



## Design of Business Ecosystem Mapping in the Black Soldier Fly Industry of Bandung City

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**ABSTRACT:** BSF (Black Soldier Fly) maggot cultivation is an alternative organic waste management that is growing rapidly in the city of Bandung. This research aims to design a business ecosystem map for the BSF maggot cultivation industry in Bandung City. The method used is business ecosystem mapping with a qualitative approach modified by Zheng Ma.

The research results show that the BSF maggot cultivation industry in Bandung City has six main groups of actors, namely maggot producers, maggot consumers, maggot raw material suppliers, maggot cultivation equipment and technology suppliers, government, and research institutions. Interactions between actors are driven by shared values, such as sustainability, circular economy and economic value. External factors that influence the development of the BSF maggot cultivation industry in Bandung City are government policy (politics), market trends (economics), public awareness (social) and technological progress (technology).

Reconfiguration of the BSF maggot cultivation business ecosystem in Bandung City by incorporating elements of changes in external factors. The map of changes in the BSF maggot cultivation business ecosystem in the city of Bandung over the next 5 years includes: (1) increasing BSF maggot production to meet market demand, (2) developing new products and services based on BSF maggots, (3) increasing collaboration between actors, (4) strengthening human resource capacity, and (5) encouraging the development of environmentally friendly BSF maggot cultivation technology.

**KEYWORDS:** Black Soldier Fly, Maggot Cultivation, Business Ecosystem Mapping, Organic Waste Management, Circular Economy and Sustainability.

### INTRODUCTION

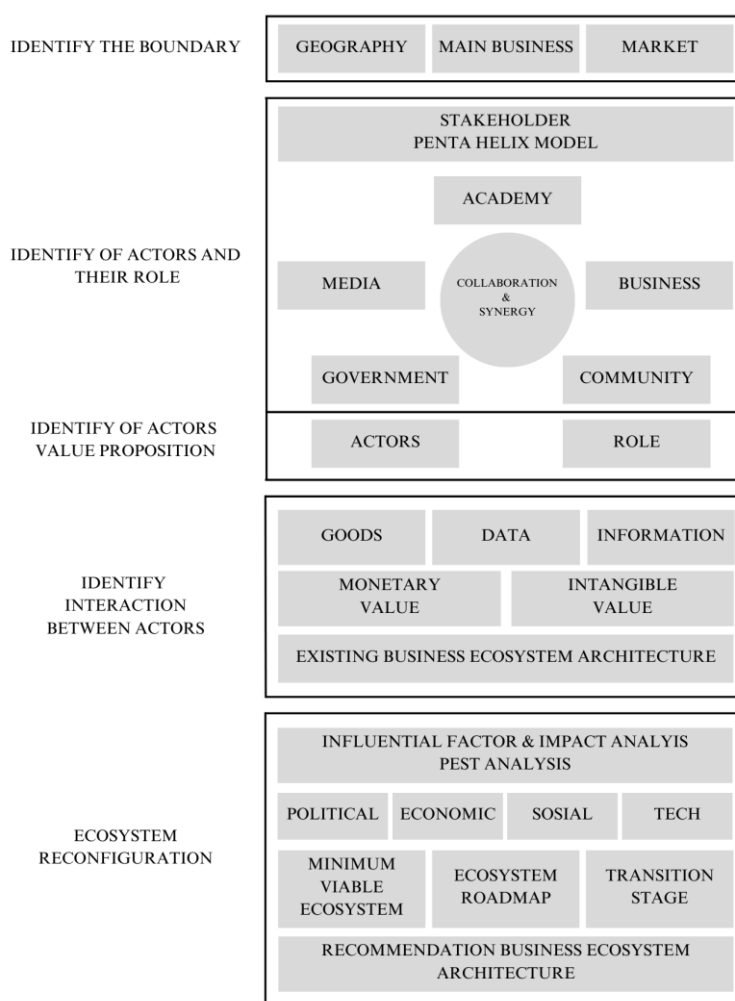
The burgeoning Black Soldier Fly (BSF) industry, particularly in urban centers like Bandung, Indonesia, presents a promising avenue for sustainable waste management and economic development. By converting organic waste into valuable products such as animal feed and organic fertilizer, BSF cultivation offers a circular economy solution that addresses pressing environmental challenges.

