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The Role of Human Capital in Strengthening Horticultural Agribusiness Institutions: Evidence from Structural Equation Modeling

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ABSTRACT

Farmers' engagement in agribusiness institutional activities has largely been confined to production activities, and has not been fully optimized. Similarly, the role of agricultural extension workers in providing institutional assistance has been narrowly scoped, mostly limited to government-initiated programs focusing on infrastructure development and production enhancement. Human capital, a vital factor for agribusiness development, has been largely overlooked. This study, therefore, seeks to investigate the influence of human capital components on the strengthening of horticultural agribusiness institutions, with farmer participation and coordination between farmer institutions as mediating factors. The research was conducted in the Uluere Sub-district, Bantaeng District, South Sulawesi Province, Indonesia, a region known for horticultural agribusiness development. Data from 120 randomly selected respondents were analyzed using Structural Equation Modelling (SEM) to accomplish the research objective. The findings revealed that leadership, a component of human capital, has a direct, positive, and statistically significant influence on institutional strengthening. However, participation does not serve as a mediator between human capital components and the strengthening of horticultural agribusiness institutions. The variable of coordination function partially mediates between leadership and institutional strengthening, while the effectiveness of teamwork fully mediates the impact on institutional strengthening.

1. INTRODUCTION

Institutional development through farmer empowerment is a significant factor in horticultural agribusiness development. The efficiency of agribusiness is closely tied to the role and transformation of its institutions [1]. Farmers have recognized the value of institutions in bolstering horticultural agribusiness development [2]. These institutions must encompass all social elements within the local community [3], including human capital. Human capital is instrumental in agribusiness institution development [4] and serves as the foundation for resource building and strength [5] in sustainable horticultural agribusiness growth. capital is the cornerstone in constructing an institutional horticultural agribusiness system. It defines the success or failure of an agribusiness system's development. High human capital within an institution or organization is characterized by the institution's growth and its effective functioning within society. Therefore, concerted attention must be given to farmer empowerment through institutional system development. The strategy for institutional system and farmer organization development must be based on a clear understanding of human capital quality. This understanding will ensure more precise institutional development designs, reflecting the fact that the form of institutions built is largely dependent on an institution's individual capacity and its capacity to leverage its human capital.

Institutions are typically established based on technical interests to facilitate coordination for government activities or programs, rather than farmers' awareness and personal will. They are often more program-oriented and do not ensure group independence and sustainability [6]. Farmers' involvement in agribusiness institutional activities has not been maximized and remains restricted to production activities. Furthermore, the role of agricultural extension workers in providing institutional support is primarily limited to government-initiated programs, focusing on infrastructure development and production enhancement. Yet, the human capital aspect, a critical factor for horticultural agribusiness institutional development and a key element in resource and strength building, has been largely overlooked [5].

Numerous human capital studies exist. Most, however, focus on business organizations in the manufacturing sector, such as those by Marimuthu et al. [7] and Cimen et al. [8], who found that human capital significantly impacts company performance. Human capital also influences regional economic growth and poverty reduction [9, 10]. Similarly, most studies on agribusiness institutions focus on institutional interconnectivity and role and function mapping [11], or on the adaptive capabilities of micro agribusiness companies in trading environments [12].

This overview underscores the importance of understanding human capital in developing institutional systems as a first step

in strengthening horticultural agribusiness institutions. As per Mayo [13], measuring institutional performance from a human capital perspective is fundamental for driving an organization with knowledge, ideas, and innovation. Human capital constitutes productive wealth embodied in skills and knowledge that contribute to economic productivity [14]. Pasban and Nojedeh [15] argue that core institutional management must possess sufficient knowledge, information, and creativity to create a competitive advantage for the institution.

Knipprath and De Rick [16] posit that human capital is a crucial factor in predicting participation. Understanding human capital involves identifying and measuring community human capital capabilities, focusing on the individual capabilities of local institutional actors. The quality of human resources managed by farmers will guide the development of a model for strengthening horticultural agribusiness institutions that can effectively stimulate their household economy's empowerment in the context of horticultural agribusiness development. Institutional strengthening of horticultural agribusiness must take into account the knowledge and skills of farming communities in improving human resource quality.

