Department für Agrarökonomie
und Rurale Entwicklung

2025

It's a Man's World:

Exploring Women's Aspirations for Income Opportunities in Indonesian Oil Palm Villages

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Rurale Entwicklung
Universität Göttingen
D 37073 Göttingen
ISSN 1865-2697

Diskussionsbeitrag 2502

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Declaration of conflict of interest: All authors declare no conflict of interest.
Ethical statement: This study was approved by the ethical commission of the Indonesian National Reseach and Innovation Agency (BRIN, Badan Riset dan Inovasi Nasional).
Funding declaration: This study was funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) – grant number 192626868 – in the framework of the German-Indonesian Collaborative Research Center CRC 990.
Acknowledgements: We thank our respondents who participated in our study, as well as our field team for their great work.

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Abstract

The expansion of male-dominated cash crops marginalizes women in the economic value chain. This issue is notably prevalent in Indonesia's continuously growing oil palm industry. Yet, there has been limited research on potential pathways for women's economic integration. This study addresses this gap by utilizing primary data collected through qualitative interviews from Jambi, a key region for oil palm cultivation. We undertake an in-depth exploration of women's work aspirations in general and specifically in relation to beekeeping, as beekeeping presents itself as a sustainable economic activity. The aim of our study is to understand how income opportunities for women in rural, agri-monoculture-dominated areas can be sustainably enhanced. The findings suggest that even though overall household income increase over the past decades due to palm oil cultivation, women nevertheless want to work. They state a variety of aspired professions which we cluster into "Traders", "Socials", and "Miscellaneous". The majority of women are open to beekeeping activities and those who are not raise concerns that could easily be addressed through information, training, and by keeping stingless bees. Our results provide insights into the socio-economic dynamics of oil palm expansion. We offer recommendations for policymakers and researchers aiming for more resilient and sustainable smallholder driven oil palm systems.

Introduction

The development of oil palm plantations across Indonesia during the last decades has led to fundamental land use changes (Qaim et al., 2020). While the boom of monoculture oil palm cultivation yields increased income for farm households, there are numerous, serious downsides. First, from an environmental perspective the expansion of oil palm plantations comes at the cost of destroying forest land and a single crop cultivation depletes biodiversity (Morgans et al., 2018).

Second, from a socioeconomic perspective the land use change towards oil palm cultivation from previous crops such as rubber, cacao or coffee tends to exclude women (Mehraban et al., 2022; Chrisendo et al., 2020). The palm oil industry is predominantly male-dominated, and despite the critical importance of gender-related concerns in this sector, they have received minimal attention thus far. While women were previously engaged in e.g. rubber cultivation, they now tend to have little access to or control over oil palm earnings, as men are the ones receiving payment when the fresh fruit bunches are harvested (Araya, 2019).

While gender equality and women's empowerment are crucial factors for sustainable development, particularly among rural women (Shenbei et al., 2023), it is thus far not clear how the sustainable economic integration of women in oil palm cultivating villages could look like. If women were to take up an alternative income opportunity complementary to oil palm cultivation, then they were likely to increase their resilience, financial agency, autonomy, and self-esteem. Chrisendo et al. (2020) show that female off-farm labor contributes positively to household nutrition. However, it remains unclear whether rural women desire alternative income sources, and if so, what types of activities they prefer and their suitability given the circumstances. Additionally, it is important to discuss what barriers prevent them from pursuing these activities. Against the background of gender disparities in male-dominated cash crop landscapes this understanding becomes pivotal to ensure the design of targeted interventions and activities. If such an activity was also ecologically beneficial, there is potential for it to further incentivize pro-environmental behaviour.

If women wished for economic activities, ideally such an activity would cover *all* three pillars of sustainability -i.e. social, economic, and environmental- in order to address the current adverse outcomes of oil palm cultivation. One promising activity in this context is beekeeping, which functions complimentary to oil palm cultivation and can thus be seen as a form of on-farm diversification. Indeed, on-farm diversification has been shown to particularly benefit rural women in terms of increased food security and empowerment (Hegazi and Seyuba, 2024). Enabling women

in oil palm cultivating villages to equip themselves with meliponiculture starter-sets could provide ecosystem services through pollination and incentives for preserving natural forests (environmental sustainability), additional income (economic sustainability), as well as agency and capacity building (social sustainability) for the women. While many activities could foster social and economic sustainability, beekeeping is particularly interesting because of its potential to also drive environmental sustainability in an industry in need for pro-environmental incentivation. Mono-culture oil palm has been associated with adverse environmental consequences, such as deforestation and biodiversity loss (Qaim et al., 2020; Kubitza et al., 2018; Krishna et al., 2017). As beekeepers, women and the community can understand the services of the environment, i.e. that the forest is needed for the bees to produce the honey. This change of economic incentivization can, along with environmental education and awareness, function as a strong mechanism to protect forest area, while the bees themselves will enrich biodiversity. Beekeeping holds further potential to be a promising economic activity as it can be complementary to oil palm cultivation and does not need much land. It does not require much time from the beekeeper, thus enabling women to still fulfil other duties. Further, the produced honey can be marketed by the women at the local market and beyond, as honey can be stored for a long time.

Against this backdrop, the objective of this study is to conduct an empirical investigation into women's preferences for income generation in rural Indonesia. For this purpose, we investigate three research questions (1) If any, which income generation activities are attractive for women adjacent to the oil palm industry? (2) How can we cluster women based on their aspired activities and how can these clusters be described? and finally, (3) Is there an interest in beekeeping activities and if not, what are the concerns?

