CHAPTER I

Introduction

1.1 Background

The purpose of this research is to investigate a range of sustainable practices integral to black soldier fly (BSF) farming that ensure a minimal ecological footprint. This includes exploring the use of organic waste as feed for BSF larvae, which not only reduces landfill waste but also contributes to the principles of a circular economy. The research will also emphasize the broader implications for economic sustainability, including job creation and local economic enhancement while fostering social sustainability through equitable labor practices and community engagement (Ernest Emmanuel Odongo et al., 2024).

Additionally, this research assesses the scalability of BSF farming operations across various regions of Indonesia, considering the unique agricultural landscapes and socio-economic conditions in different areas. This entails a detailed analysis of regional demand for sustainable protein sources, potential market channels, and the identification of challenges such as regulatory hurdles and access to technology. Ultimately, the goal is to develop tailored strategies that encourage the growth of BSF farming, making it a viable and attractive alternative for diverse communities throughout the country.

Choosing to explore black soldier fly (BSF) farming and its sustainable practices is important due to the urgent need for effective waste management and food security solutions. As urbanization increases, repurposing organic waste is crucial for environmental sustainability. BSF larvae can convert waste into high-quality protein, addressing both waste issues and the demand for sustainable protein sources. This topic also emphasizes economic sustainability, highlighting job creation and local development, especially in Indonesia. Our approach will include a thorough literature review to identify gaps, followed by mixed methods research. We will conduct qualitative interviews with

farmers and stakeholders to gather insights, alongside quantitative surveys to assess market demand and consumer preferences. By analyzing regional conditions, we aim to tailor our findings to the specific challenges and opportunities in different areas of Indonesia. Ultimately, the goal is to present actionable strategies that promote the growth of BSF farming, benefiting diverse communities across the country.

Based on the Theory of Planned Behavior, behavioral intention is determined by three core components: attitude toward the behavior, subjective norms, and perceived behavioral control (Ajzen, 1991). In the context of innovative and sustainable products such as Black Soldier Fly (BSF)-based foods, knowledge acts as a critical cognitive precursor that influences consumer beliefs and evaluations. As demonstrated by Puiu et al. (2023), increased product-related knowledge enhances individuals' ability to assess product value, which in turn strengthens both attitude and intention. This process is closely tied to perceived usefulness, defined as the degree to which a person believes that using a product will improve their experience or outcomes (Davis, 1989). While initially conceptualized within the Technology Acceptance Model, perceived usefulness also fits within Theory of Planned Behavior as a cognitive belief that shapes attitude an individual's positive or negative evaluation of the product (Ajzen, 1991; Davis, 1989). Puiu et al. (2023) confirm that both knowledge and perceived usefulness significantly influence attitude, which ultimately drives purchase intention. Even when external social pressures are limited, consumers' intention to adopt novel products like BSF-based foods can be effectively predicted by internal cognitive evaluations and favorable attitudes. Thus, increasing public knowledge and emphasizing the usefulness of BSF products represent essential strategies to encourage sustainable consumption behavior.

The study conducted by Saraswati et al. (2025) on green design innovations within Indonesia's manufacturing sector underscores the significance of sustainable practices, which may be linked to the evaluation of market potential for the black soldier fly (BSF) industry. Given that BSF larvae are increasingly acknowledged for their capacity to convert organic waste into high-quality protein and mitigate environmental impacts, the integration of green design principles has the potential to

enhance the sustainability of BSF production processes. This synergy highlights the necessity for innovative methodologies across both sectors to advance environmental sustainability and economic viability, ultimately contributing to the establishment of a more sustainable food system.

The research regarding household solid waste management in Setia Asih Village reveals the potential for converting organic waste into valuable resources, such as organic liquid fertilizer, which aligns with the utilization of black soldier fly (BSF) larvae for waste transformation. Both studies reinforce the importance of sustainable practices; BSF larvae can effectively process organic waste, thereby reducing landfill reliance and producing protein-rich feed for livestock, subsequently boosting local agricultural productivity. Moreover, the implementation of a waste bank system in Setia Asih may facilitate a market for BSF products, as local farmers may seek alternative waste management solutions and nutrient sources for their small-scale farms, signifying an expanding market potential for BSF within the region (Widyaningsih and Sasaki, 2022).

The increasing awareness of food waste issues has led to innovative solutions, particularly among Gen Z entrepreneurs, who are exploring sustainable practices to address this challenge. One promising avenue is the utilization of the Black Soldier Fly (BSF) larvae, which can effectively convert organic waste into high-protein feed, thereby reducing food waste while creating a viable business opportunity. Evaluating the market potential for BSF not only aligns with the goals of reducing food waste but also supports sustainable agricultural practices, making it a compelling area for further research and investment (Widyaningsih et al., 2025).

