



Social Network Analysis and Stakeholders' Influence on Moringa Plant Development Potential in Mpwapwa District, Tanzania

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Abstract

Moringa plant (*Moringa oleifera*) has for quite a number of years been grown by farmers of Mpwapwa District in Dodoma Region Tanzania. The Moringa plant had been regarded as a potential for medicinal and income purposes. A number of stakeholders have been realized to contribute efforts to develop the production of the plant in the district. This paper therefore analyzed the interactive efforts of stakeholders and perceived influence on supporting the cultivation and business of the Moringa plant in the district. A questionnaire survey was carried out among 30 Moringa plant farmers. The influence of stakeholder was analyzed using Social Network Analysis (SNA) to investigate the extent of interaction in the business network. Ten (10) potential stakeholders were identified and categorized as Religious, Commission Agents, International actors, Local Authority and Entrepreneurs. Degree of centrality was used as a measure of the real influence of Moringa plant stakeholders. Findings show that all stakeholders played roles with different influential weights. There was a noticeable interaction and cooperation among stakeholders in coordinating Moringa plant activities, especially on technical, financial and material support. A multilevel interaction and cooperation of domestic and foreign stakeholders was realized. Therefore, by strengthening the coordinated efforts of stakeholders, applying feasible economic and policy approaches would be appropriate initiatives to scale-up the Moringa plant in a more positive economic promise.

Keywords: *Moringa, Social, Network, Mpwapwa, Stakeholders, Farmers*

Received: 27/06/23

Accepted: 06/07/23

Published: 14/09/23

Cite as: *Balama, (2023). Social Network Analysis and Stakeholders' Influence on Moringa Plant Development Potential in Mpwapwa District, Tanzania. East African Journal of Science, Technology and Innovation 4(special issue 2).*

Introduction

Recent studies around the globe have explored the use of social network analysis to identify stakeholders' influence on Moringa plant (*Moringa oleifera* L. as well other related species) development potential (Gandji *et al.*, 2018; Hermans *et al.*, 2017; Przesdzink *et al.*, 2022; Ramoroka *et al.*, 2022). Moringa plant is a perennial softwood tree with a variety of potential uses (Jaimes-Rangel *et al.*, 2021), of which the nutritional and medicinal are considered the most. To date the plant has gained

a market potential from accrued tree products (Ojo *et al.*, 2022). The global products market for Moringa is valued at 317.15 Million USD since 2020 and is expected to grow at the rate of 5.86% up to 2027 (Global Market research and Analysis). This figure offers a room for market opportunities in developing countries, particularly in Tanzania, where the plant has been noticeably performed well in terms of growth and survival; varying from coastal to semi-arid areas including Mpwapwa District in Dodoma Region (Gandji *et al.*, 2018; Edward *et al.*,

2013). Since 1990's, a number of stakeholders have realized this plant. However, the need to understand their interaction with others at multilevel is practically important. Identification of stakeholders offers a critical understanding of the level of their power and influence to a targeted impact. It also allows the stakeholders to be positioned in the range of interest for proper planning strategies (Bourne & Walker, 2005). Some of the studies have analyzed the strength of influential stakeholders and drew their importance as the key complementarity of resources and capabilities in the value chain (Bitzer & Glasbergen 2015).

However, there is limited information on Social Network Analysis and Stakeholders' Influence on Moringa Plant Development Potential, despite its wide distribution in the world (Brilhante *et al.*, 2017). The growing demand for dried Moringa leaves powder across the globe is primarily driving the market growth, with the leaves of Moringa reported for the maximum revenue share in the global nutritious and nutraceutical foods (Patil *et al.*, 2022). In line to that, the role played by Moringa Plant stakeholders in Tanzania is not certain. Thus, it is essential to

conduct a social network analysis to identify the stakeholders and their influence on the development potential of Moringa plants in Tanzania. Based on this consideration, this paper presents a social network analysis and the perceived influence of key stakeholders in Moringa development in Mpwapwa District. The analysis is useful to support the decision makers and policy implementers to include all the interests and efforts reached for further designing of an appropriate environment that will benefit Moringa farmers at high in the district.

Materials and Methods

Study Area

The study was conducted in Mpwapwa District, in Dodoma Region, Tanzania (Figure 1). Sites selected for the study were: Chamtumile, Pwaga, Idenge, Kinusi, Kibakwe, Vinghawe, Nhambi, Mazae, Makutupa, Mima, Bumila. Selection of study sites was based on the presence of Moringa farmers in the village. Moringa plants were found to be grown in farmer's farms with average plots of 0.56 ha for small landholders (below 2.8 ha), 0.6 Ha for medium landholders (2.8 - 4.4 ha) and 0.92 ha for large landholders (above 4.4 ha).