To investigate our research questions, we rely on qualitative interviews conducted with 65 women from oil palm cultivating villages in Jambi, Indonesia. The province of Jambi is among the world's leading regions in oil palm cultivation, with livelihoods heavily reliant on the crop (Qaim et al., 2020). We employ a cluster analysis to analyze our data. To the best of our knowledge, we are the first to investigate women's attitude and wishes for economic integration and within a landscape of male-dominated cash crops. Our results provide insights into the socio-economic dynamics of oil palm expansion. By presenting women's aspirations, we offer insights for policy makers and researchers working towards making oil palm value chains more resilient and sustainable.

The remainder of this paper is organized as follows: Section 2 provides background information. Section 3 introduces the methods and materials utilized in this study. In Section 4, we present and discuss the results, followed by the conclusion in Section 5.

Background

Rural contexts in the Global South pose particular challenges to its inhabitants, which are further intensified for rural women (Sharma and Das, 2021). This is further exacerbated in rural contexts with the primary income source being male-dominated cash crops, such as in oil palm cultivating villages (Mehraban et al., 2022). This poses the challenge to foster female participation through complimentary, sustainable economic activities, such as beekeeping.

Rural regions and gender specific challenges

Worldwide, women hold an integral role in the rural agricultural sector, yet often with considerable disadvantages compared to men, referred to as *gender gap*. Women are more likely to be food insecure. Further, as producers, they are also more likely to lack access/have limited access to farm inputs, financial and educational services as well as technologies (FAO, 2021). Women also tend to have more household responsibilities than men and tend to take over the majority of child care (FAO, 2011; UNDP, 2016). However, if rural women are able to access services and productive resources and get an economic opportunity, there are considerable positive economic and overall welfare effects (FAO, 2021). Therefore, closing the gender gap especially within the rural agricultural sector is of integral importance for the global development agenda, i.e. the Sustainable

Development Goals, hereinafter SDG, see SDG 5 'Gender Equality '.

In many cultivation systems, women take up an active role in a variety of farm-related activities - from seeding to marketing (Satyavathi et al., 2010; Piedrahita et al., 2023) - which ensures economic inclusion. Rural regions in the Global South typically have little infrastructure - such as roads and markets - and with that limited economic opportunities (Pinstrup-Andersen and Satoru, 2006; Mu and Van de Walle, 2011). Agriculture is the dominant economic activity, either as a smallholder farmer or farm laborer (Rapsomanikis, 2015; Adegbite and Machethe, 2020). When women have a lesser or more disadvantaged role within the rural agricultural sector, this leaves limited opportunities for economic inclusion of women. Markets in rural regions are easily saturated due to limited income and thus purchasing power of households within the villages. Typical service occupations for the direct community - such as selling food - can only be undertaken by so many agents, as supply would quickly surpass demand. Engaging in other entrepreneurial activities can be challenging due to potentially high upfront costs paired with limited access to credit markets. Finding off-farm employment in larger cities can furthermore be challenging due to limited infrastructure (and with that high travelling costs and long travelling times), with questionable welfare benefits for the women who also has a pivotal role within the household.

Oil palm and gender roles

While oil palm cultivation has increased overall welfare, the role of women has changed with its boom. The global demand for oil palm increased starkly over the past decades. The global area utilized for oil palm quadrupled from the 1980s to 2018 from less than 5 million hectares to more than 20 million hectares (Policy, 2019; Qaim et al., 2020). The majority of the land expansion took place in Indonesia and Malaysia, with exports from these two countries now accounting for almost 85% of the globally traded palm oil (Qaim et al., 2020). The expansion of oil palm was shown to have driven rural development overall (Qaim et al., 2020) and in particular food security (Tabe-Ojong Jr et al., 2023), improved household welfare (Mehraban et al., 2021) and enhanced nutrition (Chrisendo et al., 2022). Furthermore, oil palm cultivation was shown to be positively associated with human capital development (Tabe-Ojong Jr and Molua, 2023). Despite these gains, the oil palm expansion comes with serious environmental and social costs (Qaim et al., 2020). The expansion of farm land to cultivate oil palm threatens forest land and decreases forest area while the expansion of mono-culture threatens biodiversity. From a social perspective, oil palm cultivation is a predominantly male industry (Mehraban et al., 2022). The continuous expansion of farmland for oil palm cultivation translates into higher labor demand - primarily for men (Kubitza et al., 2023). This is largely due to the higher physical demand that oil palm cultivation requires as well as the overall lower labor intensity compared to previously cultivated crops such as cacao or rubber (Mehraban et al., 2022; Etuah et al., 2020; Chrisendo et al., 2020).

This shift in labor demand associated with the expansion of oil palm cultivation can result in negative consequences for females in oil palm households, such as lower control over finances, lower agency or decision-making power within the household (Elmhirst et al., 2017; Morgan, 2017). Women's access to economic resources can help increase the share of household spending on common goods that benefit all household members, particularly the well-being of children. Compared to income earned by men, that tends to be used more often for personal needs or investments in productivity-enhancing goods, women's participation in the financial decision-making of the household can have a positive impact on overall family well-being, especially in terms of health, nutrition and education. These dynamics were highlighted for example by Salazar and Quisumbing (2009) in the Philippines.

Potential of beekeeping as a sustainable income activity

The positive economic development through oil palm cultivation, expressed in the substantial reduction of Indonesia's poverty line, has contributed to the achievement of important development goals, particularly within rural contexts (Qaim et al., 2020). However, the economic exclusion of

women is an adverse side effect, which urgently needs to be addressed to foster economic participation in the mid and long run. Beekeeping has been identified before as a sustainable economic activity for smallholders (Chanthayod et al., 2017), as it does not require much time or land, has low upfront costs, and potentially creates positive synergies to the cultivated crops through pollination.

