

Challenges and transformation of orchid
smallholders in Taiwan

A Case of Chung-Hsin Orchid Nursery in Tainan region



Zhi-Shan Wang

Van Hall Larenstein University of Applied Sciences

The Netherland

5, October, 2019

Challenges and transformation of orchid smallholder in Taiwan

A Case of Chung-Hsin Orchid Nursery in Tainan region

A research project submitted to
Van Hall Larenstein University of Applied Sciences
in partial fulfilment of the requirements for
the degree of MSc in in Agricultural Production Chain Management,
specialization in Horticultural Chain

By
Zhi-Shan Wang
5, October, 2019

Copyright © 2019 by Zhi-Shan Wang
All rights reserved

ABSTRACT

Purpose: This research has been carried out in Tainan region, Taiwan, which is famous with sufficient diversity of orchids. After 2014, the figure of exporting Taiwanese orchid decreased gradually because of global competition. However, small-scale orchid growers still have maintained the same production mode for the past 30 years. The main objective of this research was to evaluate the performance of Chung-Hsin Orchid Nursery in order to make the organization viable for a small-scale orchid grower, Jing-Kai Yan, to link more firmly the markets and achieve sustainable development.

Methods: Both of qualitative and quantitative data were collected during research. Through literature review, research questions were set up based on Total Quality Management Theory. Data was analysed by chain map used to overview the orchid value chain, power and interest grid used to show the power and interest of the supporters, Business Canvas Model and PESTEC and SWOT used to analyse the challenges and opportunities.

Results: The results showed that there was unstable relationship between wholesalers and commissioner. At the same time, commissioner could not provide specific value to wholesalers comparing other competitors. It means Chung-Hsin Orchid Nursery has low competition.

Conclusions: Firstly, Chung-Hsin needs to decide which international market they want to provide so it is easier to predict the demands of market. After that, Chung-Hsin should concentrates to produce medium sized orchid mericlones which are the most profitable if taking consideration with profit, space and risks. During the cultivation, promoting a supervisor whose responsibility is recording the procedure and deal with question from international staff. So commissioner has spare time to formulate strategy and network with other orchid growers.

Key words: Total Quality Management; Value Chain; Orchid Smallholder; Mixed methods research.

ACKNOWLEDGEMENTS

I am thankful for people who help me a lot and support me to finish the thesis. Thanks for my supervisor always give me a lot of feedback which is not only improve my English skill but also leading my critical skill. Thanks for my friend, Andi, Hazel and Yi-Xia support me and share their idea and time to me. Thanks for my interviewees to trust me and agree with meeting. Thanks for my family to reply my call even at night. Without you, I can't pass by myself. Thank you for being my energy. Good luck for our future.

TABLE OF CONTENTS

ABSTRACT

ACKNOWLEDGEMENTS

List of Tables	4
List of Figures	5
List of Pictures	6
List of Abbreviations	7
1. INTRODUCTION	8
1.1 Research Justification	8
1.2 Background	8
1.3 Problem Statement	10
1.4 Problem Owner	10
1.5 Research Objective	10
1.6 Research Questions	10
2. LITERATURE REVIEW	12
2.1 Development of orchid industry in Taiwan	12
2.2 Cultivation methods of Phalaenopsis in Taiwan	12
2.3 Quality Management	13
2.4 TQM	14
2.5 Quality criteria of potted orchid	17
2.6 Analytical tools	17
3. RESEARCH METHODOLOGY	19
3.1 Description of Study Area	19
3.2 Research Design	20
3.3 Sampling Method	21
3.4 Data Collection	22
3.4.1 Desk study	22
3.4.2 Interview	22
3.4.3 Survey	23
3.4.4 Observation	23
3.5 Data Processing	23
3.6 Data Analysis	23
4. RESULTS	26
4.1 Weaknesses of commissioner's organization analysed by TQM theory	26

4.1.1	Customer involvement	26
4.1.2	Information and feedback	27
4.1.3	Leadership and training	27
4.1.4	Employees involvement	28
4.1.5	Process management	29
4.1.6	Supplier management	32
4.2	Opportunities of commissioner's organization	32
4.2.1	Value chain analysis	32
4.2.2	Stakeholder analysis	34
4.2.3	Business Canvas Model	35
4.2.4	SWOT Analysis and PESTEC Analysis.....	36
4.2.5	Cost benefit analysis.....	37
5.	DISCUSSION	38
5.1	Information gap between orchid growers and wholesalers.....	38
5.2	Unclear role in the market.....	38
5.3	Limited access of external information from stakeholders	38
5.4	High employee turnover in the future.....	38
5.5	Weakness in process management	38
5.6	Reflection on the research process and qualityCONCLUSION.....	40
6.	CONCLUSION	41
6.1	Weaknesses of commissioner's organization analysed by TQM theory	41
6.1.1	Customer involvement	41
6.1.2	Information and feedback	41
6.1.3	Leadership and training.....	41
6.1.4	Employees involvement	42
6.1.5	Process management	42
6.1.6	Supplier management	42
6.2	Opportunities of commissioner's organization	42
6.2.1	Position of small-scale orchid grower	42
6.2.2	Interest and power of small-scale orchid grower.....	42
6.2.3	Added value of Chung-Hsin to stakeholders	42
6.2.4	Opportunities and weakness of Chung-Hsin in the future.....	42
6.2.5	The decision of producing certain size of orchids	43
7.	RECOMMENDATIONS	4
7.1	Deciding the role in the market (From 1 to 2).....	44
7.2	Enhancing the stability of production (From 2 to 3)	44
7.3	Enhancing the activities of communication with growers (From 3 to 4).....	44

REFERENCES	45
APPENDIX	48
Appendix 1: The description and margin of different stage of orchids	50
Appendix 2: The questionnaire of Employees' satisfaction Survey	51
Appendix 3: Transcription of interview with Jing-Kai Yan (Commissioner)	53
Appendix 4: Transcription of interview with Mao-De Lin (grower)	54
Appendix 5: Transcription of interview with Jia-Zhong Chen (Supporter)	56
Appendix 6: Transcription of interview with Hong-Ming He (Input supplier)	57
Appendix 7: Transcription of interview with Jun-Bi Zeng (Supporter)	58
Appendix 8: Transcription of interview with Wan-Rong Zhang (Wholesaler)	59

List of Tables

Table 1. Criteria of optional condition in greenhouse

Table 2: Schedule of interviewing

Table 3: Research strategy of main question 1

Table 4: Research strategy of main question 2

Table 5: Business Canvas Model of Chung-Hsin Orchid Nursery

Table 6: SWOT/PESTEC matrix of Chung-Hsin Orchid Nursery

Table 7: Cost and benefit analysis of different size of mericlone orchids

List of Figures

Figure 1. Orchid supply chain in Taiwan

Figure 2. Conceptual Framework

Figure 3: Floor plan of Chung-Hsin Orchid Nursery

Figure 4: Research Framework

Figure 5: Employees' Satisfaction Survey

Figure 6. Orchid value chain in Taiwan

Figure 7: Stakeholder matrix of Chung-Hsin Orchid Nursery

Figure 8: Scaling up the position of Chung-Hsin Orchid Nursery

List of Pictures

Picture 1: Location of Chung-Hsin Orchid Nursery

Picture 2: Arrangement of orchids from Taiwan Sugar Corporation

Picture 3: Workplace for covering moss and changing pots

Picture 4: 18 orchid mericlone in one tray

Picture 5: Cultivation area of Medium-sized mericlones

Picture 6: Medium-sized mericlones with white dots

Picture 7: Procedure of foliar application of fertilizers

Picture 8: Wind flow in Taiwan Sugar Cooperation

Picture 9: Wind flow in Chung-Hsin Orchid Nursery

List of Abbreviations

SOP	Standard operating procedure
TOGA	Taiwan Orchid Growers Association
TQM	Total Quality Management Theory
TOP	Taiwan Orchid Plantation

1. INTRODUCTION

This first chapter will give the overview of orchid industry in Taiwan and then introduce the problem of commissioner, Jin-Kai Yan, who takes a main role in this research project. The research project will be introduced the following six paragraphs: justification, background, problem statement, objective and research questions.

1.1 Research Justification

The global orchid market is highly competitive. In 2015, it is first time that orchid production is more than demand (Chen, 2017). In 2017, the price is stable. However, in 2018, price decrease because of less quantity due to high temperature (Chen, 2017).

Most of Taiwan's orchid producers are small scale. In order to compete with competitors at global market, actors in orchid industry in Taiwan create a vertical chain of specialization, for instance, different size potted orchids and cut flowers of orchids. Because of current status of global market, if Taiwan orchid producers invest their money in expanding their scale of production, it may result in the lower market prices. So it is better for Taiwan producers to improve their quality management than enhancing yield.

In the existing literature, there is little literature focusing on improving orchid quality management for small and medium-scale producers in Taiwan. Only a few websites and newspapers make suggestions about how to improve orchid quality during production. However, in orchid producers' points of view, it is unfortunate that some suggestions are not inconsistent with existing facts. For example, an anonymous researcher(2012) suggests the tree bark for potting media instead of moss because lower shipping fee. However, the reason why growers use moss is decreasing the times of watering because high humidity will result in diseases and pest (Yan, 2017). Based on these reasons, the researcher expected that this thesis research would give a real insight into the orchid industry by applying techniques and data analysis and formulating recommendations which are helpful for commissioner, a small-scale Taiwan orchid producer.

1.2 Orchid cultivation in Taiwan

Orchids account for a large share of global floriculture trade, both as cut flowers and as potted plants, and are estimated to comprise around 10% share in international trade (COA, 2018). In 2012, there were more than 40 exporting and 60 importing orchid countries, around the world, and the total size of the global trade was US\$ 504 million (Chandra De, et al., 2015).