Coordination functions within a group must also be considered. Sarstedt and Cheah [17] assert that weak coordination is detrimental to institutional revitalization aimed at strengthening institutions in the agribusiness system. According to Harris et al. [18], human capital can affect coordination, which in turn impacts organizational performance. Organizations should therefore concentrate on recruiting members with the necessary human capital to exhibit the behaviors required by the organization, and retain these members to develop stable relationships and capital, enabling better coordination of activities and improved overall institutional performance.

This research investigates the influence of human capital on horticultural agribusiness institutions, a topic not extensively covered by previous researchers. In this study, the construct of the coordination function is added to the research model, following the findings of Harris et al. [18] who discovered that coordination functions as an intervening variable between human capital and institutional performance, and Nuraini et al. [19] who found that coordination is crucial in carrying out institutional revitalization. A participation construct was also added, based on research by Shivakoti and Thapa [20], who contend that participation in institutional activities is crucial for development effectiveness and sustainability. The study aims to examine the effect of human capital components on horticultural agribusiness institutional strengthening and the mediating roles of participation and coordination.

2. METHODS

The research location was in Uluere Sub-district, Bantaeng District, South Sulawesi Province, Indonesia (Figure 1). The sample selection was made by simple random sampling, which was taken as much as 10% of the total population following Silalahi, who said [21] that a sample of 10% of the total population is considered the minimum amount so that the number of samples used was 120 respondents. Data collection was carried out in July-November 2022.

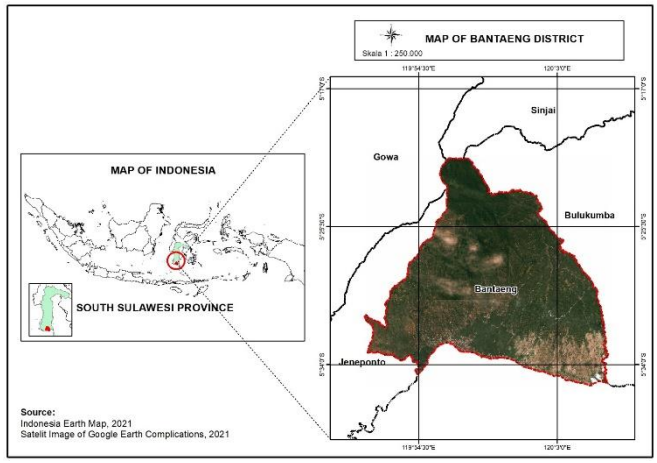

Figure 1. Research location of study of the effect of human capital on institutional strengthening of horticultural agribusiness

In this study, the answer scale provided disagree, disagree, agree/neutral, agree, and strongly agree. In this study, the questionnaire used a Likert scale to measure the variable individual capabilities (X_1), individual motivation (X_2), leadership (X_3), the organizational climate (X_4), workgroup effectiveness (X_5), institutional strengthening of horticultural agribusiness (Y_1), Participation (Y_2), Coordination function (Y_3) The score weighting is as follows:

a. Strongly Agree (SS) with a score weight of 5;
b. Agree (S) with a score weight of 4;
c. Neutral (N) with a score weight of 3;
d. Disagree (TS) with a score weight of 2;
e. Strongly Disagree (STS) with a score weight of 1.

Furthermore, to obtain results on the influence of human capital on institutional strengthening of horticultural agribusiness, analyzed with a quantitative approach using the analysis technique Structural Equation Modeling (SEM). SEM is a combined analysis tool of factor analysis and regression [22] used to analyze multivariate data to test hypotheses or interactions between variables [23-26]. SEM analysis in this study used the Smart-PLS 4 Software.

Hair et al. [27] proposed the stages of modeling and analysis of structural equations into 4 (four) stages, namely:

1. Make a specification of the line model. The SEM is based on causality, where changes in one variable are assumed to result in changes in other variables.
2. Make a specification of the measurement model.
   a. Arrange causality relationships with path diagrams and construct structural equations. Simultaneously individual abilities, individual motivation, leadership, the organizational climate, and workgroup effectiveness indirectly affect the institutional strengthening of horticultural agribusiness, as depicted in Figure 2.
   b. Structural and measurement equations hybrid models across the factors influencing institutional strengthening. Based on Figure 2, the structural equation is arranged as follows:

$$\eta_1 = \beta_{21}\,\eta_2 + \beta_{22}\,\eta_3 + \gamma_{11}\,\xi_1 + \gamma_{12}\,\xi_1 + \gamma_{13}\,\xi_1 + \gamma_{14}\,\xi_1 + \zeta_1$$