Beekeeping has shown to hold a variety of economic opportunities and to hold the potential of being a welfare-increasing activity for (poor) smallholder farmers (Otim et al., 2018; Berem et al., 2010; Amuko et al., 2023; Mushonga et al., 2019; Carroll and Kinsella, 2013; Amulen et al., 2019; Meilby and Cross, 2019; Thomas and Tounkara, 2020), especially for most marginalized groups (Schouten et al., 2019). Beekeeping can increase income and food security of households through the production of honey, beeswax, proppolis (e.g. as cream for healing wounds), and royal jelly used as enhancer for health and beauty (Berem et al., 2010; Krell, 1996). Grüter (2020) presents a insightful overview of stingless bees[1] and their longstanding cultivation among indigenous groups around the world for both their products (similar to the once mentioned above) as well as their cultural, religious, and healing value stemming from the bees themselves and their products. Stingless bees are well known in Southeast-Asia (Chantawannakul et al., 2018), with more than 40 stingless bee species recorded alone in Indonesia (Gratzer et al., 2019; Kahono et al., 2018).

Furthermore, there is empirical evidence on various environmental benefits, such as the positive impact of bees themselves on the net environmental benefits of food through their pollination activities (Sillman et al., 2021), as well as the improved valuation of eco-system services and pro-environmental behavior of beekeepers (Chanthayod et al., 2017; Kumsa et al., 2021). This could be of special importance in this studies context: Especially when oil palm villages are close to the periphery of the tropical rain-forest, which is threatened with deforestation to expand the oil palm cultivating land (Harianja et al., 2023) - bees can function as a strong incentive to keep the forest and function an ambassadors to value eco-system services. There is empirical evidence of changed attitudes and behaviors of rural beekeepers. Kumsa et al. (2021), for example, systematically assess the contribution of traditional beekeeping to maintaining agrobiodiversity among rural communities in Ethiopia. Compared to non-beekeepers, they find that beekeepers show more pro-environmental behavior - for example by storing more residues of trees and gardening for their beekeeping activities - are less likely to expand crop production, and have a higher number of floral species in their home-garden. Indeed, Patel et al. (2021) argue that bees play a central role in achieving the SDGs, particularly SDG 2 (food security) and SDG 13 (climate action) and at least 30 of the SDG targets. However, when considering the case of women from oil palm households to become beekeepers, we can add - as a minimum - contributions to SDG 1 (No Poverty) and SDG 5 (Gender Equality).

Methods and Materials

Study Site and Data Collection

This study utilizes primary data, which was collected from September 2022 until March 2023 throughout the Indonesian province of Jambi by trained, local enumerators. This study was approved by the ethical commission of the Indonesian Government. The province of Jambi provides an ideal setting for this study, given that 40% of all oil palm plantations are managed by smallholders (Apriani et al., 2020; Euler et al., 2016). Moreover, the local livelihoods are highly reliant on oil palm cultivation (Qaim et al., 2020), which has played a pivotal role in reducing the national poverty line (Gatto et al., 2017). To ensure targeted and comprehensive data, enumerators specifically focused on women living in oil palm cultivating villages. Women were randomly approached and asked whether they would be interested in participating in a survey on women's economic role in oil palm cultivating villages. The interviews then took place either in public gathering spaces or within the participants' homes, allowing for flexibility and comfort. None of the questions were mandatory for participants to answer and their participation could be withdrawn at any time

[1] Stingless bees produce honey just like honeybees (who can sting).

throughout the interview. The questions were formulated open ended, allowing women to express their thoughts in their own words. The complete questionnaire can be accessed in appendix B. The interviews were held in *Bahasa Indonesia* and lasted on average 15 minutes. The interviews were transcribed verbatim.

We collected standard socio-economic household information and also inquired about the women's' attitudes towards income generating activities aside from oil palm farming. To identify patterns within the women's preferences we first asked the women what kind of work they would like to do with their available resources and skills. Each woman was asked to reflect on the skills she possessed and the resources available to her within the context of her community and household. These questions were intentionally open-ended, ensuring that responses were not confined to pre-defined categories but instead reflected the diverse aspirations among the women. Through this qualitative approach, we sought to capture the depth and variety of their preferences.

Cluster Analysis

We employ a cluster analysis, a technique widely accepted for organizing homogeneous subject groups and is commonly employed in market segmentation analysis (e.g., (Calvo-Porral and Lévy-Mangin, 2018; Rojas-Rivas et al., 2020). Additionally, it has proven valuable in studying specific population groups, such as farmers (Bruns et al., 2022; Netshipale et al., 2022). All statistical analyses were performed using Stata 15.

In the next step we grouped their responses into subgroups e.g. grocery selling into Sales, or horticulture into Farming. We present the statements with the by us assigned subgroup in Table A.1. The remaining variables for our cluster analysis are thus Sales, Social, Administration, Farming, Services, Nothing and Undecided. These seven variables are appropriate for the sample size since Mooi et al. (2018) recommends to have at least ten times as many observations as cluster variables. Our sample consists of 65 women. To test the variables for collinearity, we perform a pairwise correlation estimation. All variables correlate well below the suggested threshold of 0.9 and thus are suitable for the analysis (Mooi et al., 2018).

