

Communication Process for Partnership Tree Farming in Markham Valley of Papua New Guinea

RIWASINO John^{1*}, YARAPEA Apoi² and HENSON Michael³

*1,3: PNG Biomass Limited. P.O. Box 173, Lae, Morobe Province,
Papua New Guinea.*

*2: The University of Papua New Guinea
School of Humanities and Social studies,
P.O. BOX 320, University, 134, National Capital District, Papua New Guinea
Corresponding author: Email: jkriwasino@gmail.com

Abstract

Tree farming is necessary for forestry industry that use wood chips to fuel a biomass power plant and contribute towards climate change resilience through carbon sequestration process from planted trees. The research paper discusses communication process for partnership tree farming and further identifies factors affecting communication process in Markham Valley of Papua New Guinea. The research involves both qualitative and quantitative data collection methods. The primary data were collected from the landowners and the main data collection instrument were interview and survey questionnaire. The research randomly selected and interviewed 10% of 150 household units as sample size from the project impact communities of Markham Valley in order to represent the whole population. The field data were processed, analysed and interpreted using Ms excel, Statistical Package for Social Sciences (SPSS) software and NVIVO for quotes or narratives from the landowners.

The research identified infrastructure, socioeconomic and extension service problems as main factor affecting communication processes for tree farming efforts. According to Problem Identification Index (PII), highest ranked problem affecting communication process for partnership project development were; lack of electricity (168) and funding (158), followed by training needs and awareness (155) and then lack of visit by transfer agent problem (154).

On the basis of the findings, this research paper recommends the use of appropriate communication language during communication process. Furthermore, the research recommends for the change of overall message packaging approach to make it more appropriate for the sociocultural context when communicating for partnership tree farming.

Key words: communication process, community development initiatives, forest industry, partnership tree farming, sociocultural context

Introduction

Communication plays an important role for forestry and agricultural development. Communication is a link between the resource, resource owners and the developer. The effective communication brings about positive social change through dialogue, interaction and collective action (FIGUEROA *et al.* 2002, OBREGON and CASANOVA 2019, SERVAES 2008). According to AGUNGA and MANDA (2014), interaction amongst different stakeholders and collective action influence participation, integration and capacity building. This interaction between resource owners, developers and other stakeholders for resource development promotes adoption of new ideas, innovations and technology transfer.

Agroforestry and tree farming practices have been integral parts of livelihood strategies in rural communities of Papua New Guinea. According to ROSHETKO (2013), small holders' agroforestry systems enhance rural livelihoods. The author further added that the smallholder investment in trees is one component of their overall land use and livelihood improvement approach. The ACIAR REPORT (2014) points out that integration of highly valued tree species in agroforestry systems enhances landowner livelihoods in the rural communities of Papua New Guinea. The integrated practice of tree and food crop farming systems have been a motivating factor as a result of income derived from the trees. Although timber trees do also have potential to earn money for the tree planted, little effort has been directed toward this activity. One of the factors that affected agroforestry and tree farming efforts was the lack of communication between the tree farmers and developer.

Tree farming is the partnership project between a developer (PNG Biomass) and the landowners of Markham Valley in Morobe Province, Papua New Guinea. The partnership project involves PNG Biomass as a developer who provides technical expertise including financial capacity, whereas the landowners provide land resources and labor strength for farm development. However, the communication for tree farming efforts had been affected and influenced by various factors.

The research intended to investigate and identify factors affecting communication process for partnership tree farming project development in Markham Valley. The significance of the research was to identify appropriate communication strategies for advocating and disseminating information about tree farming effort in Markham Valley. The finding from the research shall provide data base about trend of communication issues in Markham Valley and other parts of Papua New Guinea for the researcher, agribusiness entrepreneurs, government agencies and any other interested parties in the field of communication for partnership project development.

The research site and methodology

The research site

The research was conducted at rural communities of Markham Valley in Morobe Province, Papua New Guinea. The primary field data were collected from PNG Biomass project impact communities of Markham Valley (Fig. 1).

