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Full Length Research Article

Development Strategy of the Bird Nest Adoption Program in the Community Forest of Jatimulyo Village, Kulon Progo Regency, Special Region of Yogyakarta

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ABSTRACT

The bird nest adoption program in Jatimulyo is one of the activities to protect birds from extinction. This activity is carried out by keeping birds that are breeding in nests in community forest habitats. The development of this concept was expected to protect the birds and increase the economic value of the community-owned forest from the non-timber sector that supported environmental sustainability. However, the program is not yet implemented in the whole area of Jatimulyo Village. This study aimed to determine the strategy for developing the bird nest adoption program in Jatimulyo Village. Data was collected through in-depth interviews with expert respondents with extensive experience and knowledge of the studied problems. The data that has been collected was analyzed using SWOT analysis. The SWOT analysis results showed that an offensive strategy is needed to develop the bird nest adoption program, which can be carried out by utilizing strengths to seize opportunities. There are five alternative strategies, i.e. (1) increase the number of nest findings to be adopted to increase people's incomes; (2) take advantage of the attention of the government and other institutions to strengthen farmer groups and support the management of adoption programs; (3) opening access to birdwatching special interest tours by involving the community as local guides; (4) encourage bird protection in the Jatimulyo area and jointly promote bird nest adoption program; and (5) expanding the adoption area in Jatimulyo Village.

1. Introduction

Forests with diverse vegetation are suitable habitats for developing various types of animals, including birds. Community forests are one of the locations where many bird species are found (Diniyati 2015). Sagita (2021) has recorded 33 species from 19 families in the Jatimulyo region. More species, namely 77 species, were recorded in the Jatimulyo community forest (Mufti 2020). This explains that community forests in Jatimulyo Village have a fairly high potential for bird species diversity. Before 2014, the area was often hunted for animals, which raised local concerns about the loss of animal species diversity. This condition prompted the issuance of Jatimulyo

Village Regulation No. 8 of 2014 concerning the environment, which contains sanctions for perpetrators of environmental damage in Jatimulyo.

In 2016, the Jatimulyo Bird Watching Community (*Masyarakat Pemerhati Burung Jatimulyo*/PMBJ) and the Indonesian Kutilang Foundation initiated an effort to protect the existence of birds by conducting a nest adoption program. This activity is a form of support for Jatimulyo Village Regulation No. 8 of 2014 (Taufiqurrahman et al. 2019). Bird nest adoption programs have also been carried out in other places, such as Thailand (Poonswad et al. 2012) and India (Rane and Datta 2015). The adoption program in Thailand performed to conserve hornbill species was successfully carried out in conservation areas. India also successfully performed adoption program activities in conservation areas. The bird nest adoption program (*Program Adopsi Sarang*) in Jatimulyo Village differs from the program at those two locations; adoption in Jatimulyo targets more bird species to be adopted in this activity. In addition, the bird nest adoption program in Jatimulyo Village has also been carried out in community (private) forests so that it also involves the landowners.

The main concept of the bird nest adoption program is nestling together between the community and the adopter, which includes local guards who protect and supervise the nests, foster parents who financially support the conservation efforts, and the landowners who manage the forests. This protection effort is also an alternative to anticipate the failure of forest management by optimizing the potential of non-timber resources, community forest owners, and adopters so that they are expected to be able to make more contributions to society and the environment. The program is expected to be a pilot in habitat restoration, increase breeding, map threats to sustainability, and increase knowledge of residents built by the community itself (Wanapaksi et al. 2020).

Sustainable forest management must be based on the preservation of ecological, social, and economic functions (Purbawiyatna et al. 2011). Furthermore, environmental conservation through local wisdom has indirect benefits for the community (Suryadi et al. 2016). Bird adoption schemes were designed to ensure that the communities can directly benefit from bird protection. This concept will be an excellent opportunity to increase the economic value of community-owned land from the non-timber sector and for environmental sustainability. This activity will directly maintain the habitat as a nesting place and involve the community as actors. Balantukang et al. (2015) stated that the involvement of local communities in the protection of birds is considered better than being carried out by agencies that do not involve the community. The concept developed by the Jatimulyo community is an excellent opportunity to increase the economic value of community-owned land from the non-timber sector and for environmental sustainability. However, this program faces a problem that hinders its development, namely the limited number of hamlets in Jatimulyo involved in the bird nest adoption program activities. The lack of people who have basic skills and knowledge in bird conservation is also an obstacle in program management. The small number of people with basic skills and knowledge in bird conservation is also an obstacle in managing the program. This condition will result in less economic impact that society can feel.

