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Full-Length Research Article

Fostering Community Participation: The Role of Forestry Extension Officers in Maximizing Social Capital for National Park Conservation

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ABSTRACT

The lack of community involvement poses a significant obstacle that may impede the achievement of success in the conservation partnership program between the Mount Merbabu National Park (MMNP) authority and the local community. This study serves a purpose and presents a new approach by investigating the impact of human and social capital on community engagement in the conservation partnership program, with the mediation of the extension worker's role. This location was determined using a purposive method, focusing primarily on three villages surrounding MMNP, Indonesia. The sampling technique employed was simple random sampling, where 30 respondents were chosen from each village, resulting in a total sample size of 90 respondents. This study examines the variables using the Structural Equation Model (SEM) - Partial Least Squares (PLS) approach. Social capital has a positive and significant impact on community engagement through forestry extension workers, while human capital does not affect community conservation partnership involvement through the same workers. This study recommends enhancing social capital to increase community participation in conservation initiatives. Forestry extension officers should improve communication, social networks, and environmental competency to encourage greater community involvement in environmental protection.

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1. Introduction

Conservation partnership programs are implemented to protect the environment, such as at the Mount Merbabu National Park Office (MMNPO) in Boyolali Regency, Central Java. Since 2019, the MMNPO has collaborated with local communities near the forested region to actively participate in the conservation partnership initiative (Nur 2021). The active involvement of the community plays a crucial role in the program's success as it fosters collective awareness, understanding, and concern for environmental preservation (Hartanto et al. 2019). Nevertheless, the limited level of involvement poses a significant obstacle that may impede the accomplishments of the conservation partnership initiative (Esthi et al. 2022). Hence, it is imperative to exert substantial endeavors to enhance public consciousness, impart knowledge about the merits of conservation, and offer incentives that can motivate enthusiastic engagement in this program (Muttaqin et al. 2019). The success and positive impact of environmental sustainability at MMNP

can only be achieved through robust participation and effective collaboration among relevant stakeholders in the conservation partnership program (Tadesse et al. 2021).

In conservation partnership programs, community involvement can be enhanced by leveraging the crucial assets of human and social capital (Simmons et al. 2020). Human capital encompasses the acquisition of knowledge, skills, and proficient decision-making capabilities concerning conservation matters (Ahmed and Wang 2019). People can be fully involved in this program and make helpful efforts if they fully understand why conservation is important and how it helps society (Zhang et al. 2021). Furthermore, social capital can serve as a potential supporting element, encompassing the interconnected network of social relationships possessed by individuals or groups (Auer et al. 2020). Communities can learn from one another and pool their resources through this network, increasing their engagement and effectiveness in conservation partnership programs (Irawan et al. 2022). Through a conservation partnership program, environmental awareness, knowledge, and community involvement can be expanded through the strategic application of human and social capital (Carmen et al. 2022).

Forestry extension officers play a crucial role in implementing the forest conservation partnership program in the MMNP area, encompassing economic, social, and environmental aspects. From an economic standpoint, forestry extension officers offer essential guidance and training to local communities on sustainable opportunities, such as environmentally conscious forest management practices and the cultivation of high-value forest products (Sheppard et al. 2020). Regarding social impact, forestry extension officers play a vital role in facilitating effective communication and dialogue among the government, local communities, and other relevant stakeholders to foster understanding and promote harmony when implementing partnership programs (Ribeiro et al. 2020). From an environmental standpoint, forestry extension officers are also responsible for raising awareness about the significance of forest conservation and closely monitoring the ecological impact of human activities (Pritchard and Brockington 2019). The active involvement of forestry extension officers in the forest conservation partnership program is expected to lead to effective implementation, sustainable economic advantages, enhanced social welfare for the community, and environmental protection in the MMNP area (Arce 2019).

This study specifically explores how human and social capital impact community participation in the conservation partnership program, with the mediation of extension officers' role. The uniqueness of this research lies in its approach of integrating these factors and recognizing the role of extension officers as mediators in the connection between human capital, social capital, and community participation. Therefore, this study provides a more comprehensive understanding of the elements influencing community participation in conservation partnership programs. Furthermore, the findings of this study are anticipated to considerably enhance community engagement in the conservation partnership program by providing recommendations to relevant stakeholders.

2. Materials and Methods

2.1. Research Location

The methodology employed a purposive approach to determine the locations, specifically targeting three villages: Jeruk Village in Selo, Boyolali; Jagonayan Village in Ngablak, Magelang; and Tajuk Village in Getasan, Semarang. This selection was made intentionally to ensure a

representative sample across different regions within the research scope. The villages were intentionally chosen considering specific factors, including their significant conservation potential, susceptibility to environmental changes, and active participation in the conservation partnership program (Murniati et al. 2022). By employing a purposive approach, the researcher can direct their attention towards villages possessing pertinent attributes, thus enabling a comprehensive exploration of community involvement within that context. Research location is shown in Fig. 1.

