Value Chain Management of Orchid Businesses: A Case Study of the Indonesian Orchid Association of West Java

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ABSTRACT

The orchid business in West Java can not be separated from the active role of the Indonesian Orchid Association (IOA). Currently, orchid business actors in this province have faced production problems due to their inability to meet market needs, both in quantity and quality. This study aims to identify orchid value chain management in IOA of West Java. The data collection utilized purposive and snowball sampling techniques. The respondents in this study consisted of six breeders, six growers (two seedlers and four juveniles-adults growers), six traders, and two employees of the Department of Food Crops and Horticulture of West Java. The data obtained were mapped using Porter's value chain model. The research findings disclosed that the orchid value chain began with the procurement of inputs such as planting media, seeds, fertilizer, and pesticides. The production involved the in vitro production of plantlets using seeds obtained from crossbreeding and continued with plant enlargement. Adult and flowering plants were sold directly to consumers or through agents and traders. Two forms of governance existed within the orchid value chain. Market governance occurred between breeders and growers, growers and consumers, agents and traders, and traders and consumers. Whereas modular governance took place between breeders (imports) and industry, as well as the industry and agents. In conclusion, the value chain management of the IOA of West Java was not optimal due to the unimplemented application of tissue culture technology. Consequently, orchid production remained suboptimal and low level of orchid uniformity.

Keywords: Governance; IOA, Orchid; Value chain; West Java

INTRODUCTION

West Java is a province with the highest diversity of orchid species on the island of Java, Indonesia. A total of 642 orchid species have been thrived in this province (Comber, 1990). In 2021, West Java became Indonesia’s province with the most orchid production, specifically 4.84 million stalks (Rizaty, 2022). The central production areas of orchids in this province involve Bogor, Subang, Karawang, Sukabumi, and West Bandung Regencies (Department of Food Crops and Horticulture, 2022).
As Islam and Rahman (2013) mentioned, flower cultivation is a profitable agriculture business, offering greater potential for returns than other crops. In this regard, orchids emerge as one type of flower with high business potential. The orchid business is currently experiencing continued development, driven by rising market demand for potted plants and cut flowers. It is also supported by environmental conditions, such as landscape and climate conditions, and other factors, such as government support (Chowdhury & Khan, 2015; Hinsley et al., 2018). Two types of orchids most in demand worldwide, including in Indonesia, are Phalaenopsis sp. and Dendrobium sp. Both types of orchids are widely preferred due to their attractive shapes, colors, and patterns, which are the main attributes for consumers when selecting the type of orchids (Hinsley, Verissimo, & Roberts, 2015; Li et al., 2021; Williams, Gale, Hinsley, Gao, & St. John, 2018).

In developing agricultural businesses, the role of institutions is essential in enhancing farmers’ knowledge and skills, supporting material and financial resources, and strengthening the bargaining position through cooperation to improve farmers’ welfare (Setthachotsombut & Aunyawong, 2020). Agricultural business development will run effectively with the support of various stakeholders with their respective knowledge (Soonthornpipit, Kortana, & Aunyawong, 2020). One of the institutions engaged in the orchid business in West Java is the Indonesian Orchid Association (IOA), possessing goals to advance the orchid business and raise public awareness about preserving Indonesian orchids (Atnews.id, 2022).

The high diversity of orchid species, favorable environmental conditions, increased demand, and the existence of IOA offer opportunities for West Java to develop the orchid business. Despite its great business potential, the orchid business in this province still encounters various problems, such as inadequate production to meet market needs, indicated by the high dependence on imported seeds (Puspitasari, Nurmalina, Fariyanti, & Kiloes, 2018). In 2018–2019, the productivity of orchids in West Java was only 6.22 stalks per m², while in Banten Province, it reached 46.65 stalks per m² (Center for Agricultural Data and Information Systems Ministry of Agriculture Indonesia, 2020). In addition, the tissue culture technology has not been widely applied in Indonesia, including by business actors in IOA; most still utilize crossbreeding techniques by seed propagation.

Accordingly, efforts are required to support orchid business development in West Java. One of them is understanding all stages of business activities, starting from production to the creation of value-added products, known as the value chain (Timmer, Erumban, Los, Stehrer, & de Vries, 2014). Value chain analysis aims to determine the relationships between the actors involved, known as value chain governance (Gereffi & Lee, 2016). Based on this background, this study aims to identify the orchid value chain management of IOA of West Java.