The sustainability and development of the bird nest adoption program will positively impact Jatimulyo Village, which has pledged to become a "*Desa Ramah Burung*" or Bird Friendly Village. Information on environmental conditions and the contribution of the bird nest adoption program to the socio-economic aspects of the program is an important part of formulating a sustainability strategy. The bird nest adoption program is also inseparable from the ecological

aspects considered in efforts to sustain natural resource management activities in the village. Therefore, the bird nest adoption program development strategy needs to be carried out as a reference in developing programs for all hamlets in the Jatimulyo area. This study aimed to formulate alternative strategies to develop the bird nest adoption program in Jatimulyo by identifying internal and external environmental factors.

2. Materials and Methods

2.1. Research Sites

This research was conducted in Jatimulyo Village, Girimulyo Sub-District, Kulon Progo Regency, Special Region of Yogyakarta. Jatimulyo Village has an area of 1629.06 ha (BPS 2019) with an altitude range of 200-800 m.a.s.l (Sari 2019). It is located in the Menoreh Hills, dominated by community forest areas with diverse vegetation (Hadi et al. 2016).

The bird nest adoption program was carried out by the Wanapaksi Forest Farmers Group (*Kelompok Tani Hutan*/KTH Wanapaksi), who own and manage the community forest land. The bird nest adoption program was implemented at 3 out of 12 sub-villages of Jatimulyo Village i.e., Gunung Kelir, Sokomoyo, and Banyunganti **(Fig. 1).**

