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Factory fortunes? Agrarian change, gendered livelihoods and the feminisation of labour in the edible birds' nest trade in rural Indonesia

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ABSTRACT

While the production and exchange of high-value non-timber forest products (NTFPs) can benefit the rural poor, their sustained intensification can often reinforce uneven gendered outcomes. This paper examines how the expanding edible birds' nest (EBN) trade in Indonesia, has unevenly incorporated a growing number of young rural women in precarious off-farm work in EBN 'cleaning' factories. We examine the gendered divisions of labour that emerge as more women enter assembly-line nest cleaning in converted homes situated along the supply chain. Based on extensive fieldwork in Kapuas Hulu, West Kalimantan, we reveal how the tedious, routine, and low-paying nature of women's factory work reproduces new forms of feminised labour and livelihood insecurity. To negotiate the less desirable aspects of factory cleaning work, women sustain connections across farms and fields in their natal villages and, in the process, challenge local trends of 'de-agrarianisation'. In doing so, they negotiate the feminised labour conditions of intensifying NTFP commodity chains by leaning on their agricultural base to sustain family and finances amid truncated agrarian change.

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Introduction

Across Southeast Asia, rural households increasingly derive cash incomes by diversifying their livelihoods across forest, farm, and off-farm labour activities (Elmhirst 2008; Ambarwati et al. 2016; Leder 2022). Others seek service sector employment in peri-urban and urban centres as patterns of 'de-agrarianisation' unfold (Griffin et al. 2024). While some rural households pursue trans-local livelihoods that secure much-needed remittance streams from distant urban areas or overseas work (see Pernia 2008; Ratha, Plaza, and Dervisevic 2016), many more sustain multi-local livelihoods by combining activities across rural and peri-urban areas (Dove 2011). In particular, rural smallholders often invest in lucrative commodity production with

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significant financial rewards and risks, while staying in or near rural areas (Dove 2011; Zhu and Peluso 2021). Such livelihood strategies are gendered, with men and women often working together and separately to meet household needs (Mandel 2004; Douglass 2007). Yet livelihood scholarship often overlooks how gendered social differences influence familial social reproduction, including who undertakes which roles and responsibilities (Langill and Oberhauser 2025; Razavi 2009; Katz 2004). Analysing such gendered livelihoods dimensions is critical for understanding the uneven and relational ways in which rural people make a living amidst broader agrarian transformations (Langill and Oberhauser 2025).

Smallholders across Kalimantan, Indonesia, have long engaged in and profited from harvesting non-timber forest products (NTFPs) for global supply chains (e.g. *gaharu* (*Aquilaria* spp.), orchids (*Orchidaceae* spp.)) (Goh and Potter 2023). In time, however, the intensification of high-value NTFP production and exchange can benefit wealthy entrepreneurs and local traders while negatively impacting the rural poor, particularly local and Indigenous women, who have little control over prices and labour conditions along supply chains (Li 2014; Dove 2011). Poorer women—perceived as dutiful and diligent—are often employed in low-paying positions in differently sized NTFP processing factories to perform the monotonous yet necessary tasks that ‘add value’ for subsequent commodity exchange or export (Kanji and Menon-Sen 2001; Tjandraningsih 2000). These women negotiate social relations, uneven labour conditions, and reproductive roles as they weigh the opportunities and risks of piece-rate assembly-line labour against broader livelihood portfolios (Taylor 2016; Dutta 2019). We show that these relatively new spaces of opportunity can drive the feminisation of labour in frontier areas, creating hopeful albeit precarious futures for young women and their family’s life course.

The intensifying harvest and exchange of edible birds’ nests (EBNs) has become implicated in the feminisation of labour and the deepening of livelihood precarity. Harvested across Southeast Asia and traded for consumption in China and Hong Kong, the nests are formed from the hardened saliva of swiftlet birds (*Aerodramus* spp.) attached to the walls of limestone caves or purpose-built farmhouses (Thorburn 2015; Dunphy et al. 2024). EBNs are perceived to have health and cosmetic benefits when consumed (commonly as birds’ nest soup) or applied to the skin (such as face masks) (Yeo et al. 2021). The (centuries-old) EBN trade has rapidly expanded and globalised since the late 1980s, driven by China’s growing middle class (Chew et al. 2020). As a result, increasing numbers of people in rural and urban Southeast Asia have met this demand by selling their labour to harvest or clean the nests under other employers, while wealthier households have invested in constructing swiftlet houses that entice the birds to roost and produce nests for sale (Dunphy et al. 2024).

Indonesia supplies up to 80% of the global EBN market, exporting approximately 2,000 tons of factory-cleaned and processed nests annually (BPS 2024). West Kalimantan province has emerged as a key production zone due to its low population density and extensive forest cover, attracting increasing numbers of farmhouses, traders, and EBN cleaning factories (Vebriansyah 2017; Neubauer 2021). While the extraction and harvest of EBNs are typically carried out by younger, able-bodied men, young women are employed along the supply chain in factory-based, assembly-line nest cleaning (Chew et al. 2020). Using medical tweezers, these young women meticulously remove

small impurities (e.g. dirt, vomit, feathers etc) from the nests to meet export, quarantine, and hygiene standards (Chew et al. 2020; Neubauer 2021). As Chiang (2011, 414) noted, 'consuming birds' nests is essentially consuming behind-the-scenes labour'.

Strict EBN export cleaning regulations in Indonesia and Malaysia have driven the rise of cleaning factories, particularly after a 2012 trade agreement between Indonesia and China mandated compliance with specific quality standards (Elvi 2014). These factories have since emerged in various forms across key EBN production and exchange zones (Kasmir 2019). In Indonesia's urban EBN trading centres, such as Surabaya and Medan, large, industrial-style cleaning factories employ dozens of women to clean nests in expansive, sterile environments (Jandam 2021). In peri-urban areas, EBN cleaning often takes the form of smaller-scale cottage or 'home' industries, where a dozen or so local women clean nests in informal warehouses and repurposed homes (Chew et al. 2020; Kasmir 2019). Both types of cleaning factories have deepened the commodification of EBN as women's labour underwrites intensified export production with low wages and few social safeguards (Caraway 2007).