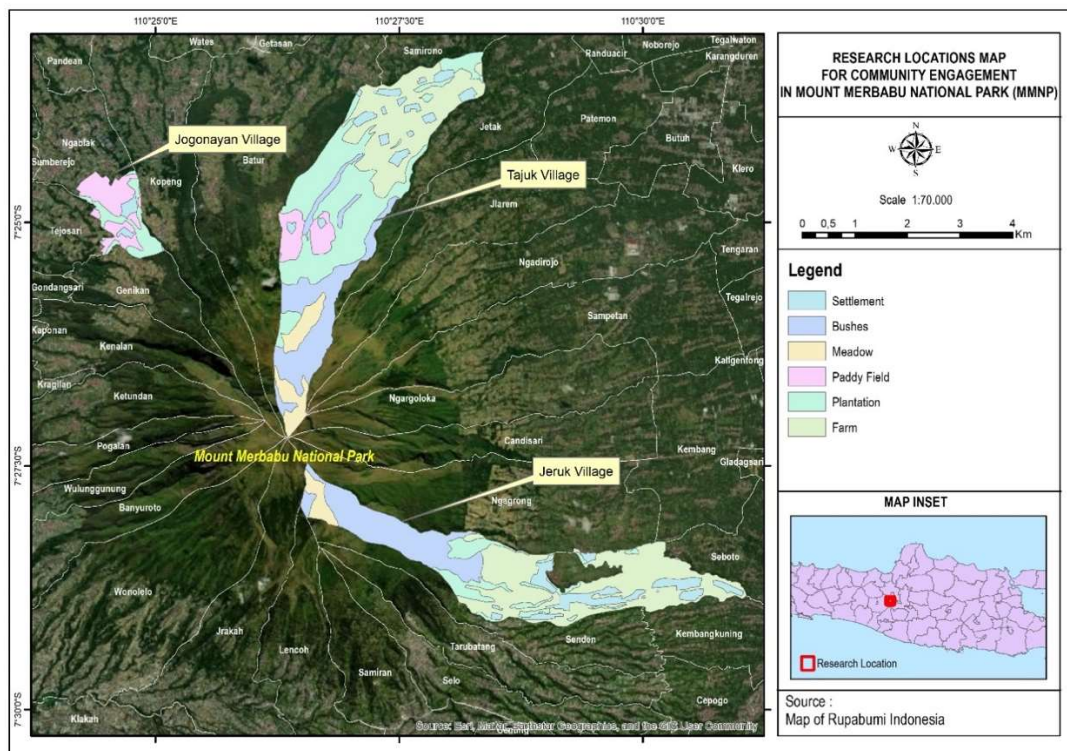


Fig. 1. Research location.

2.2. Respondent

The study's population comprised individuals who were part of farmer organizations residing in three villages, presumed to engage in agricultural practices that intersect with the authority of the MMNP. The selection of farmer groups as the study population was based on their significant involvement in agricultural activities within the area (Muharam et al. 2020). The sampling technique employed was simple random sampling (Hariadi and Widhiningsih 2020). A total of 90 respondents were selected, with 30 chosen from each village. The selection of respondents aimed to capture the diversity of experiences and perspectives within farmer groups in each village concerning the conservation partnership program (Idrus et al. 2019). Through the data collected from this sample, the study aims to present a comprehensive overview of community involvement in the conservation partnership program across the three villages (Sirimorok and Rusdianto 2020). This will enable the findings to inform the development of more suitable and sustainable policies in the three villages so that the results can be used to make more appropriate and sustainable policies.

2.3. Data Collection

For this research, data collection was conducted using surveys, interviews, and observation. Survey techniques involve gathering data by distributing questionnaires to respondents (Bac

2016). The questionnaire is methodically structured to gather pertinent information regarding the community's involvement in the conservation partnership program (Damastuti and de Groot 2019). Furthermore, interviews were carried out with multiple members of farmer groups and affiliated stakeholders to gain a deeper and more comprehensive understanding of their perspectives, experiences, and perceptions of the program (Purnomo et al. 2022). Moreover, observational methods are employed to directly observe community activities and interactions within the framework of the conservation partnership program (Putraditama et al. 2021). By using all three methods together, we hope to get complete and accurate data that will give us a more comprehensive understanding of how the people in all three villages participate in the conservation partnership program.

2.4. Data Analysis, Research Variables, and Indicators

The relationship between research variables (**Table 1**) was examined in this study using the SEM-PLS analysis method. The research model organizes the relevant indicators associated with the construct (Sarstedt et al. 2019). SEM-PLS is employed as a statistical instrument to examine the intensity of the relationship between these variables and to detect factors that notably impact community engagement in conservation partnership programs. This study uses PLS to understand better what affects people's involvement in their communities and to find the variables that have the most impact on increasing participation.

Table 1. Research variables and indicators

| Variable | Indicator | Explanation |
|---|-----------|--|
| Human capital (HC) | HC1 | The level of education/knowledge (Ardoin et al. 2020). |
| | HC2 | Communication and negotiation skills (Rahman et al. 2021). |
| | HC3 | A person's competence in environmental and conservation issues (Takala et al. 2021). |
| Social capital (SC) | SC1 | Community social networks (Savari et al. 2020). |
| | SC2 | Trust (Tiebel et al. 2021). |
| | SC3 | Social norms and values (Landmann and Rohmann 2020). |
| Extension officer's role (ER) | ER1 | Forestry extension officers play the role of facilitators within the community (Wong et al. 2020). |
| | ER2 | Forestry extension officers play the role of mediators within the community (Rizzolo et al. 2021). |
| | ER3 | Forestry extension officers play the role of motivators within the community (Soe and Chang 2019). |
| | ER4 | Forestry extension officers play the role of organizers within the community (Santika et al. 2019). |
| Community participation in conservation partnership programs (CP) | CP1 | The rise in the participation of communities in conservation partnership programs (Falcone et al. 2020). |
| | CP2 | Public awareness of environmental and natural resource conservation has increased (Soe and Chang 2019). |
| | CP3 | The community and MMNPO collaborated more on conservation partnership programs (Meijaard et al. 2020). |
| | CP4 | The impact of community participation in conservation partnership programs on behavior change and sustainable natural resource use increased (Garrett et al. 2021). |
| | CP5 | The level of community engagement in overseeing the enforcement of policies related to environmental and natural resource conservation has been elevated (Erbaugh 2019). |

This study explores the correlation between human capital variables, social capital, the involvement of extension workers, and engagement in conservation partnership programs. To accomplish this objective, we developed and assessed seven hypotheses to enhance our comprehension of the factors that affect community involvement in conservation partnership programs. The organization of the seven hypotheses is as follows:

H1: Human capital (HC) influences the extension officer's role (ER),

H2: Social capital (SC) influences ER,

H3: HC influences community participation in conservation partnership programs (CP),

H4: SC influences CP,

H5: ER influences CP,

H6: HC influences CP mediated by ER, and

H7: SC influences CP mediated by ER.