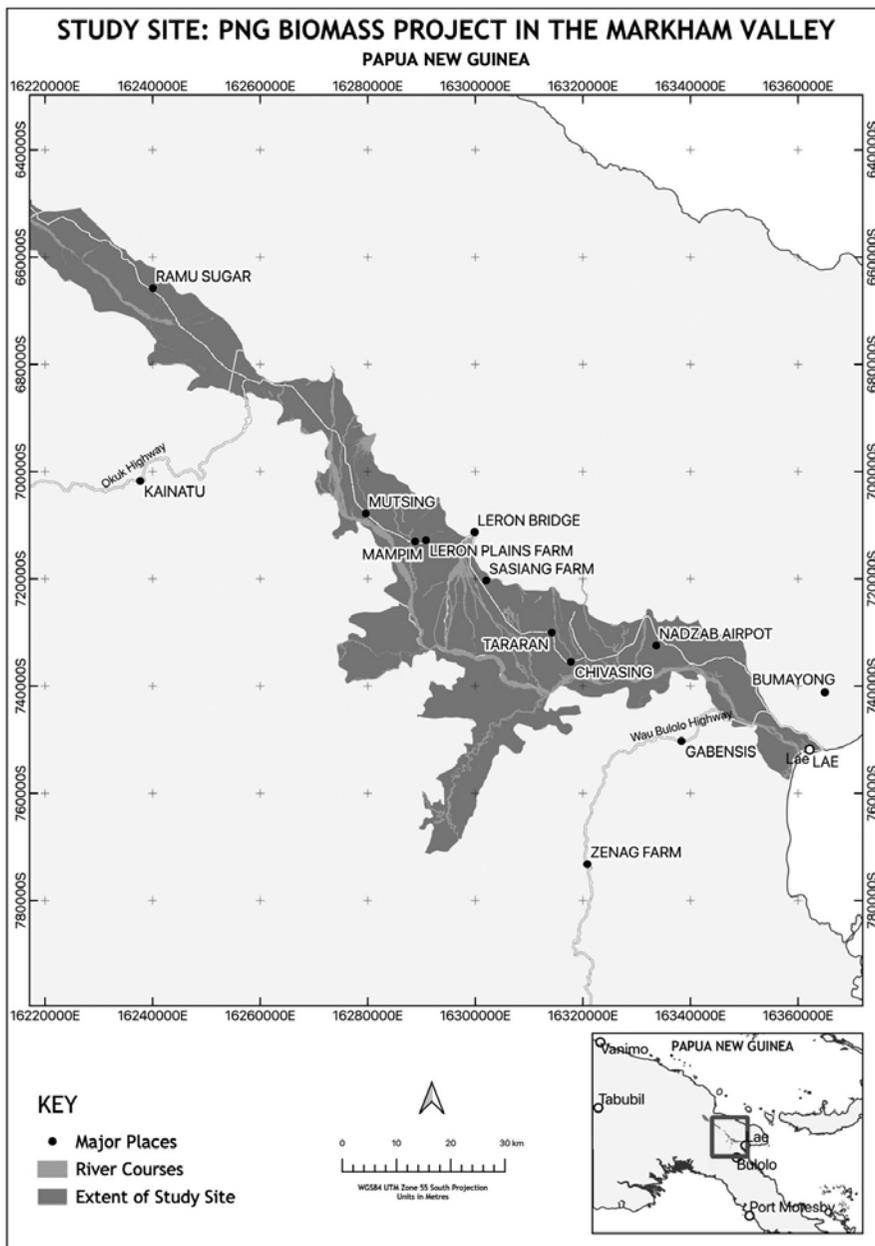


Fig.1 Map shows the PNG Biomass project site and study area in Markham Valley of Morobe Province, Papua New Guinea. Source: PNG Biomass project site profile Map, (DECEMBER 2021)

Markham Valley is located in a strategic location where future commercial farming activities is conceivable due to fertile land and proximity to coast as Lae is the main industrial hub and shipping port for New Guinea main land and Papua New Guinea.

The research methodology

The research methodology comprise of research design, theoretical concept and conceptual framework, and research method which describe data collection approach.

Research Design

The research involves cross-sectional research design that provides data base for drawing the conclusion to the research problem. The cross-sectional design aims at finding out the prevalence of a phenomenon, situation, problem, attitude or issue by taking a cross section of a population once to give an overall picture (LEVIN 2006).

The sampling strategy in this research was random purposeful sampling technique whereby selected each and individual sample size in an identified population of interest (KULSHRESHTHA 2013, SURI 2011).

The research was aim to sample the rural population of Markham Valley who participated in the partnership tree farming project development. The central focus of the research was to determine different factors affecting communication process.

Theoretical concept and conceptual framework

The attribute theory in communication explains about measure of communication performance and effectiveness of the communication outcome which is deemed to be influenced by the human behaviour competencies (skills) input in the communication process. The theory assertion that attribution provides direction and prediction for the process, action and outcome to become effective in communication during communication process (DELGRECO *et al.* 2021, KWOFIE *et al.* 2014). Fulcrum attribution theory for communication competency (Fig. 2) emphasis about how attributional factors and skills influence and impact the communication competency and overall communication performance (KWOFIE *et al.* 2014).

In similar context, the conceptual framework of communication process for partnership project development was developed by synthesis, both attribute theory in communication

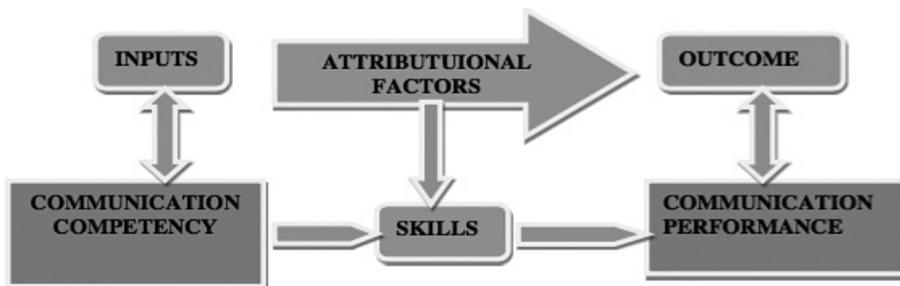


Fig.2 Attribution Theory for Communication Competency. Source: KwofieWet *et al.* (2014)