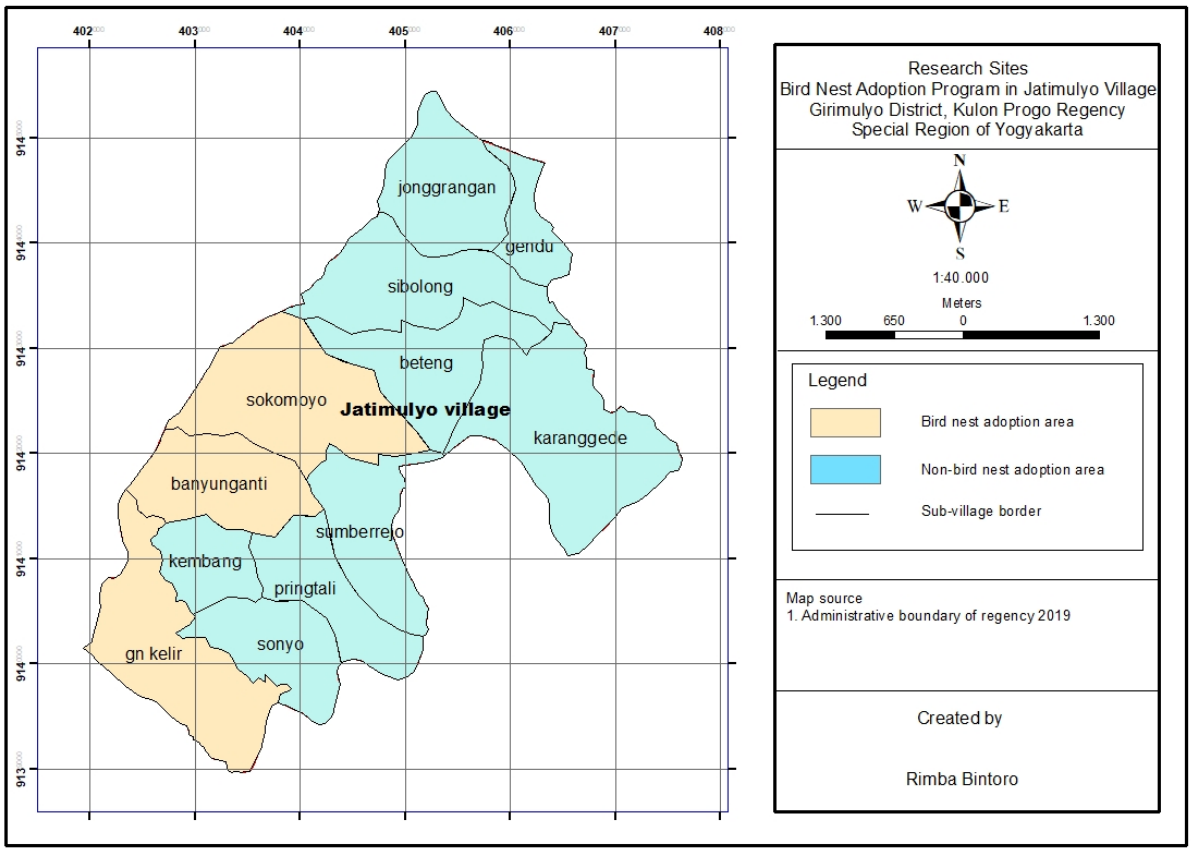

Fig. 1. Map of the bird nest adoption program area in Jatimulyo Village.

2.2. Data Collection and Analysis

Data and information were obtained directly from respondents through structured interviews using questionnaires and in-depth interviews to determine internal environmental factors (IFAS) and external environmental factors (EFAS) (Butar et al. 2019; Fauzan et al. 2019; Indrasari et al.

2017; Meizannur and Wulandari 2015). Respondents in this study were 7 expert respondents consisting of the Head of the Conservation Division of Environment and Forestry Office of DI Yogyakarta, chairman of KTH Wanapaksi, head of the conservation division of KTH Wanapaksi, Jatimulyo Village officials, BISA Indonesia (NGO), and scientists on forestry and conservation from Gadjah Mada University. The aspect discussed in the interview is that bird conservation has been carried out by the community and the Jatimulyo Village government. Community institutions and the role of the parties in implementing the bird nest adoption program were also discussed. The development of bird conservation efforts in the territory of Indonesia and its obstacles became part of the discussion to formulate internal and external factors for the bird nest adoption program in Jatimulyo Village.

Data were analyzed using the SWOT (strengths, weakness, opportunities, and threats) analyzed. Interviews with expert respondents were conducted to obtain information to identify internal factors (strengths and weaknesses) and external factors (opportunities and threats). The identification results are then followed by scoring obtained from all respondents. Each factor was given a weight based on the experience of the expert. Variables in the analysis were assessed using a Likert scale ranging from 1 starting from the numbers 1 (strongly disagree), 2 (disagree), 3 (disagree), 4 (agree), and 5 (strongly agree) (Sugiyono 2016). The best factor will have the highest value by multiplying the weight and rating of the variables. These results were then developed using the SWOT matrix (**Table 1**).

Table 1. The SWOT matrix

Internal / External	**Strengths (S)**	**Weakness (W)**
Opportunities (O)	S-O Strategy Using power to seize the opportunity	W-O Strategy Overcoming weaknesses to seize opportunities
Threats (T)	S-T Strategy Using force to deal with threats	W-T Strategy Overcome weaknesses to avoid threats

Source: Raja et al. (2016).

Strategy formulation was carried out through data analysis using SWOT analysis by identifying various factors systematically by formulating four quadrants in SWOT analysis (SO, ST, WO, and WT strategies). The strategic decision-making process using the SWOT matrix was obtained based on the analysis of external and internal strategic factors (Raja et al. 2016) . Analysis of the development strategy of the bird nest adoption program was carried out using a SWOT analysis with variables consisting of strengths, weaknesses, opportunities, and threats. The SWOT analysis identifies various factors systematically to formulate a strategy by maximizing strengths and opportunities while minimizing weaknesses and threats (Sitorus et al. 2021).

To explain the condition of the presence of birds at the research location, sampling was carried out to determine the comparison of the number of species, abundance, and diversity index (H'). Data was collected using an encounter rates system by exploring the area and counting every bird encountered (Alamsyah and Marhento 2016). Observations were made in the morning from 06.00-08.30 and in the afternoon from 15.30-18.00 for 3 repetitions at 6 different locations. The relative abundance was calculated using Equation 1:

$$Relative\ abundance = \frac{Number\ of\ individuals\ of\ each\ species}{Total\ observation\ time} \quad (1)$$

The level of bird diversity (H') was calculated using the Shannon-Wiener index (Mubarik et al. 2020). The level of diversity was measured using the Shannon-Wiener diversity index with low criteria $H' \leq 1$, moderate if $1 \leq H' \leq 3$, high $H' \geq 3$.