3. Results and Discussion

3.1. Partial Least Squares (PLS) Algorithm Test Result

Partial Least Squares (PLS) analysis is employed in conducting multivariate analysis to investigate the correlation between independent and dependent variables in research (Rish et al. 2023). PLS offers a distinct advantage in addressing the challenges associated with intricate interrelationships among variables and can effectively establish connections by incorporating additional variables as mediators (Sarstedt et al. 2020). Within the realm of research, PLS proves valuable by aiding in the identification and examination of the impact exerted by independent variables such as human capital, social capital, and the involvement of extension officers on the dependent variable, namely, community engagement in conservation partnership programs (Llanos-Contreras et al. 2021). By employing the PLS methodology, this study can investigate and gain insights into the intricate interplay among these variables and examine whether the mediating variable operates as a catalyst in shaping the association between the independent and dependent variables (Alazmi and Alenezi 2020).

Based on **Fig. 2**, the outcomes of the PLS algorithm assessment demonstrate that the outer loading value of all research indicators surpasses 0.70, indicating that the constructs measured in this study possess a high level of credibility (Hair et al. 2019). The outer loading measures the degree to which indicators can effectively represent the measured variable (Violinda and Jian 2016). When the outer loading value is high, it indicates a strong association between the indicators and the constructed variable, thereby establishing them as reliable and effective measurement tools (Akkaya and Qaisar 2021). Therefore, these findings instill confidence in the validity of the measurement instruments employed in the research, demonstrating their adequacy in assessing the variables under investigation.

3.2. Reliability and Validity Test Result

The subsequent phase of the study involves evaluating the reliability and construct validity of the four variables by verifying the fulfillment of the designated criteria. This procedure is crucial to guaranteeing that the variables in the study possess a heightened level of reliability and effectively capture the concept under investigation (Dzin and Lay 2021). By conducting tests on

the construct’s reliability and validity, this research will instill greater confidence in the obtained results and conclusions (Hair et al. 2020).

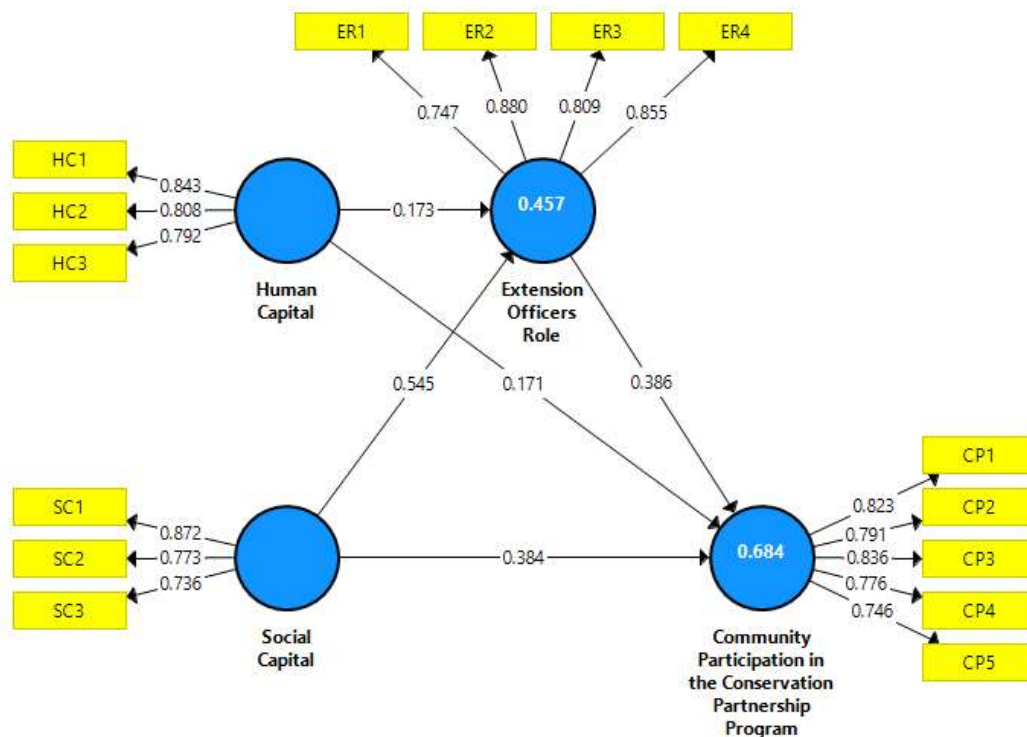


Fig 2. PLS algorithm test result variable HC, SC, ER, and CP.