Our paper draws on the life stories of six women EBN cleaners and their male factory boss to understand the micro-level negotiations and gendered livelihood strategies unfolding amid the feminisation of labour in rural Indonesia. We explore how and why these young women took up EBN cleaning work and how they negotiated changing agrarian livelihoods in relation to changing needs on the farm and within the family. We use a feminist political ecology (FPE) approach with insights from feminist political economy to examine the cleaning roles and livelihoods of young women in smaller-scale EBN factories in Kapuas Hulu, Indonesia. Rather than portraying women EBN cleaners as victims of expanding capitalist production, we examine how young women adjust their labour practices and negotiate feminised precarities along intensifying commodity chains.

Gendered livelihoods and (truncated) agrarian change

Across much of Southeast Asia's frontiers, once largely forest and farm-dependent peoples have been moving away from land-based livelihoods toward off-farm, labour-based activities—a transition often referred to as 'agrarian change' (Bernstein 2010; Razavi 2009). Such agrarian changes, however, are messy, uneven, and disjointed with no neat linear path from farm to off-farm livelihoods (Rigg et al. 2018). Described as 'truncated agrarian change', these uneven transitions challenge the supposedly linear trajectory often described in past and present literature (Rigg et al. 2018; Griffin et al. 2024). In Indonesia, truncated agrarian change can increase insecurities for the rural poor as it presents 'no pathway from country to city, agriculture to industry, or even a clear pathway into stable plantation work that pays a living wage' (Li 2010, 296). Poorer households are not simply absorbed by wide spread factory production and service sector roles (Griffin et al. 2024). Rather, most rural poor tend to negotiate a back-and-forth, trying new forms of work and then relying on land-based livelihoods to meet household needs (Zhu and Peluso 2021). Women often take on uneven productive and (social) reproductive roles frequently framed as a 'new feminised class of labour' (Mezzadri et al. 2024, 4). They negotiate the 'opportunity costs' associated with entrenched gender norms—both within the household and other forms of work

(see Setyonaluri and Utomo (2024) for urban Indonesia). However, questions of how young women navigate these uneven, truncated agrarian changes and negotiate precarious rural to urban off-farm work in light of shifting household livelihood needs and aspirations remain underexamined.

Drawing on feminist political ecology (FPE), we analyse gendered divisions of labour in EBN cleaning work and examine how women negotiate such off-farm work in relation to uneven social power relations, changing livelihoods, NTFP commodification, and broader processes of agrarian change. Earlier studies in FPE foregrounded gender differentiated access to, use of, and control over land and resources (Elmhirst 2015; Toumbourou and Dressler 2021), while more recent studies have focused on intersectional, embodied experiences of changing political ecologies across axes of social difference, such as gender, age, and ethnicity (Sultana 2021). In this paper, we use FPE to examine gendered labour dynamics in emerging EBN cleaning factories, focusing on the opportunities, exclusions, and divisions of work that shape women's experiences and decision-making strategies. By linking feminised labour processes in NTFP commodity chains to broader agrarian transformations, we highlight how rural women engage with and reshape shifting labour conditions and livelihood strategies.

We draw on the notion of social reproduction to inform our understanding of how women's productive and social reproductive roles shape and are shaped by broader economic and political structures (Mezzadri et al. 2025; Katz 2004). In feminist political economy, social reproduction refers to biological production, labour reproduction (both paid and unpaid), and practices of care (Cantillon, Marchetti, & Stevano 2023). These processes sustain societal structures and shape capitalist relations. Social reproduction involves the daily regeneration of gendered divisions of labour, power structures, and socio-cultural norms that reinforce and/or shift uneven gendered and class roles and relations over time (Cantillon, Marchetti, & Stevano 2023). We apply a social reproduction lens to analyse how women's labour has become increasingly commodified and restructured amid the intensifying EBN trade in agrarian settings (Razavi 2009). In doing so, we explore how scaled political dynamics, alongside gendered power relations, shape women's labour, influence household decision-making, and drive shifts in rural livelihoods.

NTFP commodification and the feminisation of labour

Global market integration and the intensifying commodification of nature have profoundly reshaped environments, livelihoods, and social relations across rural Southeast Asia (Potter and Badcock 2005). While these changes can open new avenues for fulfilling the social and material aspirations of rural households, they can also generate or exacerbate social and economic vulnerabilities and risks (Elmhirst 2008; Zhu and Peluso 2021). These uneven effects are differentiated by gender, age, class, ability, and geographic location (Sultana 2021; Langill and Oberhauser 2025).

Women and men from different social groups adopt new—or specialise in existing—money-making activities to meet changing family demands and material aspirations (Bennike, Rasmussen, and Nielsen 2020). While men often dominate and influence the extractive or harvesting end of commodity chains—thereby masculinising production and exchange (Großmann 2017; Dunphy et al. 2024; Colfer 2021)—many

women take on additional responsibilities within domestic and reproductive spheres (Pattenden 2023). Increasingly, women are also drawn into the processing of high-value NTFPs to earn critical cash incomes. As the global trade in tropical NTFPs (e.g. nuts, resins) intensifies, women's labour is both instrumental and adversely impacted in the production process (Hecht 2007; Lundy 2012). Export-oriented NTFP industries often maintain profit margins by exploiting women through low-wage, precarious, assembly-line processing—justified by gendered stereotypes framing them as docile, dexterous, and adaptable (Ong 1987). These roles are embedded within 'just-in-time' global supply chains that prioritise efficiency and responsiveness to demand over worker welfare and sustainability (Kreng and Wang 2005). Male factory owners frequently exploit these gendered assumptions, demanding long hours of factory work with little job security (Caraway 2005). Moreover, the rise of piece-rate, flexible, and informal labour is poorly regulated (Kanji and Menon-Sen 2001; Ong 1991). Piece-rate workers are paid per unit produced—such as each nest cleaned—rather than through daily or monthly wages (Luluk et al. 2017). Precarious labour systems tend to operate informally, with cash-in-hand payments, and beyond government legislation that might require a minimum wage (Hartiningsih 2000). This casualisation renders women disposable and exploitable as they 'are concentrated on the lowest rung of the ladder in the production line' (Tjandraningsih 2000, 262). Such gendered precarity generates persistent uncertainty, insecurity, and volatility in women workers' present and future lives (Kalleberg 2009; Standing 1999).