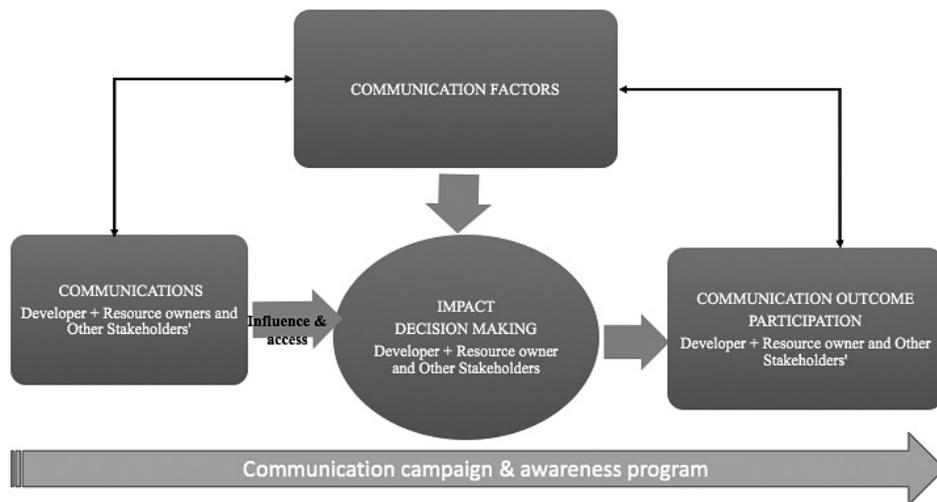


Fig.3 Conceptual Framework of communication process for the partnership project development.

and Fulcrum attribution theory for communication competency. The conceptual framework (Fig. 3) presents communication process for partnership project development whereby it provides strategies towards mitigating and overcoming factors affecting communication process. The framework identifies factors affecting communication process, use of communication campaign to influence behavior and decision making process of the land owners and other stakeholders who involved in the tree farming partnership project development. The outcome of communication process is the improve understanding of tree farming about the importance and benefits and then participation in the partnership project development.

The research method

The research methods were interviews and survey questionnaires. The interview involves both formal and informal approaches. The main aim of interviews was to obtained the interviewees’ stories, views and opinions about factors affecting communication processes for partnership tree farming project development in Markham Valley. The survey questionnaire was another research method for collecting field data from project impact communities. The nature of inquiry for using a survey questionnaire involved both closed and open-end questions. The open-ended questions were classified into categories in which the researcher read through whereby each respondent’s answers and then “coded” it by deciding whether to go into one or another category. In this research, for example, one open-ended question was, “Do socioeconomic factors affect communication process?” If the respondent answered ‘yes’, he or she was required to give a reason. “If yes, how does it affects communication process and the development of tree farming?” (Appx. 1). In the sense, coding actually measured the un-measurable and counted the uncounted in which it converted the qualitative answers to a quantitative measure. Both closed and open-end items were analysed and interpreted in which provided the data base for identifying the factors

affecting communication processes for partnership project development of tree farming in Markham Valley.

The research randomly selected and interviewed 10% of 150 household unit as sample size from the PNG Biomass project impact communities of Markham Valley in order to represent the whole population. The purpose of 10% sampling strategy was to collect the valuable information with minimum cost so that the findings represent the whole population.

Data Analysis

The research employed mixed data analysis techniques to reduce field data to a manageable size. According to DRISCOLL *et al.* (2007:27), mixed data analysis is a process whereby “qualitative data provide an in-depth understanding of survey responses, and statistical analysis that can provide detailed assessment of patterns of responses.” ONWUEGBUZIE and TEDDIE (2003) describe six steps for mixed data analyses: data reduction, data display, data transformation, data consolidation, data comparison and data integration. This research applied the six steps of mixed data analyses whereby the transformed data were consolidated using a formulated formula known as Problem Identification Index (PII).

The data were consolidated and analysed using the formulae below to determine the factors affecting the communication process.

$$\text{Problem Identification Index (PII)} = \frac{[(NP \times 0) + (LP \times 1) + (MP \times 2)]}{\text{Total number of sample (TNS)}} \times 100$$

Weight: NP= 0 LP = 1 MP = 2
NO Problem (NP); Little Problem (LP); More Problem (MP)

The respondents were asked about the level of problems concerning the factors affecting communication processes by choosing one of the three options: (i) no problem (0), (ii) little problem (1), (iii) more problem (2). The figures in the brackets were the weights assigned to each level. The Problem Identification Index (PII) with the highest value was ranked as first; next highest as second and so on in a descending order to the lowest.

The field data collected through interview and survey questionnaires were analysed, processed and interpreted using spread sheets on MS Excel and MS Word as well as Statistical Package for Social Sciences (SPSS) software and NVIVO for quotes or narratives from the landowners. The coding system was applied in which it converted qualitative answers to quantitative measurements. The field data were interpreted through computing process that provides finding to the research.

Results and discussion

The research provides findings and discussed the factors affecting communication processes for partnership tree farming project development in Markham Valley.

Factors affecting communication processes for partnership project development

The research was based on personal, socio-cultural, socio-economic, infrastructure and extension services problems that affects communication processes for partnership project development of tree farming in Markham Valley of Morobe Province, Papua New Guinea.

Personal problems

The two main personal problems that the research investigated were lack of education and literacy, and then language barriers. Table 1 presents personal problem affecting communication processes for partnership project development. The finding shows that lack of education and literacy ranked first and scored highest with 138 on Problem Identification Index (PII). This was due to the fact that low literacy and education level contributed towards the landowners lack of understanding. In other words, most landowners were found to be illiterate and the message about importance of tree farming was not clear to them for better understanding and participation in the communication process of tree farming. CANO and BANKSTON (1992) point out that lack of education and literacy limit the understanding of people and further contributes towards non-participation of people in forestry activity.