$$\eta_2 = \gamma_{21}\,\xi_2 + \gamma_{22}\,\xi_2 + \gamma_{23}\,\xi_2 + \gamma_{24}\,\xi_2 + \zeta_2$$

$$\eta_3 = \gamma_{31}\,\xi_3 + \gamma_{32}\,\xi_3 + \gamma_{33}\,\xi_3 + \gamma_{34}\,\xi_3 + \zeta_3$$

c. Analysis of measurement models and structural models. The measurement and structural models were analyzed to see the relationship between variables and between the variables and their indicators. Testing is done by looking at the validity and reliability tests. The structural model test was conducted by using the R Square test (R^2). The R^2 test was carried out to see the determination of the exogenous variable on the endogenous one. If the value of R^2 is greater, it indicates a better level of determination. According to Chin [28], the R-square value is > 0.67 (strong), > 0.33 (moderate), and > 0.19 (weak).

d. Hypothesis test
This test was conducted to see the effect of human capital on strengthening agribusiness institutions. In this test, the criterion used is the Critical Ratio (CR) which is identical to the t-test in regression testing. If the results of calculations with this model obtained a CR value ≥ 1.96, it is the basic criterion for rejecting the null hypothesis and accepting the alternative hypothesis that the regression coefficient obtained is significantly not equal to zero. In this study, the SEM model consisted of five exogenous latent variables, three endogenous variables, and 32 observed/indicator variables. The relationship between variables and the measurement and structural models are implemented through path diagrams.

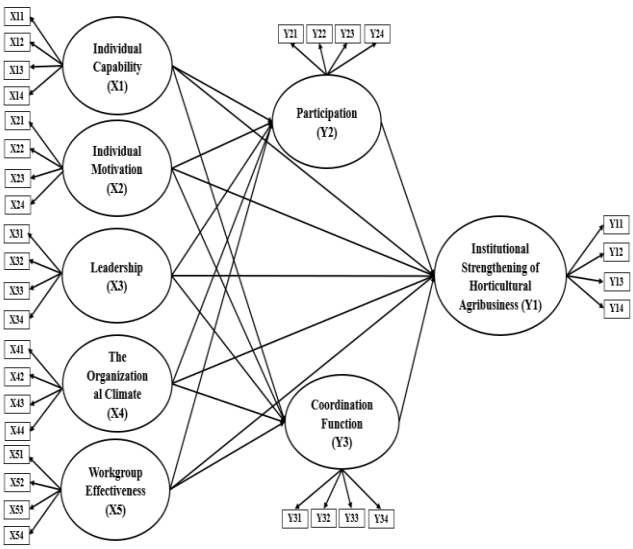

Figure 2. The theoretical model of the influence of human capital through participation and coordination functions on strengthening horticultural agribusiness institutions

The limitations of this research method include the following: a cross-sectional study cannot explain the dynamics of changing conditions or the relationship of the population it observes in different periods, as well as the dynamic variables that influence it, and the information obtained is not in-depth.

3. RESULTS AND DISCUSSION

Data collection in the SEM analysis was conducted using an interview method with the help of questionnaires to farmers as horticultural agribusiness institutional actors in Bantaeng Regency. Then all the answers from the farmers were analyzed using the SEM analysis tool. The first result of the SEM analysis method is to look at the frequency of answers from each farmer and see the strength of the relationship between variables, as presented in Tables 1 and 2.

Table 1. The mean value and standard deviation of the research variables of study of the effect of human capital on institutional strengthening of horticultural agribusiness

Variable	Mean	Standard Deviation
Individual Capability	3.448	0.604
Individual Motivation	3.221	0.854
Leadership	3.567	0.760
The Organizational Climate	3.484	0.648
Workgroup Effectiveness	3.448	1.158
Participation	3.162	1.125
Coordination Function	3.396	0.937
Institutional Strengthening of Horticultural Agribusiness	3.377	1.032

Table 2. The correlation coefficient between variables of study of the effect of human capital on institutional strengthening of horticultural agribusiness

Description	Correlation Coefficient
Individual Capability -> Agribusiness Institutional Strengthening	0.477
Individual Motivation -> Agribusiness Institutional Strengthening	-0.117
Leadership -> Agribusiness Institutional Strengthening	0.443
The Organizational Climate -> Agribusiness Institutional Strengthening	0.038
Workgroup Effectiveness -> Agribusiness Institutional Strengthening	0.021
Participation -> Agribusiness Institutional Strengthening	-0.001
Coordination Function -> Agribusiness Institutional Strengthening	0.477

3.1 Data validity and reliability test

Research data processing was done using the Partial Least Squares (PLS) technique through Smart-PLS 4 Software to assess the specifications of the structural model and measurement model [29], explaining that the structural model shows the relationship between variables. In contrast, the measurement model shows the relationship between each variable and its indicators. The first step taken to check and ensure that the indicators used can represent the variables studied is to test the measurement model with the validity and reliability test approach. The results of the validity test can be seen in Figure 3.