Orchid cultivation began in 1860 in Taiwan. The country has been described as the "Orchid Kingdom" (Li, et al., 2011), especially for the cultivation of *Phalaenopsis* orchid seedlings. According to 2016 data provided by TOGA (2016), the association for orchid growers in Tainan region, the total export value

of flower and plant exports from Taiwan was US\$181 million of which orchid exports accounted for \$172 million, equivalent to 92% of total flower and plant exports. In 2017, the total value of Phalaenopsis export was US\$128 million. Phalaenopsis makes up 68.5% of the country's total value of orchid export (Briercliffe, 2019). Japan and the United States are Taiwan's two main markets for the export of orchids, with the United States the bigger import country (TOGA, 2018). In terms of the type of orchid products exported, potted seedlings constitute 80% of the total Phalaenopsis flowers exported, small tissue cultures make up close to 20%, and fresh-cut orchids only about 1% (Hsin-I Hsiao, 2015).

The total number of Taiwan Phalaenopsis orchid growers in 2005 was 371, 264 small-scale producers (under 930 m²), 89 mid-sized producers (between 930 -1860 m²), and 18 large-scale producers (above 1860 m²) (Hsin-I Hsiao, 2015). The operation of orchid farms in Taiwan is tending to become larger in scale. In Taiwan, the structure of supply chain is vertical. First phase is breeder, second phase is growers and third phase is support industries such as delivering and marketing companies (Wu, 2004): (Lin, 2007) (Kuo, 2017)(See Figure 1.).

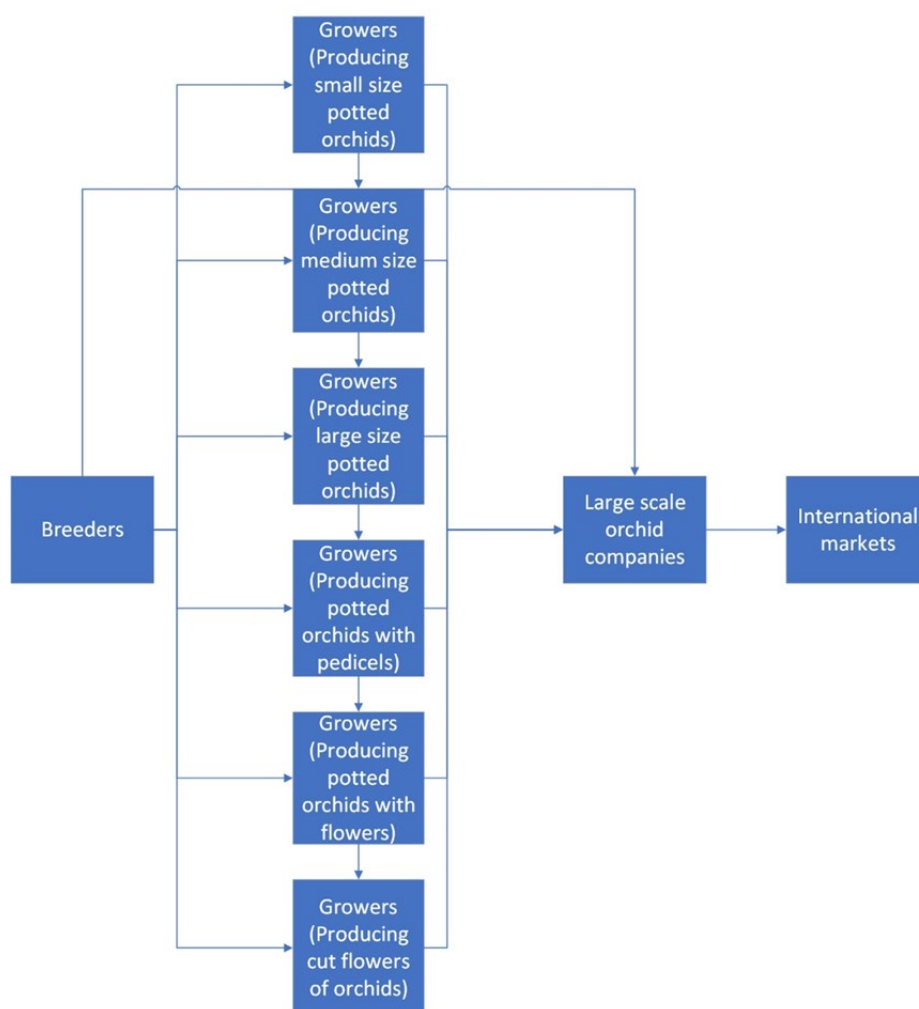


Figure 1. Orchid supply chain in Taiwan (Wu, 2004 ; Lin, 2007 ; Kuo, 2017)

However, the market prospect is getting dimmer and riskier due to the fiercer competition such as from the Netherlands, China and Vietnam which provide numerous and cheaper orchids (Chang & Wu, 2011).

1.3 Chung-Hsin Orchid Nurseries

The case study company, Chuan-Hsin Orchid Nursery in Tainan, Taiwan, was established in 1989. The commissioner, Jin-Kai Yan, is a typical small-scale producer. He inherited the nursery from his wife's father. He purchases the tissue culture seedlings from a breeding company and concentrates to produce medium size potted orchids. He also cooperates with large scale orchid company to export orchids to the United States. In five years, he expects to produce high consistency of potted orchid in order to get high margin with same production scale

1.3 Problem statement

The factors causing low margin for commissioner are categorized as low quality and low yield. Because the current trend is overproduction, it is high risks if commissioner expands the scale of nursery. Mr. Yan wants his medium size potted orchid to go to production seamlessly and release the rate of defects. Today commissioner has knowledge and stakeholder gap which result in low quality. For example, it is hard for him to produce orchid with uniform quality because of inappropriate SOP and limited market information. If he ignores this problem, competitors from national or global level will surpass him and win the orders from large scale orchid companies. He may loss customers which could result in lost revenue, lost business and further damage to his quality reputation.

1.4 Problem owner

The problem owner is the owner of Chung-Hsin Orchid Nursery, Mr. Jin-Kai Yan.

1.5 Research objective

To increase the margin for commissioner of Chung-Hsin Orchid Nursery in the future, by practical recommendations identifying practical ways for improving orchid quality during cultivation and by giving enhancing the interaction between commissioner and stakeholders that can be recommended to owner of Chung-Hsin Orchid Nursery.

1.6 Research questions

Main question 1: **What are weaknesses for commissioner's organization looking at six aspects of the TQM theory(customer involvement, information and feedback, leadership and training, employee involvement, process management and supplier management)?**

Main question 2: **What are opportunities for commissioner's organization?**

- 2.1 What is the position of small-scale orchid growers in the orchid value chain?
- 2.2 Who are the main stakeholders in the commissioner's orchid chain?
- 2.3 What kind of value does Chung-Hsin Orchid Nursery provide to its stakeholders?
- 2.4 What kind of strategy does Chung-Hsin Orchid Nursery have nowadays?
- 2.5 Which size of orchids is most profitable for Chung-Hsin Orchid Nursery?

2 LITERATURE REVIEW

This chapter is organized in three parts. The first part explains the development of orchid industry and current cultivation in Taiwan. The second one gives a theoretical background to the concept of Total Quality Management that is used to analyse six dimensions of Chung-Hsin Orchid Nursery. The third section explains the analytical tools which are utilised to analyse in result section of the thesis.

2.1 Development of orchid industry in Taiwan

In order to increase working efficiency and yield, Taiwan Sugar Corporation which is a state-owned enterprise in Taiwan, in 1990 set up criteria of potted orchid and the use moss as potting media which can keep water (Liu, 2005). Based on the successful business model of Taiwan Sugar Corporation, more and more people established their own orchid companies. Among these orchid companies, only large-scale orchid companies have capacities of developing new species and selling on the international market (Tsai, 2016). The small-medium scale orchids companies which cluster around in Tainan play a main role in orchid industry (Liu, 2005). The main reason is the typical structure of orchid industry because it cost at least 2 years to produce orchid. In other words, if someone produce orchid from cultivation seedling to plant with flowers, the cost and risk are high during producing and it may cause an operational dilemma. Taking into account the financial resource, it limited the scale of nursery scale. In order to get cheaper input, small or medium scale nurseries cooperate to buy together or even rely on big scale orchid companies to purchase what they need (Tsai, 2016). This pattern of mutualism is still used up to now.

Recently, the orchid market in Vietnam is growing up because of increasing income in Vietnam (Taiwan Trade Centre Ho Chi Minh City, 2013). Besides, Ben-Zhi Lai, a owner of Tai-Da orchid company, indicated that some big scale orchid companies which move to Vietnam because of appropriate climate, low labour cost and tariff discount (Lai, 2018). Small-medium scale growers have high possibility to be replaced by Vietnam growers on the global market if they do not produce more competitive orchid products.

2.2 Cultivation methods of Phalaenopsis in Taiwan

Orchid growers in Taiwan mostly use water moss as a cultivation media. Because the water moss easily becomes acidified, Phalaenopsis pots will be changed every five months during planting. Therefore, the cultivation stage of Phalaenopsis after removing from flask is often divided into three seedling stages. The first stage is a small seedling, which is planted in a soft pot of diameter of 4.5-6.0 cm after removing from flask. After 3-5 months, Phalaenopsis is switched to a soft pot of diameter of 7.5-8.5 cm and this stage is called medium seedling. After 3-5 months, Phalaenopsis is changed to a soft pot of diameter of 10.5 cm and this stage is called a large seedling. After about 3-5 months, the mature Phalaenopsis is removed to cool environment for flower induction and then blooming (Lin, et al., 2013).

The common system in greenhouse is semi-automation which can control external environmental factors (Chen, 2017). According to Chandra De, et al. (2015) the factors which have an influence on the commercial value of orchid during cultivation include humidity, light, temperature, atmosphere, pots and potting media, watering and nutrition, see table 1.