3. Results and Discussion

3.1. Identification and Evaluation of Internal Factors

Internal factors were identified to determine the strengths and weaknesses of the bird nest adoption program managed by the Wanapaksi Forest Farmers Group (KTH Wanapaksi). Strengths that were internal factors in the program management are: the diversity of species and the number of bird encounters are still relatively high. At least 105 bird species were found in 2020 in the Jatimulyo region (Wanapaksi et al. 2020). The Jatimulyo Village government supports the bird nest adoption program through Peraturan Desa No. 8 Tahun 2014. The program is carried out in a farmer group forum (KTH Wanapaksi). The bird nest adoption program activities have support from the local community, and the habitat conditions support the level of bird diversity. The community forest vegetation in the bird nest adoption program area in Jatimulyo is still relatively good. It showed the stability of species diversity even though it is located near settlements.

The weakness of the program identified as an internal factor was that not all members of KTH Wanapaksi were directly involved in the adoption program. The community involved in the adoption process includes the nest finder, the employee of the nest monitor, and the landowner who will receive adoption funds. Apart from land ownership, the knowledge and skill factor in identifying species and knowing the behavior of birds in nesting becomes the criteria for keeping and monitoring nests during the adoption period. The cost to become an adopter in the bird nest adoption program is quite expensive. The value of adoption in the range of IDR 500,000 up to IDR 1,000,000 for the public is relatively quite expensive, unlike if the person works in a particular company or institution, Farmers' income from the adoption program is still low. The local community will receive adoption funds in IDR 100,000 – IDR 150,000 for each adoption. These funds are obtained during the adoption process and are not routinely obtained monthly by the community. The written protocol for the bird nest adoption program made by KTH Wanapaksi has not been adequately implemented. The protocol has not been studied well by some members of KTH Wanapaksi, so there is often a poor flow of information. There is no standard format for reporting the results of the implementation of the bird adoption program.

Internal factors evaluation is the first step in formulating the bird nest adoption program strategy. The results obtained from the evaluation calculation through the IFAS matrix consist of 5 strength factors and five weakness factors with various values. The calculation results of the evaluation matrix are presented in **Table 2**.

Each factor has a different value based on the internal factor evaluation matrix. The highest score on the strength factor is the diversity of species, and the number of bird encounters is still relatively high, with a score of 1.03 and a weight of 0.23 which means that this factor is the strongest. Brata and Puspareni (2016) reported in their study that 29 species of birds were found in the Banyunganti Hamlet of Jatimulyo Village. This study found more bird species in the bird nest adoption program area (Gunung Kelir, Banyunganti, and Sukomoyo) than in the non-bird nest

adoption program area (Gendu, Beteng, and Jonggrangan). The diversity analysis results of the Shannon Wiener index (H') at the bird nest adoption program location fall into the high diversity category **(Table 3).**

Table 2. Calculation of the evaluation matrix of internal factors for the development strategy of the KTH Wanapaksi's nest adoption program in Jatimulyo Village

No	IFAS	Weight	Rating	Score
	Strength			
1	The diversity of species and the number of bird encounters is still relatively high	0.23	4.57	1.03
2	The bird nest adoption program activities get support from the Jatimulyo Village government through Village Regulation No. 8 of 2014	0.03	4.71	0.14
3	Carried out in farmer group forums (KTH Wanapaksi)	0.08	4.86	0.36
4	The bird nest adoption program activities received community support	0.08	4.14	0.31
5	Supportive habitat conditions for bird diversity	0.10	4.86	0.49
	Total value of strength			2.33
	Weakness			
1	Members of KTH Wanapaksi are not all directly involved in the adoption program	0.05	3.29	0.16
2	The cost of becoming an adopter in the bird nest adoption program is quite expensive	0.05	2.71	0.14
3	Farmers' income from the adoption program is still low	0.25	2.57	0.64
4	The written protocol for the bird nest adoption program made by KTH Wanapaksi has not been appropriately implemented	0.075	2.86	0.21
5	Reporting on the results of the implementation of the bird adoption program does not yet have a standard format	0.075	3.43	0.26
	Total value of weakness			1.41
	Total IFAS			**0.92**

Table 3. Species number, encounter rate, and diversity index (H')

Analysis	Bird nest adoption program location	Non-bird nest adoption program location
Species number	46	40
Encounter rate	2,3800[a]	2,1800[a]
H'	3,0146[b]	2,9885[c]

Notes: [a]*Anthreptes malacensis* with encounter rate often; [b]high, [c]medium.