Another reason for the landowners not willing to participate in communication for tree farming was due to fear over social change from the development projects, particularly the introduction of technology (new ways of farming system) and innovation in farming practices. For example, the landowners of the Markham Valley assumed and feared that innovation might influence and affect their social and cultural norms. Further, the landowners assumed that innovations might affect the old practices of agricultural farming system and reduce income levels. LUNENBURG (2010) emphasizes that individual person may come up with different perceptive, knowledge, belief and opinion toward development project. These fears and presumption about negative impact of tree farming initiative and development can be reduced by educating the landowners through awareness and training programs. According to CROWLEY *et al.* (2017), farmers training must base on farmers need and abilities and also on improving effective communication.

The language barrier ranked second and scored 119 on problem identification index (Table 1). This result shows that language barrier affects communication process for

Table 1. Personal problems affecting communication processes.

Personal Problems	No Problems	Less Problems	More Problems	Problem Identification	
				Index (PII)	Rank
<i>Lack of education and literacy</i>	30	77	47	138	1
<i>Language barriers</i>	51	51	52	119	2

$$\text{Problem Identification Index (PII)} = \frac{[(\text{NP} \times 0) + (\text{LP} \times 1) + (\text{MP} \times 2)]}{\text{Total number of sample (TNS)}} \times 100$$

Weight: NP= 0 LP = 1 MP = 2
No Problem (NP); Less Problem (LP); More Problem (MP)

partnership project development. The language barrier was found between national and local language, how information about importance of tree farming can be transmitted in the local context for the local people to understand, accept and adopt the innovation in farming. As HARZING and FEELY (2008) point out, communication fluency is essential during the communication process. In other words, the use of appropriate words, language and dialogue during the conversation and interaction with the landowners is vital to avoid misunderstanding and misinterpretation of the message. In most cases, the culturally acceptable language and dialogue is essential to avoid miss-understanding and misconception about intended message during the communication process for tree farming.

The research through informal interview further reveals that individual persons in the community have their own personnel perspectives and perceptions about understanding and interpretation of the development projects, and also issues that affect their daily needs and challenges. There may be positive response from the landowners when the message about development project feeds their needs and aspirations that address their current problems and challenges. According to VAN RULER (2018), communication as two-way process; with receiver and sender perspective. In other words, the message about tree farming from the sender (developer), must be conveyed through common dialogue or language which the receiver (landowners) shall clearly understand and interpret. BESSETTE (2006) further added that the success of participatory development communication is influenced by information and persuasive approach that facilitate exchange between different stakeholders. The information transmitted by developer (PNG Biomass) to the audience (landowners) must contain messages that emphasise ways to improve current problems and challenges. The approach may influence the landowners' mind-sets to make informed decisions over the use and management of their land resource. KASSER (2009) stress that psychological sustainability can be achieved by satisfying individual needs, addressing their personal wellbeing challenges and enhancing ecological sustainability through sustainable practice of farming entrepreneur. JAPAN INTERNATIONAL CO-OPERATION AGENCY (2009) further emphasizes that leaning to improve skills and knowledge about agricultural innovation can be influenced and motivated by applying innovation to their own situation or current trend of living.

Socio-cultural problems

The socio-cultural problems were tradition and custom, gender inequality and rural power structure as shown on Table 2. The findings show that tradition and custom scored highest, followed by gender inequality and then rural power structure. The tradition and custom was ranked first with the score of 132 on Problem Identification Index (PII). This result indicates that tradition and custom affects communication process, because it influences the land use decision-making process for tree farming. Study by LEE (2003:10) about communication barriers in Health Care stated that "self-centeredness, individual motivation for improvement, and life-style change conflict with the traditional importance of family over self." In other words, the dissemination of information about tree farming opportunities in Markham Valley must consider cultural aspects of the society.

Table 2. Sociocultural problems affecting communication processes.

Sociocultural Problems	No Problems	Less Problems	More Problems	Problem Identification Index (PII)	Rank
<i>Tradition & custom</i>	40	64	52	132	1
<i>Gender inequality</i>	38	72	42	127	2
<i>Rural power structure</i>	51	52	10	65	3

$$\text{Problem Identification Index (PII)} = \frac{[(\text{NP} \times 0) + (\text{LP} \times 1) + (\text{MP} \times 2)]}{\text{Total number of sample (TNS)}} \times 100$$

Weight: NP= 0 LP = 1 MP = 2
No Problem (NP); Less Problem (LP); More Problem (MP)

The second ranked socio-cultural problem that affect communication process was gender inequality with score of 127 on problem identification index (Table 2). This finding shows that decision making power and participation of vulnerable people in the society particularly women were found to be very limited due to traditions and customs norms of the society in Markham Valley. The cultural barrier and limitation for women to participate in decision making affects communication process for tree faming. The informal interview with Ken Kamap of Mangiang village in Markham Valley also reveals that next of kin through blood line had authority over the ownership and the use of resources whereas other external family members such as nephews, tambu’s (brother-in-law or sister-in-law) and cousins do not have rights and decision-making powers about use and benefit of land resources. LUNENBURG (2010) and KHAN *et al.* (2012) point out that cultural heritage, biases and prejudices may contribute towards communication problems.