1.2. Research Question

This study examines the perceived usefulness positively influence consumers' attitude toward BSF-based products in Indonesia by exploring key factors that knowledge, perceived usefulness, and attitude in shaping purchase intention, it seeks to answer:

1. Does consumer knowledge about BSF-based products positively influence attitudes toward these products?

2. Does perceived usefulness of BSF-based products positively influence consumer attitudes?
3. Does consumer attitude toward BSF-based products positively influence purchase intention?
4. Does attitude mediate the relationship between knowledge and purchase intention?
5. Does attitude mediate the relationship between perceived usefulness and purchase intention?

1.3. Research Objectives

The research aims to assess consumer acceptance of bsf-based products: the roles of knowledge, perceived usefulness, and attitude in shaping purchase intention.

1. To examine the effect of consumer knowledge on attitudes toward BSF-based products.
2. To evaluate the influence of perceived usefulness on consumer attitudes.
3. To analyze the impact of consumer attitude on purchase intention.
4. To investigate the mediating role of attitude in the relationship between knowledge and purchase intention.
5. To assess the mediating role of attitude in the relationship between perceived usefulness and purchase intention.

1.4 Significance of the Study

Consumer behavior plays a pivotal role in the success of any emerging agricultural innovation. While BSF products offer substantial benefits, including sustainability, cost efficiency, these advantages are meaningless without market adoption. By understanding consumer attitudes, companies and policymakers can develop effective awareness campaigns, adjust product presentation, and create strategies that align with consumer preferences, ultimately fostering wider acceptance of insect-based products in Indonesia. There are three main contributions of this research they are discussed below.

1. Practical Contribution

From a practical standpoint, the findings provide insights into consumer attitudes, knowledge, and purchase intentions toward BSF-based products. This benefits consumers by clarifying the perceived benefits and ecological value of sustainable alternatives, empowering more informed and responsible choices (Joshi & Rahman, 2015). For farmers and producers, the study highlights key factors that influence market acceptance, enabling them to tailor product development, marketing strategies, and educational outreach to better align with consumer expectations (Lin & Niu, 2018). Additionally, the study contributes to the environmental sector by promoting the adoption of waste-reducing, circular economy solutions—such as BSF-based feed and fertilizer—which support ecological sustainability and resource efficiency (van Huis, 2020).

2. Theoretical Contribution

Theoretically, this research enriches the body of knowledge within consumer behavior studies, particularly in the context of emerging sustainable innovations like BSF products. By integrating constructs such as ecological concern, innovation perception, and knowledge into the behavioral framework, the study extends the applicability of established models such as the Theory of Planned Behavior (Ajzen, 1991) to novel product categories. It also contributes to the growing literature on green consumption and sustainable product adoption, offering a foundation for future research on insect-based technologies and their acceptance in developing markets (Paul et al., 2016; Chen & Chang, 2012).

3. Policy Contribution

On a policy level, the study offers valuable input for government agencies and regulators in Indonesia seeking to promote sustainable agriculture and waste management practices. By identifying the psychological and informational drivers behind consumer acceptance, the

findings can inform public awareness campaigns, regulatory frameworks, and incentive programs that encourage the production and consumption of BSF products. This supports national goals related to food security, environmental protection, and circular economy development, aligning with Indonesia's broader sustainability agenda (FAO, 2013; Kementerian Lingkungan Hidup dan Kehutanan, 2021).

1.5. Scope of Research

This study focuses on Indonesian consumers, specifically analyzing awareness, acceptance, and willingness to purchase BSF-based products across different market segments. The research includes urban and rural consumer perspectives, identifying demographic patterns that shape attitudes toward insect-derived goods. Additionally, insights from businesses marketing BSF products will be reviewed to understand existing branding and outreach strategies.

Despite its broad approach, the study has several limitations. Cultural biases may influence food preferences, potentially restricting the generalizability of the findings. Additionally, since BSF-based products remain a niche market in Indonesia, consumer exposure to them is limited, which may affect survey responses. Furthermore, while the study can assess consumer interest and perceptions, actual purchasing behavior may be influenced by external factors such as price, availability, and accessibility. Another limitation is the lack of prior studies on this topic in Indonesia, which makes it challenging to compare findings or build on previous research within the local context. This scarcity of literature also highlights the need for further studies to validate the results and deepen the understanding of consumer acceptance of BSF products in Indonesia.