Anthreptes malacensis showed the highest encounter rate (**Table 3**). These bird species belong to the Nectarinidae tribe, a group of nectar-sucking birds. Many coconut trees are found in the bird nest adoption program locations and the coconut sap tapping sites. Alikodra (2019) reinforces this condition by stating that the habitat will be frequented by birds if the location has food and water.

The weakness in developing the KTH Wanapaksi's nest adoption program in Jatimulyo is that farmers' income in the adoption program is still low, with a score of 0.64 and a weight of 0.25. The community's income from the adoption program is still in the low category compared to the

community's average total income. KTH Wanapaksi manages adoption funds received from adopters, which are earmarked for the adoption process and given to people entitled to receive them in the adoption process. Communities entitled to adoption funds include nest finders, landowners, employees of the nest monitor, and sub-hamlet heads. Although the portion of the income from this program is economically low, it is a meaningful additional income for the landowner, the head of the neighborhood (*Rukun Tetangga*/RT), employees of the nest monitor, the nest finder, and KTH Wanapaksi.

3.2. Identification and Evaluation of External Factors

External factors outside the bird nest adoption program environment can affect the program. External factors that affect the program are opportunities and threats. Opportunities external factors include: The bird nest adoption program provides additional income for community forest farmers in the program location. The program can expand partnership networks between the Jatimulyo community and outside parties. For example, several birding tour agents have become the partner of the community to observe and document bird species in Jatimulyo. Environmental conservation activities through the bird nest adoption program can increase the government's attention. Various environmental NGOs such as Kutilang Indonesia, BISA Indonesia, Yayasan Kanopi Indonesia, and Jogja Bird Watchers Association (*Paguyuban Pengamat Burung Jogja*/PPBJ) assisted the community in bird conservation in the Jatimulyo area. The bird nest adoption program areas could become special interest tourism (birdwatching tours).

The threats to the bird nest adoption program are: catching wild animals, especially birds, which is still happening. Catching wild birds by the Jatimulyo community is no longer found but based on the results of interviews with KTH members, catching wild birds in the Jatimulyo Village area has been tried by people from neighboring villages. Government assistance is still lacking. Regional regulations do not yet exist to protect bird species diversity and support the bird nest adoption program activities. Local regulations do not yet exist to protect bird species diversity and support the program activities. Most of the bird adopters come from outside the Special Region of Yogyakarta. Brood parasite disturbances often cause the natural failure of the successful adoption of chicks. The type of brood parasite that most often causes failure in the adoption process is from the family of Cuculidae. The behavior of leaving their chicks in the nests of other bird species causes adoption failure. The parasitic birds recorded in the Jatimulyo area include *Surniculus lugubris*, *Cacomantis merulinus*, *Cacomantis sonneratii*, and *Cacomantis sepulcralis*. Brood parasitic birds lay their eggs in the nests of other birds, causing failure in the host's breeding effort. This type of parasite often causes adoption failure in the Jatimulyo area.

External factors are evaluated to determine the variation of scores on external factors identified. For example, opportunities are building activities that can be profitable, while threats are challenges due to changing circumstances that can reduce current opportunities (Kotler 2002). The scores obtained from the evaluation of external factors show varying values (**Table 4**).

Evaluation of external factors shows that the opportunity factor with the highest score is that the bird nest adoption program area can become special interest tourism. Avitourism special interest tourism can be an activity that can encourage various other economic activities for the community. Economic activities that can grow from this tourism include local birdwatching guides, rental of birdwatching equipment, and souvenir sales. Opportunities from external factors are very high because the area in the Jatimulyo area is one of the tourist destinations in Yogyakarta.

These tourists are an opportunity to increase the economic activity of the surrounding community by providing certain tourism alternatives to existing visitors.

