Mediterranean Journal of Basic and Applied Sciences (MJBAS)
Volume 10, Issue 1, Pages 277-289, January-March 2026

Assessment of Poultry Production Potential System and Constraints in Arsi Zone, Oromia Regional State, Ethiopia

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DOI: https://doi.org/10.46382/mjbas.2026.10116

Article Received: 18 January 2026 *Article Accepted: 22 March 2026* *Article Published: 25 March 2026*

ABSTRACT

This study was conducted with the objectives of assessing poultry production potential and identifying constraints associated with poultry production system in the study area. Both primary and secondary data were utilized and analyzed using descriptive statistics. In the study area village/backyard and small-scale poultry production systems are widely exercised and more than ninety six percent of the respondents produced less than fifty poultry per year. The average poultry holding of the respondents was 9 birds with minimum of 1 and maximum 400 birds. More than ninety percent of the respondents produced poultry feed by themselves due to unavailability and high prices of commercial feed. Poultry production is highly affected by poultry disease and number of poultry population is decreasing from time to time. Vaccination, good feed, good water, good housing and cleaning/disinfection are highly ranked as most important elements of poultry production. The respondents had information about improved breeds and implement that used for feeding but they didn't utilize it due to unavailability and expensiveness of the technologies. Though there is access to credit for producers, they didn't utilize credit services due to high interest rate and religion. Disease outbreak, high cost of commercial ration and lack of production manual were highly rated and ranked as poultry production constraints. Agricultural Engineering Research Center, regional and zonal livestock's experts should have to work on technologies and constraints related issues.

Keywords: Constraint; Farmers; Feed; Potential; Poultry Production; Utilize; Ethiopia.

1. Introduction

Poultry production and consumption provide different functions for the producer as compared to the other livestock production (Tadesse et al., 2013; Anja and Hussen, 2016). Among the functions some are: Immediate source of cash income, provides meat and egg for household consumption, contributes for food security and creates employment, source of organic fertilizer, requires low initial capital investment, small land and low labor input, efficient feed converters and have a wide range of adaptability for different agro-ecologies (Habte et al., 2017; Yenesew et al., 2015, and Fan et al., (2025).

Modern poultry production started in Ethiopia about 40 years ago, mainly in colleges and research stations (Alebachew et al., 2022). The activities of these institutions focused on the introduction of exotic breeds and their distribution to farmers, along with appropriate management, feeding, housing and health care packages (Dawit, 2010). There are a few private modern production farms around Addis Ababa City and some state-run poultry multiplication centers have been established, with the aim of providing improved breeds to farmers through the extension service (Aklilu, 2007; Özentürk et al., 2024).

In Ethiopia there are about 60.64 million poultry population and distribution varies with regional states, higher in Oromia 20.8 million followed by Amhara Regional State 19.8 million and Harari Regional State 0.097 million has a lower poultry population (Alebachew et al., 2018).

Beside the production there are many constraints that inhibit the productivity of poultry in Ethiopia (Fadilah et al., 2025 and Yared et al., 2019). According to Wilson (2010), percentage distribution share of poultry production in Oromia was about 34. 45 percent and households owning domestic poultry species in Arsi zone was 62%. Arsi

zone livestock resource development office annual report (AZAO, 2019) indicated that, total poultry population distributed was 1,299,133 birds in which 1,108,727(85.34%) follows local production system and 190,406 (14.66%) follows hybrids production system.

Despite the fact that, poultry products play an important role directly or indirectly in the livelihood of Ethiopian people, the potential and constraints aspects have not yet studied and well documented so for in Arsi zones of Oromia Regional state. Thus, this study was initiated to assess the poultry production potential and to identify constraints associated with poultry production system in the study area.

1.1. Objectives of the Study

1) Assessing the poultry production potential in the study area.

2) Identifying constraints associated with poultry production system

2. Literature Review

2.1. Basic concepts and poultry production

The estimate of poultry population in Ethiopia is over 60 million, out of which indigenous chickens comprise about 94.33%; the remaining are crosses and exotic chickens owned by improved family poultry and specialized commercial poultry farms (CSA, 2017). Poultry in Ethiopia provides the production of eggs for hatching, sale, and home consumption and the production of birds for sale, processing, replacement, and home consumption (Bekele and Abebe, 2025). Chicken meat is the most palatable and easily digestible animal meat and contains essential amino acids required for human beings, and eggs are richly endowed with nutrients (Gasimova, 2024).