Based on Mooi et al. (2018), we utilize a hierarchical clustering method, which is considered suitable for sample sizes below 500 respondents (Kühl et al., 2017; Gunarathne et al., 2017). Specifically, we employ the Ward's linkage algorithm to group subjects in a manner that minimizes the increase in total variance within the clusters while ensuring the construction of homogeneous clusters with roughly equal membership (Mooi et al., 2018).

To investigate statistically significant differences within these clusters, we subject the distributions to a one-factor ANOVA test. Notably, in this study, we can confidently eliminate concerns related to outliers and highly correlated variables influencing the Ward algorithm. This is because the cluster variables demonstrate weak correlations, and the absence of outliers is attributed to all values being limited to either 1 or 0.

We create seven dummy variables for the responses of the women. Agreement with the economic activity is coded as 1 and rejection as 0 so that a general rejection of all economic activities can also be represented. However, as they have many negative matches compared to positive matches, subjects may appear similar. To address this issue, Mooi et al. (2018) propose the Jaccard coefficient to calculate the distance which does not consider negative agreement between respondents. In the context of our research endeavour, this is the most reasonable interpretation of similarities between sample members.

Several criteria can be employed for determining the number of clusters in a dataset. One of the most prominent is the Duda-Hart Index. In Table 1, the Duda-Hart Index (Je(2)/Je(1)) is highest for the two-cluster solution, while the modified Duda-Hart Index (pseudo T-squared) is minimized for a three-cluster solution. Instead of selecting only two clusters, we opt for three clusters, as it is

the more practical solution which provides interpretable and meaningful results and fits our data better. Determining the correct number of clusters is thus a result of thorough analysis but also a combination of manageability, context and practicability (Mooi et al., 2018).

Table 1: Determination of Cluster Size by Duda-Hart

Number of clusters	Je(2)/Je(1)	Pseudo T-squared
1	0.5995	42.08
2	0.6910	15.21
3	0.6414	13.42
4	0.5407	13.59
5	0.3860	14.32
6	0.0000	.

Source: Authors' own calculation

Results and Discussion

We first begin this section by showing results on whether women are interested in economic activities in general. We then discuss women's job aspirations in light of sustainability. Against the previously outlined background of the sustainability of beekeeping in terms of socio-economic and ecological benefits, we furthermore explore women's attitudes to beekeeping in particular.

Income generating activities of women

The women in our sample are, on average, 33 years old and have 3.3 years of schooling. 44 percent are transmigrants. On average, the women live in a household of 4.4 members. Furthermore, 58 percent state to own assets (see Table 3.

As a first step, we answer a crucial question, which is posed through the work of Mehraban et al. (2021), namely whether women in palm oil households wish to participate in economic activities or if they are satisfied with the increased leisure time and generally higher household income generated through oil palm cultivation. We find that they wish to work and that they have a wide variety of aspirations. Notably, out of 65 women only two stated an activity related to oil palm cultivation.

In Table A.1 we report the women's stated activities, sorted by us into different categories, namely Administration, Farming, Sales, Services, and Social roles, alongside responses indicating indecision or lack of interest in work. The *Administration* category includes roles related to village governance and office work, while Farming encompasses various agricultural activities such as fish cultivation, livestock raising, and oil palm planting. The *Sales* category is notably detailed, listing various entrepreneurial activities, from running grocery stores and restaurants to selling specific goods like cakes and electronics. The Services category includes professions like tailoring and makeup, whereas the *Social* category highlights roles in education and community support, such as teaching and health services. Additionally, some individuals expressed uncertainty or a lack of desire to work. Out of 65 women, 7 fall into the *Nothing* category, with two stating that they do not want to work and the five others stating that there is no work available. Thus, The table provides a comprehensive overview of occupational interests, reflecting a mix of entrepreneurial, agricultural, administrative, and social engagement within the community.
A first take-away is that out of 65 women, 63 were generally willing and wanting to work. This is an interesting finding as palm oil cultivation yields a relatively good household income (compared to other possible crop portfolios of smallholder farmers in Indonesia). Thus, one could argue that women are hesitant to take up an economic activity and rather focus on their day-to-day chores. Our results indicate that this is not the case.

Cluster of women based on their aspired activities

This section discusses the results of our cluster analysis, showing the relative distribution of the segmentation variables across the different clusters and the cluster characteristics by giving the mean values of socio-demographic characteristics. We begin by presenting attractive income generation activities stated by the women in our sample, organized as clusters that follow our cluster analysis.

Table 1 presents the clusters and illustrates the absolute frequency of the clustering variables in the three clusters. We determined the names of the individual clusters based on the most influential variables of the respective segment. **Cluster 1 "Traders" (N=29)** consists of women who indicated that they wanted to work in anything trade-related, for example selling groceries or cakes. **Cluster 2 "Socials" (N=10)** is comprised of women who are interested in doing social work such as teaching or working in a hospital. **Cluster 3 "Miscellaneous" (N=26)** describes the women who indicated that they wanted to do administrative work, in the farming or the service sector. This cluster also contains respondents who indicated that they wanted to work but were undecided. Out of 26 women, two women said that they did not want to work at all, five women said they cannot work as there is no work available, which might still indicate a general work interest.