The rural political structure was third, final and the least sociocultural problem that scored 65 on problem identification index. This result indicates that rural political structure do not have any influence over communication process for tree farming, since most decisions about the use of land were made through collective views by the clan members in an organized meeting. The ACIAR REPORT (2014:22) stress that “use of particular parts of the group’s resource endowment may circulate amongst group members over subsequent cropping cycles.”

Socio-economic problems

In this research, socio-economic indicators were both social and economic conditions that affect communication process of partnership project development. The research investigated three main socio-economic problems which were lack of funding, participation and collaboration. Table 3 represents the socioeconomic problem affecting communication process for partnership tree farming business. Finding indicates that the highly rated socio-economic problem was the lack of funding, followed by the lack of participation and then collaboration. The lack of funding was scored highest and rank first with 158 on Problem Identification Index (PII). This result shows that the main socio-economic problem was funding, in terms of monetary, material and equipment to supports on-going communication

Table 3. Socio-economic problems affecting communication processes.

Socioeconomic Problems	No Problems	Less Problems	More Problems	Problem Identification Index (PII)	Rank
<i>Lacking of funding</i>	18	63	73	158	1
<i>Lacking of participation</i>	47	73	34	118	2
<i>Lack of collaboration</i>	47	67	29	105	3

$$\text{Problem Identification Index (PII)} = \frac{[(NP \times 0) + (LP \times 1) + (MP \times 2)]}{\text{Total number of sample (TNS)}} \times 100$$

Weight: NP= 0 LP = 1 MP = 2
No Problem (NP); Less Problem (LP); More Problem (MP)

process for tree farming. The money was found to be a source of transaction between people and access to modern communication facilities and services. The landowners' needed funding (money) in order to access communication systems and also purchase communication equipment such as mobile phones to communicate and access services. ABAH and PETJA (2015) point out that two of the socioeconomic challenges for agricultural extension development are inadequate access to credit and farm input.

The next socio-economic problem was lack of participation in which ranked second with score of 118 on problem identification index (Table 3). The result indicates that lack of participation caused communication barrier for tree farming effort, because there was no teamwork established amongst the clan members and family units due to fear and uncertainty over the development of the project. Furthermore, most landowners lacked understanding about the importance and the benefits of tree farming. KOCZBERSKI and CURRY (2005) elaborate that change of livelihood is determined by new policies and analytical approaches towards management and use of resource. In other words, proper communication strategies must facilitate the interaction between the developer (PNG Biomass) and the people (the landowner) in order to achieve the diffusion of innovations and the adoption of tree farming practices.

The research reveals that lack of collaboration was the least socioeconomic problem with scoring of 105 on problem identification index (Table 3), because the developer (PNG Biomass) collaborate and consistently improve relation with landowners for tree farming effort.

Infrastructure problem

The research investigated the infrastructure problems which were electricity, communication medium, transportation, roads and bridges as shown on Table 4. The finding shows that electricity was the most common infrastructure limitation followed by communication medium and transportation problems. The lack of electricity ranked first and scored highest with 168 on the problem identification index since most landowners agreed that electricity as the basic household need and livelihood improvement services in the community. COOK *et al.* (2007) stated that rural electrifying is linked to development

Table 4. Infrastructure problems affecting communication processes.

Infrastructure Problems	No Problems	Less Problems	More Problems	Problem Identification Index (PII)	Rank
<i>Electricity</i>	21	16	117	168	1
<i>Communication medium</i>	48	82	24	113	2
<i>Transportation</i>	87	49	18	72	3
<i>Road network</i>	105	27	22	56	4

$$\text{Problem Identification Index (PII)} = \frac{[(NP \times 0) + (LP \times 1) + (MP \times 2)]}{\text{Total number of sample (TNS)}} \times 100$$

Weight: NP= 0 LP = 1 MP = 2

No Problem (NP); Less Problem (LP); More Problem (MP)

prosperity in terms of energy uses and poverty reductions. The research also revealed that most household unit were found to be off-grid the main power transmission line from PNG Power Limited, (the power provider for Papua New Guinea) in Markham Valley. Those populations lived along the grid-line were unable to be connected and access power due to the cost involved in connection and purchase of electrical equipment.

Communication medium was the second ranked infrastructure problem with score of 113 on problem identification index. This was because most landowners do not own and used communication mediums such as television, radio and mobile phones due to high cost involved in the purchase and the use of communication medium. Another reason was due to the unavailability of services in the community. The research also found that most landowner were unfamiliar with the use of mediums as they were uneducated and illiterate (Table 1), and further unable to read and understand the medium.

The transportation systems and road network scored 72 and 65 on problem identification index and they were the least infrastructure problem affecting communication process for partnership project development. The finding shows that there was no significant difference observed between lack of transportation system and road network as both scored below 100 on the problem identification index (Table 4). Both transportation system and road network were classified as least problem due to the fact that most feeder roads network in Markham Valley is being connected and it have very good road condition. Due to improved road condition, transport system is being effective with local people ventured into trucking business that readily available for transportation services. Further, the road network connected with main Highlands highway of Papua New Papua that makes more efficient for access to transportation and other services in Markham Valley.