The following are the guidelines proposed by [Setiaman \(2020\)](#) to assess the reliability and validity of constructs related to HC, SC, ER, and CP variables and indicators:

1. To ensure that the items align with the construct being tested, the cross-loading value is recommended to surpass 0.70.
2. A Cronbach’s Alpha (CA) value greater than 0.70 is advised to indicate the instrument’s reliability in accurately measuring the intended construct.
3. A Rho_A value exceeding 0.7 indicates high instrument reliability and suitability for analysis.
4. A Composite Reliability (CR) value above 0.70 is recommended, signifying good construct reliability and suitability for data analysis.
5. The Average Variance Extracted (AVE) value should exceed 0.50, indicating that the variable used as a construct indicator can account for at least 50% of the variation in the construct being tested.
6. An R Square value (R^2) greater than 0.67 suggests a strong predictive model, while R^2 values ranging from 0.33 to 0.67 indicate moderate predictive potential, and R^2 values less than 0.33 indicate a weak predictive model.

Table 2 shows that the variables and indicators of HC, SC, ER, and CP fulfill all the suggested criteria. The cross-loading values on all indicators surpass 0.70, suggesting that the items are compatible with the tested construct. The CA value for each construct surpasses 0.70, signifying a dependable level of instrument reliability. Rho_A, too, surpasses 0.70, indicating the instrument’s high reliability. Moreover, the CR value exceeds 0.70, signifying favorable construct reliability. The AVE surpasses 0.50 as well, suggesting that the variables used as construct indicators can explain a significant portion of the tested construct’s variation. The findings of this

research indicate that the ER variable has an R square value of 0.46, implying that it can account for approximately 45.70% of the observed variations in the dependent variable.

Table 2. Validity and reliability assessments were conducted to evaluate the HC, SC, ER, and CP variables

| Variable | Indicator | Cross Loading | | | | CA | rho_A | CR | AVE | R ² |
|----------|-----------|---------------|------|------|------|------|-------|------|------|----------------|
| | | HC | SC | ER | CP | | | | | |
| HC | HC1 | 0.84 | 0.46 | 0.41 | 0.46 | 0.75 | 0.75 | 0.85 | 0.66 | - |
| | HC2 | 0.81 | 0.37 | 0.34 | 0.49 | | | | | |
| | HC3 | 0.79 | 0.76 | 0.54 | 0.58 | | | | | |
| SC | SC1 | 0.66 | 0.87 | 0.56 | 0.60 | 0.70 | 0.71 | 0.83 | 0.63 | - |
| | SC2 | 0.46 | 0.77 | 0.54 | 0.66 | | | | | |
| | SC3 | 0.49 | 0.73 | 0.47 | 0.52 | | | | | |
| ER | ER1 | 0.33 | 0.29 | 0.74 | 0.29 | 0.84 | 0.88 | 0.89 | 0.68 | 0.45 |
| | ER2 | 0.54 | 0.74 | 0.88 | 0.70 | | | | | |
| | ER3 | 0.43 | 0.46 | 0.80 | 0.67 | | | | | |
| | ER4 | 0.43 | 0.54 | 0.85 | 0.60 | | | | | |
| CP | CP1 | 0.62 | 0.61 | 0.41 | 0.82 | 0.85 | 0.85 | 0.89 | 0.63 | 0.68 |
| | CP2 | 0.53 | 0.71 | 0.60 | 0.79 | | | | | |
| | CP3 | 0.33 | 0.50 | 0.56 | 0.83 | | | | | |
| | CP4 | 0.49 | 0.49 | 0.56 | 0.77 | | | | | |
| | CP5 | 0.53 | 0.62 | 0.72 | 0.74 | | | | | |

On the other hand, the CP variable demonstrates an R square value of 0.68, signifying its capability to account for 68.40% of the observed fluctuations in the dependent variable. Therefore, both the ER and CP variables make substantial contributions in explaining the variability of the dependent variable. The strength of this model is moderate for the ER variable as the R square value falls within the 0.33–0.67 range, while it is high for the CP variable since the R square value surpasses 0.67. The findings of this research validate the crucial role of ER and CP in analyzing the dependent variables under investigation.

3.3. Direct and Indirect Effect Test Result

Subsequently, the researchers examined both the direct and indirect impacts of the relationship model, elucidating the connection between the independent and dependent variables and the influence wielded by predetermined mediator variables (Pour et al. 2023). Researchers employed the SEM-PLS method to analyze the intricate connections among these variables. The objective is to acquire a more profound comprehension of the mechanisms governing the relationships between variables and to obtain fresh perspectives on both direct and indirect impacts within the investigated model (Tong et al. 2023).

According to **Table 3**, community human capital has no significant impact on the role of forestry extension officers. Nevertheless, community social capital significantly influences the role of forestry extension officers. Moreover, community participation in the conservation partnership program is significantly influenced by both human capital and social capital factors. Furthermore, the involvement of forestry extension officers plays a significant role in influencing community participation in the program (Lawrence et al. 2020). Nevertheless, upon examining mediators, no

substantial impact was observed regarding the influence of forestry extension officers in connecting community human capital with their engagement in the conservation partnership program. However, in relation to community social capital, the involvement of forestry extension officers significantly influences the correlation between social capital and participation in conservation partnership programs (Auer et al. 2020). These findings suggest that to enhance community engagement in conservation partnership programs, it is crucial to consider human capital, social capital, and the pivotal role of forestry extension workers as fundamental elements in both direct and indirect models.