2.2. Importance of chicken production and consumption

Chicken production and consumption provide different functions for the producer as compared to other livestock production (Birhanu et al., 2021). Among the different functions, the following are the main ones: Immediate source of cash income, Provides meat and egg for household consumption, Contributes to food security and creates employment, Source of organic fertilizer, requires low initial capital investment, small land, and low labor input. Efficient feed converters have a wide range of adaptability for different agro-ecologies. Their product is acceptable to most of the community, and the meat and eggs contain special proteins that allow children to grow strong and their brains to develop (Yenesew et al., 2015).

2.3. Structure of the Ethiopian poultry sector

According to Tsegaye at al. (2024), the poultry sector in Ethiopia can be characterized into three major production systems based on some selected parameters such as breed, flock size, housing, feed, health, technology, and biosecurity.

2.3.1. Village or backyard poultry production system

Backyard poultry is the predominant system in Ethiopia and accounts for nearly 99 percent of the poultry population. Backyard poultry is characterized by local chicken breeds, individual farm household management,

minimum labor inputs where birds are kept under a scavenging system, little or no input for housing, feeding, or health care, and not being business-oriented but rather destined for satisfying the various needs of farm households.

2.3.2. Small-scale poultry production system

Modest flock sizes, usually ranging from 50 to 500 exotic breeds, are kept for operating on a more commercial basis, common in the urban and pre-urban areas of Addis Ababa. Birds are kept both indoors and outdoors with a low biosecurity level.

2.3.3. Commercial poultry production system

A commercial poultry production system is characterized by a highly intensive production system. greater than or equal to 10,000 birds, indoor conditions with a medium-to high-biosecurity level, imported exotic breeds that require intensive inputs such as feed, housing, health, and a modern management system. The commercial poultry production system accounts for nearly 2% of the national poultry population (Tsegaye at al., 2024). A few companies are situated mostly in Bishoftu areas (ELFORA, Alema, and Genesis Farms). There are seven public poultry multiplication and distribution centers (PMDCs) located in different regions operating with the major objective of distributing improved exotic breeds to smallholder farmers.

2.4. Empirical review of poultry production systems

Modern poultry production started in Ethiopia about 40 years ago, mainly in colleges and research stations. The activities of these institutions focused on the introduction of exotic breeds and their distribution to farmers, along with appropriate management, feeding, housing, and health care packages (Dawit, 2010). There are a few private modern production farms around Addis Ababa City. Some state-run poultry multiplication centers have been established, with the aim of providing improved breeds to farmers through the extension service (Aklilu, 2007).

According to Moges et al. (2010), the purposes of chicken production were sale for income, egg hatching for replacement, consumption, use of birds for cultural and religious ceremonies, and egg production. The result of the study revealed that there is a great interest in boosting up the existing village chicken production and productivity. This should be considered an opportunity and potential to design and implement interventions aimed at improving the production and productivity of village chickens in the district.

Anja and Hussen (2016) found that the mean flock size recorded in this study was 4.82 chickens, the value of which is higher than the national average, 4.1. About 80% of the respondents used to supplement poultry with cereal grains like wheat and corn early in the morning and late in the afternoon. The flock composition consists of laying hens (27%), which reflect their retention for production purposes. Dawit (2010) found that poultry production has high turnover earnings, a small feed requirement, a lower initial cost requirement, employment opportunities for poor women and men, landless farmers, and disadvantaged groups, and is a less limiting factor for its production.

The main constraints of indigenous chickens in the tropics are that they are poor producers of eggs and meat (Fadilah et al., 2025). A study conducted by Yared et al. (2019) shows the major constraints of poultry producers were disease outbreaks, the high cost of commercial rations, and unavailability of day-old chicks in time, market

instability, and poor supply and quality of vaccines. Khan et al., (2025) reported some constraints like shortage of exotic chicken, lack of good management practices, and placing exotic and local chickens in one house, which leads to diseases called Newcastle, Salmonella, and chicken mites. Getu and Birhan (2014) found that seasonal outbreaks of diseases and predators were the two major causes for loss of chickens.

