THE ANALYSIS OF BEEF CATTLE BUSINESS SUSTAINABILITY IN DONGGALA REGENCY, INDONESIA

Haerani*, Zaenal Fanani, Budi Hartono and Bambang Ali Nugroho

Abstract: *Beef cattle business in Indonesia has a huge prospect. It is supported by the increasing demand due to population growth and development of the national economy. Consumers' demands for beef cannot be met from domestic supply because the rate of increase in demand cannot be matched by population growth and increased production. Nationally, to meet the demand for beef, the government imports cattle's in order to fulfill consumers' demands for meats so that the dependence on foreign cattle's is getting higher. The aim of this study is to examine and to analyze the sustainability of beef cattle business using SEM analysis tool. Specifically, the study was conducted in Damsol district, Donggala, because this district is the center of beef cattle production in Donggala even in Central Sulawesi. The determination of the sample size in this study refers to Solving formula on the precision of 5% and was obtained of 165 farmers. Based on the results and discussion, we concluded as follows (1) the Human Capital (X1) has no significant effect on the Beef Cattle Business Sustainability (Y), it shows that the level of human capital value (X1) will not affect the level of Beef Cattle Business Sustainability (Y). the Social Capital (X5) has no significant effect on the Beef Cattle Business Sustainability (Y), it shows that the level of the social capital value (X5) will not result in the level of the Beef Cattle Business Sustainability (Y).*

Keywords: *Beef Cattle, Sustainability, Donggala, Indonesia*

1. INTRODUCTION

Beef cattle business in Indonesia has a huge prospect. It is supported by the increasing demand due to population growth and development of the national economy. Consumers' demands for beef cannot be met from domestic supply because the rate of increase in demand cannot be matched by population growth and increased production. Nationally, to meet the demand for beef, the government imports cattle's in order to fulfill consumers' demands for meats so that the dependence on foreign cattle's is getting higher.

Beef cattle development efforts, particularly in the area of Donggala regency, the government has made some breakthroughs such as adoption of technology in the

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* University of Brawijaya, Indonesia

form of implementing cross breeding of local cattle's with cattle's sourced from quality seeds through artificial insemination (IB), controlling diseases, conducting counseling to farmers so they maintain cattle's from grazing system maintenance to grounded system, providing capital assistance (BPLM) in the hopes of changes focused on changes in income. However, until now the development of beef cattle is still slow. It is due to the problems faced in the people's cattle business are very complex, among others, limited resources, land, capital and labor as well as business management itself.

The reasons why beef cattle business needs to be increased in term of its roles in an area/areas: (1) The livestock sub-sector has the potential to be a source of new growth in the agricultural sector. The indication is for the period 1999-2003, livestock subsector grew by an average of 3.2% / year, higher than the agricultural sector by 2.0%. (2) households involved directly on the livestock business increased from 4.45 million in 1983 up to 5.62 million in 1993 and 6.51 million in 2003 (CBS, 2004) and beef cattle business provides a very large portion, (3) the spread of production centers in some areas while the urban consumption is centralized in cities so it can move the regional economy, and (4) supporting the food security both as providers and as sources of revenue that both serve to increase the availability and accessibility of food.

The analysis of sustainability (sustainability), Farrington *et al.* (1999) introduces the 5 capitals or resources as a determinant of business sustainability. Those five capitals are human capital, natural capital, financial capital, physical capital, and social capital which are interlinked with one another. The results of research conducted by Parmawati *et al.* (2012) use the application of the five capitals in measuring the sustainability of Agropolitan business in the city of Batu. The use of analysis tool Structural Equation Modeling (SEM) was able to finish the link of the five capitals and its impact on business sustainability. In contrast, the study by Suyitman (2009), the five capitals introduced by Farrington was adapted through the five dimensions (capital). They are ecological, economic, socio-cultural, infrastructure/technology, and legal/institutional. Using the analysis tool Multidimensional Scaling (MDS), the results of this study were able to answer the level of sustainability of the business based on the five dimensions. Unlike the case with MDS, SEM analysis, in addition was able to explain the level of business sustainability based on the five capitals (resources), and are also able to explain the relationship between the five capitals and its impact on business sustainability. So that, the present study aims to examine and to analyze the sustainability of beef cattle business using SEM analysis tool.