Based on Figure 3, it can be explained that two indicators (economic motivation and social motivation) have a loading factor value below 0.7. So, it requires re-analysis by eliminating invalid indicators, as shown in Figure 4.

Based on the results of convergent validity testing (outer loading and AVE) on the indicators used, two were omitted from the 32 indicators used because they had values below the threshold of 0.7 [29]. The detailed test results can be seen in Table 3, showing that the model under study can explain the variance of indicators with an average extracted variance (AVE) value above 0.5 [30].

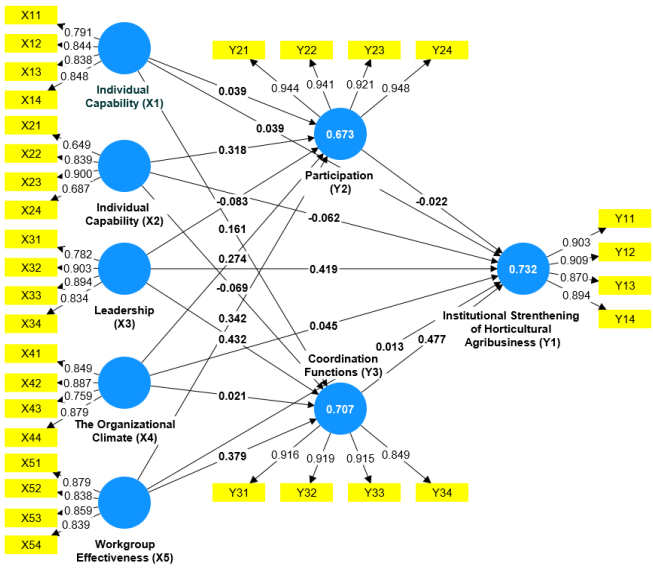

Figure 3. Results of the outer loading analysis of the study of human capital on strengthening horticultural agribusiness institutions

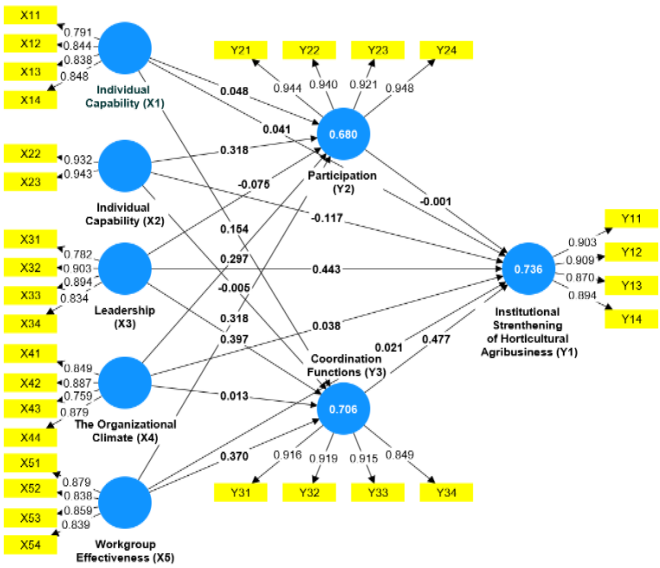

Figure 4. Outer loading analysis results after eliminating indicators X_{21} and X_{24} on individual motivation variables

Table 3. Results of validity test of research indicators study of human capital on institutional strengthening of horticultural agribusiness