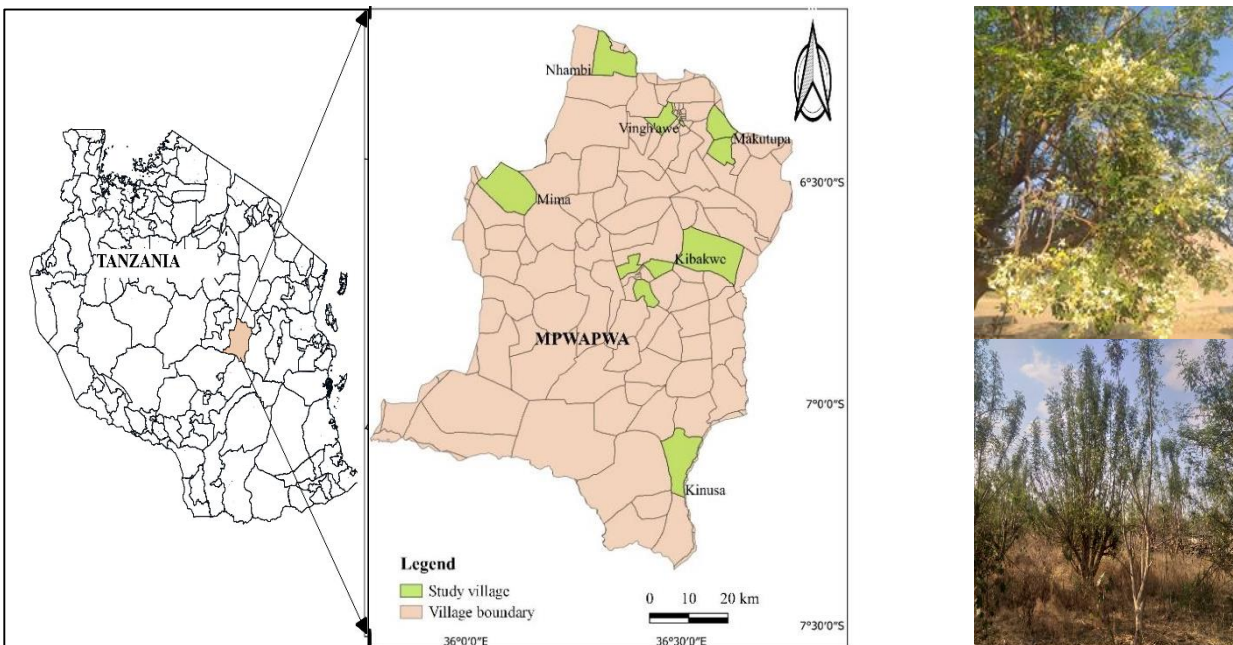


Figure 1. Study Areas of Moringa in Mpwapwa District, Dodoma Region.