Apart from the lack of electricity supply to the households, informal interview found that most landowners and rural people in Markham Valley do not access to water supply, health services and public facilities. This shows that landowners lack basic infrastructure developments and services. According to VANCLAY (2004) and JAPAN INTERNATIONAL CO-OPERATION AGENCY (2009), adoption occurs when landowners clearly understand new ideas to help them achieve their personnel goals. In other words, landowners can only participate

Table 5.

Extension Service Problems	No Problems	Less Problems	More Problems	Problem Identification Index (PII)	Rank
<i>Lack of awareness & training</i>	15	86	53	155	1
<i>Lack of visit by transfer agent</i>	15	92	47	154	2
<i>Lack of field trials</i>	25	96	32	138	3

$$\text{Problem Identification Index (PII)} = \frac{[(\text{NP} \times 0) + (\text{LP} \times 1) + (\text{MP} \times 2)]}{\text{Total number of sample (TNS)}} \times 100$$

Weight: NP= 0 LP = 1 MP = 2

No Problem (NP); Less Problem (LP); More Problem (MP)

in development project that is beneficial and contribute towards improving their livelihood. It is therefore important for the developer (PNG Biomass) to identify problems that affect individual livelihoods and then design development projects which would suit their daily needs so that traditional landowners would readily accept new ideas and provide their land for farm development.

Extension services problems

Table 5 presents different extension service problems that affect communication processes for partnership project development. The three main extension service problems investigated were the lack of awareness and training, transfer agent visits, and then field trials. The result shows that lack of awareness and training scored highest with 155 followed by lack of visit by transfer agent with 154 and then lack of field trial with 138 on problem identification index (PII). These results indicate that there was no significant difference observed between all three extension service problems; as most landowners recommended for all extension services to be provided to their respective communities for facilitating tree-farming project. These findings affirm that the landowners wanted developer (PNG Biomass) to provide awareness and training programs about the importance of tree-farming and its benefits. The landowner also wanted vital information about land-use plan must publicized to them in order to make informed decisions about the use and management of the land. According to BLACK (2014) and ZAHRAN *et al.* (2020), agricultural education and extension systems lacks innovation and training needs. SUVEDI *et al.* (2017) added that ongoing efforts in extension education is critical in promoting adoption of more profitable cropping systems. FAO (2016) mentioned that one of the ways of bringing the extension services would be to hold field day visits for the community in order to equip them with knowledge on how to manage their farms. KINGIRI and NDERITU (2014) also stated that on-farm demonstration is one of the extension methods which can be used to actively involve the farmers and by doing so they may take ownership of the program.

The findings from factors affecting communication processes for partnership project development draws conclusion and recommendation to the research study.

Conclusion and recommendations

Conclusion

This research underpins partnership tree farming project development between a developer and the landowners of Markham Valley in Morobe Province, Papua New Guinea. The partnership project involves PNG Biomass as a developer who provides technical expertise as well as financial capacity whereas the landowners provide land resources and labor strength for farm development. Partnership tree farming is necessary for forestry industry in order to produce and use wood chips for fueling a biomass power plant including climate change resilience through carbon sequestration process from planted trees.

The research paper discusses the communication process for partnership tree farming project development. The research identifies factors affecting communication process for partnership project development and further provide strategies towards mitigating and overcome those factors affecting communication process.

The research identified infrastructure, socioeconomic and extension service problems as main factor affecting communication processes for tree farming efforts. According to Problem Identification Index (PII), highest ranked problem affecting communication process for partnership project development were; lack of electricity (168) and funding (158), followed by training needs and awareness (155) and then lack of visit by transfer agent problem (154). The lack of electricity was the main infrastructure problem affecting communication process since most landowners agreed that electricity as the basic household need and livelihood improvement services in the community. Funding was another main factor under socio-economic limitations, in terms of monetary, material and equipment to supports on-going communication process for tree farming. The money was found to be a source of transaction between people and access to modern communication facilities and services. The landowners' needed funding (money) in order to access communication systems and also purchase communication equipment such as mobile phones to communicate effectively and access services. Lack of training for the landowners and awareness program about importance of tree farming business also contribute towards communication barriers and interaction between the developer (PNG Biomass), landowners and other stakeholder for collective action that influence active participation, integration and capacity building for partnership project development. Another problem that affect communication process was the lack of visit by transfer agent (developer) to enhance effective communication and interaction between landowners and other skate holders. Most landowners agreed that, for example, holding a field day visits and on-farm demonstration improve active participation and further improve skills and knowledge on how to manage their farm through the process of technology transfer.

Recommendations

In order to improve and enhance effective communication process for tree farming efforts, the research recommends for the use of appropriate language during conversations and interactions between the developer (PNG Biomass) and the landowners of Markham

Valley including other stakeholders who involved in tree farming business. The research also recommends for developer (PNG Biomass) to carry out communication campaign and awareness programs that address current trend of need in the community and the importance of partnership tree farming development. Furthermore, the research recommends of change overall message packaging approach to make it appropriate for the sociocultural context when communicating for partnership project development. Most importantly, the communication approach should meet a particular need of a society so that people readily accept the message. The research further recommends for funding make available to the landowners through monetary, material and equipment resource for community developments initiatives.