Table 1. Criteria of optional condition in greenhouse

Factors	Description
Humidity	70-75%
Light	1200-2000 foot candles of light intensity
Temperature	Day and night temperatures of 28-30°C and 23-25°C, respectively are essential for optimal flower production
Atmosphere	Enough internal air movement
Pots	Soft pots
Potting media	Moss
Watering	Water of pH 5.0-6.5
Nutrition	Concentration of 0.2 to 0.3% of 30:10:10 (N:P:K) at the vegetative stage

Source: (Kuo, 2017) (Chandra De, et al., 2015) (Chen, 2017)

2.3 Quality Management

Quality is total features and characteristics of a product or service that have its own ability to satisfy with certain people (Reeuwijk & Houba, 1998). In other words, it means that a product has good quality when it achieves the expectations of customers. There are a lot of researches about quality management. However, research of quality management is difficult to define at a single definition of product quality (Sousa & Voss, 2002). It means quality management has different meaning in different situations. In this case, orchid supply chain is driven based on customer demands so quality management means satisfied with individual consumer preferences. Through quality management, it may result in higher prices and in more satisfied consumers. If the savings are higher than the costs of these quality adaptations, the more profit can be gained (Sousa & Voss, 2002).

2.4. TQM

Total quality management is a theory to evaluate quality management. The factor according to the theory are as follows.

2.4.1 Customer involvement

To compare with other competitors in market, organizations need to provide high quality product

which is meet customer demands. When customers are satisfied with quality of product, they have high wiliness to return to original stores, while dissatisfied customers are more to go elsewhere (Nofal, et al., 2005). Without a unifying vision of customer needs, even the most talented teams earn only the small satisfaction of narrow competence, and the customer is lost (Chen, 2017).

2.4.2 Information and feedback

To get high quality of products, collecting and communicating external and internal information are important for all actors in the chain (Zhang, 1997). Both internal and external information are used to help an organization to make more effective business decisions. Internal data is information generated from within the business, covering areas such as operations, maintenance, personnel, and finance (Rundle, 2017). External data comes from the market, including customers and competitors (Rundle, 2017).

For example, the medium sized potted orchids which are produced by commissioner will be delivered to international market and then orchids are further grown by local orchid nurseries. Based on cooperative production, traceability of cultivation information is necessary and beneficial for actors who work in the chain. It can reduce the damage of orchid during cooperation.

2.4.3 Leadership and training

Leaders are responsible for establishing and communicating the vision and mission of the organization (Harris, 2012). Especially in small businesses, a proprietor of a small business company needs to be a leader and also manager to lead their team towards success (Mazzarol, 2003). Several results from reports mentioned that training is a key factor to improve continuously quality (Hansson and Klefsjo, 2003; Dale et al., 1997). Dale et al. (1997) indicated that training and development may improve employees' personal skills and then enhance the possibility for organizations to promote employees' commitment and let staff work better. Mendes (2012) mentioned that developing additional training seems to not only benefit employees' overall performance but also enhance the overall ability of organization

2.4.4 Employee involvement

Pun and Chin (1999) highlighted that the more organizations allow their employees to join initiatives, the more positive results they will receive, and the more profitable and competitive the organization will become, through higher employee satisfaction, and quality of life. O'Brien (1995) observe that higher productivity and efficiency may be reached through employees' empowerment. According to Dale et al. (1997), results suggest a positive correlation between high employee involvement and companies' productivity and long-term financial performance. Besterfield et al. (1999) highlighted that the core objective of TQM is to guarantee that every employee involves in customer-supplier relationships and his/her involvement is benefitable for quality improvement.

2.4.5 Process management

Process management adjusting processes to an organization's strategic goals, designing and implementing process architectures, establishing process measurement systems that align with organizational goals, and educating and organizing managers so that they will manage processes effectively. Managing by process is the key to engaging an organisation's employees to take responsibility for what they are doing in relation to satisfying the customers (Guimaraes and Armstrong, 1998). Appelbaum et al. (2000) mentioned that the process-based approach or managing by process improves customer focus and avoids the limitations of managing by vertical functions.

2.4.6 Supplier management

Supplier management is an important aspect of competitive manufacturing. The role of supplier management is highlighted by Szwejczewski et al. (2001) and they suggest that suppliers can make a significant contribution to the achievement of objectives .

2.4.7 Conceptual framework

According to literature review of six elements from TQM theory, researcher formulates indications of each dimensions.

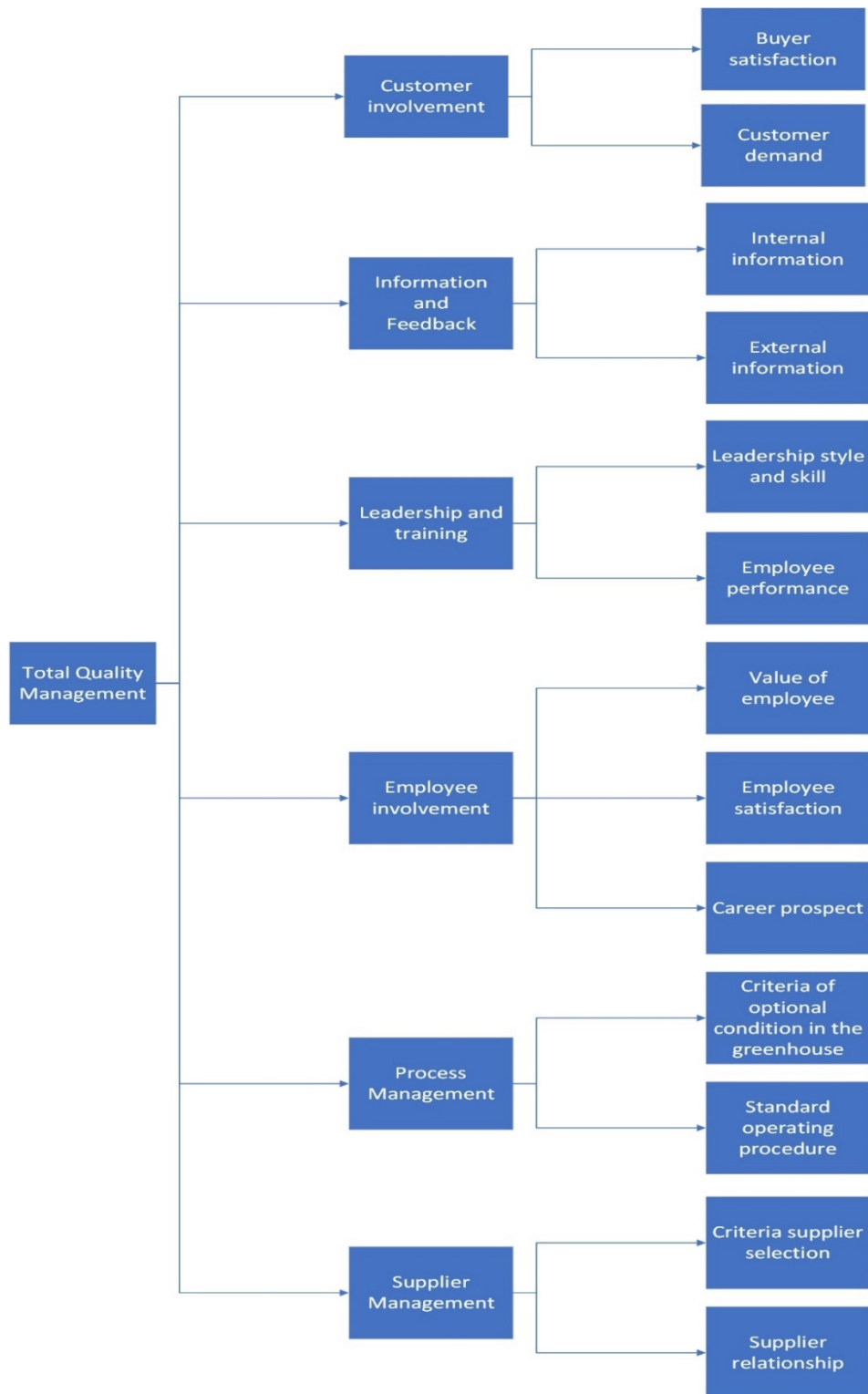


Figure 2. Conceptual Framework (Author, 2019)

2.5 Quality criteria of potted orchid

According to the criteria of potted orchid from Verenigins van Bloemenveihingen Netherlands, external quality of orchid includes:

1. Orchid pots are filled with 90% compost or substratum which should not be hang over any level as well.
2. Root ball have to meet the min water content.
3. In visual point of view, the orchid pot should be clean
4. The root of orchid can through the media and well root
5. Substratum be sufficiently moist
6. Visually free of animal or insect on the potted orchid and free of damage by animal or insect in plant
7. The orchid plant has good shape, standard colour, strong and straight stalk
8. The lot should be uniformly and correct graded, including:
 - Pot size
 - Plant height
 - Plant diameter
 - Thickness
 - Maturity
9. The potted orchid has to be correctly and uniformly packed
10. If add something in the potted orchid, the potted orchid needs to be labelled.

2.6 Analytical tools

This section introduces the analytical tools which would be applied in the thesis. Analytical tools include Value Chain Analysis, Stakeholder Analysis, Business Model Canvas and SWOT Analysis. Based on transcription, researcher formulated the chain map to give an overview of exist orchid field in Taiwan. To realize the position of actors, researcher used the stakeholder analysis and showed the figure. According to the CANVAS model, it shows the value of commissioner's organization while delivering their orchid. To develop strategies, researcher use SWOT Analysis and PESTEC Analysis to analyse the organizational and external factors which need to be taken into consideration.

2.6.1 Value Chain Analysis

The definition of value chain can be explained in a narrow and broad meaning. In the narrow meaning, a value chain includes the range of activities did within an organization. This include design phase, the process of buying input, the marketing activities and after-sale services etc. In the broad meaning, the activities of a value chain is done by several actors from a raw material through chain to a product for sale (M4P, 2003). The aim of value chain analysis is strengthening the linkages and interventions that improve the commissioner's opportunities. So researcher will analyse the impact of value chain from the point of view of commissioner.

2.6.2 Stakeholder Analysis

This analysis would be done with the stakeholder matrix which is created by Jeston and Neils (2006). The stakeholder matrix shows the power and interest of stakeholder in orchid chain. The stakeholder matrix also can help to find the key players who are necessary to keep in contact with in order to realize exist market information.