3. Research Methodology

3.1. Description of the Study Area

The study was conducted in Arsi zone, located in Oromia Regional State of Ethiopia. Arsi zone is characterized by crop-livestock mixed farming system where crop production is dominant. The major crops grown are annual crops such as cereals, pulses, oilseed and vegetables (Weldeyohanis et al., 2017). The major livestock's reared in the area are cattle's, sheep's, goats, horses, donkey's mules, poultry and bee colonies (Yami et al., 2017). The agro ecological zone of the study area is comprised of low altitude, mid altitude and high altitude.

3.2. Sample Size and Method of Sampling

The sampling frame of the study was poultry producer households which are found in selected kebeles. A three-stage sampling procedure was employed to select the specific respondents. In first stage, four representative potential poultry producer districts were selected purposively based on poultry producing potentials (Table 1). In the second stage among the kebeles of selected districts, two kebeles from each district were again purposively selected based on their poultry production potentials. In the third stage, using the population list of poultry producer farmers from sampled kebeles, the representative poultry producer households were randomly selected using simple random sampling technique.

The intended sample size was determined by employing probability proportional to population size using formula given by (Yamane, 1967), at 5 percent level of precision.

$$\mathbf{n} = \frac{N}{1+N(e)^2} = \frac{2140}{1+2140(0.05)^2} = \frac{2140}{1+2140(0.0025)} = \mathbf{337}$$

Where: n = the sample size, N = 2140, total poultry producer households of selected kebeles, e = 0.05, the level of precision.

Table 1. Sampled distribution of poultry producers in selected kebeles'

Districts	Kebele	Total producers (N)		Sampled producers (n)
		282		
Lemu and Bilbilo	Ciba michel			44
	Bokoji negeso	274		43
Digalu and Tijo	Dgalu bora	275		43
	Kogo ashebeka	270		43
Lode hetosa	Melka jabbi	263		42
	Addamare	257		40
Dodota	Dodota alem	256		40
	Lode sharbe	263		42
Total		2,140		337

3.3. Data Types, Sources and Methods of Data Collection

The study utilized both primary and secondary data. Those selected farm households involved in poultry production were used as a source for collection of primary data through structured interviews. A pre-test was conducted on some respondents and some adjustments were made to the questionnaire and the data used in the research was collected from 337 respondents. In addition, Focus Group Discussion (FGD) at each selected district and Key Informants' Interview (KII) with expert; at different level were employed using checklists to obtain additional supporting information for the study. Secondary data were collected from different published and unpublished sources, such as, the District and Zone Agricultural and Natural Resource Development Office (DANRDO), website and reports were utilized to generate relevant data on poultry production potentials and constraints.

3.4. Method of Data Analysis

In this study descriptive statistics was employed for analyzing the data collected from poultry producers. Data collected were analyzed using SPSS, and the survey results were reported using mean, frequency, percentage, and tables.

4. Results and Discussion

4.1. Demographic and Socio-Economic Characteristics of Respondents

Survey result indicates that in the study area, out of total samples 71.5 percent of the respondents were male, whereas 28.5 percent of the respondents were female. The mean age of the respondent's household, was 38.75 with minimum and maximum of 20 years and 75 years respectively. The average education level of the respondents was 6.5 grades with minimum and maximum of grade one (1) to 1st degree, respectively. The average number of family size of the respondents was 4.9 with minimum and maximum of 1and 18 respectively (Table 2).

Table 2. Household characteristics

Household characteristics	Observation	Min.	Max.	Mean	Std. dev.
Age of the household head	337	20	75	38.75	11.68
Household educational status	337	1	15	6.48	3.34
Total family size	337	1	18	4.98	2.27

The mean land holding of the respondents were 1.4ha for cultivated with minimum and maximum of 0.02ha to 8ha. The mean grazing lands of the respondents were 0.4ha, with minimum and maximum of 0.02ha to 2ha. The average homestead land of the respondents was 0. 22ha, with minimum and maximum of 0ha to 1.2ha. The average poultry holding of the respondents were 9.19 birds with minimum and maximum of 1 and 400 bird's respectively (Table 3).