Table 2: Clustering Variables and Clusters

	Cluster (1) Traders	Cluster (2) Socials	Cluster (3) Miscellaneous	Total
N	29	10	26	65
Administration	0%	0%	15%	6%
Farming	0%	0%	31%	12%
Nothing	0%	0%	27%	11%
Sales	100%	0%	0%	45%
Services	0%	0%	20%	8%
Social	0%	100%	0%	15%
Undecided	0%	0%	7%	3%

The *Traders* represent the biggest cluster, comprising 29 women. In this cluster, some women already participate in some trading activity. For example, one woman reported "I've done it. I've been selling groceries and snacks since 2005", see Table A.1. One woman aspired to "enlarge the store", while another aimed to "increase selling capital". However, most women in this cluster aim to start a new business. Most commonly reported were activities related to food. This includes opening up a restaurant, starting a bakery, or selling groceries. Six women left the entrepreneurial domain undefined and just reported "selling", "own a shop", or "trade". Some women were envisioning of other shops such as opening up a credit shop (1), opening up an electronic business (1), or opening up a boutique (1).

The *Socials* build the smallest cluster with 10 women. All of these women state to either wanting to be a teacher (8) or a health service worker (2). Concerning teaching, one woman stated to wanting to teach baking, one woman would like to be an Al-Quran teacher, and one would like to open a community learning activity center. The other women just generally stated "teacher" or "lecturer". Concerning health services, one woman would like to open a health clinic, the other one aspires to be a social rehabilitation assistant. While opportunities such as taking on a role in teaching or in healthcare can most definitely be income-generating activities, they also require certain levels of (formalized) training.

The *Miscellaneous* comprise 26 women and a variety of business activities as well as those who do not want to engage in any business activity. Four women were interested in an administrative job. One woman stated she would like to be a "village apparatus", one an "office employee", one very

generally "administrative staff", and one wanting to advance "SMEs in the village". Eight women were interested in farming activities. Two of them stated to wanting to engage in the ongoing oil palm cultivation by "utilizing the entire palm tree" and invest in "more oil palm planting". Three of the women stated that they wanted to raise livestock - including rabbits, goats, and cattle - and/or fish. The others either simply stated general farming or that they wanted to have more gardens/ more vegetables. Five women reported their wish to engage in the service sector. The most common activity stated was sewing (3). One woman wanted to open a make-up service, and one wanted to start a business of woven mats. Seven women stated that they do not want to work either because they simply did not want to (2) or because they claimed there wasn't any work (5). Two women were undecided about what to say.

The mixed group represents the richness and innovativeness of rural women. The varieties of ideas show great potential for further exploration of their potential as well as potential hurdles. The *Traders* tend to think of village level entrepreneurial activities, which might be a reflection of preferences for starting a business close to the house. A restaurant or a bakery can be run from inside of the house in rural regions, so the women does not have to trade-off between household/child care and her entrepreneurial activity. As women most probably possess the needed skills e.g. to bake bread or cook food, as well as the needed equipment, it seems that women build the aspiration around low upfront-costs. This might appear to be a rational thought as rural regions tend to lack access to financial markets. However, many of the aspired economic activities of the "Traders" may have limited success opportunities due to the quick saturation of the rural (service) market.

The *Miscellaneous* state a variety of business ideas. For example, keeping livestock complementary to oil palm cultivation is promising. Livestock can work as an asset for the household and/or nutrient-rich food contributing to the household's food security (Devendra, 2010; Moll, 2005). Especially small ruminants like rabbits reproduce quickly and have low feeding requirements (Gerbil et al., 2023). However, additional livestock and especially fish need additional space, a potential bottleneck. Administrative jobs, as also found in the *Socials* represent stable income activities but need to be funded by the community, which can be a critical limitation in rural regions with lacking or more informal tax systems.

Table 3: Cluster Description

		Cluster (1) Traders		Cluster (2) Socials		Cluster (3) Miscellaneous		Total Total	
Variable	Unit	mean	sd	mean	sd	mean	sd	mean	sd
Age	years	36.62	7.88	29.90	8.50	41.00	12.92	37.33	10.81
Asset ownership	dummy^A	.52	-	.60	-	.65	-	.58	-
Education	years	3.00	1.10	4.50	1.27	3.12	1.11	3.28	1.23
Household size	members^B	4.38	1.40	4.30	1.42	4.38	1.96	4.37	1.63
Transmigrant	dummy^C	1.76	-	1.50	-	1.62	-	1.66	-

Note: ^{A} yes=1, no=0,; ^{B}Number of members living under one roof; ^{C} yes=1, no=2

Table 3 further describes the women in each cluster and presents the different sociodemographics. The *Traders* are of medium age (36 years), have relatively low education (on average 3 years of formal education), relatively the lowest asset ownership (52% of households own assets) and are most likely to be a transmigrant. Houshold size is rather similar between all three clusters with 4.3-4.4 members living under one roof. The *Socials* are the youngest (29.9 years of age, on average), and the most educated (on average, 4.5 years of formal education). The *Miscellaneous* stand out for being, on average, the cluster with the oldest women (41 years) and highest share of assets (65% of the households own assets).

Two interesting take-aways follow the insights shown in Table 3. First, there are considerable differences in sociodemographics between the groups. We find a variety of business aspirations within our sample and differences in age, education, asset ownership, and migration background between

the clusters. Women in the villages represent a diverse group with diverse ideas and aspirations, a reminder that one size will not fit all. Second, we asked the women for job aspirations roughly within their current skill-set, which the women appear to have stuck to. The most educated women are in cluster 2, the *Socios*, i.e. those aiming to be teachers or health workers.

The potential of beekeeping for rural women's economic participation

As previously argued, beekeeping presents itself as a promising activity for women in oil palm cultivating villages, with the potential to contribute to social, economic and ecological sustainability. Hence, we wanted to specifically elicit the perceptions of and attitudes towards beekeeping, beyond the clusters. Beekeeping holds an immense potential in terms of socio-economic participation and ecological benefit. Out of the women who participated in our study, the majority, namely 60% (39 women), were in favor of beekeeping and 40% (26 women) were opposed or at least hesitant to engage in beekeeping (see Figure 1).