The Phalaenopsis supply chain in Taiwan can be divided into three stages: breeders, growers and support industries such as delivering and marketing (Lin & Chen, 2009). For breeders, their jobs include breeding, progeny identification, and bottle seedling production (Lin & Chen, 2009). To supply different size seedlings whole year, growers divide their works so each person can concentrate to produce certain size orchids in order to efficient work (Chen, 2017). However, the biggest challenge for vertical production is inconsistent quality because each outsourced orchid nursery has different equipment and management (Lin & Chen, 2009). For example, some growers have better cooling device in the greenhouse. When orchid seedlings move to other greenhouses without same scale cooling device, different environment can influence on growth of orchid seedlings. (Lin & Chen, 2009)

2.6.3 Business Model CANVAS

The Business Model Canvas is a strategic management tool to define and communicate a business idea which is integrated economic, environmental, and social dimension (Joycea & Paquinb, 2016). It is how companies create their own value for themselves while they deliver products or services to their customers (Joycea & Paquinb, 2016).

2.6.4 SWOT Analysis and PESTEC Analysis

SWOT framework can be categorized into internal and external factors from environment so SWOT analysis can be used as strategic analysis for organization (Pickton & Wright, 1998). Due to simplicity and practicality, SWOT analysis is used widely in strategic planning. However, the shortfalls of SWOT analysis are uncritical and non-rational. To avoid strategic error, Pickton and Wright proposed that people who use SWOT analysis need to consider the process value and output as well. To increase the efficient, PESTEC Analysis which can give systemic description of external factors is supported the “O” and “T” of SWOT. Based on the description from interviewees and other analysis, a matrix which linked between SWOT and PESTEC analysis were conducted for future developments.

2.6.4 Cost and Benefit Analysis

Cost and befit analysis is done based on literature review. Through the space, cost price and sell price, researcher will find which is the most profitable size of orchid for Chung-Hsin.

3 RESEARCH METHODOLOGY

This chapter introduces the study area and methods which be used during research. Both of qualitative and quantitative data were collected. Field work which was done by survey and checklist gave answers to sub-questions. The employees' satisfaction survey was done by 4 employees of Chung-Hsin Orchid Nursery with 10 well-structured questions which evaluated the performance of the organization. During interview with 6 actors, each actor would be asked according to the questions on the checklist which guide the discussion. Interviews were also performed in order to triangulation of the opinions from different actors in orchid chain.

3.1 Description of Study Area

Chung-Hsin Orchid Nursery is located in Taiwan Orchid Plantation which matches ecological elements of orchid such as warm climate and adequate sunlight in Tainan city (Taiwan orchid plantation, 2019). Altitude of Taiwan Orchid Plantation is around 27 meters(Google earth). Comparing with the other production area like central and western Taiwan, Taiwan Orchid Plantation can decrease the usage of energy to heat during night (Mao-De Lin, 2019). Nowadays, the amount of orchid nurseries are 82 in Taiwan Orchid Plantation. Among of them, there are around 20 large-scale orchid companies which act both of growers and wholesalers.



Picture 1: Location of Chung-Hsin Orchid Nursery (Google map and google earth, 2019)

Comparing other competitors in Taiwan Orchid Plantation, Chung-Hsin Orchid Nursery is categorised into small-scale orchid company whose greenhouse is only occupied 662 square meters. The greenhouse has already gotten the certification of exporting the United State. This

certification means orchid nursery can exports orchid seedlings with moss which can decreases effectively attrition rate during delivering (Yao et. al, 2015). The nursery can produces 30,000 medium-sized potted orchid seedlings every year (Jing-Kai Yan, 2019). In the nursery, there are two greenhouses, one precooling room, one workspace, one office, one storage room (see figure 3). Four employees and Mr. Yan are main labour to operate the nursery.

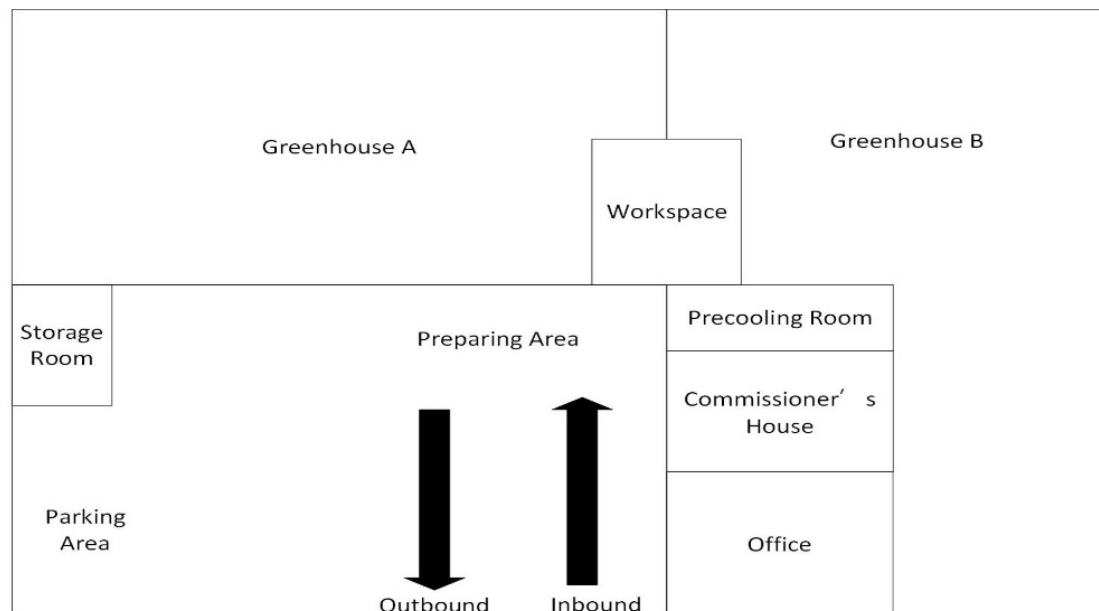


Figure 3: Floor plan of Chung-Hsin Orchid Nursery (Author, 2019)

3.2 Research Design

After contacting the commissioner, Mr. Yan, researcher formulated the problem statement of Chung-Hsin Orchid Nursery. According to the problem statement, researcher started to do desk study which gives an overview of orchid field and chose the relative concepts to analyse as well. The research had both qualitative and quantitative method to collect data. For qualitative data, researcher used checklist during interview. For quantitative data, researcher collected the opinions of the amount of employees through satisfaction questionnaire. The following figure 4 shows how the steps process during research. Researcher used the theory of total quality management, which includes the nine common elements which are concluded by Sousa and Voss (2002), because there is a substantial agreement among the instruments used. These nine elements include product design, supplier management, process management, customer involvement, employee involvement, committed leadership, training, strategic planning, information and feedback (Sousa and Voss, 2002). There is some limitation for the research so researcher adapted to six dimensions to evaluate current situation. Researcher excluded current product design and strategic planning because of convention which means that growers use certain size plant with certain pot and commercial confidential respectively. Otherwise, commissioner is the one who lead organization and train employees, so researcher merged committed leadership and training and then researcher evaluated six dimensions, which include customer involvement,

information and feedback, leadership and training, employee involvement, process management and supplier management, to evaluate current quality management system of Chung-Hsin Orchid Nursery in Taiwan. Finally, researcher drew a value chain of commissioner's orchid business and then formulated the recommendations based on six dimension of total quality management.

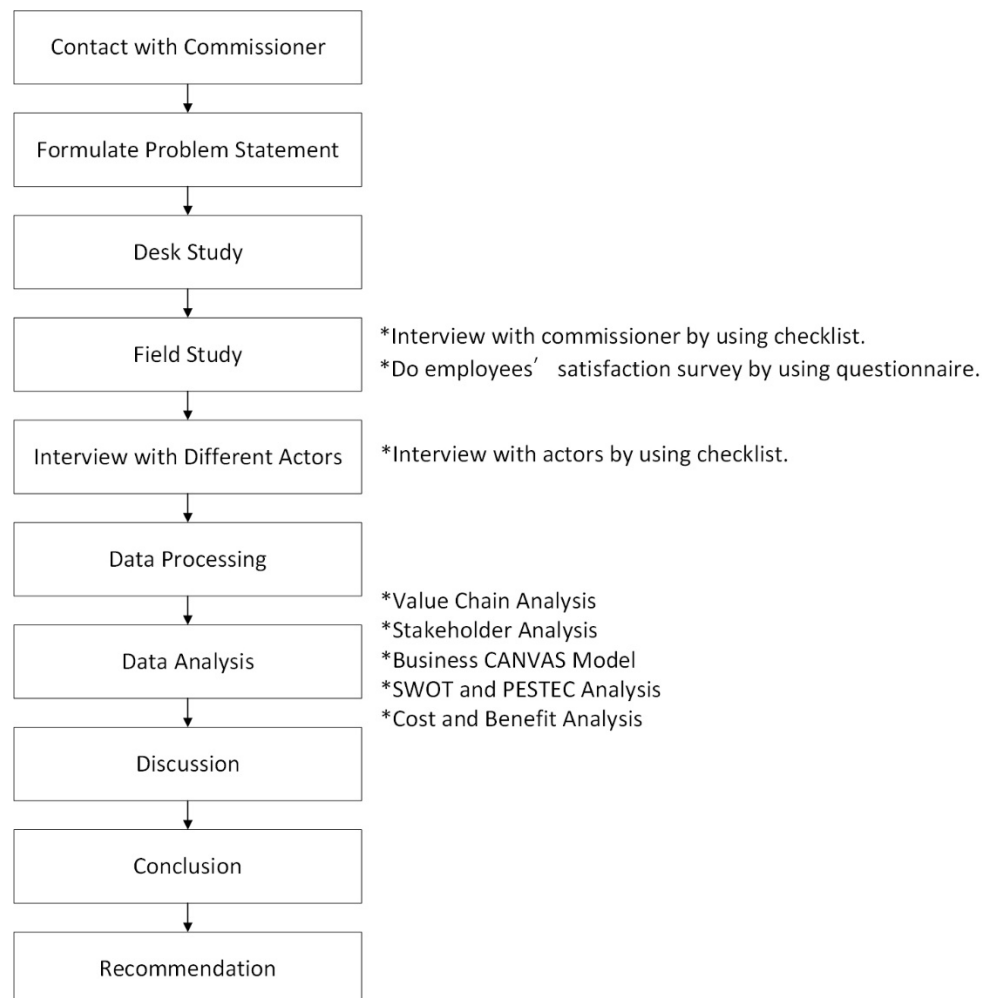


Figure 4: Research Framework (Author, 2019)

3.3 Sampling Method

In this research, commissioner was selected because researcher want to understand the orchid business management of smallholder. Mr. Yan has ten year's experience of growing orchid. According to the pattern of small-sized grower, he has to know deeply every step between buying input and deliver outside.