Research Variables/Indicators	Outer Loading	Average Variance Extracted (AVE)
Individual Capability (X_1)		
▪ Professionalism	0.791	0.690
▪ Organizational experience	0.844	
▪ Networks and Connections	0.838	
▪ Attitude	0.848	
Individual motivation (X_2)		
▪ Economic motivation	0.932	0.879
▪ Self-actualization	0.943	
Leadership (X_3)		
▪ Fair Attitude	0.782	0.730
▪ Leadership Loyalty	0.903	
▪ Responsibility	0.894	
▪ Leadership orientation	0.834	
The organizational climate (X_4)		
▪ Friendly working atmosphere	0.815	0.786
▪ Openness	0.922	
▪ There is a transfer of knowledge	0.759	
▪ Freedom to innovate	0.879	
Workgroup Effectiveness (X_5)		
▪ Involvement in problem-solving	0.900	0.763
▪ Group support	0.901	
▪ Division of tasks	0.859	
▪ Mutual Respect	0.839	
Participation (Y_2)		
▪ Participation in planning	0.944	0.881
▪ Participation in the implementation of activities	0.940	
▪ Participation in activity evaluation	0.921	
▪ Participation in inviting others to be involved in institutional activities	0.948	
Coordination Function (Y_3)		
▪ Communication	0.916	0.811
▪ Obedience to coordination	0.919	
▪ Diagonal coordination	0.915	
▪ Awareness of the importance of coordination	0.849	
Institutional Agribusiness Strengthening (Y_1)		
▪ Institutional Innovativeness	0.908	0.800
▪ Effectiveness of Institutional Functions and Roles	0.909	
▪ Achievement of objectives	0.864	
▪ Institutional Sustainability	0.895	

Furthermore, the reliability test was carried out by assessing latent constructs using the reliability value of alpha and Cronbach composites. The test results showed that the Cronbach's Alpha value and the reliability of the composite obtained were higher than the threshold level of 0.70 [31]. In contrast, the rho-A value of 0.7 or greater was approved to indicate the reliability of the composite. The reliability value in this study can be seen in Table 4.

Table 4. Research variable reliability test human capital study on strengthening horticultural agribusiness institutions

Research Variables	Cronbach's Alpha	Rho-A	Composite Reliability
Institutional Agribusiness Strengthening	0.916	0.917	0.967
Participation	0.955	0.957	0.84
Coordination Function	0.922	0.932	0.945
Individual Capability	0.851	0.859	0.899
Individual Motivation	0.862	0.867	0.934
Leadership	0.877	0.891	0.915
The Organizational Climate	0.863	0.875	0.917
Workgroup Effectiveness	0.844	0.854	0.906

3.2 Structural model evaluation (R^2)

The structural model is evaluated by looking at the inner model test (R-Square) to see the direction of the relationship and the significance level between exogenous and endogenous variables. R-Square's rule of thumb value is 0.75 in the strong category, 0.50 in the moderate category, and 0.25 in the weak category [27]. Based on the test results (Table 5), the R-Square

results were obtained for each construct, namely the institutional strengthening construct of 0.736, which means that institutional strengthening variables can be explained and influenced by individual capability variables, individual motivation, leadership, organizational climate and effectiveness teamwork affect institutional strengthening by 73.6% and included in the moderate category. For the variable of coordination function of 0.706, individual capability, individual motivation, leadership, organizational climate, and work team effectiveness affect 70.6% and are included in the moderate category. Furthermore, the participation variable is 0.680, which means that individual capability, individual motivation, leadership, the organizational climate, and workgroup effectiveness affect participation by 68% and are included in the moderate category.

Table 5. Results of the R-square test of the study of human capital on institutional strengthening of horticultural agribusiness

Variable	R-Square
Agribusiness Institutional Strengthening	0.736
Participation	0.680
Coordination Function	0.706

3.3 Evaluation of significance value (t-test and p-test)

Evaluation of the significance value is done by observing the path coefficient value. The test results with the bootstrapping procedure are presented in Figure 5 and Table 6. From the test results, it can be seen that the human capital variable that has a direct influence on institutional strengthening is the leadership variable. The variables of individual capability, motivation, organizational climate, and teamwork effectiveness do not directly affect institutional strengthening.