**RESEARCH METHOD**

This research was carried out in the cities of Bandung and Cimahi and the regencies of Bandung, West Bandung, Sumedang, Subang, Pangandaran, and Bogor in West Java. A qualitative approach was adopted, aiming to understand a phenomenon holistically or generate a theory that can be tested deductively (Gehman et al., 2017). In this case, it concerns
orchid value chain management of IOA of West Java, especially for two types of orchids: *Phalaenopsis* sp. and *Dendrobium* sp. Primary data were collected through observation and interviews, while secondary data were obtained from the literature.

Purposive and snowball sampling techniques were employed. Purposive sampling involved selecting people subjectively by considering their ability to provide information to answer the research problems. Snowball sampling is sequential sampling where a group grows from one respondent to another to complete the information (Sharma, 2017). The respondents in this study consisted of business actors of IOA of West Java, including six breeders, six growers (two seedling growers and four juvenile-adult growers), and six traders. Data were also gathered from two employees of the Department of Food Crops and Horticulture of West Java.

The orchid value chain was analyzed by identifying the primary and supporting activities based on Porter’s value chain model (Porter, 1985). Primary activities are related to inbound logistics, operations, outbound logistics, marketing and sales, and service, while firm infrastructure, human resource management, technology development, and procurement are included in supporting activities (Porter, 1985). The information obtained was analyzed by mapping the processes and product flows and identifying the business actors and the value chain governance relationships.

RESULTS AND DISCUSSION

IOA of West Java was established in January 2022 and consisted of four branches: Bandung City, Bandung Regency, West Bandung Regency, and Sumedang Regency. Its roles are to provide information, be a means of socializing, and support the orchid business. Two marketing channels existed within IOA, differentiated based on the supplier and producer. The first marketing channel encompassed local breeders, growers (seedling, juvenile, and adult-flowering), and consumers, while the second one consisted of importers, industries, agents, traders, and consumers.

Orchid Value Chain Mapping

Primary activities contribute directly to the added value of a product or service while supporting activities assist the running of a business (Smidt & Jokonya, 2022). Figure 1 displays the value chain model of the orchid business of IOA of West Java.

**Inbound Logistics**

Inbound logistics activities involved the receiving, storing, and distribution of raw materials. Small-scale growers obtained seeds in plantlets produced in vitro from crossbreeding seeds. Each bottle contained 20 plantlets. The sales price ranged from IDR 60,000 to IDR 80,000 per bottle for *Phalaenopsis* sp. and IDR 30,000 to IDR 35,000 per bottle for *Dendrobium* sp. The seed was distributed using expeditionary services.
Industries and large-scale farmers obtained orchid seeds from tissue culture in the form of seedlings originating from imports, specifically from Taiwan and Thailand. They preferred to use a ship rather than a plane due to the lower costs despite the greater risk of damage and death caused by a longer journey.

Other raw materials required were pots, planting media such as kadaka root (black mosses) and sphagnum mosses (white mosses), fertilizers, pesticides, fungicides, and bactericides. The findings of this study align with Hotrawaisaya, Chandraprakaikul, and Suthikarnarunai (2014), stating that orchid production could be supported by industries providing essential supplies such as seeds, fertilizers, pesticides, packaging, and equipment.

**Operations**

The orchid operation has been associated with plantlet production and plant enlargement activities, as portrayed in Figure 2. Plantlets are seeds produced aseptically under controlled environmental conditions. The process of plantlet production is known as in vitro culture (Utami & Hariyanto, 2019). Several studies have highlighted the effectiveness of in vitro culture in growing orchid seeds, such as *Cymbidium* sp., *Phalaenopsis* sp., *Dendrobium* sp., *Oncidium* sp., *Dactylorhiza* sp., and *Calanthe* alliance. The success of in vitro culture could be affected by seed maturity and conditions of culture, including culture media (Bae, Oh, & Kim, 2015; Bezerra, Gabriel, Mariano, & Cardoso, 2019; Gao et al., 2020; Kanchanapoom, Anuphan, & Pansiri, 2014; Ram et al., 2016; Teixeira da Silva, Winarto, Dobranszki, Cardoso, & Zeng, 2016).