However, Mr. Yan cannot reveal name list of his input suppliers and wholesalers because of confidentiality agreement. Therefore, researcher finds the biggest input supplier in Taiwan called Green Culture which is good at providing high quality orchids in flask. The owner of Green Culture

has ability to give an overview of orchid input supplier based on his experience. Secondly, researcher contacts with Wan-Rong Zhang from Taiwan Sugar Corporation, which has the first system to produce orchid in Taiwan, to realize their requests of seedlings. At the domestic market, researcher interview with Mao-De Lin, the owner of Long-Feng orchid nursery, to realize the procedure of supply. For two supporters, researcher interviews with professor Jia-Zhong Chen, from National Chung Hsing University, and secretary-general Jun-Bi Zeng, from Taiwan Orchid Growers Association.

Table 2: Schedule of interviewing

Date	Actor	Interviewee	Organization
7/8, 8/9	Orchid grower	Jing-Kai Yan	Chung-Hsin Orchid Nursery
7/14	Orchid grower	Mao-De Lin	Lung-Fen orchid nursery
7/18	Supporter	Jia-Zhong Chen	National Chung Hsing University
7/29	Input supplier	Hong-Ming He	Green Culture
7/31	Supporter	Jun-Bi Zeng	Taiwan Orchid Growers Association
8/7	Wholesaler	Wan-Rong Zhang	Taiwan Sugar Corporation

3.4 Data Collection

In this research, qualitative data is done by desk study and interview. The front approach provides an overview and general contest of previous orchid in Taiwan. The last method collects the opinion and experience from different actors in the chain. Quantitative data was collected from employees' satisfaction survey. During research, the data collection is done by three approach such as desk study, interview and questionnaire.

3.4.1 Desk Study

In the beginning, researcher use desk study to realize deeply the procedure of growing orchid in Taiwan such as different type of orchid seedlings. According to the literature, orchid production in Taiwan is scalized-production like a factory so researcher choose total quality management to analyse the operating conditions in Chung-Hsin Orchid Nursery. After collecting complete qualitative data, researcher will use value chain theory to analyse the exist orchid supply chain.

3.4.2 Interview

Through different interviews' opinions and experience, researcher can organize overview of exist

orchid supply chain in Taiwan and compare with the condition of Chung-Hsin Orchid Nursery. Semi-structured interview outline is set up based on research questions. During interview, researcher will use checklist to ask interviewees. Each interview would spend no more than one hour.

3.4.3 Survey

Researcher used questionnaire to do employees' satisfaction survey. The survey was conducted by researcher individually to find out what employees think of their organization. There are ten questions in the questionnaire whose answers are 5-point scale. Employees will do the test individually. The test of time would spend one minute. Researcher wants to know the employees' opinion about training, internal communication, identity, profession, independent, working time, goal, salaries, value and health protection.

3.4.4 Observation

To increase the diversity of knowledge acquisition, research observed the reality condition and compared with commissioner's opinion and conditions of production from other orchid nurseries.

3.5 Data Processing

Before interview, researcher asked the permission from interviewees to record by cell phone. After interview, researcher recorded and translated the transcription which was posted in Appendix.

For employees' satisfaction survey, researcher will give questionnaires to employees face-to-face and ask Mr. Yan to leave during the test. Researcher will expect testers can feel free to say their opinions. After finishing, researcher will withdraw the questionnaires by herself. The survey will not show employees' names on the questionnaire. Researcher will use SPSS to process figures and average score.

To complete the collected data, research added the notes based on observation during interviews and surveys.

3.6 Data Analysis

There are two section of main question. For the main question 1, the data is collected based on interviewees' opinion and then categorised into each sub-question. For the main question 2, the data is processed according to main question 1 and transcriptions. Main question 1 give an overview of orchid smallholder. Question 2 give an overview of orchid filed in Taiwan and compare with other stakeholders. The following tables shows how to process each sub-question with different tools.

Table 3: Research strategy of main question 1

Research Question	Stakeholder	Method of data collection	Tool for data collection
What is the large-scale orchid company performance on Chuan-Hsin Orchid Nursery?	<ul style="list-style-type: none"> Jing-Kai Yan (Commissioner) Wan-Rong Zhang (Wholesaler) Mao-De Lin (Orchid Grower) 	<p>Desk study</p> <p>Interview</p>	<p>Literature review</p> <p>Checklist</p> <p>Recording application</p>
What can commissioner do for managing (collect and deliver) information?	<ul style="list-style-type: none"> Jing-Kai Yan Jun-Bi Zeng (Supporter from TOGA) Jia-Zhong Chen (Supporter from NCHU) Mao-De Lin 	Interview	<p>Checklist</p> <p>Recording application</p>
Which level of the efficiency in Chuan-Hsin Orchid Nursery between leadership and training?	<ul style="list-style-type: none"> Jing-Kai Yan 4 Employees (from Chung-Hsin Orchid Nursery) 	<p>Interview</p> <p>Survey</p>	<p>Checklist</p> <p>Recording application</p> <p>Questionnaire</p>
What do employees of Chuan-Hsin Orchid Nursery think about involving organization?	<ul style="list-style-type: none"> 4 Employees (from Chung-Hsin Orchid Nursery) 	Survey	Questionnaire
What kind of improvement are possible during processing in Chuan-Hsin Orchid Nursery?	<ul style="list-style-type: none"> Jun-Bi Zeng Jia-Zhong Chen Mao-De Lin 	Interview	<p>Checklist</p> <p>Recording application</p> <p>Moisture meter</p> <p>Thermometer</p>
What is the value of input suppliers for commissioner?	<ul style="list-style-type: none"> Jing-Kai Yan Hong-Ming He 	Interview	<p>Checklist</p> <p>Recording application</p>

Table 4: Research strategy of main question 2

Research Question	Information resource	Method of data collection	Tool for data collection	Tool for data analysis
1. Who are influencers in orchid value chain in Taiwan?	<ul style="list-style-type: none"> Jing-Kai Yan Mao-De Lin Wan-Rong Zhang Jun-Bi Zeng Xin-Yin Zhao Jia-Zhong Chen Miki Smile Flower Shop(JP) Orchid Web(US) 	<p>Interview</p> <p>Desk study</p> <p>Website</p>	<p>Literature review</p> <p>Checklist</p> <p>Recording application</p>	Value chain map
2. Who are the main stakeholders in the commissioner's orchid chain?	<ul style="list-style-type: none"> Jing-Kai Yan 	Interview	<p>Checklist</p> <p>Recording application</p>	Stakeholder analysis
3. What kind of value does Chung-Hsin Orchid Nursery provide to its stakeholders?	<ul style="list-style-type: none"> Jing-Kai Yan 	Interview	<p>Checklist</p> <p>Recording application</p>	CANVAS
4. What kind of strategic planning does Chung-Hsin Orchid Nursery use nowadays?	<ul style="list-style-type: none"> Jing-Kai Yan Researcher observed 	Interview	<p>Checklist</p> <p>Recording application</p>	SWOT/PESTEC matrix
5. Which size of orchids is profitable for	<ul style="list-style-type: none"> Jun-Bi Zeng Wan-Rong Zhang 	<p>Interview</p> <p>Desk study</p>	<p>Literature review</p> <p>Checklist</p>	Cost and benefit analysis

Research Question	Information resource	Method of data collection	Tool for data collection	Tool for data analysis
Chung-Hsin Orchid Nursery?			Recording application	

4 RESULTS

This chapter presents the findings based on interviews, questionnaire and observation. First section introduces the findings based on TQM theory. Second section analyses the data is analysed by Chain map, Power Interest Grid, Business Canvas Model, PESTEC/SWOT analysis and Cost and Benefit analysis.

4.1 Weaknesses of commissioner's organization analysed by TQM theory

4.1.1 Customer involvement

In the interview's transcription, both the commissioner and Mao-De Lin, orchid grower from JIA, mention that wholesalers prefer to buy strong plants, free of insects and diseases. However, the standards are not uniform as they are changed by different people from quality control staff of the wholesalers. On the day of meeting the commissioner, he said that one of his wholesalers rejected his orchid because of red spiders on the orchid plants without any visual evidence.

Wan-Rong Zhang, production section supervisor from Taiwan Sugar Corporation, explained that his organization produced orchid mericlones by themselves but also purchase mericlones from other growers to cover the rest of orders. He said the criteria of purchase, for example V3 species medium sized orchid, include leaves distance 40 cm, leaf colour (dark green) , 5-7 roots and round root ball.



Picture 2. Arrangement of orchids from Taiwan Sugar Corporation (Author, 2019)

4.1.2 Information and feedback

In the internal organization, commissioner mentioned that because he is owner and also supervisor, he prefers to chat with employees face to face so he could control the procedure of working. In the greenhouse, there were some monitoring systems and sensors inside to monitor and control the environment temperature and light intensity. so commissioner could use his cell phone to check data.

Commissioner also said that he keeps in touch with other small-scale growers by social media every day in order to catch the latest market information and wholesalers' condition. Due to being a member of Taiwan Orchid Growers Association, commissioner does receive seasonal magazines which show statistic of orchid yield and the trends in global market. However, commissioner didn't show interest in communicating with orchid flask suppliers and wholesalers. Only during the international orchid exhibition, commissioner had opportunity to contact with international wholesalers.