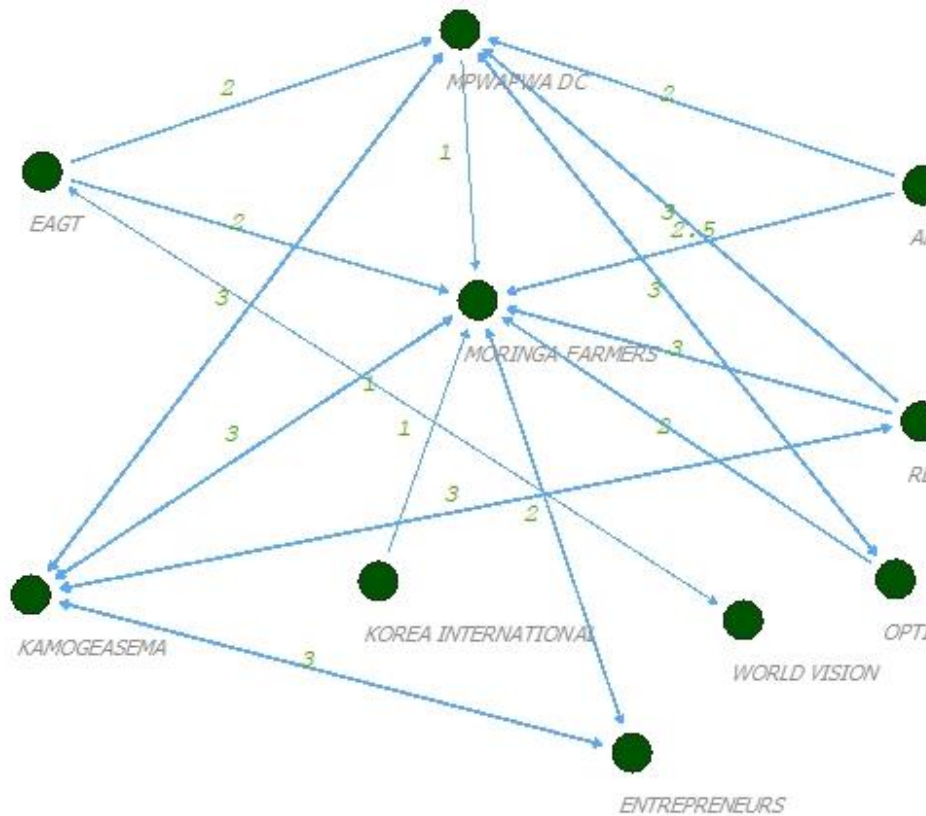


Figure 2. Social Network Analysis of Moringa Stakeholders in Mpwapwa District

Data Collection

Qualitative techniques for data collection included Focus Group Discussions (FGDs), individual interviews and direct field observations. Stakeholder analysis was conducted to identify and characterize the stakeholders to the extent of their influence in the development of Moringa. All stakeholders at different levels of individuals, institutions, organization, society groups were recognized in the exercise. A brainstorming session was facilitated between researchers and Moringa farmers. Stakeholders’ perception was drawn in ratings based on their influence on Moringa developmental processes. The real role of stakeholders in terms, technical, physical and social provisions was also assessed.

Data Analysis

Social Network Analysis (SNA software) was used to assess the power of stakeholders on a

relational basis. SNA is a method used to define and analyze the relationships that stakeholders have with each other. The method provides a focus on positions and structural patterns of actors (Scott, 2000). Therefore, SNA was used to highlight important stakeholders influencing the actions for the development of Moringa in Mpwapwa District.

A network centrality was used to analyze the role and position of stakeholders in the Moringa business network. Under this, degree centrality was used as a measure of the real influence among stakeholders to represent the level of communicating actions (Mizruchi, 1998). The following relation represents the formula for the degree centrality:

$$D(n_1) = \sum_{k=1}^n a(n_i, n_k) (N - 1)^{-1}$$

Where: D = degree centrality, a_{ik} = arc between nodes. (Reads 1 when there is a connection between n_i and n_k , 0 when there is not a connection).

Results

Moringa Stakeholders and Business Network

Stakeholder analysis identified several actors of Moringa who were then categorized into nine categories (Prabawanti, & Lamaile, 2022) as

Religious stakeholders (EAGT, Anglican), Commission Agent (KAMOGASEMA), International organizations (Korea International Cooperation Agency, World Vision, Optimal of Africa Limited, REDFIN, Local Government Authority (Mpwapwa DC) and Entrepreneurs (Figure 2). The named stakeholders appeared with different approaches; however, some with common efforts for the influence of Moringa development in Mpwapwa District, since 1998.

Table 1

Degree centrality of Moringa Stakeholders

Moringa Stakeholders	Degree Centrality (Dc)	Standardized Dc
KAMOGASEMA	12	0.22
REDFIN	9	0.17
Mpwapwa (DC)	7	0.13
EAGT	5	0.09
Entrepreneurs	5	0.09
Moringa Farmers	5	0.09
Optimal Of Africa	5	0.09
Anglican	4.5	0.08
Korea International	1	0.02
World Vision	1	0.02

Perceived Influence on Moringa development

Results of SNA indicated that all stakeholders contributed in terms of weight scores defined by degree centrality (Table 2). KAMOGASEMA Company limited is the leading Commission Agent/Stakeholder with the highest value of degree centrality (Dec = 12). The company is located in Mpwapwa District, specialized in buying raw products of Moringa from farmers. The stakeholder is highly centralized in both the influence and roles of Moringa activities with farmers. The highly reported influence of this

stakeholders were on sensitization and provision of technical skills in the production processes to match with existing markets. Indeed, the actor plays a big role in connecting farmers with markets (entrepreneurs), and other moral and technical stakeholders like REDFIN and Mpwapwa District Council (DC). The next Stakeholders were REDFIN (Dc = 9) and Mpwapwa DC (Dc = 7) who contributed for 16.5% and 12.8% in weight on the supportive activities of Moringa production (Figure 2).