Table 3. Land ownership of household

Land and poultry ownership	Observation	Min.	Max.	Mean	Std. dev.
Cultivated land in ha	312	0.02	8	1.4	1.22
Grazing land in ha	88	0.02	2	0.4	0.45
Homestead land in ha	303	0.00	1.12	0.22	0.19
Number of poultry	337	1	400	9.19	23.35

4.2. Poultry Production System in the Study Area

Out of total respondent's 61.7 percent engaged in layer chicken for eggs production whereas 2.1 percent of the respondents engaged in broiler chicken for meat production. From total respondent's 36.2 percent engaged in both broiler and layers chicken. Concerning seed sources, 56.97 percent of the respondents utilized local markets as a seed source for meat chicken whereas 32.05 percent of the respondents didn't engage in it. Only 10.98 of the respondents obtained meat chickens from commercial growers. From total respondent's 78.3 percent utilized local markets as a seed source for layer chicken whereas 14 percent obtained layer chickens from commercial growers and 7.7 percent of the respondents didn't engage in it (Table 4).

Table 4. Types and sources of breeds for meat and eggs of poultry production

Types of poultry	**Frequency**	**Percent**
Broiler for meat production	7	2.1
Layers for eggs production	208	61.7
Both broiler and layers	122	36.2
Total	**337**	**100**
Sources of breeds for meat poultries from local markets	192	56.97
Respondents didn't engage in production of meat poultries	108	32.05
Meat poultries from commercial growers	37	10.98
Total	**337**	**100**
Sources of breeds for layer poultries from local markets	264	78.3
Layer poultries from commercial growers	47	14.0
Respondents didn't engage in production of layer poultries	26	7.7
Total	**337**	**100**

4.2.1. Types of Poultry Feed Utilized by the Respondents

Out of the total respondents, about 62.3 percent utilized homemade feed, whereas 25.2 percent utilized a mixture of homemade and commercial feed for poultry production. From the interviewed respondents, only 12.5 percent utilized commercial feed (Table 5). The majority of the respondents utilized homemade feed for poultry production due to the unavailability and high prices of commercial feed for poultry production.

Table 5. Types of poultry feed utilized by the respondents

Types of poultry feed	**Frequency**	**Percent**
Homemade feed	210	62.3
Commercial feed	42	12.5
Both Commercial and Homemade feed	85	25.2
Total	**337**	**100**

4.2.2. Sources of Poultry Feed Utilized by the Respondents

From total respondents' 65.6 percent of poultry producers prepared homemade poultry feeds by themselves, while 30.2 percent of the respondents prepared homemade poultry feeds and mixing it with commercial feeds. Only 4.2 percent of the respondents utilized commercial feed for poultry production (Table 6).

Table 6. Sources of feed for poultry production

Sources of poultry feed	Frequency	Percent
Self-production	221	65.6
Feed company	14	4.2
Self-production and mixed with commercial feed	102	30.2
Total	**337**	**100**

4.2.3. Annual Poultry Production Capacity

From total respondents' 96.1 percent of the respondents produced less than fifty (50) chickens in a year, whereas 3.9 percent of the respondents produced from 50 to 400 chickens in a year (Table 7). From this one can conclude that the poultry production in the study area is village (backyard) poultry production system. The classification is similar with the study conducted by (Bushira, 2012) and (Hinsemu et al., 2018).

Table 7. Annual poultry production capacity

Poultry production capacity	Frequency	Percent
Village (backyard) < 50	324	96.1
Small scale from 50 -400	13	3.9
Total	337	100

4.2.4. Annual Egg Production Capacity

From total respondent 38.1 percent of the respondents produced more than one hundred to one thousand eggs in a year whereas 55.3 percent of the respondents produced more than one thousand and less than five thousand eggs in a year. Out of total respondents' 3.6 percent of the respondents produced more than five thousand and less than ten thousand eggs per a year whereas only 3.0 percent of the respondents produced more than ten thousand eggs in a year (Table 8).

Table 8. Annual egg production capacity

Egg production capacity	Frequency	Percent
Less than one thousand (< 1000)	127	38.1
From one thousand to five thousand (1,000 - 5,000)	188	55.3
From five thousand to ten thousand (5,000 - 10,000)	12	3.6
Greater than ten thousand (> 10,000)	10	3.0
Total	337	100

4.2.4.1. From Poultry and Eggs Production, Share of Market and Consumptions

The mean poultry production capacity of the respondents was 14.92, with minimum of 1 and maximum of 400 per year, whereas that of Eggs production capacities was 2,378eggs, with minimum of 100 and maximum of 109,500 per year. From annual poultry production the mean share of markets was 11, with minimum of zero (0) and maximum of 390 per year. From annual poultry production the mean share of consumption was 4 with minimum of 1 and maximum of 10. From annual eggs production the mean share of market was 1,934 with minimum of 50 and maximum of 108,000. From annual eggs production the mean share of consumption were 444eggs with minimum of 50 and maximum of 1500 (Table 9).

