

## **Factors Influencing Cocoa Farmers Smallholder Clusters in Adoption of Technology: A Review Paper**

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**Abstract:** Cocoa farmer cluster is an advanced type of cocoa revitalization. It is great significant in influencing adoption of technology among cocoa farmers, productive advantage through mutual closeness and associations, promoting cocoa growth, enhancing the rural competitive strength, and increasing the incomes of the farmers. The main objective of cocoa farmer cluster is to enhance sustainable adoption of technology among smallholder cocoa farmers for increase in productivity and sustainability of cocoa upstream. This paper discusses the importance of farmer Clusters function in Adoption of Technology as well as Factors that can influence effectiveness of farmer clusters. Meanwhile, it recommended that farmers cluster should be effectively manage as this will serve as a key to repositioning declining status of cocoa plantation in Malaysia.

**Keywords:** cocoa farmers, farmer cluster, group, smallholder, technology adoption,

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### **I. Introduction**

Clustering is a way to increase effectiveness, support collective research, rationalize a whole industry, and implement environmental management systems. It was based on the concept of agglomerating enterprises with related economic factors and organizations for the purpose of productive advantage through mutual closeness and associations [1, 2, 3]. However, the approach to clustering is not new, but agricultural based clustering is said to be one of the important approaches development practitioners are using to improve agricultural sector [4]. Furthermore, case studies gathered found that clustering was slowly becoming a rural phenomenon as we can find in the expansion of Indonesian cottage industries [5]. Cluster farming is both marketing and a production strategy which means individual farmers are committed to work together to gain market opportunities and overcome common challenges [6]. It also functions as a production and financial planning tool for groups of farmers in a particular area [7]. According to [4], agriculture based clustering is an efficient and sustainable way of connecting farmers to global value chains. The approach has benefits in terms of diffusing innovations, using and creating farm services, and increasing access to markets and information [8]. In the case of Mindano, Philippines, the cluster process was applied by the Catholic Relief Services (CRS) by organizing smallholder farmers into 5 to 15 clusters of farmer in order to supply high quality vegetables to market specifications as well as the volume required by the buyers with characteristics of market-driven [9]. Moreover, [9] reported that farmers begin by understanding the needs of market, plan production and marketing with a view to responding to those needs. In the process, farmers produce the type of vegetables needed, to the quality specifications required and guided by the knowledge that they are producing what the market wants when it needs it. Therefore, farmers know their targets and they are producing with the knowledge that markets are more likely to buy their products. In Malaysia, farmers cluster was introduced to enhance the production of cocoa bean in the country by way of improving cocoa technology adoption, when they realized that the work rate of extension services to individual farmers would be too costly and time consuming [10]. Each group has a member of 10-50 cocoa farmers with a leader in order to look after the growth and development of cocoa farms in their area and for transfer of technology. He also emphasized that through cluster or group, cocoa farmers interact with one another to achieve a common goal, and the interaction among members of the cocoa farmer clusters is more than with those outside the group. However, this article positioned farmers cluster as effect of a practice in which it shows increase in the adoption of cocoa technology among smallholder farmers to undertake initiatives that will improve their quality of production. Moreover, Farmers cluster as a practice of success must be influenced by many factors depending on the area, needs, interest, values and norms of the cluster and farmers at large. This paper discusses the importance of farmers cluster function in adoption of technology as well as factors that determine increase in the adoption rate of cocoa technology by farmers through the use of farmers cluster.

## **II. Theoretical Concept of Cluster**

The foundations of economic cluster theory were established by Porter in 1990. [11] defined a cluster as a group of firms engaged in similar economic activities. Economic model for clusters was later formalized by [12] as geographic closeness which increases returns to capital such that related firms will often end up concentrating in one region. More researches from [13, 14, 15] emphasized the importance of shared location, shared supply chains, shared markets and shared relationships with institutions for facilitating interactions between firms in clusters to promote knowledge exchange, technology spillovers and stimulate innovation. This cooperation among a range of actors, in theory, can ignite a virtuous cycle of development by enabling economies of scale, rapid transmission of information, and adoption of new technologies that enhance long-term competitiveness of industries [4].

Cluster formation is usually related to natural endowments and proximity to major markets and infrastructure, as well as local skills in trading, design, or production capacity, and local and regional market demand [16]. Clusters can emerge organically, as in the case of the Maharashtra Grape Cluster in India where several spatially-dispersed small farmers formed cooperatives that then created a private company, Mahagrapes, to collectively market their grapes and bargain for fair prices based on quality standards [17]. Alternatively clusters may also emerge with support from external actors, as with the Bio blueberry cluster in Chile where Fundación Chile facilitated cluster formation by introducing new berry varieties and supporting export market development [16, 18]. Clusters may also either fall within administrative boundaries such as the Cuyo wine cluster in the Cuyo Region of Argentina, or they may cross traditional boundaries such as the Lake Victoria fishing cluster across Kenya, Tanzania, and Uganda. Indeed, recent research suggests that social distance (i.e., degree of interactions between key actors) may be more important to cluster performance than physical distance [19].