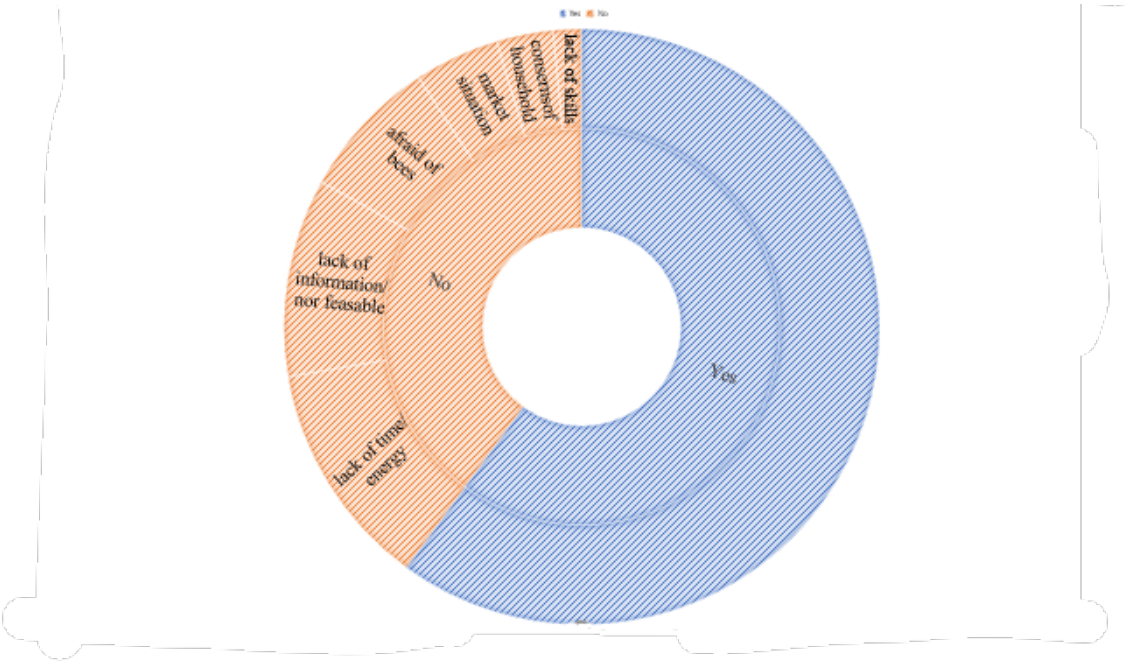

Figure 1: Attitude towards Beekeeping (N=65)

The reasons for being opposed or at least hesitant towards beekeeping activities are diverse[2]. We have categorized them into six groups[3]. First, *lack of time/energy*: The main reason women state for not wanting to engage. Women in this group report for example that "Because want to focus on business" or "exhausting" or "not strong enough to work". Second, *Lack of information/think it is impossible*: Seven women fall into this category. Statements include reservations "Never knew anyone who is a beekeeper" or "Never tried (no experience)", "Difficult", as well as logistical hurdles due to the distance from household to the botanic area "There is no interest because the fields/gardens are far away" or informational hurdles "Because the area is far from water, mother said bees like near water". Third, *Afraid of bees*: Four women fall into this category and stated that they were generally afraid of bees (3) as well as being afraid of being stung (1). Fourth, *Market Situation*: Women are concerned about the unstable market situation, which includes the concern about price fluctuations in the market as well as the difficulty of marketing and maintaining the

[2]The following is based on 26 answers given by those who stated to be opposed/hesitant to take up beekeeping. Women stated their main reason for being opposed/hesitant to beekeeping, i.e. we recorded one reason per hesitant women.

[3]see A.2 in the appendix for detailed answers

business. Fifth, *General concerns of the Household*: Two women gave reasons that fall into this category. One woman was concerned that her husband would not approve this enterprise, and the other felt beekeeping was out of place for her. Sixth, *Lack of skills*; One woman reported that she is unskilled and therefore she is not interested in beekeeping activities.

With all concerns being valid and similar to concerns identified in the literature (Meilby and Cross, 2019), many of these could be addressed. For example, *Lack of information/think it is impossible*, *Lack of skills*, *Market Situation*, as well as some of the concerns from other groups could be addressed through information and training sessions. For example, Beekeeping (when done extensively) should not take up more than a few hours a week, on average. Bees can be kept close by the house, which eliminates the need to travel far. Also, farmers could receive information about market prices and net demand for honey in Indonesia. Further, *Afraid of bees* could be addressed by taking up stingless bees instead of bees that sting - as both deliver honey - as well as by providing training and showing the bees to the farmers. However, how beekeeping is introduced and how the training is designed is critical to its success (Nat Schouten and John Lloyd, 2019; Schouten et al., 2019). Research shows that factors such as tradition and local conditions (Kumsa et al., 2021; Schouten, 2020) as well as tailored extension services, technology and market ties (Nat Schouten and John Lloyd, 2019; Thomas and Tounkara, 2020) and floral landscape (Nat Schouten and John Lloyd, 2019) are critical for beekeepers to be successful.