Many women engage in piece-rate work pursue cash incomes because their spouses work away from home, leaving them responsible for both earning an income and caring for the family (Colfer, Ihalain, and Monterroso 2020). This dual burden constitutes a 'double duty' for women who work across both public and private spheres of reproduction (Pattenden 2023). Yet women's labour is often rendered invisible and remains disproportionately precarious in both domains, with few social and economic safeguards from the state or private sector (e.g. maternity or sick leave) (Dominika 2017; Ong 1987).

While scholarship on the political economy of women's factory work and their perceived docility and dexterity is well established, less attention has been paid to the growing feminisation of labour in rural settings and how young women negotiate such precarity, including through opting out (Wolf 1992). As we show, households entangled in commodity production can 'simultaneously resist, participate in an attempt to control' conditions, processes, and social relations (Taylor 2016, 146).

In rural Indonesia, households seek to bridge farm and off-farm work by securing cash incomes through the expanding and lucrative EBN nest trade—reflecting broader global trends towards de-agrarianisation and off-farm transitions (Goh and Potter 2023). In West Kalimantan, young women are hired by small-to-medium-sized factories to clean EBNs—extracting dirt, vomit, and dust from recently harvested nests—for low wages. However, as we show, many women leave this work after only a few days due to its tedious, monotonous nature. In response, some return to the farm to mitigate livelihood insecurities and meet household needs while continuing to navigate emerging off-farm opportunities (Fougeres 2008). The intensifying commodification of EBN exposes the gendered micro-politics of labour within cleaning factories and reveals the expanding feminisation of precarious off-farm work as part of broader

livelihood diversification strategies (Razavi 2009). We examine how women navigate patriarchal labour relations while attempting to retain control over their labour and weighing broader livelihood strategies.

Women's livelihood strategies and decision-making processes in the context of NTFP commodity chains and agrarian change literature requires further analysis. As we show, many women ultimately exit unfavourable factory conditions and fall back on farm-based livelihoods. They push for control over their labour and livelihoods as they move in and out of factory and farm work (Dutta 2019). As agrarian landscapes and livelihoods shift, women's labour in the home, farm, and work influence how these changes unfold (Bryceson 2019; Natarajan and Brickell 2022). We argue that agrarian changes remain partial and uneven, as women sustain ties to the farming while pursuing off-farm work opportunities. Rather than follow a linear livelihood trajectory from farm to factory, women who seek off-farm work often maintain a partial connection to the farm and field (Eder 1999).

As new off-farm opportunities emerge, both women and men strategically engage in a mix of farm and off-farm livelihood activities to mitigate risk and adverse outcomes. As Wolf (1992, 252) noted, 'rural industrialisation allows semi-proletarian families to maintain their tiny landholdings, preventing further deterioration of their already low socioeconomic status.' Women with access to land are often able to navigate new forms of waged labour in peri-urban areas while retaining the option to fall back on farming.

This is not to suggest that land-based livelihoods are necessarily secure or safe. Livelihoods across farm, field and forests are fluid and contested, shaped by changing dynamics of household land ownership and access, yield, gendered divisions of labour, and market relations (Leder 2022; Akram-Lodhi et al. 2009). Cash crop markets are prone to price fluctuations, while subsistence-oriented livelihoods often face limited income-generating options (Goh and Potter 2023). Yet for many rural households, land-based livelihoods remain familiar, and for those with access—through ownership, rental, or borrowing—such activities can offer a temporary buffer against volatile livelihood changes (Hecht 2007).

Methods

Our findings are based on ten months of fieldwork conducted in two phases between 2021 and 2023, necessitated by initial COVID-19 restrictions. The first phase (December 2021 to February 2022) involved online interviews conducted in collaboration with research assistants in Nangah, Langkang, and Melbourne. The second phase (August 2022 to February 2023) involved in-person data collection by the lead author in both Nangah and Langkang. Data collection was centred in Nangah village, where the lead-author was based and where the broader study was primarily focused. This two-phased approach allowed for deeper triangulation and added nuance to the data collection process.

We draw on 85 life-story and semi-structured interviews conducted in Nangah and Langkang to examine changing gendered livelihoods, histories, and agrarian social relations in the context of EBN commodification and intensification. Life stories are not just individual accounts but reflect wider trends in gendered, agrarian, and family

transitions (see Dutta 2019; Douglass 2007). In this paper, we foreground seven life-stories of individuals directly involved in EBN cleaning factory work, including six female nest cleaners and one male cleaning factory owner. Four of the women were from Nangah—where no other women beyond these interviewees had prior or current experience in EBN factory work—while the remaining two, from Langkang, were selected through snowball sampling. The additional 78 interviews were conducted with a range of actors, including the EBN cleaners' husbands, cave workers, farmhouse owners, and other local households. These interviews inform and contextualise the broader findings on gendered social reproduction and livelihood strategies discussed throughout the paper.

All interviews were conducted in Bahasa Indonesia, with informed consent obtained from all participants. Ethics approval was granted by both the university and relevant Indonesian government authorities. Pseudonyms are used throughout to protect the anonymity and privacy of individuals and locations, except for Pontianak, the provincial capital. This study forms part of a broader ARC Linkage research project (no. LP190100940) examining the harvest and trade of EBN across Southeast Asia (Figure 1).