## **III. Farmer Clusters Function in Adoption of Technology**

Farmer clusters play an important role in successful technology adoption among group members [20]. According to [20], there are significant difference between adoption efforts of individual and group. Groups are important as it serves as a platform for collective action among farmers to get access to resources such as credit, labour and information [21]. Group assist farmers to obtain latest technologies and also allow them to enjoy economic of scale, it helps establish networks with suppliers and provides guidelines for natural resource management [22]. Farmers group can be an effective tool for extension agent because it will allows passage of information and technologies in a better form [23]. Farmers' group has been found to support fellow farmers in the group in adoption of new technologies [24] and this was supported by [25] who stated that farmers' groups provide an efficient way for farmers to share information and experience. The benefit of clusters was seen as an improvement in productivity as well as farmers income [26]. [27] reported farmers can benefit from participating in farmers cluster as it allows them to achieve scale economies and share costs related to training, information sharing, certification and technology application. Participation in farmers cluster affects farm management, new technology adoption and environmental practices, profitability and smallholder farmers' access to markets in a sustainable way. However, the importance of farmers' leaders in adoption of technology cannot be over emphasized as this is very crucial in the early stage of adoption process.

## **IV. Factors that can Influence Effectiveness of Farmer Clusters**

In the context of this paper, factors perceived to influence farmers cluster success in adoption of technology includes individual factors, group factors and external factors. Personal factors are highlighted to include both farmers and extension agents, while group factors comprises of leadership, cohesion, communication, the goal of the cluster, membership and participation of members in the cluster. Meanwhile, external factors are seen to be cultural competency, knowledge and skill, professional skill, and communication effort [10].

### **4.1. Individual factors**

The uniqueness and personal situational characteristics may influence the adoption behaviour of any farmers [28]. This was supported by [29] that individual innovation affected both the individual's characteristic as well as the nature of the social system in which the individual was a member of a system's norm that could be a barrier to change. On the other hand, the extension agent has a special working relationship with the farmers which demanded much skills and creativity. The knowledge and personal skills of the extension agent is very important in order to bring desired changes to the rural areas as well as transform the lives of the farmers.

## **4.2. Group factors**

In studying what makes farmers cluster to be effective, productive and sustainable, the following factors were found to be most prominent among others, namely; leadership, cohesion, communication, the goal of the cluster, membership and participation of members in the cluster. [10, 30]. However, the interactions and counter interactions that occur during group process or activities were found to have helped farmer groups, non-farmer groups and extension organizations to reach high efficiency in the economic performance through increased technology adoption and increased rate of out-put.

### **4.2.1. Leadership**

Leadership refers to the ability to influence a group toward the achievement of goals [31]. However, the strength of a leader is to be able to convince, control, influence the way members behave in order to follow what he actually assigned to carry out or achieved [32]. Leadership according to [33] can be defined in several ways depending on the structure or organization. He said communication between leader and followers resulted to interpersonal influence leading towards the direction of goal accomplishment, this influence rise above personal fulfillment with directions and guidelines that causes members to pursue a line of action. Leadership is very vital to the success of any cluster as is the art or process of influencing or motivating other people to strive towards the achievement of cluster goals [34]. In the group, leader should be able to; (a) Influence members through effective communication and character towards goal accomplishment. (b) Determine the use of appropriate method of leadership as the need arises [35]. [36] in the 21 most powerful minutes in a leader's day expressed that "every leader is either a lifter or a limiter of people, and then if leaders limit people, they limit not only the people but also themselves". Moreover, [37] concluded that most the rural communities were unable to tackle major socio-economic problems by belonging to farmers cluster unless they appoint, elect, nominate or select a leader that possess both the inherent and acquired abilities, that will help member to convene, bring about changes and design a strategy to implement the adopted technology for improvement in their production.

### **4.2.2. Level of Participation**

Cluster participation is the involvement of individuals for the purpose of attaining mutual and satisfying common interest. The pattern of interaction varied but in a group where we have higher role of group participation, it positively influenced willingness to adopt technology which in turn resulted to improved group performance even at a difficult condition through appropriate use of all available knowledge and skills [38]. According to [39], high level of participation is very important as this will enable the farmers to be able to identify and prioritize their needs and opportunities. Also, participation will enhance the decision making process of the participant in order to adopt any form of technology given to them [40]. Members of the group are to be stimulated, encouraged and motivated in order to be able to take group and right decisions. Furthermore, participation and involvement of members the cluster activities will bring about positive change through interaction with other members. During this period, every member will experience desired changes their attitude thereby acquiring knowledge and skills both consciously and unconsciously from one member to another. The resultant effect of this is that there will be increases in the capacity and ability of the member to perform certain task. Therefore, active participation by members enhances their level of tolerance and increases the social action; it also creates enabling for making new friends and develops a spirit of happiness during working with each other [41].