Professor Jia-Zhong Chen said that he is the planner of anonymous orchid cooperation, which function is different from Taiwan Orchid Growers Association. This cooperation includes different position of small-scale farmers whose land size were lower than 2000 square meter. For instance, once the only one wholesaler receives an order. Other members in this cooperation have responsibilities to do their job based on their position such as producing orchids in flasks, small-sized orchid mericlones etc. The goal of this cooperation is exporting high quality orchid to the United States. After six years practice, this cooperation has a fixed local importer who sells orchid to supermarket in US. Each grower trusts each other so they shared internal information for stakeholder in their chain.

4.1.3 Leadership and training

Commissioner mentions that he collects all staff when they arrive and divides the jobs of that day every morning. He also writes down some details on the white board like the procedure of mixing fertilizer. Commissioner expresses that he tries to simplify the instructions for his employees so they could work fast and conveniently. Because of small-scale producing, the main goal of nursery is increasing tray turnover. According to the questionnaire, 3 out of 4 employees expressed that they are very satisfied with both the training they get and the internal communication and only one person feels satisfied instead of very satisfied. The performance shows positive average in

leadership and training.

4.1.4 Employee involvement

The four employees have a totally different opinion about salary (see Figure 5). Only one person scored very satisfied about the salary. Comparing with the 2019 statistics of Human Resource Agency, the average salary of Chung-Hsin Orchid Nursery in Tainan region is 705 euro which is just a little bit higher than the minimum wage, 650 euro. Employees were also asked about whether they feel they can work independent and self-conscious. Two persons scored very satisfied, the other two scored satisfied and ok (see Figure 5).

During communicating with employees, researcher finds that three out of four employees would sit on the chairs and change the moss from the potted orchids. This procedure takes long time on the chair by employees because they change one pot at once (see Picture 3).



Picture 3: Workplace for covering moss and changing pots (Author, 2019)

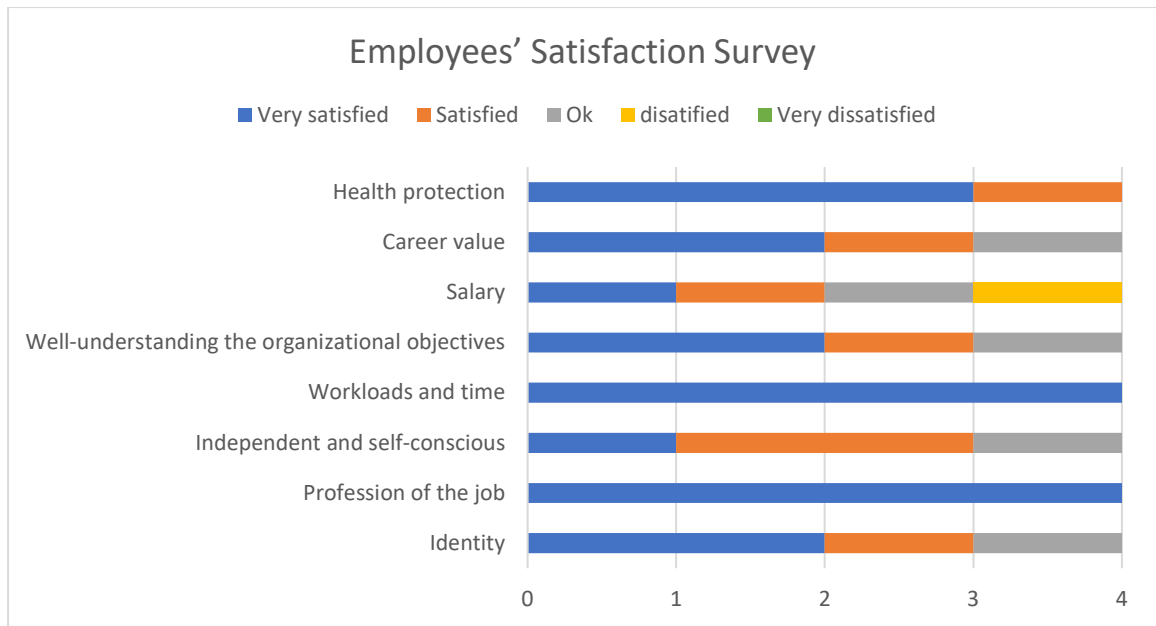


Figure 5: Employees' Satisfaction Survey (Author, 2019)

4.1.5 Process management

Commissioner mentions that main process management includes domestication (the process of bringing orchids under human control in order to accommodate themselves to the new environment), packaging moss, changing soft pot, guiding roots, cleaning the greenhouse. When input suppliers deliver orchid mericlones in flasks to greenhouse, staff will keep orchids in the greenhouse A for one week. After that, they will change to soft pots and cover moss in the stage of small-sized and medium-sized. During cultivation, staff guide the root into the moss in order to absorb sufficient nutrients. Staff also clean the greenhouse three times a week. This kind of process management is also mentioned by Mao-De Lin and Wan-Rong Zhang during interview. For the companies they have experience with

To work conveniently, commissioner puts 18 orchid mericlones in one tray (see Picture 4). Wind direction and the leaves of orchids are vertical. Because of limited space for each orchid mericlones, leaves of orchids in commissioner's greenhouse seems like misaligned compared to orchid seedling from Taiwan Sugar Corporation (see Picture 2 and 5).

During the observation of returned product from wholesalers, researcher found that one fourth of the orchid seedlings' roots are in the air (see Picture 4, red circles). Even some of the orchids have white pot on plants (see Picture 6) because of foliar application of fertilizers (see Picture 7). The white dots can be cleaned by water.



Picture 4: 18 orchid mericlone in one tray (Author, 2019)



Picture 5: Cultivation area of Medium-sized mericlones (Author, 2019)



Picture 6: Medium-sized mericlones with white dots (Author, 2019)



Picture 7: Procedure of foliar application of fertilizers (Author, 2019)

4.1.6 Supplier management

The criteria for choosing orchid flask suppliers include free disease, cheaper and good credit. Commissioner said that he trusts his input suppliers based on long term relationship. Once the input supplier broke the contract, it was hard for him to choose others.

4.2 Opportunities for commissioner's organization

4.2.1 Value Chain Analysis

The value chain map(see Figure 6) is drawn based on the transcription of the interviewees and desk study. The Taiwanese orchid industry has typical cooperation in producing stage because of limited space and long cultivation time of orchids (Xin-Yan Zhao, 2009). Jun-Bi Zeng from TOGA mentions that there are 50 wholesalers who focus on international market and 83 growers provide their orchids to these wholesalers. There are three supporters, TOGA, Taiwan Breeders Orchid Society and Floriculture Research Centre. Based on Jun-Bi Zeng's opinion, TOGA provides marketing service such as hosting orchid exhibition and match the wholesalers and local importers. They also publish seasonal magazine about orchid market information for their members.

The main responsibility of Taiwan Breeders Orchid Society is gathering with Taiwanese breeders because most of breeders are not full-time. They breed orchids because of interest. Floriculture Research Centre from government provide the technical support to growers.

However, there is limitation to get the sale price of wholesalers and importers. The price for medium-sized potted orchid growers are same if their orchids are sold to the US and Japan. If their orchids are sold in domestic market, the price is half of price in international markets.

Regarding information flow, the actors below the wholesalers but above input suppliers are difficult to get market information from. Both commissioner, Jing-Kai Yan, and Mao-De Lin, owner of Long-Feng Orchid Nursery, mention they prefer to keep contact with other growers in order to get first hand information but they are not quite sure what the demands of final consumers are.