The plantlet production consisted of several steps. It began with washing the orchid fruits and bringing them into the inoculation cabinet. The fruits were sterilized by dipping them in alcohol. Furthermore, the fruits were placed on a petri dish using tweezers and then split using a sterile scalpel. The seeds inside the fruits were employed as explants and spread on the culture medium in bottles. Other studies explained that various types of explants could
be utilized in addition to seeds, for example, leaf segments or tissue (Datta, Zahara, Boonkorkaew, & Mishra, 2018), callus and protocorm-like bodies (Niknejad, Kadir, & Kadzimin, 2011), flower stalk nodes (Balilashaki & Ghasemi Ghehsareh, 2016), and flower stalks (Chung et al., 2016).

Murashige and Skoog (MS) emerged as one of the most commonly adopted media for in vitro culture. This medium culture is usually added with organic supplements, which are effective in enhancing the growth and development of plant tissue. Some organic supplements could be utilized, such as apple juice, tomato juice, tryptone, peptone, coconut water, banana homogenate, potato homogenate, corn extract, yeast extract, casein hydrolysate (Gupta, 2016; Kaur & Bhutani, 2016; Prando, Chiavazza, Faggio, & Contessa, 2014; Zhang, Lee, Deng, & Zhao, 2013), and almond milk (Calevo et al., 2022). In this research, orchid breeders of IOA of West Java employed potatoes, coconut water, and bananas as organic supplements. After spreading the seeds, the bottles were immediately closed and sealed to prevent contamination. During the process of growing seeds into plantlets, several subcultures were carried out.
Subculture refers to the replanting process to provide space for the plants to grow. The whole plantlet production took 9 to 12 months.

After having complete organs, the plantlets entered the acclimatization stage—the process of adjusting the plant to a new environment. The plantlets were removed from the bottle using a wire with a bent tip until the roots were released from the agar medium. Subsequently, the plantlets were washed until the roots were clean to prevent root rot. Furthermore, the plantlets were soaked in fungicide for 15 minutes and continued with air-dried on newspapers. The drained seeds were ready to be moved into pots containing media. Growers usually utilized kadaka root or sphagnum moss as the culture medium for plantlets. As mentioned by Utami and Hariyanto (2019), the culture medium suitable for planting the plantlets includes coal pieces, tree fern roots, and sphagnum moss with a composition 1:1:1 ratio.

As illustrated in Figure 2, plant enlargement consists of several stages: seedling, juvenile, adult, and flowering. Each stage took 4 to 6 months. During the enlargement, plant maintenance was carried out by watering, fertilizing, and handling pests and diseases using fungicides, insecticides, and bactericides. The maintenance has been considered a suitable environment to optimize the growing. Each type of orchid needs different growing conditions. Biswas, Pal, and Kalaivanan (2021) asserted that Phalaenopsis sp. needs 60% shading, while Dendrobium sp. only requires 30% shading. In addition, humidity levels have been considered crucial factors that must be controlled. Generally, orchids require 60% to 80% humidity. When the size of the plant increased, the plant was transferred to a larger pot, and the planting medium was replaced if the pH of the medium was acidic. During repotting, all the old potting material should be removed from the plant, and the dead roots trimmed before repotting the plant (Biswas et al., 2021). In short, the operation of the orchid business in West Java aligns with the research of Havardi-Burger, Mempel, and Bitsch (2020), revealing the value chain stages of flowering potted plants, encompassing breeding, propagation, young plants, potted plants, and distribution.

**Outbound Logistics**

Ready-to-sell orchid plants were packaged using cardboard or wooden frames filled with newspapers or dacrons. In the plantlet packaging, bubble wrap was added to prevent the bottles from breaking during distribution. The products were distributed using expedition services or directly picked up by consumers. However, when the products were in bulk, the industry or agents picked them up directly by truck.