Bandung, like many urban areas, grapples with mounting organic waste. The cultivation of BSF has emerged as a viable solution due to its capacity to bioconvert organic matter efficiently. The growth of the BSF industry in Bandung is evidenced by the increasing number of cultivators, as highlighted by the Paguyuban Pembudidaya Maggot Nusantara (PPMN), a regional association of BSF cultivators. The PPMN plays a pivotal role in fostering knowledge exchange, promoting sustainable practices, and advocating for the industry's growth. While the BSF industry in Bandung holds significant potential, several challenges impede its full realization. These include:

1. Complex ecosystem: The industry involves a diverse range of stakeholders, from cultivators to end-users, each with unique interests and challenges.
2. External factors: Economic, environmental, and policy factors can significantly influence the industry's trajectory.
3. Lack of comprehensive understanding: There is a need for a deeper understanding of the interconnections between stakeholders and the broader ecosystem to identify opportunities and address challenges effectively.

**METHODS**

This study adopted a qualitative research approach to explore the business ecosystem of the Black Soldier Fly (BSF) industry in Bandung, Indonesia. Data were collected through in-depth interviews with key stakeholders, including government officials, BSF producers, consumers, academics, and community representatives. Purposive and snowball sampling techniques were employed to select participants who were considered knowledgeable about the BSF industry. Additionally, documentary analysis was conducted to gather supplementary information. Thematic analysis was applied to identify key themes and patterns within the collected data, allowing for a comprehensive understanding of the BSF business ecosystem. To map the ecosystem, a network analysis approach was utilized to visualize the relationships and interactions among different stakeholders.