Table 9. Annual poultry and egg production share of market and consumptions

Production capacity share of market and consumptions	Min.	Max.	Mean
Annual poultry production capacity in chickens	1	400	14.92
Annual egg production capacity in eggs	100	109,500	2378.35
From annual poultry production share of market	0	390	11.30
From annual poultry production share of consumption	1	10	3.62
From annual egg production share of market	50	108,000	1934.42
From annual egg production share of consumption	50	1,500	443.9

4.2.5. Poultry Disease Found in the Study Area

The poultry disease found in the study areas are Newcastle, Fowl pox, Fowl typhoid, Salmonella and Gambaro. From total respondent's 84.2 percent replied Newcastle was the most viral disease that attacked the poultry. Out of total respondents' 11.6 percent of the respondents replied that Fowl pox was the viral disease that attacked poultry (Table 10).

Table 10. Poultry disease found in the area

Poultry disease	Frequency	Percent
Newcastle	284	84.2
Fowl pox	39	11.6
Fowl typhoid	5	1.5
Gambaro	4	1.2
Salmonella	5	1.5
Total	337	100

4.2.5.1. Vaccination application for poultry diseases

Out of total respondent's 67.1 percent applied vaccination for poultry diseases, whereas 32.9 percent of the respondent's didn't applied vaccination to poultry diseases and one can concluded that almost one third of the respondents didn't applied vaccination for poultry diseases (Table 11).

Table 11. Vaccination application for poultry disease's

Vaccination application	Frequency	Percent
Yes	227	67.1
No	110	32.9
Total	337	100

Furthermore, the results of FGD and KII indicate that the majority of poultry producer's farmers/individuals have got improved poultry breed from local markets and suffer due to poultry disease. The different kinds of poultry feed widely utilized in the area are: Corn, Corn powder, "Fino", Wheat, and Barely. The poultry disease found in the study area is Newcastle, Fowl pox, Fowl typhoid and Salmonella. Newcastle is the most dangerous disease that complicated the life of individuals engaged in poultry production. During discussion and interview the respondents replied the number of poultry is decreasing from time to time due to this disease. Traditional way of poultry production system is widely utilized in the study area and the producer farmers hold from one to twenty (1-20) flocks. From annual poultry production, concerning share of sale and consumption they replied that share of sale is 75 percent and share of consumption is 25 percent.

4.2.6. Important Elements of Poultry Production

As important elements of poultry production, different items were listed for the respondents to respond as important/not important. Accordingly good water, vaccination, cleaning/disinfection, use of medication and good housing were ranked from first to fifth as important elements for poultry production by scoring 99.7, 99.4, 99.1 and 98.8 percent respectively (Table 12).

Table 12. Important elements of poultry production

No	Factors	Important		Not important		Rank
		Frequency	%	Frequency	%	
1	Vaccination	335	99.4	2	0.6	2nd
2	Good feed	331	98.2	6	1.8	6th
3	Good water	336	99.7	1	0.3	1st
4	Good housing	333	98.8	4	1.2	5th
5	Cleaning/disinfection	335	99.4	2	0.6	2nd
6	Use of medication	334	99.1	3	0,9	4th
7	Good weather	325	96.4	12	3.6	8th
8	Skilled workers	331	98.2	6	1.8	6th

4.2.6.1. Access to information and services

From total respondents' 63.5 percent of the respondents had information about improved breed and implement that used for feeding poultry production whereas 36.5 percent of the respondents had no information. Concerning access to credit services 78.6 percent of the respondents had no access to credit services on poultry production (Table 13). The majority of the respondent didn't utilize credit services for poultry production due to high interest rate and religion case.