**Marketing and Sales**

Local breeders and growers performed either offline or online orchid marketing and sales. Offline marketing was conducted by selling at exhibitions, shops, or facilities provided by IOA of West Java. Figure 3 portrays an orchid market held by IOA every Sunday on Merak Street in Bandung City. The members could sell various products involving orchid plants, equipment, and supporting materials such as planting media, fertilizers, and pots.
FIGURE 3. ORCHID MARKETING AND SALES (A) ORCHID MARKET ON MERAK STREET, BANDUNG CITY (B) ORCHID EXHIBITION

Typically, an agent system was adopted for the industry’s sales operations. Hence, it was not directly sold to the end consumer. Agents acted as distributors, marketing orchids to retailers and florists. Collaboration between industry and agents took the form of a contract or productive debt; thus, agents who sold and distributed products must pay up to a certain period. This finding aligns with the research conducted by Waluyo (2021), which stated that the marketing channels of orchids involved multiple institutions, such as wholesalers and retailers. Additionally, direct sales from farmers to consumers have become a common practice in the orchid business.

The marketing strategy was put into action using social media, such as making posts on WhatsApp, Facebook, and Instagram. The marketing strategy was also carried out by looking at the season, such as during Eid, when the demand for white-colored *Phalaenopsis* sp. increased rapidly, while during Chinese New Year, red and purple orchids became the most sought-after orchids. Some sellers preferred using paid advertisements on social media to expand the market reach following the desired consumer criteria.

Compared to growers’ marketing, the industry’s marketing and selling of orchids resulted in more profits. This situation arose because the industry sold in bulk to agents all the time, but growers did not have permanent consumers. It is in accordance with a study by Novita, Satriawan, and Yuwiritin (2016), showcasing that farmers would be more profitable if selling their products to collectors than directly to consumers because collectors make purchases continuously, while consumers only occasionally.

Service

One service offered by business actors in IOA of West Java was education to both consumers and members regarding orchid care. Education was carried out directly at the time of purchase or through the IOA WhatsApp group. Currently, IOA has opened an orchid training class, allowing orchid enthusiasts to learn more. Collaborating with academics to become speakers was another common practice for IOA. Occasionally, business actors in IOA opened internship opportunities for students.
Procurement

Bottles, media such as agar-agar, MS nutritional fertilizer, activated charcoal, sugar, and organic supplements such as potatoes, coconut water, and bananas were all part of the input procurement activities for plantlet production. Meanwhile, production machines and equipment employed included stoves, pots, autoclaves, inoculation cabinets, tweezers, scalpels, petri dishes, and burners. The procurement of machines and equipment was carried out at the beginning of the business. It was purchased when it was damaged or required additional production. Another input was the mother plants, purchased if the mother plants die or if they want to produce other varieties.

The inputs in growing orchids encompassed plantlets or seedlings, pots, kadaka roots or sphagnum moss, fertilizers, pesticides (fungicides, insecticides, and bactericides), and other media (coconut fiber, ferns, and charcoal), adjusting the availability and ease of obtaining them in their respective areas. The procurement of inputs was carried out routinely during enlargement. Shen, Liao, and Huang (2018) asserted that sphagnum moss has become the most commonly applied growing medium in pots because of its ability to store water and nutrients and its high level of plasticity, making it easy to use for potting plantlets. Several materials were commonly employed and mixed to support orchid growth, such as bark (50%), coconut fiber (15%), perlite (20%), vermiculite (10%), and sphagnum moss (5%). Nevertheless, several growers in West Java preferred kadaka root as an alternative to sphagnum moss due to its affordable price despite having a lower quality.

Technology Development

Plantlet production was carried out using in vitro culture with crossbreed seeds. Various factors could affect the success of seed germination in vitro culture, such as the types of culture media (Atnews.id, 2022; Hossain & Dey, 2013; Vudala & Ribas, 2017), carbohydrates (Huh et al., 2016), organic amendments (Zeng et al., 2014), and maturity of the seed (Udomdee, Wen, Lee, Chin, & Chen, 2014). The use of seeds as explants in vitro culture has resulted in orchids with low uniformity and were ineffective for large-scale production, hindering their ability to meet the standards required for industrial or export purposes. As Khatun, Nath, and Rahman (2020) emphasized, uniformity in flower characteristics is crucial for commercialization. A high level of uniformity could be achieved by applying tissue culture with a maximum variation of 10%. However, limited capital has prevented business actors in IOA from applying tissue culture. Similarly, Jouzi et al. (2017) have highlighted that the lack of technology has become a challenge for small-scale farmers, alongside other issues such as limited access to markets and capital.