Table 3. The direct and indirect pathways connecting HC, SC, ER, and CP

| Variable | Original Sample (O) | T Statistics | P Values | Sig. | Hypothetical conclusion |
|------------------------|---------------------|--------------|----------|------|-------------------------|
| <u>Direct effect</u> | | | | | |
| H1: HC → ER | 0.17 | 1.40 | 0.16 | ns | Rejected |
| H2: SC → ER | 0.54 | 6.23 | 0.00 | *** | Accepted |
| H3: HC → CP | 0.17 | 1.98 | 0.04 | ** | Accepted |
| H4: SC → CP | 0.38 | 3.41 | 0.00 | *** | Accepted |
| H5: ER → CP | 0.38 | 4.81 | 0.00 | *** | Accepted |
| <u>Indirect effect</u> | | | | | |
| H6: HC → ER → CP | 0.06 | 1.37 | 0.17 | ns | Rejected |
| H7: SC → ER → CP | 0.21 | 3.66 | 0.00 | *** | Accepted |

Notes: sig = significance, *** = $p < 0.01$ (99% confidence level), ** = $p < 0.05$ (95% confidence level), * = $p < 0.1$ (90% confidence level), and ns = $p > 0.1$ (not significant).

3.4. Community Human Capital Impacts Forestry Extension Officers

According to the findings from **Table 3**, the first hypothesis of this research, which suggests that community human capital affects the involvement of forestry extension officers, is refuted based on the data analysis outcomes. This finding indicates that human capital elements, including knowledge, skills, and community capabilities, have no significant impact on the involvement of forestry extension officers in the present study. The invalidation of this initial hypothesis holds significant implications in comprehending the determinants that affect the involvement of forestry extension officers. Moreover, these findings suggest that other factors hold greater prominence or importance in shaping the role of forestry extension officers. Acknowledging the insignificance of the human capital factor in this context can offer valuable understanding regarding other elements that warrant attention in enhancing the efficacy of forestry extension officers. These may include social, institutional, or local contextual factors that substantially impact community engagement in forest conservation partnership programs.

The findings obtained from field observations concerning the influence of community human capital suggest that the proficiency level of individuals within the community has a minimal effect on the effectiveness and efficiency of forestry extension officers. Factors other than community human capital, such as resource availability, institutional support, and communication channels, have a more significant impact on determining the performance of forestry extension officers. This discovery emphasizes the necessity of transitioning from solely enhancing human capital towards adopting a holistic approach that considers various aspects to enhance the

efficiency of forestry extension officers and promote sustainable development within the forestry sector.

This result contradicts the prior research conducted by [Rahayu et al. \(2020\)](#), which asserted that community human capital can potentially influence the role of forestry extension officers. The skills, knowledge, and education of the people living in a community can be referred to as community human capital ([Tamsah and Yusriadi 2022](#)). In addition, community human capital may encompass the social networks and interpersonal connections established within a community ([Nerfa et al. 2020](#)). Forestry extension officers offer communities technical support and educational resources regarding matters that pertain to forestry ([Maryudi et al. 2022](#)). Forestry extension officers play a crucial role in enhancing forest management practices and advocating for the sustainable utilization of forest resources ([Tajuddin et al. 2019](#)). The level of community human capital significantly influences the role of forestry extension officers. Communities with higher levels of human capital are more inclined to embrace advice from these officers and possess the necessary resources and skills to implement forestry management practices effectively ([Choden et al. 2020](#)).

3.5. Community Social Capital Impacts Forestry Extension Officers

The data in **Table 3** confirms the acceptance of the second hypothesis in this study, which suggests that community social capital plays a significant role in influencing the functions and responsibilities of forestry extension officers. The study's findings revealed a substantial and favorable correlation between the variables under investigation. These results suggest that social networks, beliefs, norms, and values greatly influence community participation in conservation partnership programs. These findings represent critical factors that motivate and mold public consciousness in engaging in conservation endeavors. Moreover, the study also uncovers the pivotal function of forestry extension officers in facilitating, mediating, motivating, and orchestrating collaborative conservation initiatives between the community and the MMNPO. This responsibility positions forestry extension officers as the primary catalysts in enhancing community engagement and fostering effective communication and collaboration among relevant stakeholders ([Lawrence et al. 2020](#)). The findings of this research offer enhanced insights into the various determinants impacting community engagement within the conservation partnership program, as well as highlighting the indispensable role played by forestry extension officers in attaining conservation objectives. The implications derived from these findings underscore the necessity for heightened focus on fostering social networks, enhancing trust, promoting supportive norms and values that foster community engagement, and reinforcing the pivotal role of forestry extension officers in bolstering forest conservation endeavors.

The observations show that the MMNP conservation community's social network includes the local community with specialized knowledge, government bodies managing park management, environmentally focused NGOs providing support, scientists conducting research, and nature enthusiast groups raising awareness. These elements work together synergistically to contribute to the conservation and sustainable management of the park. However, the findings also highlight several obstacles in enhancing the effectiveness of this social network, such as limitations in resources hindering coordination and training efforts, insufficient awareness and education create barriers, conflicts, and tensions that impede collaboration, ineffective communication disrupts coordination and evolving social and economic factors impact participation. Dealing with these

challenges is crucial in fostering a strong and efficient network for the conservation of MMNP. It is not clear what the exact steps are to solve these problems. However, research by [Musakwa et al. \(2020\)](#) suggests that some possible solutions are getting the resources that are needed, raising awareness and education, using information and communication technology (ICT) to improve communication and coordination, resolving conflicts, making partnerships with different groups, and encouraging active community participation and ownership. These measures need to be customized according to the distinctive context of each community and should include community participation to guarantee their effectiveness. The community's firm convictions significantly impact the conservation endeavors within the MMNP concerning the preservation of nature and the protection of the environment. Social norms can serve as a guiding framework for engaging in conservation, preserving the environment, and implementing sustainable resource management practices. Norms like these influence actions like trash management, hunting regulations, and forest fire prevention ([Mahmood et al. 2021](#)). Moreover, community principles such as sustainability, fairness, ecological compatibility, and shared accountability contribute to the protection and preservation of the environment. The community appreciates the natural magnificence, diverse ecosystems, cultural and spiritual significance, and surrounding mountain areas.