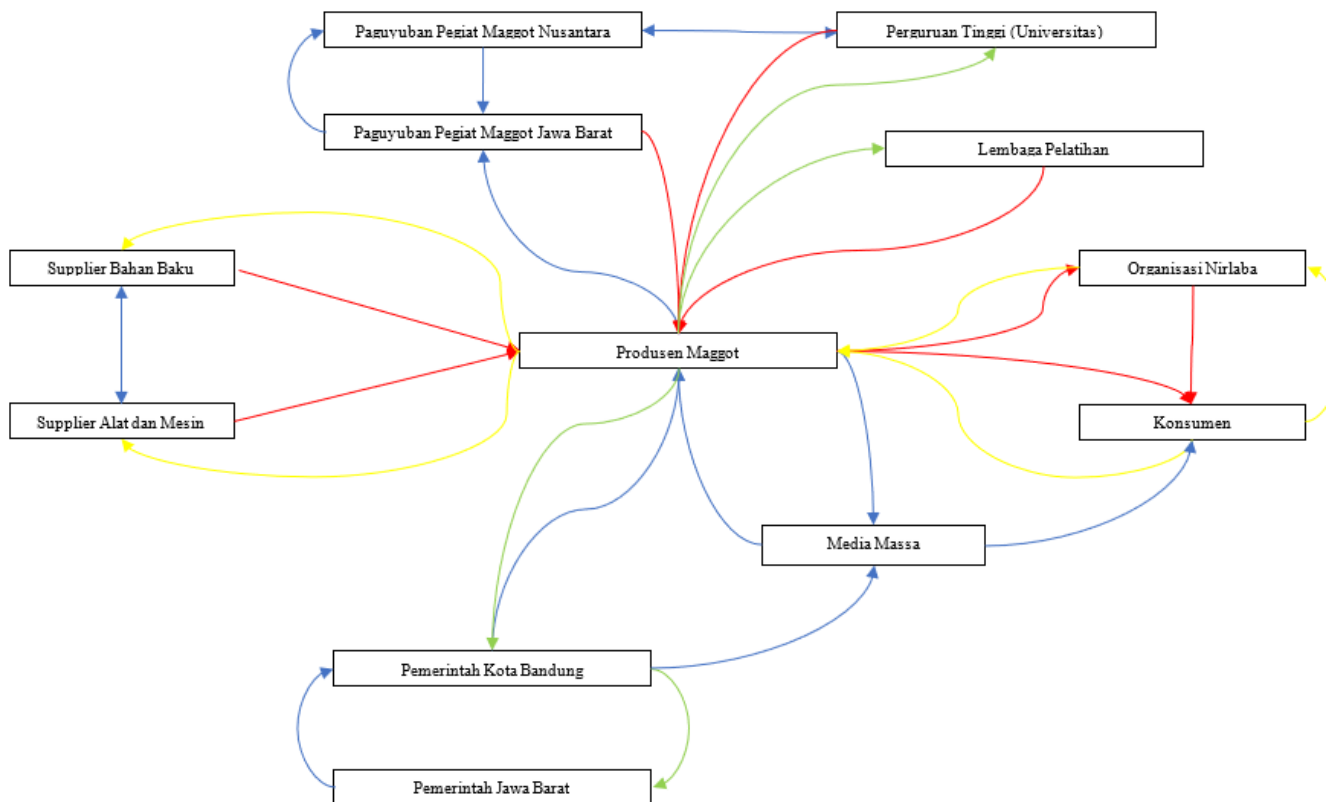
**Figure 1. Research Framework**

Business ecosystem mapping is a method used to understand, describe, and analyze the structure, dynamics, and complex interactions within a business ecosystem. This mapping process involves several key steps: (1) Defining Ecosystem Boundaries: Defining the scope of the ecosystem to be studied based on products, markets, or geographic regions. (2) Identifying Actors: Identifying all parties involved in the ecosystem, both primary actors and supporting actors. (3) Analyzing Roles and Value Propositions: Analyzing the roles of each actor and the value they offer to customers. (4) Mapping Interactions: Visualizing the relationships between actors using diagrams or networks. (5) Analyzing Ecosystem Dynamics: Analyzing changes and trends occurring within the ecosystem.

**RESULT AND DISCUSSIONS**

This study begins by attempting to comprehensively understand the boundaries of the Black Soldier Fly (BSF) business ecosystem in Bandung City. We identify three primary dimensions of these boundaries: (1) Geographical boundaries that define the physical area where BSF business activities take place, (2) Business boundaries encompassing the types of businesses related to BSF, and (3) Market boundaries referring to the market segments served by BSF businesses.

Furthermore, we map out the various actors involved in this ecosystem, including: (1) Academics who play a role in research and development, (2) Media that disseminate information, (3) Businesses operating in the BSF industry, (4) Government that formulates policies and regulations, and (5) Community members who are directly or indirectly involved in the ecosystem. Through in-depth interviews with these actors, we successfully identified the roles and positions of each as well as the interactions among them. The results of these interviews were then compiled into a BSF business ecosystem map that depicts the existing conditions.



**Figure 2. Existing Business Ecosystem Mapping**

The accompanying visual representation portrays the extant state of the Bandung BSF business ecosystem mapping. Within this established ecosystem mapping, the interactions and value propositions among the various stakeholders are discernible, each denoted by a distinct color.

Building upon the constructed ecosystem map, we undertook a reconfiguration endeavor to procure a more granular and precise depiction. This reconfiguration process entailed an analysis of the diverse types of interactions among the stakeholders, encompassing: (1) the exchange of goods (BSF products), (2) the exchange of data (BSF-pertinent information), (3) the exchange of information (knowledge and insights), (4) the flow of monetary transactions (business dealings), and (5) intangible values (reputation, trust). Consequently, we have successfully formulated a more comprehensive BSF business ecosystem map that graphically represents the dynamics inherent within the system. To refine the ecosystem map, we applied the Minimum Viable Ecosystem (MVE) concept in the reconfiguration. This MVE identifies the core elements that support value interactions among actors.