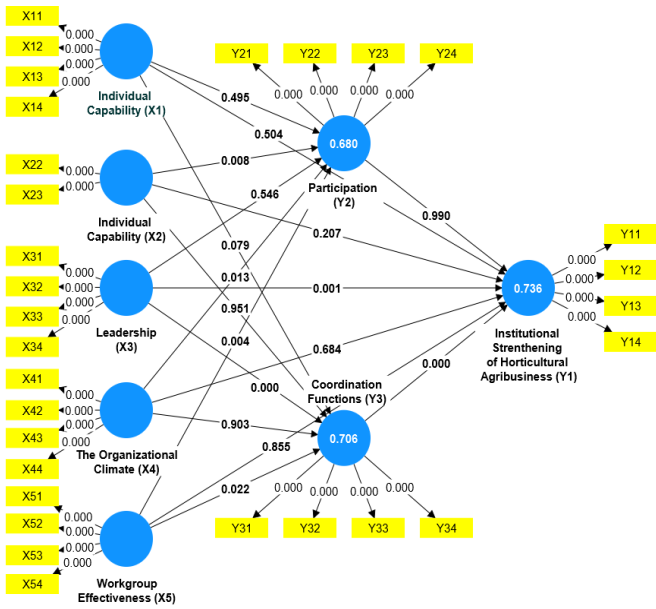

Figure 5. Results of the bootstrapping analysis of human capital studies in strengthening horticultural agribusiness institutions

Table 6. The direct and indirect effects of human capital variables on strengthening horticultural agribusiness institutions

Description	Original Sample (O)	t-Statistic	p-Values
Individual Capability -> Agribusiness Institutional Strengthening	0.049	0.816	0.415
Individual Motivation -> Agribusiness Institutional Strengthening	-0.138	1.402	0.162
Leadership -> Agribusiness Institutional Strengthening	0.476	3.777	0.000
The Organizational Climate -> Agribusiness Institutional Strengthening	-0.169	1.484	0.138
Workgroup Effectiveness -> Agribusiness Institutional Strengthening	0.229	1.766	0.078
Individual Capability -> Participation -> Agribusiness Institutional Strengthening	0.000	0.005	0.996
Individual Motivation -> Participation -> Agribusiness Institutional Strengthening	0.000	0.007	0.994
Leadership -> Participation -> Agribusiness Institutional Strengthening	0.000	0.004	0.997
The Organizational Climate -> Participation -> Agribusiness Institutional Strengthening	0.044	0.007	0.994
Workgroup Effectiveness -> Participation -> Agribusiness Institutional Strengthening	0.000	0.007	0.995
Individual Capability -> Coordination Function -> Agribusiness Institutional Strengthening	0.076	1.615	0.107
Individual Motivation -> Coordination Function -> Agribusiness Institutional Strengthening	-0.007	0.161	0.872
Leadership -> Coordination Function -> Agribusiness Institutional Strengthening	0.181	2.362	0.019
The Organizational Climate -> Coordination Function -> Agribusiness Institutional Strengthening	0.044	0.687	0.492
Workgroup Effectiveness -> Coordination Function -> Agribusiness Institutional Strengthening	0.134	2.199	0.028

Furthermore, the variables of individual capability, motivation, leadership, organizational climate, and workgroup effectiveness have no effect by using the participation variable as a mediating variable. The test results found that all of these variables got a statistical t-value of <1.96 and a significance value of >0.05. Then, the human capital variables that indirectly influence institutional strengthening are leadership and teamwork effectiveness. The coordination function variable does not mediate between individual capability, motivation, and the organizational climate on the institutional linking of horticultural agribusiness.

3.4 Direct influence of human capital on institutional strengthening of horticulture agribusiness

The concept of human capital was put forward by the study [25] in an article entitled Investment in human capital, which says that human capital is an important factor in increasing a country's economic productivity. This concept assumes that humans are a form of capital or capital as other forms of capital, which can be reproduced, become absolute, and require maintenance.

The results of the analysis show that individual abilities do not have a direct influence on the institutional strengthening of horticultural agribusiness. This result means that the strength of agribusiness institutions is not influenced by the level of professionalism of the management or experience in managing the organization. This finding is inconsistent with the study of Cahyanto et al. [32], which found that individual capability has a significant effect on performance [33], which states that good human capital will enable workers to innovate. Likewise, individual motivation, organizational climate, and workgroup effectiveness do not affect the institutional strengthening of horticultural agribusiness. This finding differs from Irwan et al. [34], which found a positive and significant effect between individual motivation, the organizational climate, and workgroup effectiveness with institutional strengthening. This difference is caused by the existence of farmers involved in institutions; most of them are only administratively registered and do not carry out their roles and functions according to existing procedures in the institution.

Leadership is the human capital variable that directly influences the strengthening of agribusiness institutions. This result means strong agribusiness institutions can be built with loyal and responsible leadership and leadership orientation based on service orientation to farming communities. This result corresponds with Orey [35] that the role of leadership in the organization is significant without forgetting the collective vision of the organization itself. This result is also in line with what Anantanyu [36] said that one indicator of institutional strengthening is the existence of a leadership role and leadership function in a running institution and a clear pattern of authority and division of tasks.