Table 4. The calculation of the evaluation matrix of external factors for the development strategy of the KTH Wanapaksi's nest adoption program in Jatimulyo Village

No	EFAS	Weight	Rating	Score
	Opportunity			
1	The bird nest adoption program provides additional income for community forest farmers in the program locations	0.10	4.57	0.23
2	The bird nest adoption program can expand partner networks between the Jatimulyo community and outsiders	0.05	4.57	0.23
3	Environmental conservation activities through the bird nest adoption programs can increase the government's attention	0.05	3.71	0.19
4	Support of environmental NGOs	0.05	4.00	0.20
5	The bird nest adoption program area has the opportunity to become special interest tourism (birdwatching)	0.25	5.00	1.25
	The total value of the opportunity			2.32
	Threat			
1	Catching wild animals, especially birds, still occurs	0.20	3.57	0.71
2	Assistance from the government is still lacking	0.04	2.86	0.11
3	No local regulations exist to protect bird species diversity and support the bird nest adoption program activities	0.05	4.00	0.20
4	Other bird nest adoption programs in Indonesia have started	0.15	2.86	0.43
5	Average bird adopters come from outside the Special Region of Yogyakarta	0.01	3.43	0.03
6	Parasite disturbances often cause natural failure in the process of successful adoption of chicks	0.05	3.86	0.19
	Total value of threat			1.68
	Total of EFAS			**0.64**

Catching wild animals, especially birds, is still a threat factor with the highest external factor evaluation matrix score. The activity of catching and hunting birds based on information from the community was often carried out by some people in the past. Protection efforts by the Jatimulyo Village government through Village Regulation No.8/2014 concerning environmental conservation have not been able to fully protect the animals in the village. The bird nest adoption program activities are a form of community support to preserve the environment. The program ensures that every community involved can feel the economic impact of the conservation activities. However, the program is still limited to 3 sub-village out of 12 sub-village in Jatimulyo Village, so efforts to protect existing birds are still not optimal.

3.3. The Bird Nest Adoption Program Development Strategy

The SWOT matrix is compiled into four strategies to identify internal and external factors. The four strategies are composed of a combination of internal and external factors consisting of strengths-opportunity (SO), weaknesses-opportunity (WO), strengths-threat (ST), and weakness-threats (WT). Determination of alternative strategies in the SWOT matrix is carried out based on the IFAS and EFAS matrix scores.

The IFAS and EFAS calculations on the nest tree adoption program in Jatimulyo Village are in quadrant I position (0.92; 0.64) (**Fig. 2**). This quadrant shows that the strengths of the bird nest adoption program can be used to seize the opportunities for the program development strategies.

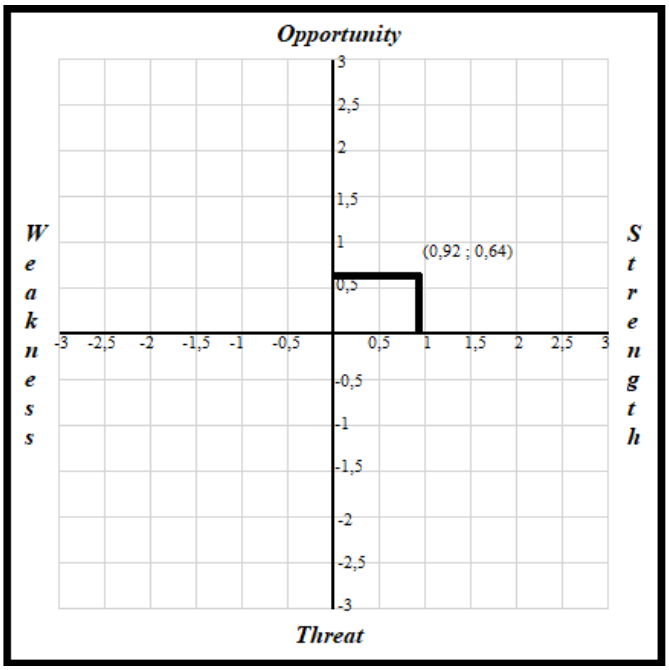

Fig. 2. The SWOT diagram of the bird nest adoption program.