Agrarian political economies and changing livelihoods in Nangah and Langkang

Kapuas Hulu district lies in the eastern reaches of West Kalimantan, Indonesia. Its capital, Langkang, is a small urban centre of 12,000 residents that has attracted the attention of wealthy elites due to its commodity production potential. Now recognised as a commodity frontier (Moore 2000), Langkang has drawn in various resource-based industries, generating a range of off-farm employment opportunities. It has evolved into a dynamic trading hub for agricultural products, crafts, and businesses profiting from forest and land privatisation. Increasingly, these ventures—ranging from grocery stores to specialised NTFP enterprises—employ local high school and university graduates to meet growing skilled labour demands, while also offering low-wage jobs to poorer men and women. As a gateway to old-growth forests and national parks, the town also hosts several local and international conservation non-governmental organisations.

The Dayak Taman village of Nangah is one of several nearby villages located approximately 30 min upstream from Langkang. Nangah has a population of 1,152, comprising 357 households. The Dayak Taman are an ambilineal ethnic group (King 1985), traditionally stratified into three social ranks: the aristocracy (Samagat), who historically held most of the land, wealth, and power; the middle rank (Pabiring); and the lower rank (Banua), representing the majority of households in Nangah. While these hierarchies have softened over the past century, many Samagat households continue to hold considerable wealth and social influence. Both Taman men and women across ranks can own land, typically inherited from their parents or acquired through purchase. Children who remain at home to care for their parents often inherit a larger share of land, regardless of gender (King 1985). Land is frequently shared among extended kin through borrowing arrangements (primarily for swidden cultivation) or temporary management when the owner resides elsewhere.

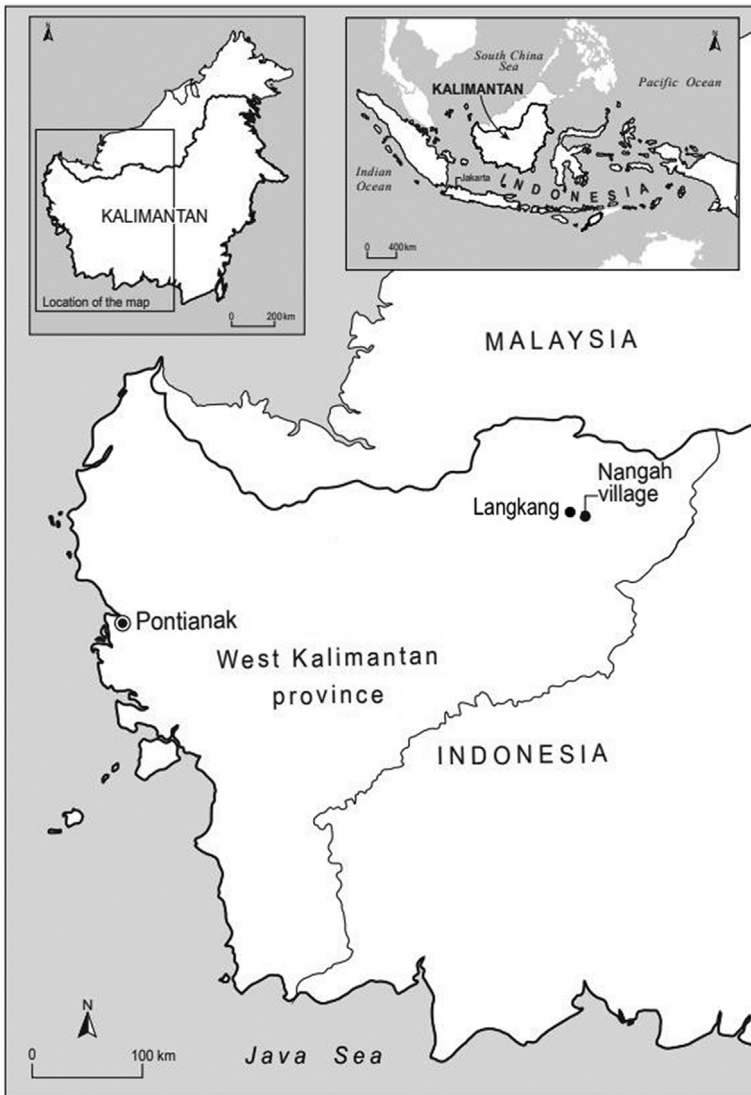


Figure 1. Langkang and Nangah village in Indonesia (© Chandra Jayasuriya).

Nangah has only been accessible by road since the mid-1990s. The increased accessibility brought more opportunities for trade, employment, education, and livelihood diversification. Road access also brought electricity and new ideas about modern living, contributing to a gradual shift away from large kin-based longhouses toward more individualised nuclear family dwellings. These transitions altered family structures and reshaped local economies, fostering a move toward more 'independent living' (also pushed by the Indonesian Government's 'anti-longhouse' policies in the 1960s (King 1985)).

Livelihoods have long centred on dry and wet-rice swidden cultivation intercropped with vegetables for subsistence and local trade networks. Para rubber (*Hevea brasiliensis*) emerged in the early-1900s and became a main income-generating livelihood,

with many households integrating rubber into their swidden fields. Men often migrated out of the village for long periods in search of gutta-percha (wild rubber, *Palaquium gutta*), gaharu (agarwood, *Aquilaria malaccensis*), or timber in forests near and far (King 1985). Over the last several decades, households manage two or three cash crops to diversify their income and take advantage of boom prices, harvesting Para rubber, banana (*Musa* spp.), and more recently kratom (*Mitragyna speciosa*) to supplement household incomes.

While many wealthier households have ceased farming altogether, poorer households continue to cultivate their swidden plots. Among them, younger women—many of whom are married mothers—seek off-farm income to supplement farm-based livelihoods and improve their families' economic prospects. Off-farm wage labour is often viewed as a pathway to achieving livelihood aspirations, such as funding children's secondary education. Access to such opportunities, particularly those located outside the village, depends on the availability and use of motorised transportation. Many older women, who do not drive, rely on relatives or neighbours for transport to Langkang or more distant agricultural sites. Those with access to motorbikes enjoy greater mobility and broader opportunities for securing off-farm employment.