Table 13. Access to information and services

Access to information	Response			
	Yes	Percent	No	Percent
Access to improved breed and implements	214	63.5	123	36.5
Access to credit services	72	21.4	265	78.6

4.3. Constraints of Poultry Production

As challenges of poultry production different items were listed for the respondents to respond as challenges and not challenges. Disease outbreak 98.5%, high cost of commercial ration 89.9%, lack of production manual 83.1%, lack of skill/training 81.3%, unlicensed suppliers of chicken on the market 81.3%, supply of young chicken from unknown sources 81%, wild animals like birds ("chilfit") and others 78.9%, lack of good management practices 78.3%, market instability 78.0%, and supply of chicken without vaccination 77.7% were items ranked from first to tenth as poultry production constraints (Table 14).

Table 14. Constraints of poultry production

Factors	Challenges	%	Not challenges	%	Rank
Disease outbreak	332	98.5	5	1.5	1
High cost of commercial ration	303	89.9	34	10.1	2
Lack of production manual	280	83.1	57	16.9	3
Lack of skill/training	274	81.3	63	18.7	4
Unlicensed suppliers of chicken on mkt	274	81.3	63	18.7	4
Supply of chicken from unknown source	273	81.0	64	19.0	6
Wild animals like birds and others	266	78.9	71	21.1	7
Lack of good management practices	264	78.3	73	21.7	8
Market instability	263	78.0	74	22.0	9
Supply of chicken without vaccination	262	77.7	75	22.3	10

Disease outbreak, high cost of commercial ration and lack of production manual, were ranked from first to third as poultry production constraints in the study area. From these ones can conclude that in poultry production constraints mentioned needs high attention.

5. Conclusion and Recommendations

5.1. Conclusions

The types of poultry production systems in the study areas were village (backyard) and small-scale poultry production systems and mainly focused on layers and broilers together. The majority of the respondents, 78.3 percent utilized local markets as seed sources of poultry production and this shows poultry production in the study areas is of local types. More than ninety percent of the respondents produced poultry feed by themselves and very few less than five percent of the respondents utilized commercial feeds from feed companies. The majority of the respondents utilized homemade feed for poultry production due to unavailability and high prices of commercial feed. Village and small-scale poultry production systems are widely exercised, because more than ninety six percent of the respondents produced less than fifty poultry per year and more than ninety three percent of the respondents produced less than five thousand eggs per year.

Poultry production in the study area is highly affected by poultry disease called Newcastle and decreased numbers of poultry from time to time. Vaccination, good feed, good water, good housing and cleaning/disinfection are the most important elements of poultry production and highly ranked by different respondents of the study areas. The majority of the respondents had information about new technologies of poultry production but they didn't utilize it due to unavailability and high prices of the technologies and the respondents also didn't utilize credit services for poultry production due to high interest rate and religion case. Disease outbreak, high cost of commercial ration and lack of production manual, were highly rated and ranked by respondents as poultry production constraints.

5.2. Recommendations

Based on the study results, the following recommendations were anticipated to improve the poultry production system. Due to high prices very few respondents utilized commercial feed from feed companies, since it has an

impact on growth rate and eggs production, feed producer micro enterprises should be established and well trained to supply. The highly rated poultry diseases found in the study areas was Newcastle, and highly affects poultry production, so vaccination and certification before distribution training for producer is highly needed from expertise. Vaccination, good feed, good water, good housing and cleaning/disinfection were highly ranked as important elements for poultry production, so awareness creation and detail training is needed from zone and district livestock unless the traditional way cannot improve production and productivity of the subsector. Disease outbreak, high cost of commercial ration and lack of production manual, were the three highly rated constraints mentioned by poultry producers, so preparing production manual, working on poultry health, increasing production and productivity of this sub sector is highly needed from livestock and veterinarian experts.

Declarations

Source of Funding

This study did not receive any grant from funding agencies in the public, commercial, or not–for–profit sectors.

Competing Interests Statement

The authors have not declared any conflict of interest.

Consent for publication

The authors declare that they consented to the publication of this study.

Authors' contributions

Both the authors took part in literature review, analysis, and manuscript writing equally.

Acknowledgments

Authors are deeply grateful to their colleagues who worked with them on this activity. Authors would like to acknowledge the Oromia Agricultural Research Institute for their cooperation and valuable assistance throughout the research. Their knowledge and talents considerably improved the quality of this work. Authors' partnership promoted a productive and innovative environment, resulting in the effective completion of this mission.

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