The strategy for developing the bird nest adoption program by combining the strengths and opportunities of the factors that have been identified in Jatimulyo Village includes:

1. Increase the number of nest findings to increase people's incomes (S1, S2, S4, S5, O1, O4). The encounter of high-flying birds at a time becomes one of the markers of the existence of a nest. The behavior of a pair of Javan kingfisher parents who take turns sending food to the chicks in the nest at intervals that are not too long (Taufiqurrahman et al. 2020). This behavior will make it easier for observers to record the bird's presence. The diversity of existing vegetation also supports feed availability in the Jatimulyo area. Habitats that provide abundant feed will have a high diversity of bird species (Putri 2015). This tendency is also supported by the data on the vegetation habitat condition and the birds' abundance and diversity at the site. The bird species that are the priority for adoption are in suitable habitats in Jatimulyo. The community increasingly feels the benefits of adoption with an increase in the number of successfully adopted nests. This situation can increase opportunities for additional income, which should be accompanied by the protection of private forest land owned by the community.
2. Take advantage of the government's and other institutions' attention to strengthen farmer groups and support the management of adoption programs (S2, S3, S4, O2, O3, O4). KTH Wanapaksi must promote success in preserving the bird nest adoption program management in collaboration with village officials. The bird nest adoption program is a form of concern for the Jatimulyo Village community in preserving the environment. The program was initiated independently by community groups to show awareness of its functions. The government's commitment to encouraging sustainable development is an opportunity to accompany the program. The strengthening of group institutions by the government is expected to increase

knowledge for each member. Strengthening farmer institutions will also encourage farmers to adopt technology (Khairunnisa et al. 2019).

3. Opening access to birdwatching special interest tours involves the community as local guides (S1, S4, S5, O1, O2, O5). Activities are carried out with good planning guided by the principles of sustainability and the involvement of the surrounding community. The development of birdwatching tourism can increase tourists' number and length of stay (Afif et al. 2018). Avitourism is good interaction between humans and birds that can provide economic and educational benefits. Planning will be easier to implement because the public's perception of the implementation of the bird nest adoption program is high. In addition, from the bird aspect, at the location of the adoption program, 46 species of birds were found. A previous study found that 28 birds were included in 17 bird families in the Banyunganti hamlet (Brata and Puspareni 2016). The potential of the birds in **Fig. 3** can be used as an attraction for birdwatching as one of the tourist attractions in Jatimulyo. This activity also has a role in preserving birds in Jatimulyo and improving the economy.

Fig. 3. The mother of the *Alophoixus bres* gives food in the form of insects to her nestling.

4. Encourage bird protection in the Jatimulyo area and jointly promote the bird nest adoption program (S1, S2, S3, S4, O2, O3, O4). The Jatimulyo Village Regulation on the environment becomes a tool to protect the existence of animals in Jatimulyo Village. Efforts to protect animals need to be carried out jointly by many parties, including the government, NGOs, and the general public, to protect animals and their habitats. Protection efforts can be carried out by commemorating World Wildlife Day, prohibiting hunting, and disseminating information on the IUCN Red List and protected species. The existence of the bird nest adoption program is either carried out using social media that is generally known. This media has the advantage of allowing interactive two-way communication and ease of access to information; social media has several advantages, especially in its ability to interactively two-way communicate either individually or in groups (Suryani 2014).
5. Development of the bird nest adoption program by expanding the adoption area in Jatimulyo Village (S1, S4, S5, O1, O5). The expansion of the location of the program is helpful for obtaining economic equality by involving community participation in environmental management. Location expansion in the hamlets in Jatimulyo Village is carried out to realize the preservation of birds and their habitats. Furthermore, the program guarantees the success of breeding for the bird species that are the target of adoption. Therefore, the expansion of this

program can increase people's income by utilizing their natural resources; environmental conservation efforts can also run.

4. Conclusions

Analysis of the SWOT matrix to develop the bird nest adoption program in Jatimulyo Village suggested program development strategies by utilizing strengths to optimize the opportunities. The offensive strategy in developing the program is an advantage because it indicates that competitors from the program have not been widely implemented. The bird nest adoption program that starts with public awareness will make it easier to implement program development strategies. Community awareness and participation in environmental care make managing the program easier. KTH Wanapaksi, as a forum for program implementation, has limited institutional capabilities. Program development to reach all villages requires the participation of other farmer groups to adopt the concept of KTH Wanapaksi. Community activities in preserving the environment and driving the economy independently in a group also require assistance. Efforts to obtain assistance can be carried out by involving the role of community leaders, government, and non-governmental organizations to support program sustainability.

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