The observations made in the field show that communities with lots of social ties, trust, and collaboration are more likely to work well with extension workers. The cohesion within the community amplifies the spread of information, facilitates the sharing of knowledge, and promotes active involvement in forestry initiatives. The study emphasizes the essential importance of community networks in magnifying the influence of officers, suggesting that promoting social capital could serve as a strategic method to enhance the effectiveness of forestry extension programs.

This finding is consistent with the prior study by [Poudyal et al. \(2019\)](#), stating that community social capital can affect the function of forestry extension officers. Community social capital encompasses interconnected networks, shared norms, and established trust within a community. Community social capital is crucial in enabling collaboration and collective efforts, which are indispensable for successfully implementing sustainable forest management practices. Forestry extension officers are responsible for delivering technical guidance and educational support to local communities regarding matters on forestry. Forestry extension officers aim to enhance forest management practices and advocate for sustainable utilization of forests. According to research, the level of social capital within a community can significantly impact the role of forestry extension officers in various ways. For instance, communities with elevated levels of social capital tend to exhibit greater trust and collaboration with these officers. Additionally, they are often equipped with the necessary resources and expertise to implement effective forestry management techniques.

3.6. Community Human Capital Affects Conservation Partnership Program Participation

According to the findings obtained from data analysis, the acceptance of the third hypothesis in this study is supported, as indicated in **Table 3**. This hypothesis suggests that community human capital significantly influences their engagement in the conservation partnership program. The study's findings demonstrate a noteworthy and favorable correlation between human capital and community engagement in the conservation partnership program. This discovery affirms that

individuals with higher levels of education, effective communication abilities, and extensive environmental knowledge exhibit greater levels of participation in conservation endeavors. Furthermore, the research highlights the commendable accomplishments of the conservation partnership program at MMNP. These accomplishments encompass a surge in participant numbers, enhanced community comprehension, enhanced collaboration among relevant stakeholders, and tangible positive outcomes resulting from the program. In addition, the significance of the part that the community plays in the policy monitoring process is receiving a growing amount of attention (Olalekan et al. 2019). The outcomes of this research offer a more comprehensive comprehension of the elements that impact community involvement in the conservation partnership program and present solid substantiation of the program's accomplishment at MMNP. These discoveries indicate the significance of cultivating and fortifying human capital to amplify community engagement in conservation partnership initiatives and to uphold and amplify the triumph of such programs through enhanced cooperation, profound comprehension, and vigorous community participation in policy oversight.

Based on the field surveys, nearly 72% of people living near the conservation area have only completed primary school. This data presents possible difficulties if not promptly addressed. Various approaches can be implemented to enhance the education standard. Initially, it is vital to improve the accessibility of education across various social groups, guaranteeing its availability to all. Next, enhancing educational quality through training and practical learning opportunities can significantly enhance students' knowledge and skills. Thirdly, emphasizing gender equality in education is crucial, ensuring equal opportunities for both boys and girls. Finally, securing adequate funding for educational resources like infrastructure, textbooks, educational technology, and essential facilities is critical to providing a conducive learning environment. These initiatives can reduce educational gaps and educate the community, improving conservation efforts over time (Gill et al. 2019).

The field observations highlight the necessity of improving communication endeavors, as 68% of the community members concur with this evaluation. Developing strong collaboration for the preservation of protected forest areas requires essential communication skills for forestry extension officers and the local community. Engaging in effective communication involves attentively listening to comprehend the needs, concerns, and perspectives of the community regarding the conservation of the protected forest (Wilkes-Allemann et al. 2021). The vitality of clear and understandable information dissemination, free from technical jargon, is underscored in building an inclusive relationship between extension officers and the community. Empowering locals with the necessary knowledge and skills is essential for fostering active conservation participation, and possessing negotiation and persuasion skills is pivotal in addressing differing opinions and interests while facilitating mutually beneficial agreements. Valuing and comprehending the cultural norms and values of the community is crucial for establishing harmonious and sustainable relationships (Huda et al. 2020). Enhancing communication abilities enables extension officers and the community to work together proficiently, ensuring the long-term preservation of the protected forest area.

The findings from field observations indicate an urgent requirement to augment environmental knowledge, with 89% of respondents expressing their agreement with this viewpoint. Environmental knowledge involves comprehending environmental concerns and the influence of human activities on ecosystems, which is crucial for raising awareness and encouraging sustainable practices. Approaches to tackling this issue involve incorporating

environmental education into school curricula to enhance students' awareness and comprehension of environmental issues. Educational initiatives such as media campaigns, seminars, and workshops are crucial in amplifying public knowledge regarding environmental matters. Promoting awareness within the community about sustainable practices, including waste management, energy conservation, afforestation, and the preservation of natural resources, is of utmost importance. Emphasizing the significance of adopting these practices is vital in ensuring a sustainable future. These measures can potentially elevate educational standards, strengthening communication skills and environmental knowledge within society, thereby contributing to the development of well-informed and environmentally conscious communities (Ullah et al. 2023).

The field observations offer compelling evidence that communities with higher levels of education, skills, and knowledge demonstrate significant enthusiasm and active participation in the program. Individuals with enhanced human capital are more inclined to understand the importance of conservation efforts, effectively express their ideas, and implement sustainable practices. This approach highlights the importance of education and skill development in cultivating a stronger sense of responsibility and dedication among community members toward the conservation partnership initiative. Consequently, this enhances the likelihood of achieving greater success and making a more substantial impact (Santika et al. 2019).