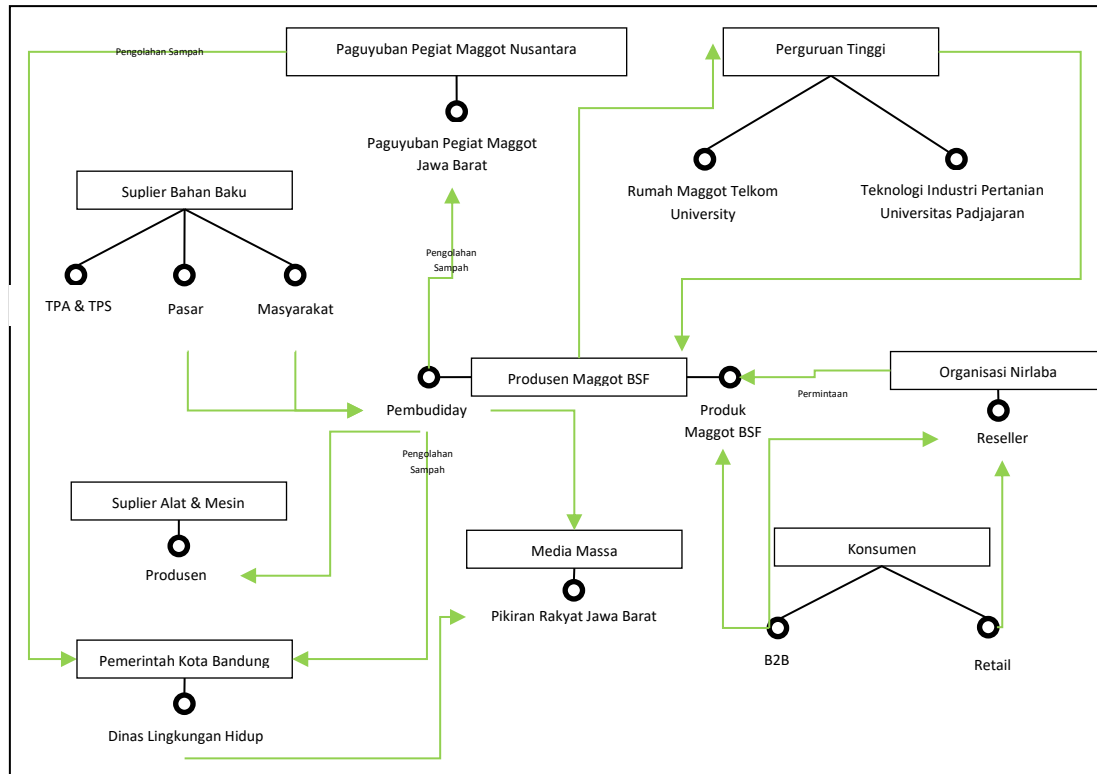


Figure 5. Data Flow in the Bandung City BSF Business Ecosystem

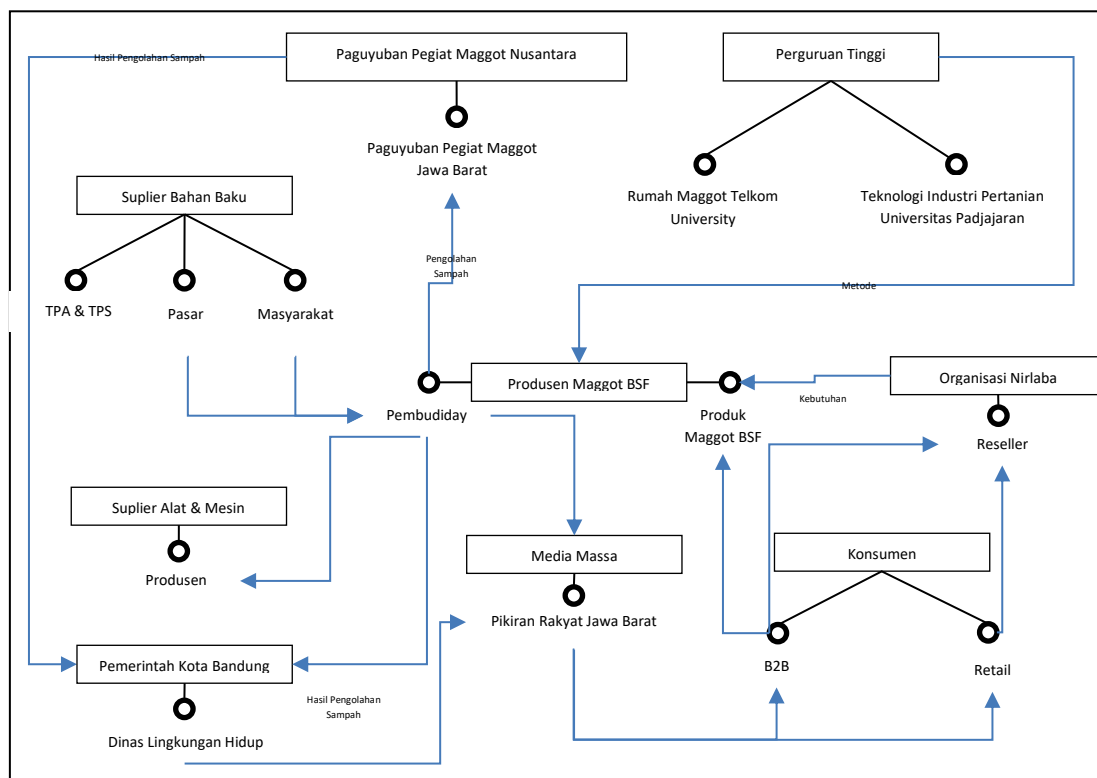


Figure 6. Information Flow in the Bandung City BSF Maggot Business

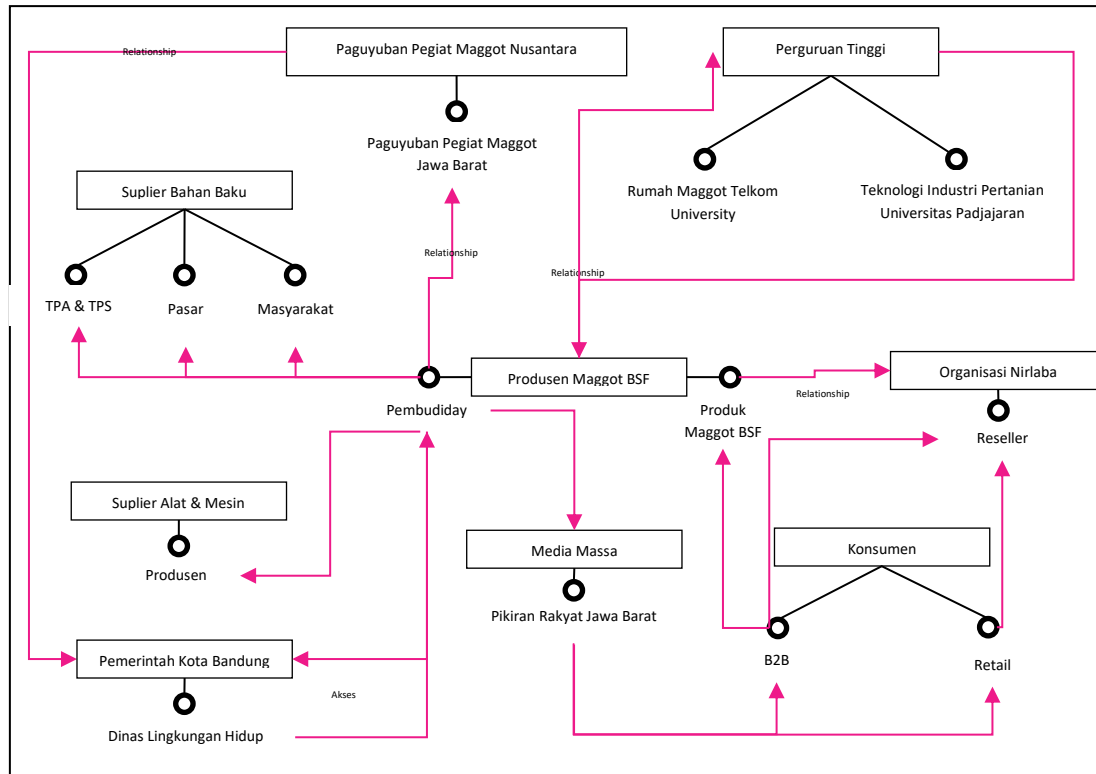


Figure 7. Intangible Interactions in the Maggot BSF Business Ecosystem in Bandung City

## CONCLUSION

The business ecosystem of Black Soldier Fly (BSF) maggot cultivation in Bandung City is a complex network of interconnected stakeholders and interactions. Our research identified six primary actors: maggot producers, consumers, raw material suppliers, technology providers, government, and research institutions. The ecosystem is driven by shared values of sustainability, circular economy, and economic value.

External factors, including government policies, market trends, public awareness, and technological advancements, significantly influence the industry's development. To navigate these factors and foster ecosystem growth, we propose a roadmap with three key stages:

1. Building Foundations (2024-2025): Focus on strengthening the industry's base through infrastructure development, capacity building, and policy support.
2. Reinforcing the Ecosystem (2026-2027): Increase production, expand markets, and enhance collaboration among stakeholders.
3. Maturity (2028): Promote BSF as a key industry in Bandung, supporting downstream product development, exports, and quality standards.

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