Among off-farm labour opportunities, productive EBN caves have provided profitable, albeit precarious, sources of income for the families of dozens of men employed to guard caves and harvested nests. Over the past decade, some of these workers have invested their earnings into constructing purpose-built EBN farmhouses (*rumah walet*), bringing swiftlets into the realm of domestication and gradually replacing cave work (see Dunphy et al. 2024). Women remain largely excluded from the extractive end of the EBN trade due to the physical risks as well as entrenched gender stereotypes and marginalisation. However, as the trade intensified, EBN cleaning factories emerged, employing younger, poorer women. In Nangah, four Dayak Taman women briefly worked in an EBN cleaning factory to supplement household incomes. Most were married, had school-aged children, and had husbands who previously worked in EBN caves upriver. None owned a *rumah walet*.

Kangan, Elvi, Patresia, Nadia, Feby and Veri all struggled with the difficult labour conditions of EBN cleaning while sustaining family needs and other livelihood activities. They worked for the cleaning factory owned by Jati, an unmarried 40-year-old Melayu man from Pontianak. Starting by selling goods on ferries, Jati built an EBN farmhouse near Pontianak before moving to Langkang in 2015 to deepen his involvement in the industry. After building farmhouses for others, he became a trader and, in 2019, opened a nest cleaning factory in a rented house (IDR 10 million per year). He now owns four EBN farmhouses, multiple properties across West Kalimantan, and a profitable nest cleaning business in Langkang. He hopes to expand the nest cleaning business.

Kangan, 34, from Nangah, has a 10-year-old child. Her husband, a plywood mill security guard, also undertook informal timber work and previously guarded EBN caves. She earns cash working on others' farms but rarely taps her rubber farm due to low prices. She decided not to open a swidden plot in 2021 to save for her son's school and rebuild their house, which had burned down in 2020. She tried working at an EBN cleaning factory in January 2023 but quit after three days.

Elvi, 36, from Nangah, has two children (five and 17-year-old daughter with a baby). She manages a swidden plot with occasional help from her husband. Together, they tend three rubber and kratom plots. Her husband, a former timber worker and EBN cave guard, spent years away. She briefly worked at a plywood factory before it closed and tried an EBN cleaning job in January 2023 but quit after two days.

Patresia, 35, from Nangah, lives with her husband, two children (eight and six), and parents. She manages a swidden plot with her parents and owns three hectares of rubber and kratom. Her husband, a security guard in Langkang, previously guarded EBN caves, returning home every 8–10 months. She tried working at an EBN cleaning factory in January 2023 but left after five days.

Nadia, 23, from Nangah and a neighbouring village, is single and childless. While studying at a vocational high school, she helps her parents in their swidden plot. She previously sorted wood at a plywood factory before it closed. In early 2022, she worked as an EBN cleaner for two months before leaving.

Feby, 24, a Melayu woman from a village outside Langkang, lives in shared housing there. She worked in a Pontianak steel factory before returning when her father fell ill. She started as an EBN cleaner in late 2020 and became a quasi-manager.

Veri's three children were 11 and 10 years old, and seven months. Her husband, a labourer, builds EBN farmhouses. She previously farmed kratom but began cleaning nests in early 2021 after her husband connected her with an EBN business owner. She continues cleaning the nests while managing household duties.

New sites of possibility? An EBN cleaning factory in Langkang

Rural men and women regularly pursue new income-generating opportunities in order to improve their livelihoods (Bennike, Rasmussen, and Nielsen 2020). In Kapuas Hulu, EBN trade has served as a key livelihood pathway for both poorer and wealthier men and their families since the early 1990s (Dunphy et al. 2024). Over the past decade, the trade has rapidly intensified with expanding markets and a growing number of *rumah walet* being built. As Jati noted, 'there are probably more than 500 *rumah walet* in Kapuas Hulu. Every year, more are built... The community never stops building; they collect their savings, build a *rumah walet*, collect their savings, build a *rumah walet*'. This dramatic expansion has transformed the rural landscape as more households redirect their savings and investments into the production and exchange of the nests. As a result, EBN cleaning factory labour has recently emerged as a dominant income earning opportunity for local households.

The intensification and commodification of the EBN trade has given rise to new labour regimes, as wealthy elites seek to profit from the commodity boom. Wealthier individuals, primarily men with minimal domestic responsibilities, often have greater mobility and access to opportunities, allowing them to capitalise on expanding commodity markets and cheaper labour in rural settings (Park and White 2017). The trajectory of EBN cleaning factory owner Jati exemplifies the shifting power dynamics and profit structures within the intensifying NTFP commodity market.

While uncleaned EBN can generate significant profits, clean nests increase the potential profit margins substantially (Dai et al. 2021). Jati negotiated his own salary by collecting payments from his buyer in Jakarta and paying as little as

possible to local EBN smallholders. This often resulted in a profit of IDR 500,000 per kilogram of nests. As EBN cultivation intensified, his buying power also improved: 'in 2017, I was buying 3-4 kilograms a month, now I buy up to 170 kilograms [per month]'. His income sometimes reached IDR 85 million (USD 5,200) per month, significantly higher than the monthly salary of a civil servant. This accumulation underscores the unequal distribution of wealth within the EBN value chain. While male traders like Jati benefit from the expansion of the trade, the labour-intensive and undervalued task of cleaning nests—performed by women—remains poorly remunerated.