### **4.2.3. Cohesiveness**

Group cohesiveness comes up when there is a bond that pulls or stick together members of a group to one another and to the group as a whole. Although cohesion can be view in different dimensions which can be broken down into four main components such as social relations, task relations, perceived unity, and emotions [42]. Also, the presence of bond caused members to resists separation from that group; members of strongly cohesive groups are more inclined to participate readily and to stay with the group [43]. Cohesiveness is the totality of force action on individual members to keep them in any cluster [35]. They emphasized that it is related to agreement on goal, norms, shared understanding and similar demographic backgrounds for productivity, satisfaction, cooperation and level of trust among members. According to [44] cohesion in a group tends to be stronger when members share some similar characteristics like age, gender, feelings, needs, interest and backgrounds. [45] stated that high levels of cluster cohesion are significantly related to positive outcomes and these includes (i) greater satisfaction with the cluster experience; (ii) higher levels of goal attainment by individual members; (iii) greater commitment (iv) increase in members feelings of self-confidence, self esteem and personal adjustment; (v) increase in the attendance meetings of the members and participation.

#### **4.2.4. Goals and Objectives**

In order for a cluster to be sustainable, collective goals and actions must meet the real needs of members as well as increase in the rate of adoption and productivity which is the basis of forming the cluster. Those needs often relate to improved quality of life, profitability, and meaningful relationships. Goal is a long term expectation of what the cluster or group intended to achieve [46] while objectives are the concretized short term evidence or outcomes observed on both individual and the groups [32]. [10] opined that for any group to achieve intended purpose it needs a well defined and clearly stated goal and objectives and when these two are mixing, the growth of the group will be hindered without any meaningful development. [47] defined goal as an internal representation of desired state. The goal of any organization must be very clear and specific, in which without a specific goal it will be difficult to attain the desired level of development in the group. It was reported by [32] that individual performs better when they have specific and challenging goal and receives feedback on how well they are progressing towards the goal.

#### **4.2.5. Membership Attraction**

The factors that will attract members to farmer clusters should be considered, such as prestige, cluster climate, level of interaction among members, size of the cluster, relationship to other cluster, success, and common goals [47]. This will make the group to be more cohesive and attractive. Also, it will enhance their ability to solve problem, mobilize resources and work with diverse interest as this will facilitate quick technology adoption among them.

#### **4.2.6. Communication**

Communication is an important factor that can have a lot of positive influence in any group if it is well channeled as it brings about interpersonal relationship within groups [48]. Quality communication that helps behaviours and information-sharing will cause groups to be in a better position than individual in terms of the quality of decisions making and effectiveness of decisions made or actions taken [49]. However, quality decision-making requires that members both identify with the group and have an attitude of commitment to participate and interact with each other [50]. Furthermore, there should be communication flow and a working relationship within the group in order to pursue commonly shared objectives for regular contact and improved productivity. Extension agents need to encourage and motivate effective communication among the group as this is vital for modification to enable new technologies and management practices to be suited to their local conditions groups generally work in a context that is both relational and social [51, 52].

#### **4.2.7. Composition of the Group**

Another important factor that determines the success of any clusters or group is the composition of the group. It includes factors such as the needs, age, level of participants, the size of the group and difference between group members [53].

### **4.3. External Factors**

The external factors that influence the performance of the group are the coordination ability of the extension agent. Such factors include; their technical capabilities, skills in managing clusters, attitude and commitment to clusters, the planning method used, purpose of initiating the cluster and most importantly, the support given to the extension agent to achieve desired level of development within the group. Other factors include; cultural competency, knowledge and skill, professional skill, and communication effort.

(i) Cultural competency of the extension agent: There is need for the extension agent to gain culture competency as it has relationship with performance [54]. It is the cultural competency that will enable the extension agent to avoid stigmatization and gain the trust of the farmers and also have ethical understanding of some fact in their environment [55].

(ii) Knowledge and skill: The extension agent should be knowledgeable and skillful in order to be able to identify and evaluate the technology based on the information received. Also, they need to be well informed on the technology through training and work collaboratively with the researcher to remove any form of problems and constraints during adoption processes [56].

(iii) Professional skill: Extension agent should be professionally skillful in strengthens the farmers' organization and to give support and facilitate exchange between researchers, disseminate information, help cluster goal and make decision on adoption and management of cluster.

(iv) Communication effort: The interaction and communication among farmers and between farmers and extension agents is very crucial and important when deciding if an innovation should be applied and whether the cluster norms should be changed.

## V. Conclusion

Cocoa farmer clusters if properly managed can be a key to repositioning cocoa plantation in Malaysia as it will enable individual smallholder cocoa farmers to operate together in more economically viable groups when processing and marketing their produce by influencing adoption of technologies among farmers. Also, the success of the group will facilitate and arouse the interest of more members to aspire to achieve success and this will contribute to greater profitability and sustainability of cocoa upstream.

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