This finding implies that strengthening the leadership capacity of institutional actors must be carried out routinely and continuously so that institutional strengthening becomes more effective in carrying out its roles and functions in the development of horticultural agribusiness.

3.5 Indirect effects of human capital through participation and coordination functions

Cohen and Uphoff [37] revealed that participation in agribusiness institutions is essential for increasing farming households' welfare. The results of the analysis show that participation is unable to play a role in mediating human capital in strengthening agribusiness institutions, meaning that the impact of individual abilities, individual motivation, leadership, organizational climate, and team effectiveness on strengthening agribusiness institutions is not determined by the level of participation in agribusiness institutional activities. Nonetheless, the results of the study found that the level of farmer participation was quite active, both in the process of planning activities, implementing activities, and being involved in inviting farmers to be involved in agribusiness institutions. This is not in line with Anwarudin and Dayat [38], who say farmer participation is essential in agribusiness sustainability. Another finding by Abdul Rahaman and Abdulai [39] shows that participation in farmer groups will increase the yield of agricultural production.

The analysis results show that leadership through the coordination function is the human capital variable that indirectly influences the institutional strengthening of horticultural agribusiness, with a t-value of 2.362. This figure indicates that the coordination function serves as a mediating variable with a partial status of mediation between leadership and institutional strengthening. This study found that farmers realized coordination was essential to minimize institutional problems. In addition, it is also said that coordination is a tool to get support for profitable cooperation. This result is in line with Häfner and Piorr [40], who found that farmers perceive support for cooperation as beneficial. Regina et al. [41] explained that work coordination is needed to align the steps between existing parts of the organization to unify the views of each member of the organization regarding a common goal.

In maximizing the coordination function, institutional actors always establish intensive communication in maximizing institutional roles. This result is in line with the study of Osifo [42] that communication in coordination is a matter that influences the performance of institutional members. These results indicate that the performance of institutional members will increase if effective communication is created between members and institutional administrators. For this reason, both the chairman and members need to pay attention to various things that influence the success of the effectiveness of communication, including the communicator aspect so that communication can run effectively, trust, and attractiveness. The results of the study explain that strong leadership can be achieved if communication and cooperation between actors are always well established, which has an effect on making policies that are in accordance with the needs of the farming community.

The workgroup effectiveness variable influences the coordination function with a statistical t-value of 2.199. The position of the coordination function as a mediating variable has a significant influence, so its existence is referred to as complete mediation. These results provide information that the effectiveness of teamwork does not directly impact strengthening agribusiness institutions but must be mediated through the coordination function. The study's results found that institutional support and a clear division of tasks effectively facilitate coordination between stakeholders in developing agribusiness institutions.

This finding implies that effective coordination is essential in maximizing the human capital component owned by farmers in developing agribusiness institutions as part of the sustainable development of horticultural agribusiness.

4. CONCLUSION

This study examines the effect of the human capital component on the institutional strengthening of horticultural agribusiness and the mediating role of participation and coordination. We hypothesize that human capital influences the institutional strengthening of horticultural agribusiness through participation and coordination functions. The test results through SEM show that leadership is the human capital variable that directly influences institutional strengthening, with a positive and statistically significant correlation. The participation variable does not mediate between human capital and institutional strengthening. The coordination function variable partially mediates leadership and institutional strengthening, while there is a full mediating effect between teamwork effectiveness and institutional strengthening. The results of this study indicate that not all hypotheses are supported.

Limitations in cross-sectional research cannot explain the dynamics of changes in conditions or population relationships observed in different periods or the dynamic variables that

influence them, and the information obtained is not in-depth. This study, n only involved farmer institutions, so further research is suggested to involve other supporting institutions involved in the development of horticultural agribusiness.

Therefore, we recommend to institutional actors that in strengthening agribusiness institutions, it is necessary to increase the quality of human capital in an integrated manner and improve the coordination function between stakeholders involved in developing agribusiness institutions by increasing the intensity of meetings and joint coordination meetings. We also recommend that the government develop leadership training programs and coordination functions for institutional actors. This study makes an essential contribution to understanding the role of human capital in strengthening agribusiness institutions. These findings can inform more effective policies and interventions to empower smallholder farmers and support the long-term sustainability of horticultural agribusiness.

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