Concluding remarks

Despite the manifold positive outcomes of oil palm expansion, particularly in Indonesia, the adverse consequences are stubborn and concerning: the loss of female participation in agricultural value creation and biodiversity losses are among the most concerning ones. This study contributes to solutions aiming to mitigate the adverse outcome of female work displacement, by eliciting the diverse aspirations of rural women for economic participation and income opportunities. We identify possible pathways for female economic integration, while highlighting one particularly promising tool to foster the synergy between socio-economic and environmental benefits: Beekeeping. We thus investigated the attitudes of rural women towards beekeeping, to understand whether there is a general interest. Using a qualitative sample of 65 women in rural oil palm cultivating villages in Jambi, we explore the different job aspirations women hold and which potentials they see for themselves to engage in economic activities.

We report three main results. Firstly, women aspire to a rich variety of economic activities, highlighting their general wish for economic participation. We answer a crucial question, which is posed through the work of Mehraban et al. (2021), namely whether women in palm oil households wish to participate in economic activities or if they are satisfied with the increased leisure time and generally higher household income generated through oil palm cultivation. We find that they wish to work. We further find that only two women want to work in an activity related to the oil palm cultivation. Secondly, we could identify three clusters of women based on their aspired activities: "Traders", such as small (food) business owners; "Socials" such as teachers or health care workers; and "Miscellaneous", which encompasses a variety of activities such as engagement in post-harvest activities, handicraft, or administrative work. This mixed group represents the richness and innovativeness of rural women. The varieties of ideas invite for further exploration of their potential as well as the discussion of their hurdles. Hurdles mainly include critical risks of success due to lack of infrastructure or market saturation in rural regions. Thirdly, we investigate the role of beekeeping as an economic activity which potentially caters to all three pillars of sustainability. Most of the women (60%) in our study were open to beekeeping. Those who were hesitant or opposed to beekeeping gave reasons that can mostly be addressed through information, training, or by keeping stingless bees in an extensive system.

Moving forward, it will be an ongoing quest to drive sustainability and resilience within the oil palm sector, particularly in smallholding communities. Gender equality is a central goal of the SDGs and closing the gender gap can have many positive spillovers to a number of other SDGs. Our study is

a critical first step to further endeavors of policy makers and researchers in their quest to make the smallholder oil palm sector more resilient and sustainable. This study has shown that rural women in oil palm contexts have an interest in economic activities in general and are open to beekeeping. We thereby set the stage for stakeholders to foster economic participation among rural women.

Important avenues for future research are testing the potential of beekeeping among rural women, potentially in the form of randomized control trials. However, researchers should critically test if beekeeping can be a bottom-up activity, truly enforced by women in the community, rather than an activity put upon them in an artificial manner.

Yet, in our study, many women express aspirations towards sales, food selling and trading. The beauty of beekeeping is, that it ties together many of the activities mentioned by the women. Furthermore, given the nature of beekeeping, it is an activity that can be relatively easy integrated into the women's lives and responsibilities. Additionally, it remains to be shown how beekeeping should be best introduced and which economic and ecological opportunities it might hold. Further, the role of beekeeping in achieving the duality between socio-economic and ecological sustainability needs additional holistic research to highlight its feasibility and impact on rural women's livelihoods. It will be of particular interest to interdisciplinary teams to understand how oil palm farm households can benefit from pollination services of bees, how bees are managed successfully and under which conditions female farmers can generate a sufficient income and gain agency. Finally, interesting future research can investigate other aspirations mentioned by the women in our sample to test their feasibility and potential training designs.

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Appendix A

Table A.1: Aspired economic activities by category: Translated statements

Assigned Category	Jobs including skills
Administration	Administrative staff
	Advancing SMEs in the village
	Village apparatus
	Office employee
Farming	Farming
	Fish cultivation
	Have more gardens
	More oil palm planting
	Raise cattle
	Raising fish, rabbits, goats
	Utilizing the entire palm tree
	Vegetable farming
Nothing	Don't want it
	Don't want to work
	There isn't any
	There isn't any
	There isn't any
	There isn't any
	There isn't any
Undecided	Don't know
	Yes
Sales	I've done it, I've been selling groceries and snacks since 2005
	Selling business
	Owns a restaurant
	Have an electronics business
	Enlarge sales business
	Own a shop
	Open a grocery shop
	Have a culinary business
	Open a boutique
	Open a grocery trading business
	Open a bakery business
	Selling
	Enlarge the store
	Selling cakes
	Selling groceries
	Trade
	Food business
	Open a business (grocery store)
	Open a food stall
	Open a grocery store
	Food business
	Open a vegetable shop
	Own a restaurant business
	Increase selling capital
	Own shop
	Opening a food business
	Selling (open credit shop)
	Have a bigger warung

Assigned Category	Jobs including skills
	Selling
Services	Makeup
	Business of woven mats from tassel (pandanus plant species)
	Tailoring
	Opened a sewing business
	Take a sewing course
Social	Al-Quran teacher
	Become a teacher
	Lecturer
	Opened a community learning activity center
	Open a health clinic
	Social rehabilitation assistant
	Teach baking
	Teacher
	Teacher
	Teacher

Note: All answers are reported in this table, one row per individual, sorted by category. Statements were translated from the original responses. Some responses were grouped into broader categories for clarity.

Table A.2: Reasons for opposing beekeeping by category (N=26)

Assigned Category	Reasoning
Afraid of Bees	Afraid of bees
	Not painstaking
Afraid of Unstable Market	The market is uncertain
	Difficult marketing and maintenance
	Not interested yet
General Concerns in Household	Feeling out of place
	Husband does not allow
Lack of Information / Think It Is Not Possible	Because the area is far from water
	Mother said bees like to be near water
	Difficult
	There is no interest because the fields/gardens are far away
	Never tried (no experience)
	Complicated. Farming paddy is enough
	Never know anyone who is a beekeeper
	Want to avoid complications
Lack of Skills	Being unskilled
Lack of Time / Energy	Confused about managing time
	Already old
	Want to focus on business
	Not strong enough to work
	Not interested, already has own work
	Bothered by taking care of it
	Exhausting
	Feels like a hassle

Note: If a woman stated that she is not interested in beekeeping, we asked for a reason. All answers are reported in this table, one row per individual, sorted by category. Statements were translated from the original responses. Some responses were grouped into broader categories for clarity.