2.   LITERATURE REVIEW

The weaknesses that become the limiting factor in the development of beef cattle in lowland areas are (1) low genetic quality of cattle, (2) lack of availability of superior bulls (3) lack of the ability of farmers in dealing with beef cattle farm business management, and cattle maintenance system that are still traditional. In the mid-lying areas, the weakness found is part-time beef cattle business management pattern, while

in highland areas, the optimization of land capacity is less, and the management ability of beef cattle maintenance is still low.

Tressia (2008) states that analyzing the potential of the area for the development of beef cattle in the study entitled Analysis of Potential Areas for the Development of Cattle in Lubuk Alung District, Padang Pariaman regency. Tressia's research results (2008) show that based on the approach to the natural resources of Lubuk Alung, Padang Pariaman, beef cattle's cannot be developed because of a shortage of food. Thus, it is still possible in terms of human resources to develop beef cattle business.

Another research has been conducted by Arfa'i (2009) entitled the Potential and the Development Strategies of Beef Cattle Business in Lima Puluh regency, West Sumatra. Arfa'i research used the same method with which of Tressia's (2008). The results show, that the Lima Puluh regency of the city of West Sumatra has the potential to develop beef cattle business in the future. Wiyatna (2002) in his study entitled the Potential of Beef Cattle Development Strategies in Majalengka has reviewed the potential of beef cattle development based on the potential resources of land and labor in the lowland (0-100 asl), medium (100-500 asl) and high > 500 asl). The results of the study show that the potential capacities for beef cattle's based on the availability of land and labor in each region is 7,397 Livestock Unit (ST) in the lowlands, 9,867 ST in medium lying areas and 8,144 ST in highland areas. A study by Suyitman, *et al.* (2009) on the status of the sustainability of livestock-based areas in Situbondo regency for the Development of Agropolitan areas with the result saying that the ecological dimension is in less sustainable status (46.0%), the economic dimension is in sustainable enough status (69.53%), the socio-cultural dimension is in quite sustainable status (55.14%), the infrastructure and technology dimensions is in less sustainable status (45.48%), as well as the legal and institutional dimension is in less sustainable status (47.46%).

A study by Parmawati *et al.* (2012) show that the human capital, the natural capital, the financial capital, the social capital, and the physical capital affect the accessibility and sustainability of the development of agropolitan in the city of Batu. By using the Structural Equation Modeling analysis tool, the study found that there was the presence of a very close relationship between the human capital to the natural capital, the financial capital, the social capital, and the physical capital, as well as among other capitals which became the implementation of the Sustainability Livelihood Approach introduced by Farrington (1999). As one of the area's top commodities, the pattern of the development of the beef cattle farming is still dominated by people's farms with subsystem approach and not apply the concept of sustainable development, so that the constraints are often faced especially by farmers engaged in the farming subsystem, of which is the difficulty in obtaining seedlings and artificial insemination (AI) services, the limited ability in the management of maintenance, high rates of illness and death of the cattle's, lack of trust from capital institutions, and lack of understanding in the application of concepts of management and environmental systems. Factors which

become driving forces for the development of beef cattle are; (1) the market demand for beef is increasing, (2) the availability biomass which is derived from agricultural and plantation wastes is large enough, (3) the availability of the Ranch fields commonly in forms of savanna, steppe and tundra outside Java, (4) the availability of the islands which are still empty of cattle's and likely to grow/continue, and (5) the availability of local animal genetic resources that have adapted very well in an environment of tropical valley. The constraints and opportunities for livestock development in an area can be used as a reference in determining the development strategy of beef cattle in the area (Diwyanto *et al.* 2006).