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References

- ABAH, C. R. and PETJA, M. B. 2015. The Socio-economic Factors Affecting Agricultural Development in the Lower River Benue Basin. *Journal of Biology, Agriculture and Health Care*, 5: 84-94.
- ACIAR REPORT 2014. The Potential of Incorporating High-value Tree Species in Papua New Guinea Agroforestry Systems to Enhance Landowner Livelihoods. Australian Centre for International Agricultural Research (ACIAR), 71pp., Canberra ACT 2601, Australia.
- AGUNGA, R. and MANDA, Z. L. 2014. Communication for Strengthening Agricultural Extension and Rural Development in Malawi. *Journal of Development and Communication Studies*, 3: 2305-7432.
- BESSETTE, G. 2006. Facilitating Dialogue, Learning and Participation in Natural Resource Management. In *People, Land and Water: Participatory Development Communication for Natural Resource Management* (Ed. BESSETTE G.), 3-31, Earthscan, London, UK (from <https://www.semanticscholar.org/paper/People%2C-Land-and-Water%3A-Participatory-Development-Bessette/5371ac51222ff454bcb783a26f7d7f841b095d47>).
- BLACK, K.M. 2014. Perceptions of Agricultural Extension Agents' in-service Training Needs within the National Agency for Rural Development in the Republic of Moldova. 126 pp., (Masters of Science Thesis), Office of Graduate and Professional Studies of Texas A&M University, Texas, United State.
- CANO, J. and BANKSTON, J. 1992. Factors which Influence Participation and Non-participation of Ethnic Minority Youth in Ohia 4-H Programs. *Journal of Agricultural Education*, 33: 23-29.
- COOK, M., LALLY, C., MCCARTHY, M. and MISCHLER, K. 2007. Guidelines for the

- Development of a Communication Strategy. New Horizon Centre. (from <https://web.wpi.edu/Pubs/E-project/Available/E-project-042507084241/unrestricted/GuidelinesForTheDevelopmentOfACommunicationStrategy.pdf>)
- CROWLEY, E., O’SULLIVAN, S. and O’KEEFFE, B. 2017. An Evaluating of Kerry Social Farming 2017. 150 pp., South Kerry Development Partnership CLG, West Main Street, Caheryveen, Co, Kerry Island, Ireland (from <https://www.southkerry.ie>).
- DELGRECO, M., DENES, A., DAVIS, S. and WEBBER, T.K. 2021. Revisiting Attribution Theory: Toward a Critical Feminist Approach for Understanding Attributions of Blame. *Communication Theory*, 31: 250-276. DOI:10.1093/ct/qtab001
- DRISCOLL, L.D., APPIAH-YEBOAH, A., SALIB, P. and RUPERT, J.D.2007. Merging Qualitative and Quantitative Data in Mixed Methods Research: How to and Why Not. *Ecological and Environmental Anthropology*, 3, 19-28.
- FAO. 2016. Farmer Field School Guidance Document: Planning for Quality Programmes. 112 pp., Food and Agricultural Organisation for the United Nation, Rome, Italy.
- FIGUEROA, E.M., KINCAID, D.L., RANI, M. and LEWIS, G. 2002. Communication for Social Change: An Integrated Model for Measuring the Process and Its Outcomes. In Working Paper Series: No.1 (Ed. BYRD, I.B), 10018-2702, The Rockefeller Foundation, New York, United States
(from <http://archive.cfsc.org/pdf/socialchange.pdf>).
- HARZING, A. W. and FEELY, A. J. 2008. The Language Barrier and its Implications for HQ-subsidary Relationships. *Cross Cultural Management: An International Journal*, 15: 49–61.
- JAPAN INTERNATIONAL CO-OPERATION AGENCY. 2009. Project on Strengthening Technology Development, Verification, Transfer and Adoption Through Farmers’ Research Group, FRG N0.6, JAPAN INTERNATIONAL CO-OPERATION AGENCY (JICA), Adam, Ethiopia
(from https://www.jica.go.jp/project/ethiopia/5065025E0/05/pdf/newsletter_04.pdf).
- KASSER, T. 2009. Psychological Needs Satisfaction, Personal Wellbeing and Ecological Sustainability. *Ecopsychology*, 1:175-180
(from <http://doi.org/10.1089/eco.2009.0025>).
- KHAN, R.F., IQBAL, Z. and GAZZAZ, B.O, 2012. Communication and Culture: Reflections on the Perspectives of Influence. *Wulfenia Journal*, 19; 197-212.
- KINGIRI, A. and NDRITU, S. 2014. Assessment of Extension and Advisory Methods and Approaches to Reach Rural Women, FEED the FUTURE: The US Government’s Global Hunger & Food Security Initiative, MEAS Evaluation Series, United States Agency for International Development (USAID), United State (from <https://meas.illinois.edu/wp-content/uploads/2017/02/MEAS-EVAL-2014-EAS-Reaching-Rural-Women-Report-Kenya-Kingiri-Nderitu-July-2014.pdf>).
- KOCZBERSKI O, G. AND CURRY, N. G. 2005. Making a Living: Land Pressure and Changing Livelihood Strategies among Oil Palm Settlers in Papua New Guinea., *Agricultural System*, 85:324 -339.
- KULSHRESHTHA, A.C. (2013). Basic Concepts of Sampling: Brief Review; Sampling Frame, U.N. Statistical Institute for Asia and the Pacific (SIAP) Second RAP Regional Workshop