Although different than the large, urban, industrial-style cleaning factories (Ong 1987; Wolf 1992), Jati's repurposing of a three-bedroom house into an EBN cleaning facility still reflects what Ong (1991, 279) described as 'new regimes of accumulation.' These small-scale operations blur the lines between domestic and industrial spaces, as women perform labour-intensive, repetitive tasks such as carefully removing debris from EBNs with tweezers (see Figure 2). This arrangement highlights the spatial intersection of informal labour, gendered workspaces, and shifting modes of production and social production within expanding commodity markets. Patresia explained the process:

The process starts from removing the coarse hairs to the fine hairs, then cleaning the black and red spots on the nests until they are clean, then cleaning them in water and brushing them with a toothbrush, then drying them and checking them again...[we use] tweezers ...[which] are like the tweezers used in hospitals, for plucking hairs [and dirt]



Figure 2. Three women clean nests in Langkang's EBN cleaning factory (© Mia Dunphy, 2022).

from nests, there is also a basin which is used to store water and as a container for brushing the nests with a toothbrush.

A 'woman's job'

All the nest cleaners in Jati's factory were young women between the ages of 18 and 35, many of whom had either never previously engaged in off-farm wage labour or had only recently entered it. Jati explained his hiring preference by stating that 'because the nests are soft, it must be done by a woman... [because] women's hands are soft.' He employed both married and unmarried women, though single women with fewer domestic responsibilities were preferred. This aligns with broader patterns in export-oriented industries, where employers often favour young, unmarried women without children to avoid the perceived burden of familial obligations (Kanji and Menon-Sen 2001). Women's ability to maintain off-farm employment is shaped by their capacity to balance productive and reproductive responsibilities during transitions to adulthood (Utomo 2012). Factors such as age, gender, ability, and marital status intersect to structure the conditions, perceived suitability, and social hierarchies of this labour (Kasmir 2019).

New workers were largely self-taught, with no assistance or compensation in the event of illness, 'there was no training; we started working right away. Nobody taught us [how to clean] ...it was difficult, and we didn't know how to do it' (Veri). To extract impurities and clean nests involved four processes including a rough feather removal, washing, brushing, drying, and another cleaning. It was often difficult work, as Nadia expressed, 'at first [the work] was difficult. I was often tired around my neck because you always look down like that, pinch pinch pinch. Then, after a long time, you get used to it.' The lack of training and assistance, alongside high expectations from the owner, meant that women struggled to meet demands. This increased precarities, ultimately deepening the feminisation of labour and impacting whether women pursued and sustained labour.

Uneven power relations between Jati and the cleaners created environments of surveillance and monitoring in the name of 'gendered efficiency'—similar to what Ong (1987) found for women working in electronics and textile factory work in Malaysia. Jati regularly inspected their work to ensure the cleaned nests met his standards. If the nests were below standard, workers were required to reclean the nests, as Nadia recounted: 'the boss checks [the nest], sometimes he says 'Oh, it's not clean yet, it needs to be cleaned again'. The nest cleaning process was complicated and slow resulting in tired bodies and little financial gain.

Women engaged in cleaning EBNs operated under conditions of informal labour marked by precarity, high expectations, and pressure. Lacking training or support, they relied on trial and error to perform delicate tasks, with any mistakes—such as breaking a nest—resulting in direct wage deductions. This system, combined with 'just-in-time' processing of large quantities of nests for transport to Pontianak, underscores the pressure placed on women cleaners, who negotiated the risks and consequences of the trade's demands with low, insecure pay. Feby explained, 'we have to hurry when washing so we can meet the deadline. We are told a few days in advance when the nests are sent [to Pontianak]'. To earn the highest possible

income for themselves and their families, the women had to clean the nests thoroughly and quickly without breaking or damaging them. For many, this was simply not viable.

Hunched over for hours examining the intricate nests, the women workers strained their eyes to ensure the removal of all the impurities. Younger women were perceived to be more ‘capable’ of carrying out this work; they could strain their eyes and pluck out dirt for longer periods (and perhaps more quickly) than their older counterparts, resulting in higher pay. Patresia worked at Jati’s facility for only five days because her eyes could not focus. Despite only being 35, she explained, ‘I’m old and can’t see clearly to clean the fine hairs on the nest, even when I use a lamp it’s dazzling because of the light.’ The struggle to meet the physical demands of cleaning nests reflects the broader structural pressures placed on workers in extractive industries, where precision tasks are essential to maintaining high profit margins but are not accompanied by adequate support or pay.

Women were perceived as biologically and psychologically better suited to the delicate, repetitive tasks involved in EBN cleaning. Their so-called nimble fingers and careful demeanour were frequently cited to justify their employment in this form of menial labour. Such gendered framings not only naturalised women’s roles in low-wage, detail-oriented work but also reinforced stereotypes that associate femininity with patience, precision, and subordination within labour hierarchies (Hecht 2007; Lundy 2012). Ultimately, this underscores how uneven processes of social reproduction sustain and perpetuate gendered divisions of labour (Mezzadri et al. 2024).

Income and uncertainty

Despite cleaners’ crucial contribution to the EBN commodity chain, their work was undervalued and underpaid. The fluctuating and complex nature of the payment system was deemed undesirable for many workers. Initially, cleaners were paid a daily wage of IDR 50,000 (USD 3.10), but this proved too expensive for Jati who sought to maximise profits. Feby explained that the payment mode changed from a wage to piece-rate work:

We were paid per day, then we were paid per nest, because there was a change in the method of washing...then the salary system changes to salary per 100 grams. The salary system changed three times.

Changing payment systems is a key aspect of the feminisation of labour (Kanji and Menon-Sen 2001); it creates ambiguous arrangements that easily manipulate workers and obscure rights (Hammer and Ness 2021). By the end of 2022, all the women’s salaries were based on the weight of nests. They were paid IDR 150,000 (USD 9.25) per 100 grams cleaned, roughly IDR 8,000 (USD 0.51) per nest.

Each worker received a ‘note’—a receipt as evidence—every week to calculate the daily weight of nests cleaned. The worker’s name and the date were written at the top, along with the type and weight of the nests cleaned (in grams). There are several nest grades, such as *kaki* (foot – nest part attached to the wall/cave), *opal* (oval shaped), *mangkok* (cupped), etc. Although these grades range in price, respondents noted that they were paid the same.