On a large-scale business, the growing and caring for orchids has been supported by the use of technology such as fans, mixing machines, and orchid sliding racks, as illustrated in Figure 4. Fans were utilized to boost air circulation, especially in greenhouses with insect nets. The mixing machine was applied to mix fertilizers, and the orchid rack was deployed to maximize land use because it was equipped with a slider for shifting.
Human Resource Management

In small-scale orchid businesses, plantlet production and plant enlargement were performed without workers and taken in private residences. In contrast, medium to large-scale businesses were assisted by several workers such as gardeners and marketers. Gardeners had a responsibility to care for the orchid, involving receiving the plants, watering, fertilizing, and handling pests and diseases, while marketers were in charge of promoting and managing buying and selling transactions. Gardeners and marketers worked from morning to evening for 8 to 9 hours each day. The salary given ranged from IDR 1.6 million to IDR 4 million. Meanwhile, bonuses were given to workers every time the sales were good.

Firm Infrastructure

Financial records in small-scale orchid businesses were often incomplete, while larger-scale businesses have implemented proper bookkeeping and financial analysis. Unfortunately, not all business actors had a business license to run their businesses, especially in small-scale or household businesses. Several obstacles observed in this research were limited funds, difficulty in correspondence, a lack of knowledge, and low interest. Mardikaningsih and Arifin (2021) also stated that lots of small-scale businesses did not have business legality due to their low level of education and interest. In fact, company legality is a crucial element that provides legal protection benefits, becomes a means of promotion, and makes it easier for companies to obtain projects or develop their businesses because it can be trusted and accounted for. However, there were also business actors who possessed a business license of a business identification number.

Governance Relationships of the Orchid Value Chain

Figure 5 displays two marketing channels in IOA of West Java. The value chain governance relationship between breeders and growers was market-oriented. Market governance is primarily characterized by a low coordination relationship between consumers
and suppliers, causing market activities to occur freely depending on market preferences (Zylberberg, 2013). Growers looked for breeders providing certain varieties based on quality and low prices. This form of governance also occurred between agents and traders, growers and consumers, as well as between traders and consumers.

![Figure 5. Value Chain Governance Relationship (A) First Marketing Channel (B) Second Marketing Channel](image)

The relationship between breeders (imports) and industry, as well as industry and agents, was modular-oriented. According to Ponte, Kelling, Jespersen, and Kruijssen (2014), the characteristics of a modular governance relationship are that suppliers provide products according to specifications from consumers with full competence and technology from suppliers. The industry entered into contracts with seed suppliers and had the right to select the type of orchids to produce. The determination of the orchid type to be produced was made at least one year in advance. It was essential that suppliers could produce orchids through tissue culture according to the type desired in certain quantities. It aligns with the research of Hotrawaisaya et al. (2014), disclosing that information regarding the demand for orchid species received by breeders 1 to 2 years in advance could be the basis for production. Similarly, agents obtained supplies from the industry with agreed-upon quality and a low tendency to change partners, making it categorized as modular-oriented.

**CONCLUSION**

The research results revealed two activities of the orchid value chain in IOA of West Java. The primary activities consisted of inbound logistics concerning the receipt of raw materials (seeds, planting media, fertilizers, and pesticides), operations related to the plantlet production and plant enlargement, outbound logistics regarding the sales distribution of orchids using expedition services or trucks, marketing and sales through offline and online channels, and services carried out through education to consumers and members. Supporting activities encompassed procuring raw materials and tools, technology development using crossbreeding and in vitro culture, human resource management carried out without workers on a small-scale business or assisted by gardeners and marketers on a large-scale business, and firm infrastructure associated with simple financial records on a small-scale business and business licenses that all business actors did not own. The orchid value chain disclosed two forms of governance relationships. Market governance occurred between breeders and growers, growers and consumers, agents and traders, and traders and consumers, while modular governance took place between breeders (imports) and industry and industry and agents. In conclusion, the value chain management in IOA of West Java has not been optimal due to the unimplemented application of tissue culture technology.
This research provides insights for academics, business actors, and other parties regarding orchid value chain management. Another contribution is to provide input for business actors to optimize each stage of the value chain activities and prioritize the application of tissue culture in developing the orchid business in West Java.

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