According to Tavaf and Kuswaryan (2006), the obstacle in the development of people's beef cattle lives tocks among others is very low productivity shown by: (1) the slow increase in weight ranging from 0.4 to 0.5 kg/head/day, (2) small business scale (ranging from 2-4 heads/livestock farmer), (3) still maintaining the traditional pattern with low input (not yet economically oriented), and (4) still concentrated in densely populated areas (Java and Bali). Diwyanto and Priyanti (2006) report that there are some quite fundamental weaknesses in the development of beef cattle's, among others; less productive human resources with low levels of education that are less able to adopt innovative technologies as well as difficult to develop institutional and business networks.

Beef cattle business in Central Sulawesi, especially in Donggala regency still faces some constraints, namely: limited knowledge of farmers and limited availability of quality seeds, and low livestock productivity. This is because the business of cattle in Central Sulawesi in general (97%) is still in form people's farm business which is as savings with relatively small-scale business (2-4 heads), does not use proper beef cattle maintenance technology and management. So, we need an analysis for the development of beef cattle in Donggala regency.

Analysis of sustainability (sustainability), based on the theory built by Farrington (1999) indicates the needs of capitals or resources in the form of human, natural, financial, physical, and social. Of the theory, it will be tested whether beef cattle business sustainability is based on five of these resources which include human, natural, financial, physical, and social. Through SEM analysis tool, the level of business sustainability based on the five capitals (resources) can be explained, and is also able to explain the relationship between the five capitals and its impact on the business sustainability.

3.   RESEARCH METHOD

The aim of this study is to analyze the sustainability of beef cattle business in Donggala regency. Specifically, the study was conducted in Damsol district, Donggala, because this district is the center of beef cattle production in Donggala even in Central Sulawesi. The determination of the sample size in this study refers to Slovin formula on the precision of 5% (Sekaran, 2006) and was obtained of 165 farmers.

The data analysis method used in this research used descriptive and inferential statistical analysis. In this study, the researcher wanted to test the relationship of the five capital variables for the development of beef cattle business. An association (or correlation) between the independent variables (Sustainable Livelihood Approach five variables: physical capital variables, Financial Capital variables, Human Capital variables, Natural Capital variables, and Social Capital variables) was measured using Structural Equation Modeling (SEM).

4. RESULT AND DISCUSSION

A. Measuring Model

The variables in this study include human capital variables (X1), natural capitals (X2), financial capitals (X3), job satisfaction (Y1) and Employee Performance (Y2). The following table presents the average results and the loading factors of each indicator in each study variable.

The term for the instruments to pass the validity test is if the correlation values are greater than 0.3, while the term for the instruments to pass reliable test is if the Cronbach alpha values are above 0.6. From Table 1, it is shown that the entire question items of the five variables, namely the human capitals (X1), natural capitals (X2), financial capitals (X3), physical capitals (X4), social capitals (X5) and beef cattle business Sustainability (Y) of which the correlation values are greater than 0.3, so that the whole items are valid questions. Of the reliability test results, the Cronbach alpha values for the six variables are shown consecutively > 0.6 so that the instruments for the six variables are declared reliable. Thus, the instruments have passed the test so that the data is valid and reliable so the measurement results using the instruments can be used for data analysis. In addition, the factor analysis shows that the strongest indictor measuring the human capital variable (X1) is the X1.1 indicator with a loading rate of 0.699 and the mean of 3.43. Furthermore, for the natural capital variable (X2), the strongest measuring indicator is the X2.2 indicator of 0.675 and the mean of 3.44. In the financial capital indicator (X3), it is known that the X3.5 indicator is the strongest indicator with the loading value of 0.682 and the mean of 3.41. The physical capital variable (X4), the X4.4 indicator is the strongest indicator with the loading value of 0.683 and the mean of 3.38. The social capital variable (X5) has the X5.2 indicator as the strongest measuring indicator with loading value of 0.682 and the mean of 3.37. And for the beef cattle business continuity variable, it is measured by Y1 as the strongest indicator with the loading value of 0.833 and the mean of 3.75.