The nests were weighed before and after cleaning, with the latter informing the salary. Salary calculation was based on the net weight of the cleaned nests rather than their initial weight, with the weight difference recorded and confirmed by Jati. Many women, particularly newcomers, struggled to navigate this complex system, which often led to underpayment and wage disparities. Gendered power imbalances further discouraged women from raising concerns, making them more vulnerable to exploitation (Kanji and Menon-Sen 2001; Ong 1987).

The labour and pay were a disappointment for newer workers—'I wanted to cry all day, there was a continuous correction of the nest, and I could only clean one [nest per day]. When I would get home, I immediately lay down, I was tired, but I didn't give up' (Feby). After working at Jati's cleaning facility for a year, Feby and Veri could clean up to 200 grams per day. Jati claimed, 'if they are smart, they can get IDR 6 million per month...if they work in a [retail] shop, it's only 1 million.' However, most women rarely received more than a couple of million per month, an amount that did not cover the increasing cost of living, domestic responsibilities, and childcare. For single women like Feby and Nadia, the income *did* cover daily goods and even allowed her to 'go to the store, buy clothes, perfume and snacks, and...give some [money] to [her] parents.' Single women also had more independence with their time compared to those with productive and social reproductive roles (Wolf 1992). Women manage uneven double duties across gendered relations and responsibilities that vary along their life course. They may work outside the home to generate cash while also working inside the home to fulfil duties of household (re)production (Cantillon, Mackett, and Stevano 2023).

The cleaners pay was received fortnightly, either in cash or an online bank transfer (though many women did not have a bank account). Veri explained how the salaries fluctuated due to the piece-rate model: 'I once made up to 4 million per month and before that I also had 1.5 million rupiah, 2 million, 2.5 million to 3 million rupiah... [Feby] once earned up to 11 million rupiah [in one month] because she stayed at the factory, working from morning to morning again (24h) without sleeping.' Workers' labour was being 'squeezed to the last drop' (Trần 2008, 57). The more one worked, the more cash one received—meaning those with reproductive or domestic responsibilities earned less, as they were unable to work long hours. This payment model not only reinforced gendered inequalities and social differentiation but also incentivised extreme and unsustainable labour practices, prioritising productivity over workers' well-being (Pattenden 2023).

However, many workers from Nangah who eventually quit, did not receive their final payment. As Elvi explained, 'we didn't get paid. Jati was strict about wages. The three of us (Elvi, Kangan, Patresia) who worked there haven't received our wages for the past two months... We didn't ask for our wages; we just stopped working...we just quit.' Uneven gendered power and labour relations meant that women were often viewed as subordinate, so issues like a few days of pay could be brushed aside by male bosses (Caraway 2005; Wolf 1992). Lack of control over how and when women receive their income is a common feature of precarious feminised labour (Kanji and Menon-Sen 2001). Bosses often manipulate women's labour conditions and pay, regularly creating ambiguous cash exchanges for piece-meal factory labour (Wolf 1992; Hecht 2007).

Opting out of EBN cleaning

Factory owners who hire women for low-paid, precarious work often assume they will continue to labour despite receiving few social and financial benefits (Caraway 2005; Standing 1999). However, many women opt out of factory work when it fails to meet their needs or expectations (Hecht 2007). In the case of EBN cleaning, many women worked only briefly before seeking other sources of income. As Feby noted, 'there are [workers] who last four months, five months, some quit after one week and some after only three days'. Feminised casual wage labour is often viewed as subordinate, surplus, and replaceable (Trần 2008). Jati confirmed that young women contacted him every day to ask about work in his cleaning factory, only to leave a few days or weeks later. The high turnover of workers and constant labour circulation reflects a perpetuating cycle of instability and socio-economic inequality in contemporary Indonesia, where women are both expected—and expect—to be secondary earners in dual-income households (Utomo 2012; Ong 1987).

Recent hires earned roughly IDR 24,000 (USD 1.54) per day. This amount was not enough to satisfy transport costs and personal needs, particularly for those with children and household expenses. Kangan explained, '[cleaning] one nest is calculated at IDR 8,000, meaning that I can be paid IDR 24,000 a day... [which is] not enough because my [motorbike] petrol is IDR 12,000, my snacks are IDR 2,000, and the remaining IDR 10,000 is taken home [to pay for family needs]'. Therefore, nest cleaners had to balance commodified labour against reproductive and domestic work in the home. Many opted out of factory work because, as Elvi noted, they 'couldn't handle it...couldn't do it; it was too complicated'. Yet, some workers persisted, as Patresia explained: 'for those who are good at cleaning nests, [they can] usually clean 100 grams of nests in two days'. Nevertheless, for many women, the pay could not support their household needs and maintain social reproduction, rendering women's wages 'doubly low' (Pattenden 2023, 174).

Several women workers quit after only a few days, with Elvi noting: 'There were about five or six of us who quit because we couldn't handle it...I worked there for only two days. I wasn't capable. There were four cleaning processes, including rough feather removal, washing, brushing, drying, and another cleaning. I couldn't do it'. Many women expressed they were 'incapable' of working long, monotonous hours that strained their eyes, fingers, and backs.

Childcare and household responsibilities also played a role. Kangan noted that in addition to the difficult work, 'I needed to look after my child while my husband was working scraping wood...my husband had no problem with me working and stopping'. The three Nangah mothers, Patresia, Elvi and Kangan, began and opted out of Jati's factory at similar times. They discussed the work and capacities together, and with their husbands, to navigate the possibility and precarity of each decision and the implications it might have on themselves and their household. Patresia noted, 'those who are already married, the salary was not enough because we have many needs, but for those who are still not married it might be enough'.