- on Building Training Resources for Improving Agricultural & Rural Statistics Sampling Methods for Agricultural Statistics-Review of Current Practices SCI, Tehran, Islamic Republic of Iran (from https://www.unsiap.or.jp/elearning/el_material/5_Agri/rap2/ag_02_03_L1_BasicConcepts_Sampling_Frame.pdf).
- KWOFIE, E.T., FUGAR, F., ADINYIRA, E. and AHADZIE, D. 2014. A Conceptual Framework for Evaluating Communication Performance among Mass Housing Project Team, 3rd International Conference on Infrastructure Development in Africa, 17-19 March, 2014, Abeokuta, Nigeria.
- LEE, M. S. 2003. A Review of Language and Other Communication Barriers in Health Care, Department of Sociology, Portland State University, Port Land.
- LEVIN, A.K. 2006. Study Design III: Cross-sectional Studies. Evidence-based Dentistry, 7:24-5. DOI: 10.1038/sj.ebd.6400375
- LUNENBURG, C.F. 2010. Communication: The Process, Barriers, and Improving Effectiveness. Schooling, 1: 1-10.
- OBREGON, R. and CASANOVA, V. J. 2019. Voices with Purpose: A Manual on Communication Strategies for Development and Social Change. Participant's Module, FRIEDRICH-EBERT-STIFTUNG (FES) fesmedia Africa, Windhoek, Namibia.
- ONWUEGBUZIE, J. A. and TEDDIE, C. 2003. A Framework for Analysing Data in Mixed Methods Research. In: Handbook of Mixed Methods in Social and Behavioural Research (Eds. TASHAKAKAKKORI, A. and TEDDIE C.), 321-350. Sage, California, USA.
- RISCOLL, L. D., APPIAH-YEBOAH, A., SALIB, P. and RUPERT, J. D. 2007. Merging Qualitative and Quantitative Data in Mixed Methods Research: How to and Why Not. Ecological and Environmental Anthropology, 3: 19-28.
- ROSHETKO, J.M. 2013. Smallholder Tree Farming Systems for Livelihood Enhancement and Carbon Storage, IGN PhD thesis August 2013. 135 pp., Department of Geosciences and Natural Resource Management, University of Copenhagen, Frederiksberg, Denmark (from <https://www.worldagroforestry.org/publication/smallholder-tree-farming-systems-livelihood-enhancement-and-carbon-storage-ign-phd>).
- SERVAES, J (Ed.) 2008. Communication for Development and Social Change. 429 pp., Saga Publications Inc. California, USA.
- SURI, H. (2011). Purposeful Sampling in Qualitative Research Synthesis. Qualitative Research Journal, 11: 63-75.
- SUVEDI, M., GHIMIRE, R. and KAPLOWITZ, M. 2017. Farmers' Participation in Extension Programs and Technology Adoption in Rural Nepal: A Logistic Regression Analysis. The Journal of Agricultural Education and Extension, 23:1-21.
- VAN RULER, B. 2018. Communication Theory: An Underrated Pillar on which Strategic Communication Rests. International Journal of Strategic Communication, 12: 367-381.
- VANCLAY, F. 2004. Social Principles for Agriculture Extension to Assist in the Promotion of Natural Resource Management. Australian Journal of Experimental Agriculture, 44: 213-222.
- ZAHARAN, Y., KASSEN, S. H., NABA, M. S. and ALOTAIBI, A. A. 2020. Shifting from Fragmentation to Integration: A Proposed Framework for Strengthening Agricultural Knowledge and Innovation System in Egypt. Sustainability, 12: 5131.

Appendix I: Research questionnaire

Research objective: Find out the factors that affect communication processes for partnership Tree Farming project development in Markham Valley.

Rank the problem(s) in the box provided against the questions from 1-4 as:

- 1, most frequently encountered
- 2, frequently encountered
- 3, encountered
- 4, not encountered.

2.1.0 Personnel problem

- 2.1.1 Language barriers
- 2.1.2 Education and literacy

Briefly explain your reason?

2.2 Sociocultural problem:

- 2.2.1 Tradition & custom

Briefly explain your reason:

- 2.2.2 Rural power structure

Briefly explain your reason:

- 2.2.3 Gender inequality

Briefly explain your reason:

- 2.2.4 Do cultural factors affecting communication? Yes No

If yes, how does it affect development of a project?.....

2.3.0 Socio-economical problem

- 2.3.1 Lack of funding
- 2.3.2 Lack of participation
- 2.3.3 Lack of collaboration (team work)
- 2.2.4 Do social factors affect decision making process? Yes No

“If yes, how does it affects communication process and the development of tree farming?”,
.....

2.4 Illiteracy

- 2.4.1 Lack of understanding (e.g. biophysical benefits)

2.5 Infrastructural problem (e.g. airstrips, roads and bridges deteriorated or being spoiled).

Rank the problem(s) in the box provided against the questions from 1-3 as:

- 1. strongly recommended
- 2. recommended
- 3. not recommended

- 2.5.1 Road & bridge
- 2.5.2 Communication medium

List the type of communication medium:

- 2.5.3 Electricity
- 2.5.4 Transportation

2.6.0 Extension services

- 2.6.1 No regular visit by transfer agent at the site

2.6.2 No awareness & training

2.6.3 No field trials