B. Assumption of The Model and Goodness of Fit Model

The assumptions that must be met prior to SEM analysis are the assumption of normality, the absence of outliers, and linearity. The multivariate normality assumption was tested with the help of AMOS 6 software. The normality test results obtained was

Table 1
Test Result of Research Instruments, Average of Score and Loading Factor

Variable	Indicator	Correlation	Alpha Cronbach	Mean	Loading
Human	X1.1	0.731	0.701	3.43	0.699
Capital (X1)	X1.2	0.669		3.34	0.484
	X1.3	0.631		3.45	0.516
	X1.4	0.645		3.41	0.504
	X1.5	0.694		3.40	0.600
Natural	X2.1	0.697	0.703	3.28	0,543
Capital (X2)	X2.2	0.698		3.44	0,675
	X2.3	0.665		3.36	0,537
	X2.4	0.711		3.25	0,624
	X2.5	0.606		3.29	0,424
Financial	X3.1	0.657	0.701	3.45	0,532
Capital (X3)	X3.2	0.671		3.43	0,515
	X3.3	0.642		3.40	0,500
	X3.4	0.700		3.25	0,612
	X3.5	0.713		3.41	0,682
Physical	X4.1	0.657	0.700	3.52	0,510
Capitals (X4)	X4.2	0.620		3.30	0,557
	X4.3	0.656		3.48	0,529
	X4.4	0.749		3.38	0,683
	X4.5	0.686		3.39	0,549
Social	X5.1	0.623	0.705	3.48	0,452
Capitals (X5)	X5.2	0.700		3.37	0,628
	X5.3	0.751		3.33	0,730
	X5.4	0.634		3.39	0,481
	X5.5	0.672		3.41	0,536
Beef Cattle	Y.1	0.881	0.702	3.75	0.833
Business	Y.2	0.874		3.68	0.650
Sustainability (Y)					

the critical ratio of -2.070 with the value of Z¬count for a 5% equal to 1.96. Since the absolute value of CR for multivariate is 2.070> 1.96 then the multivariate normality assumption is not met. However, based on the Central Limit Theorem (Central Limit Theorem), the assumption of normality, in the use of path analysis is not too critical when observational data reaches 100 or more. From a large sample, sample statistic close to normal distribution can be produced. Since this study used 169 observation data in total, so that the data can be assumed to be normal. To test whether there is an outlier or not, it can be seen using Mahalanobis Distance (MD). The Mahalanobis distance is evaluated using a value of 153.099. From the Mahalanobis distance to the most distant observation point is the 27th respondent with a value of Md = 43.693. When compared with the value of 153.099 the value of the 27th Md point <153 098, so it was concluded that all points of observation were not outliers. The linearity assumption test conducted was using the Curve Fit method. The linearity test results show a significant linear model because all the Sig values <0.05 therefore it can be concluded that the assumption of linearity has been fulfilled.

The results of goodness of fit overall models test, according to the results of SEM analysis, are to determine whether the hypothetical model is supported by empirical data, as given in Table 2 below:

Table 2
Results of Testing Goodness of Fit Overall Model

Criteria	Cut-of value	Model Result	Explanation
Chi Square	Small	368.962	Model Not Good
p-value	≥ 0.05	0.011	
CMIN/DF	≤ 2.00	1.194	Both models
GFI	≥ 0.90	0.862	Marginal
AGFI	≥ 0.90	0.832	Marginal
TLI	≥ 0.95	0.922	Marginal
CFI	≥ 0.95	0.932	Marginal
RMSEA	≤ 0.08	0.034	Both models

The results of Goodness of Fit Overall Test based on Figure and Table 2 show that two out of seven criteria indicate a good model. According to Arbuckle and Wothke, in Solimun (2009), the best criteria used as a good indication of the model are the values of Chi Square/DF is less than 2, and RMSEA values under 0.08. In this study, the CMIN/DF and RMSEA values have met the cut-off value. Therefore, the SEM model in this research is suitable and feasible to be used, so interpretations for further discussions can be done.