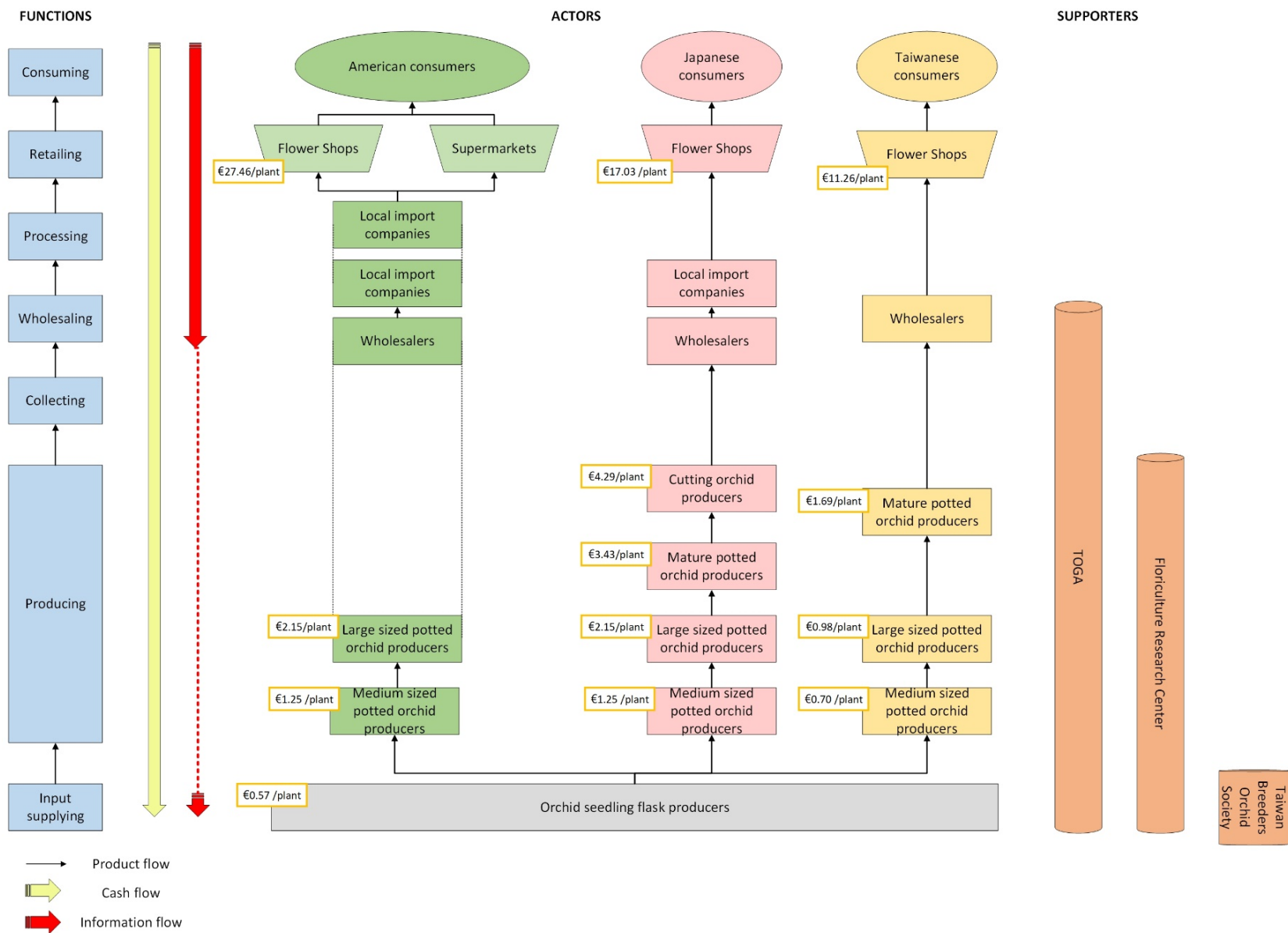


Figure 6. Orchid value chain in Taiwan (Chun-Guang Hu, 1996; Chin-Mao Chen, 2006; Shi-Xian Chen, 2006; Shu-Min Chang, 2006; Xin-Yan Zhao, 2009 (Appendix 1); Interviewees Jia-Zhong Chen, Hong-Ming He, Jun-Bi Zeng and Wan-Rong Zhang, 2019)

4.2.2 Stakeholder Analysis

Figure 7, the stakeholder matrix based on findings, shows that final consumers, flower shops, importer companies, wholesalers and producers of orchid seedling in flask are key player in orchid supply chain. However, producers, including Chung-Hsin and its competitors, TOGA and breeders just show their consideration because of low risk comparing with key players. Although producers have more risk than TOGA and breeders, they don't have power to negotiate with wholesalers.

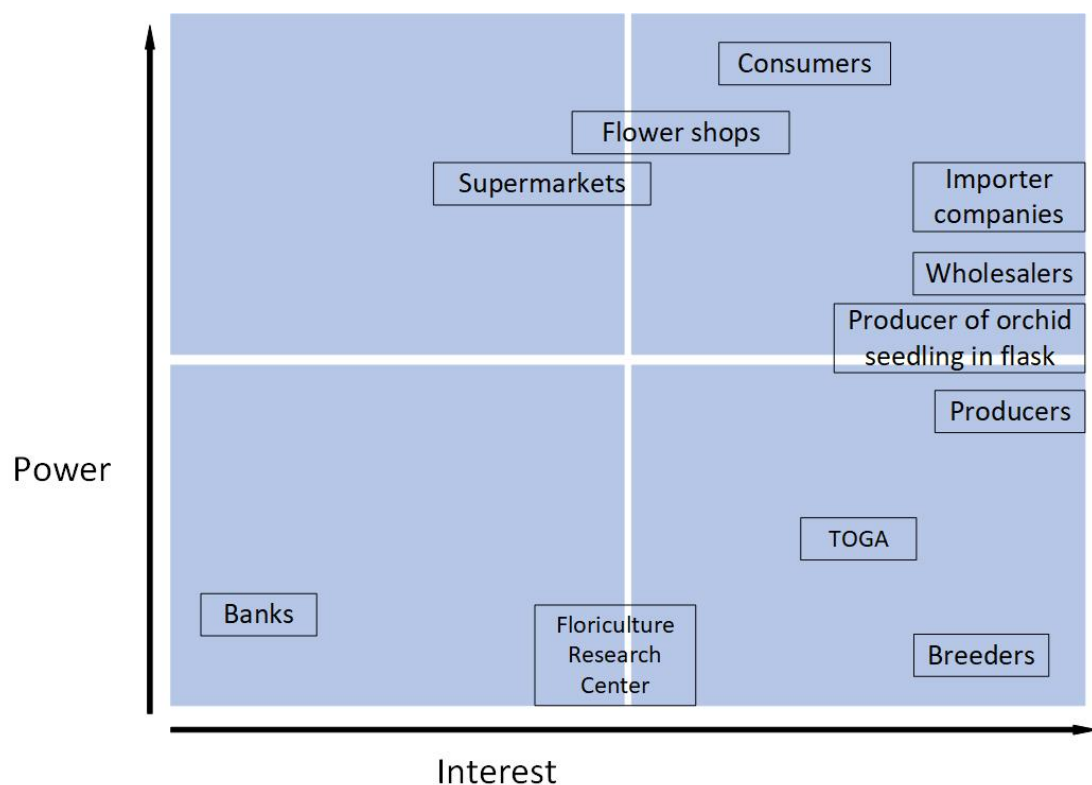


Figure 7: Stakeholder matrix of Chung-Hsin Orchid Nursery (Jeston & Nelis, 2006)

4.2.3 Business Canvas Model

The table show the resource that Chung-Hsin Orchid Nursery provide based on Jing-Kai Yan's opinion. In this table, the value behind product is limited. It is not significant to distinguish the difference between Chung-Hsin and other orchid growers. Chung-Hsin provides mainly medium-sized orchids mericlones to wholesalers because wholesalers don't have enough orchids to deliver to importers. The biggest advantage for Chung-Hsin is delivering the enough orchids in right time. The customers of Chung-Hsin can be categorized in three section: the United States market, Japan market and domestic market. The main channels to sell orchids in Chung-Hsin is physical channel. Customers make phone call to Chung-Hsin to order orchids. After that, wholesalers can choose to pick up by themselves or deliver by Chung-Hsin's truck. The customers of Chung-Hsin are known by networking with other orchids growers. Chung-Hsin provides them enough orchids which they order and make sure to deliver in right time. In the piece of revenue streams, Chung-Hsin sell orchids directly to wholesalers. In order to build a greenhouse, Chung-Hsin needs credit to get loans. Four employees maintain the manufacturing lines of orchids in the greenhouse. Another key resource is good location. Chung-Hsin is located in Tainan Orchid Plantation which gather with orchid growers and wholesalers so it is easier for Chun-Hsin to get information. The key partners of Chung-Hsin include Agricultural Bank of Taiwan and input suppliers who provide orchids in flasks and moss. Agricultural Bank of Taiwan provides loan to Chung-Hsin with lower interest rate. Input suppliers use tissue culture to provide strong and health orchids mericlones in flasks so Chung-Hsin can continue to grow them up. Moss is also important for orchids to keep water so input suppliers should clean the moss and make sure free bacteria and insects. After that, Chung-Hsin can grow medium size orchids mericlones to target customers. Excluding the building, the most expensive resource for Chung-Hsin is orchids mericlones in flasks. It is occupied around 55%. In the piece of social and environmental cost, Chung-Hsin result in air pollution although they decrease the use of pesticide. Not only the pesticides but also the fans which are set up on the greenhouse kill organisms in the environment. It impacts deeply the biodiversity in this region. However, Chung-Hsin bring the social benefit for immigrants. Chung-Hsin provide them the basic salaries, health and labour insurance.

Table 5: Business Canvas Model of Chung-Hsin Orchid Nursery

7. KEY PARTNERS <ul style="list-style-type: none">Producers of orchid seedling flaskMoss suppliersAgricultural Bank of Taiwan	8. KEY ACTIVITIES <ul style="list-style-type: none">Produce medium sized potted orchid 6. KEY RESOURCES <ul style="list-style-type: none">CreditModern greenhouse4 employeesLocated in Tainan Orchid Plantation	1. VALUE PROPOSITION <ul style="list-style-type: none">Providing medium sized potted orchids to wholesalers in order to dealing with out of stockIn time delivery	4. CUSTOMER RELATIONSHIPS <ul style="list-style-type: none">Right produceRight time	2. CUSTOMER SEGMENTS <ul style="list-style-type: none">Wholesalers sell orchids to the United statesWholesalers sell orchids to the JapanWholesalers sell orchids to domestic market
3. CHANNELS <ul style="list-style-type: none">Deliver buy own truck to wholesaler’s greenhouseWholesalers will pick up by themselves				
9. COST STRUCTURE <ul style="list-style-type: none">Greenhouse (Fixed cost)The expense of orchid mericlone in flasks (Variable cost)			5. REVENUE STREAMS <ul style="list-style-type: none">Sales directly to wholesalersSales directly to customers	
10. SOCIAL & ENVIRONMENTAL COST <ul style="list-style-type: none">Air pollutionDecrease the biodiversity			11. SOCIAL & ENVIRONMENTAL BENEFIT <ul style="list-style-type: none">Opportunity for immigrants to get basic average salaries	

4.2.4 SWOT Analysis and PESTEC Analysis

The table shows strength, weakness, opportunities and threats of Chung-Hsin Orchid Nursery. Based on transcription, Chung-Hsin has good resource such as reputation which is important to win order from wholesalers. However, the negotiation power is quite low and the position is unclear for Chun-Hsin.

Table 6: SWOT/PESTEC matrix of Chung-Hsin Orchid Nursery

STRENGTH <ul style="list-style-type: none">• Long-term reputation (stable producing)• Close to wholesalers and other producers• Experience of growing orchid	WEAKNESS <ul style="list-style-type: none">• Unclear target market• Without power to deal with wholesalers who broke the contracts• Small cultivation area
OPPORTUNITIES <ul style="list-style-type: none">• Close to wholesalers (Environment)• Low risk	THREATS <ul style="list-style-type: none">• High competition

4.2.5 Cost and benefit analysis

According to transcript(see Appendix6), Chung-Hsin Orchid Nursery produces three kinds of mericlone orchids including small sized(40%), medium size(50%) and large size(10%). Chung-Hsin sells mainly medium-sized mericlone orchids to wholesalers who collect and sell large quantity of orchids to local importers in international markets. When wholesalers have shortage of small-sized mericlone orchids, Chung-Hsin also sell orchids to these wholesalers who need to replenish stock. However, this status is not common. If wholesalers reject orchids from Chung-Hsin, Chung-Hsin will grow medium-sized orchid to large-sized orchid and then sell to wholesalers who do flower induction and sell orchids in domestic market.