This finding corresponds with prior research conducted by Carmen et al. (2022), which asserted that the human capital of a community can impact its involvement in conservation partnership programs. Community human capital refers to the collective skills, knowledge, and education of individuals in a particular community. It encompasses not only the intellectual capabilities but also the social connections and interactions within the community. Conservation partnership programs are specifically developed to engage communities in preserving natural resources. These programs often offer technical guidance, training, and potentially financial aid to communities. The study suggests that community human capital can significantly influence the level of participation in conservation partnership programs. Communities with greater human capital are more inclined to comprehend the significance of conservation and demonstrate readiness to engage in related activities. Additionally, they are more likely to possess the necessary expertise and knowledge required for active participation in such initiatives.

3.7. Community Social Capital Impacts Their Conservation Partnership Program Participation

The data analysis results support the acceptance of the fourth hypothesis in this study, as indicated in **Table 3**. This hypothesis concludes that community social capital plays a significant role in influencing their engagement in the conservation partnership program. The study results indicate a strong positive correlation between social capital and the level of community engagement in the conservation partnership program. These findings emphasize that when social networks strengthen, trust increases and supportive norms and values are prevalent, leading to a notable increase in community participation within the conservation partnership program. The research conducted by Schweizer et al. (2021) supports these findings, highlighting the vital importance of social capital in promoting enhanced community involvement and emphasizing its relevance in the success of conservation partnership programs. It underscores the influential role of robust social connections, trust, and shared values in motivating and sustaining community participation.

Additionally, the research observations shed light on the successes of the conservation partnership program at MMNP. Significantly, there was a remarkable increase in community participation, demonstrated by their heightened involvement in monitoring policies related to conservation. The program's success is indicated by the heightened community engagement in conservation management. The research conducted by Höhl et al. (2020) corresponds with these findings, highlighting the significant influence of effective conservation partnership programs in enhancing community participation and engagement in monitoring conservation policies. This result further emphasizes the program's effectiveness and the community's involvement in conservation initiatives.

The results of this study are consistent with the research conducted by Savari and Khaleghi (2023) and suggest that social capital plays a role in shaping community involvement in conservation partnership programs. These findings suggest that enhancing social capital is crucial for enhancing community engagement in conservation partnership programs. This finding can be achieved by fostering robust social networks, building and maintaining trust and supportive values, and promoting societal participatory norms.

3.8. Forestry Extension Agents Affect Conservation Partnership Program Community Participation

According to the data analysis results presented in **Table 3**, the findings of this study confirm the acceptance of the fifth hypothesis, which states that the involvement of forestry extension agents has an impact on community participation in the conservation partnership program. The research outcomes reveal a significant and positive association between the contribution of forestry extension officers and the effectiveness of the conservation partnership program at MMNP. These officers play a crucial role as intermediaries, facilitating communication, motivating community involvement, and organizing program-related activities. This position has resulted in higher program engagement, enhanced understanding within the community, increased collaboration among stakeholders, and noticeable positive outcomes. The study by Ullah et al. (2021) validates these results, reaffirming the crucial contribution of forestry extension officers in driving effective conservation programs.

Moreover, recent studies emphasize the increasing active participation of communities in monitoring policies related to conservation, highlighting their vital role in conservation management. These findings validate the substantial influence of forestry extension officers in encouraging community engagement, improving comprehension, fostering collaboration, and endorsing vigilant policy monitoring in conservation partnership initiatives. These results highlight the influential position of forestry extension officers in the planning and executing programs, emphasizing the importance of efficient communication between the community and the National Park Authority to attain sustainable conservation goals. This viewpoint is corroborated by the research conducted by Abukari and Mwalyosi (2020).

Field observations emphasize the significant influence of community social capital on their involvement in the conservation partnership program. Enhanced social connections, trust, and collaboration among community members have heightened their eagerness to participate actively. Additionally, strong social capital enables individuals to gain access to vital information and resources, allowing them to engage effectively in conservation efforts and enhance their ability to make meaningful contributions. Furthermore, strong social connections boost motivation and

dedication, promoting continued engagement, even in difficult circumstances. This data highlights the essential significance of social capital in influencing successful and long-lasting community involvement in conservation programs, a standpoint corroborated by research by [Auer et al. \(2020\)](#).

This outcome aligns with the research by [Sattayapanich et al. \(2022\)](#), affirming that the social capital of communities plays a significant role in influencing their involvement in conservation partnership programs. Communities endowed with substantial social capital generally demonstrate heightened levels of engagement in conservation initiatives. The strengthening of social capital can be achieved through increasing awareness regarding its significance, nurturing trust and cooperation among individuals within the community, and improving accessibility to information and resources necessary for active engagement. These endeavors are anticipated to enhance community involvement in conservation initiatives, resulting in considerable advantages for preserving natural resources.

3.9. Community Human Capital Impacts Forestry Extension Officers Mediate Their Conservation Partnership Program Participation

According to the findings from data analysis in **Table 3**, the hypothesis regarding the impact of community human capital on their engagement in the conservation partnership program, mediated by forestry extension officers, as stated in the sixth hypothesis of this study, has been rejected. The findings of the study showed that the influence of human capital, mediated by forestry extension officers, on the conservation partnership program at MMNP was not statistically significant. No significant correlation was found between the community's level of education, communication skills, and environmental competence and their involvement in the program mediated by forestry extension officers. The inadequate utilization of community human capital by forestry extension officers can be attributed to limitations in their knowledge, skills, or available resources. To tackle this issue, extension agents need to strengthen their abilities by enhancing their communication skills, embracing participatory outreach methods, and gaining a deep understanding of community needs.