C. Structural Model

Prior to testing the direct effect, first a test on the correlation between variables was done. Here are presented the results of the correlation between variables:

Table 3
Structural Models of SEM Results: Correlation Between Variables

Relationships Between Variables	Coefficient Std	P-value	Explanation
Human Capital (X1) ↔ Natural Capital (X2)	0.478	0.002	Significant
Human Capital (X1) ↔ Financial Capital (X3)	0.444	0.000	Significant
Human Capital (X1) ↔ Physical Capitals (X4)	0.436	0.002	Significant
Human Capital (X1) ↔ Social Capitals (X5)	0.421	0.002	Significant
Natural Capital (X2)↔ Financial Capital (X3)	0.452	0.002	Significant
Natural Capital (X2)↔ Physical Capitals (X4)	0.474	0.003	Significant
Natural Capital (X2)↔ Social Capitals (X5)	0.445	0.004	Significant
Financial Capital (X3) ↔ Physical Capitals (X4)	0.436	0.001	Significant
Financial Capital (X3) ↔ Social Capitals (X5)	0.435	0.001	Significant
Physical Capitals (X4) ↔ Social Capitals (X5)	0.454	0.001	Significant

Based on Table 3, the results of testing the correlation between variables can be presented as follows: the Human Capital (X1) has a significant relationship with the

Natural Capital (X2) with P = 0.002 (<0.05) with the coefficient value of 0.478. This means there is a significant relationship between the Human Capital (X1) with the Natural Capital. Positive coefficient means that the higher the Human Capital value (X1) will affect the higher the Natural Capital (X2), or vice versa.

In this structural model, five (5) hypothesized relationships between variables (direct effect) were tested. The following is the complete results of the testing of the relationships between variables of the study as follows: Graphically presented as follows:

Table 4
Structural models of SEM Results

Relationships Between Variables	Coefficient Std	P-value	Explanation
Human Capital (X1) → Beef Cattle Business Sustainability (Y)	-0.033	0.783	Not Significant
Natural Capital (X2) → Beef Cattle Business Sustainability (Y)	0.399	0.006	Significant
Financial Capital (X3) → Beef Cattle Business Sustainability (Y)	0.296	0.014	Significant
Physical Capitals (X4) → Beef Cattle Business Sustainability (Y)	0.291	0.021	Significant
Social Capitals (X5) → Beef Cattle Business Sustainability (Y)	-0.018	0.876	Not Significant

Graphically presented as follows:

Figure 1: Structural models of SEM Results
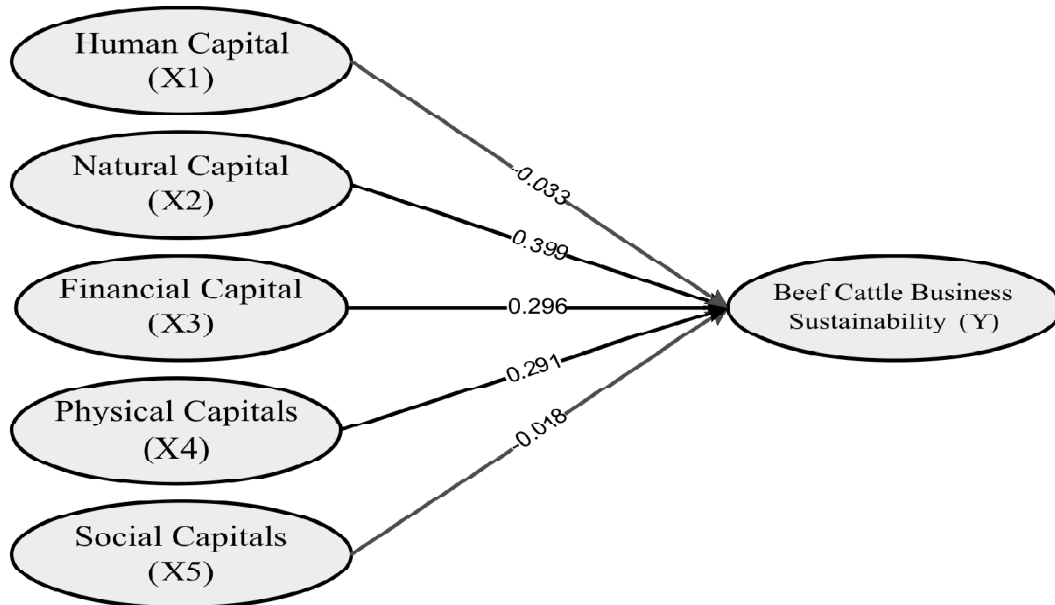
The red line shows the relationship was not significant

