakers and practitioners, highlighting the need for targeted interventions aimed at leveraging ICT to drive sustainable development and promote social inclusion in maritime communities. By prioritizing ICT infrastructure development, digital literacy programs, and community-based ICT initiatives, policymakers and practitioners can effectively harness the power of ICT to address social disparities, strengthen community resilience, and foster equitable development in maritime regions.

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