Workers often decided that cleaning EBN was not worth their time and looked for work elsewhere. Notably, many women shifted from one precarious role to another in the absence of more secure work. As Kangan explained after she quit, 'I'll try to

find another job in a shop, at a palm oil plantation, or where there are job vacancies.' Although there were no oil palm plantations in the Nangah area yet, some men and women laboured on plantations located a few hours away and returned to Nangah on weekends. While trying and opting out of various employment opportunities did not necessarily offer these women more secure alternatives, it did allow them to exercise some agency in deciding where to allocate their labour (Hecht 2007).

Leaning on the farm

As livelihood portfolios expanded with increasing cash income choices, households balanced both farm and off-farm labour. Investing in multiple livelihoods activities differed from the past. As Kangan noted,

In the past, farming was the most important job, but nowadays there is a lot of work that can be done alongside the farm, especially now that you can farm while also working in shops and factories.

For many, land-based livelihoods remained an important buffer when navigating precarious off-farm labour conditions and shifting family needs (Akram-Lodhi et al. 2009). Access to land and related livelihood activities enabled households to take up additional off-farm work, such as EBN cleaning, during farming rest periods or to keep farming as a fallback option for the future. During boom periods, cash crops (e.g. kratom, banana, or rubber) offered profitable household incomes to supplement other livelihood strategies. While reliance on the farm helped buffer against some off-farm precarities, uncertain markets, land pressure, and weather fluctuations often introduced further instability for households. For some, the rapid and uneven swings in cash crop markets became a key driver in seeking out off-farm income streams. Livelihoods were messy, shifting between farm and off-farm activities.

When cash crop prices were high, women often reorganised other work tasks—both income-generating and domestic—to prioritise the most profitable activity, embodying what Zhu and Peluso (2021) describe as 'flexible labouring subjects'. Many households chose to keep the farm either as a fallback or to continue farming alongside other forms of work (Zhu and Peluso 2021). They were not wholly subsumed by factory labour practices but instead continuously navigated and renegotiated their roles across both domains. After opting out of factory work, Elvi decided to return to the farm to harvest and sell kratom closer to home:

I sold dried kratom [leaves] and I earned over IDR two million. There's no other work at the moment, just farming crops and rice. [While we farm] our older children take care of their younger siblings.

Whether at the forefront or in the background of women's everyday lives, farm-based livelihoods often served as a safety net and reflect a 'non-commodified subsistence guarantee' (Akram-Lodhi et al. 2009). Whether part of their own or family's land, farm-based activities partly 'decoupled' household livelihoods from depending on unsustainable and insecure off-farm work, such as EBN cleaning (Dove 2011). Although land-based activities were also uneven and insecure with no social or environmental protections, they were often familiar with seemingly known expectations and outcomes.

While some women in Nangah chose not to manage their own farm each year, many laboured in other farms as a viable alternative during uncertain times. Many women opted to partake in *bawa hari*, the act of labouring in other people's farms and fields for cash or reciprocal labour. *Bawa hari* offered daily wages (IDR 70,000-150,000) and was often more reliable and higher paid compared to the EBN factory. Women, like Kangan, supplemented household income with infrequent cash from *bawa hari*: 'the other day I got IDR 70,000 for a day's work in [someone else's] swidden field, that's higher than the income working nest cleaning.' Although a seemingly reliable option, those who sought to sell their labour had to constantly search for those who were willing to buy it, which often fluctuated with seasons and household economies (Li 2014).

Although neither option was necessarily secure, women sustained connections across farms and fields to help negotiate the less desirable aspects of nest cleaning work. Women who participated in both the wage economy and the agrarian economy complicates narratives of women being passive victims in uneven capitalist expansion. It also challenges trends of linear trajectories of de-agrarianisation as women helped maintain land-based livelihoods for both subsistence and cash income to better negotiate potential social and ecological risks.

Conclusion

This paper examined how young women in rural West Kalimantan navigate precarious, feminised labour in EBN cleaning factories amidst truncated agrarian change. EBN cleaning factories—once exclusive to urban areas—have created opportunities for young rural women seeking additional income to supplement diverse, albeit insecure, livelihood portfolios. Factory owners competing in global markets often rely on precarious feminised labour at the margins to avoid state regulation and maximise profits. We showed how women actively negotiate the possibilities of such precarious labour by persisting in or opting out of factory work in line with their physical, financial, and familial capabilities and needs.

EBN cleaning represents a precarious income pathway for rural women in Kapuas Hulu. Women navigate low pay, poor working conditions, and gendered expectations as they weigh the benefits and risks of factory work. These decisions are shaped by life stage, shifting household needs, uneven processes of social reproduction, and broader economic uncertainties. While younger women test the waters of off-farm employment, many households maintain their farms as part of diversified livelihood portfolios, enabling them to navigate—whether to a lesser or greater extent—the precarity of both off-farm and farm-based labour.

Agrarian change literature often describes linear 'farm to factory' transitions. In practice, however, such transitions are often truncated, as households continue to invest in both farm and off-farm work. These trajectories are sporadic and fluid. Though also insecure, farm-based livelihood options allow households with access to land to pursue new (factory) income opportunities, knowing they can fall back on the farm—whether through waged labour or managing their own land—if such work fails to meet their physical, financial, or familial needs.

Drawing on feminist political ecology, this paper has highlighted the intersections of gender, labour, and livelihood amid globalising forest commodity markets and shifting agrarian social relations. The experiences of young women engaging in rural factory work illustrate both the precarity of feminised labour and the continued importance of land-based livelihoods in household strategies. Our findings underscore the need for greater attention to how gendered labour dynamics shape economic transitions in agrarian contexts, as women navigate precarity amid uneven and truncated processes of agrarian change.

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No potential conflict of interest was reported by the author(s).

Human ethics and consent to participate

This study received and followed ethical protocols/permits from the University of Melbourne and Badan Riset dan Inovasi Nasional (BRIN – Indonesia's national researcher centre). All participants received a Plain Language Statement outlining the research, data, and privacy. They either read this themselves or had it verbally communicated. All participants provided consent (written or spoken).

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