Based on the analysis, the Human Capital (X1) as measured by five indicators: Livestock Awareness (X1.1), Breeders' Skills (X1.2), Livestock Experience (X1.3), Absorption of Livestock Business Labors (X1.4) and Family participation in Livestock Business (X1.5) did not give significant impact on the Cattle Business sustainability (Y) with a coefficient of -0.033 and the p-value of 0.783. This means that the intensity of the Human Capital (X1), would not result in the intensity of the Cattle Business Sustainability (Y). This study is in line with the results of a study conducted by Hari Nugroho Yudianto and Arif Hoetoro entitled "the Dynamics of Weaving Industrial Business Development in the Centre of Weaving of Bandar Kidul of the City of Kediri". The study aimed to determine the cause of the development of the weaving industry in Bandar Kidul, Kediri. The variables used in this study were physical capital, financial capital, human capital, human capital, and business development. This was a descriptive qualitative study using a phenomenological approach through a variety of activities that occurred in the field where the necessary data were obtained through interviews, observation and documentation directly. In the study, the positive implications on the development of business found only in physical capital, while on the financial capital, human capital and social capital still had negative implications.

The coefficient of correlation between the Natural Capital (X2) as measured by the five indicators namely, Weather Conformity (X2.1), Environmental Health of the livestock business (X2.2), Land Suitability (X2.3), Availability of land for HPT (X2.4) and Quantity of livestock Waste (x2.5) with Cattle Business sustainability (Y) is equal to 0.399 with a p-value of 0.006. P-value <0.05 indicates that the Natural Capital (X2) significantly affects the Cattle Business sustainability (Y). The coefficient is positive indications unidirectional relationship. This means that the higher the value of the Natural Capital (X2) will result in the higher value of Beef Cattle Business Sustainability (Y). This study is in line with the results of a study conducted by Nurul Komaryatin with the title "The Development of Production Factors to Increase the Income and Business Continuity of Salt Farmers " published in the journal "Proceedings Seminar & the National Conference of Business Management". This study aimed to examine the determinants of income and business sustainability of farmers in seven salt villages in Kedung, Jepara regency. The study population consisted of 638 salt farmers, with 96 samples were taken at random people. The independent variables consisted of natural capital (X1), venture capital (X2), labor (X3), and the skills of employees (X4) and the dependent variables were income and business sustainability. The data were collected using questionnaires for and documentation for the primary and secondary data and using multiple regression analysis method. Based on the test results, the natural capital, the venture capital and the skills had a positive effect on the incomes of the salt farmers and the business sustainability.