Appendix B

1. How old are you?

   ____ years

2. How many people live in your household, including yourself?

   ____ people

3. What's your highest school degree?

   No school

   Elementary School

   Middle School

   High School

   Bachelor

   Master

   Other, please specify: _____

4. Did you or your parents / your husband or his parents participate in the transmigration-program?

   Yes

   No

5. Are you currently working?

   Yes, on-farm

   Yes, off-farm
   If yes, please specify your type of work: _____

   No
   If No, would you like to work?

   Yes, on-farm

   Yes, off-farm

   No

6. If you are currently working, are you being paid for your work?

   Yes

   No

7. If you are currently working, how difficult or easy was it for you to get this job (scale from 0 to 5)?

   ____ (0 = very difficult, 5 = very easy)

8. If you are currently not working, did you ever work before?

   Yes

   No

9. If you are currently not working, would you want to work?

   Yes

   No

   - What type of job did you last have? _____

- Did you like this job?

  Yes

  No

- Why did this last job end? _____
- How long did you work last? _____
- When did you stop working (year)? _____

10. Would you say palm oil cultivation has made it difficult for women to work compared to the time before palm oil was cultivated?

    Yes

    No

    - If yes, why? _____

11. Would you want to cultivate oil palm?

    Yes

    Yes, but with a caretaker

    No

    - If no, why not? _____

12. How long has your family / household been cultivating oil palm? (since year _____)
13. Would you say that due to oil palm cultivation it is no longer necessary for women to work because e.g. the husband generates enough income?

    Yes

    Yes, but I would still like to generate my own income

    No

14. Did oil palm cultivation change your household income?

    _____

15. If yes, how did oil palm cultivation change your household income? Do you have more money now or less?

    _____

16. Do you have more leisure time?

    _____

17. If yes, do you enjoy having more leisure time?

    _____

18. Do you know any women cultivating / owning oil palm plantations?

    Yes

    No

19. What are possible jobs / what is a typical work for women in villages or areas where lots of oil palm is cultivated?

    _____

20. With your skillset and your talents, which job would you like to do if you had the money/training to realize it?

    _____

21. Regardless of your skillset and talents and education, what would you like to work?

    _____

22. Would you be open to an income source which you could pursue from your home (e.g. handicraft, food crops, ...)?

    Yes

    No

    I don't know

23. How many hours per day are you currently working and how many hours per day would you like to work?

    Currently working: ____ hours

    Would like to work: ____ hours

24. Do you have ideas for viable businesses in your area?

    _____

25. Would you be open to work with bees and honeymaking?

    Yes

    No

    Could you explain why (not)? _____

26. Do you own any assets (money, house, land, motorbike, ...)?

    Yes

        Please specify: _____

    No

27. Do you own a bank account?

    Yes

    No

    No but I have full access to a bank account

28. Are you married?

    Yes

    No

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1808	Wille, S. C., A. Spiller u. M. von Meyer-Höfer	Lage, Lage, Lage? : Welche Rolle spielt der Standort für die landwirtschaftliche Direktvermarktung?
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1907	Reithmayer,C., M. Danne u. O. Mußhoff	Look at that! – The effect pictures have on consumer preferences for in ovo gender determination as an alternative to culling male chicks
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2021		
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Department für Agrarökonomie und Rurale Entwicklung

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Die Wurzeln der **Fakultät für Agrarwissenschaften** reichen in das 19. Jahrhundert zurück. Mit Ausgang des Wintersemesters 1951/52 wurde sie als siebente Fakultät an der Georgia-Augusta-Universität durch Ausgliederung bereits existierender landwirtschaftlicher Disziplinen aus der Mathematisch-Naturwissenschaftlichen Fakultät etabliert.

1969/70 wurde durch Zusammenschluss mehrerer bis dahin selbständiger Institute das **Institut für Agrarökonomie** gegründet. Im Jahr 2006 wurden das Institut für Agrarökonomie und das Institut für Rurale Entwicklung zum heutigen **Department für Agrarökonomie und Rurale Entwicklung** zusammengeführt.

Das Department für Agrarökonomie und Rurale Entwicklung besteht aus insgesamt neun Lehrstühlen zu den folgenden Themenschwerpunkten:

- Agrarpolitik
- Betriebswirtschaftslehre des Agribusiness
- Internationale Agrarökonomie
- Landwirtschaftliche Betriebslehre
- Landwirtschaftliche Marktlehre
- Marketing für Lebensmittel und Agrarprodukte
- Soziologie Ländlicher Räume
- Umwelt- und Ressourcenökonomik
- Welternährung und rurale Entwicklung

In der Lehre ist das Department für Agrarökonomie und Rurale Entwicklung führend für die Studienrichtung Wirtschafts- und Sozialwissenschaften des Landbaus sowie maßgeblich eingebunden in die Studienrichtungen Agribusiness und Ressourcenmanagement. Das Forschungsspektrum des Departments ist breit gefächert. Schwerpunkte liegen sowohl in der Grundlagenforschung als auch in angewandten Forschungsbereichen. Das Department bildet heute eine schlagkräftige Einheit mit international beachteten Forschungsleistungen.

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