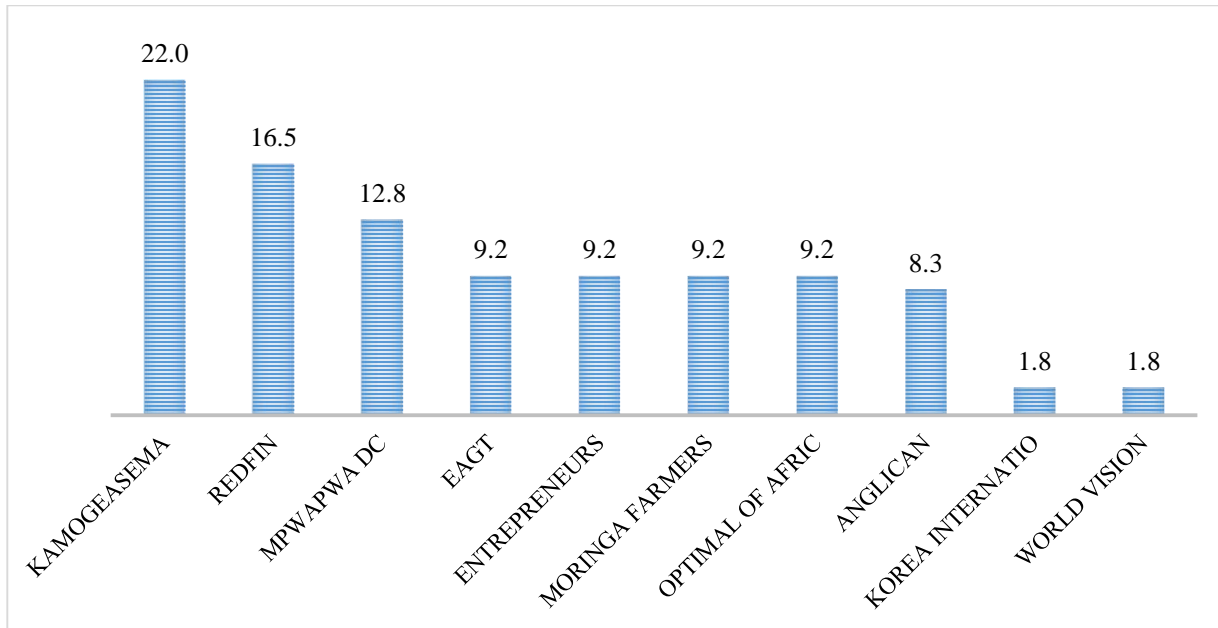


Figure 2. Percentage of degree centrality to perceived influence on

Discussion

The main contribution and support on Moringa by REDFIN was realized on technical skills, sensitization and business opportunity (Shija *et al.*, 2019) as it has been the buyer of raw Moringa (both seeds and leaves) from farmers since 2005. The actor also offered planting materials including seeds, while working closely with farmers and Mpwapwa DC. Mpwapwa DC appeared supportive of coordinating farmers with incoming stakeholders. In addition, the council was realized to provide technical skills as well as monitoring the progress of Moringa from farmers. Religious Stakeholders (EAGT and Anglican), Optimal of Africa (Organization) and entrepreneurs rated equally the same degree centrality ($D_c = 5$) as a strength measure of the influence of Moringa development (Hotel, 2019). These collectively contributed by 45.1% of the total weight scores in the influence. Religious stakeholders were reported to offer Moringa tree seedlings and seeds to farmers. They also provided education, especially technical skills on handling the Moringa plant including the products. Likewise, the Optimal of Africa Limited was also in earlier sensitization efforts of 1998 to 1999. This organization also contributed Moringa planting materials to farmers. A number of different local entrepreneurs were also acknowledged to boost the farming of Moringa

through sales regardless of low market stability (Ketema & Haji, 2021).

Furthermore, Korea International Cooperation Agency (2017) and World Vision (2008) appeared as International stakeholders in the development support of Moringa production in Mpwapwa DC; mainly on business. During discussions, Korea agency was reported to contribute to the farmer's income as the major buyer of Moringa products. The stakeholder worked on product value addition and trading of Moringa (Boopathi *et al.*, 2021) to reap the benefits of Moringa in the District. The World Vision organisation promoted Moringa in the district following the health initiatives of combating malnutrition (Thapa *et al.*, 2019). Farmers realized a significant contribution of this stakeholder particularly on financial support for the establishment of Moringa tree nurseries. The stakeholder also did support on community awareness and capacity building to the production of Moringa (Budiman *et al.*, 2022).

Conclusion and Recommendations

The results of this study present a multilevel interaction and cooperation of both domestic and foreign stakeholders (Damoori *et al.*, 2020) for enhanced development of Moringa in Mpwapwa District. Moreover, the results show the analysis

of each Stakeholder and the perceived influence on support to improve farmers' livelihood from Moringa production (Ketema, & Haji, 2021). This kind of information is very useful as it draws the picture of how Moringa had been paid with a high physical commitment from stakeholders.

This is equally important to pay more support in the coordination of initial efforts and look for a further feasible policy that can promote the plant as of medicinal and income potential. Therefore, a wide use of social-economic and political

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