The analysis results show the coefficient of correlation between the Financial Capital (X3) as measured by five indicators: Livestock Business Profit (X3.1), marketing of

livestock products (X3.2), competitiveness of commodities (X3.3), availability of livestock Product Processing Industry (X3.4) and presence of microfinance institutions (X3.5) with Cattle Business Sustainability (Y) that is equal to 0.296 with a p value of 0.014. P-value <0.05 indicates that the Financial Capital (X3) significantly affects the Cattle Business Sustainability (Y). The coefficient is positive indicating unidirectional relationship. This means that the higher the value of the Financial Capital (X3), the higher the value of the Cattle Business Sustainability (Y). This study is in line with the results of a study conducted by Taslim entitled "the Influence of Production Factors in Milk Dairy cattle business Through Path Analysis Approach in West Java," which was published in the "Journal of Animal Science". The aim of this study was to determine the correlation analysis of the influence of the factors of production to the income and sustainability of farming family business. This study was conducted using a survey and analyzed using the analysis of correlation and path analysis (path analysis). The samples (respondent) conducted two-stage random sampling. The number of respondents of dairy farmers taken was as many as 51 people. The results of this study indicated that the human capital, the natural capital, the physical capital, the financial capital, and the social capital affected the income and the sustainability of farming family business.

Based on the analysis results, the coefficient of correlation between the physical capital (X4) as measured by the five indicators namely, availability of access roads to the cattle business (X4.1), availability of infrastructure and livestock business facilities (X4.2), public access to Livestock Marketing (X4. 3), Public Access to Livestock activities (X4.4) and Availability of Slaughterhouse (X4.5) with Cattle Business Sustainability (Y) is equal to 0.291 with a p-value of 0.021. P-value <0.05 indicates that the physical capital (X4) significantly affects the Cattle Business Sustainability (Y). The positive coefficient indicates an unidirectional relationship. This means that the higher the value of the physical capital (X4), the higher the value of the Cattle Business Continuity (Y).). This study is in line with the results of a study conducted by Achmad Sjafii entitled "the Influence of Physical Investment and Human Development Investment on the Economic Growth and Sustainability in East Java, 1990-2004" published in the "Journal of Indonesian Applied Economics ". The aim of this study was to determine the effect of physical investment and human development investment to economic growth and sustainability of East Java. The variables used in this study were the physical investment, human development investment, economic growth, and economic sustainability. This study used panel data analysis, and incorporated cross section data in 37 regencies/cities and time series data on the period 1990-2004. This study used a Housman test verification process. In this study, it was found that all physical investment and human development investments affected positively and statistically significant to the economic growth and sustainability in the province of East Java.

The analysis results of the coefficient of the correlation between the Social Capital (X5) measured in five indicators namely, level of mastery and application of Technology (X5.1), people's views about the cattle business (X5.2), community empowerment in

livestock activities (X5.3), Existence and the role of counseling agencies (X5.4), and the existence of farmer groups (X5.5) with Cattle Business Sustainability (Y) is equal to -0018 with p-value of 0876. P-value> 0.05 indicates that the Social Capital (X5) has no significant effect on the Beef Cattle Business Sustainability (Y). This means that the intensity of the Social Capital (X5) would not result in the intensity of the Cattle Business Sustainability (Y). This study is in line with the results of a study by Tiara Anggita with the title "Social Capital Support in Collectivity of Farming Business to Support Agricultural Production Performance, Case Study: Karawang and Subang" which was published in the "Journal of Urban and Regional Planning". This study aimed to look at how social capital supported in the collectivity performance in terms of the quality, capacity, and continuity of the resulting production. The process of data collection was conducted through a survey of primary data. Qualitative analysis method was used as the instrument of analysis in this study. Based on the analysis, it was concluded that the conditions of social capital among the farmers in the study area could not support the collectivity performance of farming due to the financial trauma. The absence of the collectivity made the expected capacity, the quality, and the production sustainability to compete in the modern market could not occur. The cost of production became inefficient and the welfare of farmers was very low.

5. CONCLUSIONS

Based on the results and discussion, we concluded as follows (1) the Human Capital (X1) has no significant effect on the Beef Cattle Business Sustainability (Y), it shows that the level of human capital value (X1) will not affect the level of Beef Cattle Business Sustainability (Y). the Social Capital (X5) has no significant effect on the Beef Cattle Business Sustainability (Y), it shows that the level of the social capital value (X5) will not result in the level of the Beef Cattle Business Sustainability (Y).

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