Furthermore, the effectiveness of forestry extension officers in conservation partnership programs can be enhanced by establishing trust, promoting collaboration, and maximizing the potential of community members. Forestry extension officers play a crucial role in their capacity as facilitators, mediators, motivators, and organizers. Similarly, [Franco and Tracey \(2019\)](#) emphasized the necessity of enhanced skills and active involvement of the community to advance conservation objectives effectively. They underscored the crucial role that improved competencies and increased engagement play in driving successful conservation efforts.

Field observations underscore diverse impediments that impact community participation in the program. These challenges encompass restricted access to resources, insufficient levels of community education, the absence of empowerment initiatives, constrained responsibilities of forestry extension workers, and inadequate awareness regarding conservation efforts. These intricacies require holistic approaches to ensure meaningful involvement. Strategies include promoting equity in resource distribution, customizing educational initiatives, implementing programs that empower individuals, strengthening the roles of forestry extension officers, and fostering awareness. The previous study conducted by [Cockburn et al. \(2020\)](#) supports these

findings by highlighting the significance of employing multi-faceted approaches to overcome obstacles to community involvement in conservation endeavors.

Several previous research studies both corroborate and question the hypothesis. The study by [Soe and Chang \(2019\)](#) revealed that communities that received forestry extension services exhibited increased engagement in conservation partnership programs. Likewise, research conducted in Central Kalimantan by [Sinta et al. \(2022\)](#) emphasized the crucial significance of forestry extension officers in improving community knowledge and skills in forest management. A study conducted in Papua by [Christmas et al. \(2021\)](#) underscored the role of trust and cooperation building between communities and the government. Nevertheless, particular studies suggest that the impact of forestry extension officers on community participation may not always be significant. Instead, economic, social, cultural, and political factors are shown to play more dominant roles. Research conducted in North Sumatra, South Sulawesi, and North Maluku revealed that economic, social, cultural, and political factors frequently surpassed the impact exerted by forestry extension officers ([Fisher et al. 2019](#)). In summary, forestry extension officers' influence on community engagement in conservation partnership programs varies based on distinct contexts and circumstances. While they can be instrumental in certain instances, their importance may be diminished in others.

3.10. Community Social Capital Impacts Forestry Extension Officers Mediate Their Conservation Partnership Program Participation

The results confirm the acceptance of the seventh hypothesis in this study, suggesting that the community's social capital plays a significant role in influencing their participation in the conservation partnership program through the mediation of forestry extension officers. The research findings demonstrate a strong and positive correlation between social capital and the effectiveness of the MMNP conservation partnership program. This relationship is further enhanced through the intermediary role of forestry extension officers. Factors such as social networks, beliefs, norms, and community values played a pivotal role in enhancing participation and the program's overall effectiveness. Social capital facilitated robust collaborations among communities, forestry officers, and stakeholders, bolstering the program's implementation. The pivotal roles of forestry extension officers as facilitators, mediators, motivators, and organizers further strengthened the impact of social capital on conservation objectives. Through collaborative endeavors, there was a rise in engagement, improved comprehension, collective action, and favorable outcomes in conservation. [Savari and Khaleghi \(2023\)](#) affirmed the crucial significance of social capital and forestry extension officers in promoting community involvement in conservation initiatives.

Field observations highlight the substantial impact of social capital on community engagement in the conservation partnership program, wherein forestry extension officers play a mediating role in this correlation. Robust community social connections enhance trust, collaboration, and shared principles, stimulating increased conservation participation. Forestry extension officers are crucial in disseminating information and facilitating communication, bridging the gap between the community and forestry programs. These findings corroborate previous research conducted by [Qiu et al. \(2021\)](#), reaffirming the crucial contribution of social capital and forestry extension officers in promoting successful community involvement in conservation initiatives.

Prior studies indicate that forestry extension officers play a critical role in conservation endeavors (Pillay et al. 2021). Their duties involve the dissemination of vital information, facilitating efficient communication, and bridging the divide between communities and conservation initiatives. Through the provision of technical knowledge and education, they could empower communities to make well-informed choices regarding forest management, enhance collaboration among stakeholders, and guarantee the effectiveness of forestry extension endeavors. Their multifaceted role emphasizes their importance in promoting comprehension, trust, and cooperative efforts, ultimately leading to sustainable conservation outcomes.

4. Conclusions

The research findings indicate the presence of significant results. Primarily, social capital elements such as social networks, beliefs, norms, and values positively and noticeably impact community engagement in conservation partnership programs. The significance of these aspects highlights the relevance of community cooperation and active engagement in the process of safeguarding and preserving the environment. Second, forestry extension officers' roles as mediators, organizers, motivators, and facilitators positively affect community involvement in the conservation partnership program. Forestry extension officers are crucial in increasing community involvement and comprehension of conservation initiatives and mobilizing and coordinating them. Third, the contribution of forestry extension workers and the concept of social capital are significant for getting more community members involved in the conservation partnership program. However, it has not been shown that the human capital factor significantly affects conservation programs that forestry extension workers mediate. Consequently, forestry extension staff need to be more actively involved in community engagement and make better use of the social capital component if the conservation partnership program is to be more effective. Furthermore, it is suggested that more research be done to fully understand the factors that affect human capital in the conservation context and to investigate the possibility of other factors mediating the relationship between human capital and conservation partnership programs. To better engage the community in protecting our natural resources, this knowledge will shed light on the current situation and provide concrete suggestions for improvement.

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