According to the formulation from Wan-Rong Zhang, researcher get the needed space of different size of mericlone orchids. The cost and sale price are gotten from desk study. Based on this information, Table 7 shows producing small-sized mericlone is the most profitable than the others.

Table 7: Cost and benefit analysis of different size of mericlone orchids

Size of Orchid Description	Small-sized mericlone orchids	Medium-sized mericlone orchids	Large-sized mericlone orchids
Needed Space (Unit)	1	3	9
Cost (Euro/plant)	0.49	0.8	1.7
Minimum Sale Price (Euro/plant)	0.9	1.1	2
Maximum Sale Price (Euro/plant)	1	1.4	2.9
Profit (Euro/plant)	0.41~0.51	0.3~0.6	0.3~1.2

Source: (Chun-Guang Hu, 1996; Chin-Mao Chen, 2006; Shi-Xian Chen, 2006; Shu-Min Chang, 2006; Xin-Yan Zhao, 2009)

5 DISCUSSION

5.1 Information gap between orchid growers and wholesalers

Based on finding 4.1.1, there is communication gap between wholesalers and growers. In the growers' point of view, there is no clear criteria of wholesaler's demand but growers also think the criteria is difficult to achieve with limited requirements. Based on interview, the criteria of customer demands is not clear for orchid growers. The interview of growers' answers are vague such as strong plants, free of insects and diseases. On the other hand, one of interviews, from a wholesaler, give detailed information such as leaves distance should be 40 cm, leaf colour should be dark green, 5-7 roots and a round root ball. According to their answers, it seems like a communication gap between wholesalers and growers. Lack of transparency and cooperation are the main bottlenecks in unstable marketing relationships. However, cooperation in chains not only produce stably but also enables traceability systems (Wijnands & Ondersteijn, 2004).

5.2 Unclear role in the market

Based on the findings, researcher finds the role of Chung-Hsin Orchid Nursery is unclear because they provide different sized orchid nowadays. They don't know exactly the final consumers' demands but focus on selling different kinds of product in order to filling the market gap. However, the most effective things to market product smartly and efficiently is narrow gaze (Kotler & Levy, 1969).

5.3 Limited access of external information from stakeholders

Comparing commissioner's with Jia-Zhong Chen's the information management, it shows that different level of involving activities can bring different external information. For example, in commissioner's case, he only receives second hand information from other growers who have different goals from his goals. The power of crowds is scattered and also weaker than a small chain whose actors have same specific goal.

5.4 High employee turnover in the future

The production procedure of Chung-Hsin relies on labour which impacts the speed of exchanging pots and the product flow so stabilizing the workforce is crucial to secure the Chung-Hsin economic survival. In long-term view, time-consuming and boring work with low salaries has high possibility to result in high employee turnover. The result is confirmed by Hannah M. Mathers et al.(2010) who found high employee turnover of nursery workforce because of salary in the US in 2010. The result in that case also identified that there is 52% of labourers leaving after 5 years and only 5% staying the original organization after 10 years.

5.5 Weakness in process management

When researcher visited the greenhouses of the commissioner and the wholesaler, the basic structure in their greenhouses is almost same. The biggest difference is space of orchids and the wind direction. In wholesaler's greenhouse, they have 6 persons in each greenhouse for taking care of orchids. They arrange the space like Picture 8 so it is easier for staffs to move and distinguish the order. Orchids also have more space to absorb the light. The way of inline plant also can bring the insect and decrease the possibility of diseases. In Picture 9 for the commissioner, the direction between cooling water curtain and orchid's leaves is different from Picture 8. Jiunn-Feng, SuShu-Pei Chen and Ting-Fang Hsieh (2018) mentioned that orchids should always be in the direction of the wind, and do not stand at anti-wind direction to decrease the moisture which usually result in diseases.



Picture 8: Wind flow in Taiwan Sugar Cooperation (Author, 2019)



Picture 9: Wind flow in Chung-Hsin Orchid Nursery (Author, 2019)

Comparing with the orchid from Taiwan Sugar Corporation, orchids from Chung-Hsin Orchid Nursery are not good visually(see Picture 8 and 9). According to the existing status, the supply is over than demands. It is better for Chung-Hsin Orchid Nursery to change their exist strategy. Wijnands and Ondersteijn (2006) mention that it is useful to label product by himself/herself so owner can show visible description in order to add value to products.

5.6 Reflection on the research process and quality

I chose the topics about Taiwan orchids for my thesis. During looking for a commissioner for the project, it was difficult for me to keep in touch with a commissioner because Taiwanese orchid growers distrusted me. The main reason is that Dutch orchid growers are competitors with Taiwanese orchids growers, commissioner and Mao-De Lin. However, I didn't want to give up this topic because I believed it was interesting which can become passion for me to finish my thesis. So I decided to use social media to contact anyone who used to present he/she was an orchid farmer. Luckily, I found my commissioner although at that moment most of my colleagues had already started their desk study.

However, another challenge was coming, I could not find appropriate references for literature review such as quality criteria of potted orchid which acted as one of key clues for my thesis. I tried to find this information on famous academic search premier but it didn't work. Until I told this problem to my supervisor who suggested me to share orchid criteria on Dutch website. In methodology part, I felt panic again because I had no idea to how to start it individually. Although I had experience to work on project with colleagues, I didn't believe myself can handle it at that moment. My heart was occupied with fears again. I just wrote down something was cliché instead of useful. For instance, I make a list of actors who I planned to invite without mentioning any names. I didn't take consider into any unexpected incident because I thought everything would be easier when I went back home. It impacted directly the resilience while I couldn't find actors in orchid chain to be interviewees for my thesis.

During the field work, I was hampered by the distrust issue again which is the key impact to let interviewees to join the meeting with me. According to distrust issue, I have already started lately and I could not get sufficient data without interviewees. After that, I changed my plan. I tried to find literature which was hidden in different libraries in Taiwan in case I could not get any data from interviewees Luckily, my family members and my friends supported me to spread my news so I got the opportunities to interview. So I can start my data collection. The only thing I did is prepare stuff I needed during interview. Unfortunately, I messed up at the first interview with my commissioner because of an unwell-structured interview guide. It took some time for him to understand what I asked. After first interview, I rearranged the interview guide in each interview based on their answers. Sometimes I cited their opinion in order to doing triangulation. Luckily, it worked and my interviewees who gave me a lot of feedback not only to enhance data diversity but also to improve my communication skill. Through these interviews, I also found that it was lack of a systematic organization for small-scale orchid farmer to exchange their information and protect their authority.

6 CONCLUSION

6.1 Weaknesses of commissioner's organization analysed by TQM theory

For internal factors of Chung-Hsin Orchid Nursery, employees are satisfied with training and communication with supervisor. For external factors, there is a gap between wholesalers and small-scale growers like Chung-Hsin Orchid Nursery because of unclear quality criteria of the wholesalers are not clear to the growers.

When comparing the performance between Taiwan Sugar Cooperation and Chung-Hsin, the structure of process management in greenhouse is almost the same but the details are different such as direction of the in-line orchids forwards the fan and the dots which are made by use of pesticides. The satisfaction from wholesalers is also low because they rejected orchids provided by Chung-Hsin because of insects. In long term view of cooperating with existing input suppliers, they have good relationship and the quality of orchids in flasks are stable. As a whole, Chung-Hsin has the ability to produce enough orchids to cover the orders but Chung-Hsin needs to improve on the details during cultivation and meet the wholesalers' demand permanently.

6.1.1 Customer involvement

In the orchid growers' point of view, both the interviewed orchid growers mention that there is not a quantitative standard while wholesalers purchase orchid mericlones from them. There are only basic standards which include free of diseases, free of insects and strong plants. For international markets, Mr. Wan-Rong Zhang from Taiwan Sugar Corporation(wholesaler) gives detailed information such as leaves distance should be 40 cm, leaf colour(dark green), there should be 5-7 roots and a round root ball. According to findings, orchids from Chung-Hsin Orchid Nursery meet the general standards strong plants and free of diseases and similar size, but fail to free insects.

6.1.2 Information and feedback

For internal information about orchid cultivation, commissioner can get information by sensors and cell phone. The face-to-face communication with employees shows positive performance as well. However, for external information, although Chung-Hsin has already joined growers' association, the channel is still limited to get useful information because TOGA is more focused on marketing activities which is more relevant for the wholesalers not the growers. To get empowerment in the chain, commissioner needs to join a farmer cooperation formally which includes small-scale orchids growers with the same target customers. The farmer cooperation will facilitate the information flow because the members have the same objectives.

6.1.3 Leadership and training

Because of being small-scale, the commissioner is the only person who does the leading and training in Chung-Hsin Orchid Nursery. The benefit is commissioner can control everything without second-hand information. However, in the long-term view, this job should be divided with other staff because Chung-Hsin has no ability to operate a new market department. So commissioner should concentrate on the core and give authority to other staff. Firstly, commissioner can use time wisely. Secondly, staff have opportunity of promotion and it can arouse their passion for work.

6.1.4 Employees involvement

Overall, the findings of Employee's Satisfaction Survey show positive performance in identity of career, profession of the job, working independent and self-conscious, workloads and time planning, well-understanding the organizational objectives, career value and health protection. However, regarding satisfaction of salaries, staff have different opinions. In the long-term, Chung-Hsin has high possibility original staff find another attractive career, leading to high staff

turnover rates.

6.1.5 Process management

Chung-Hsin is a reliable partner in stably supplying medium-sized orchids. However, Chung-Hsin misses the details for producing high quality orchids and wants to produce more orchids as it can. Taking into consideration the scale of Chung-Hsin, it is better for Chung-Hsin to produce high quality orchids instead of high amounts of low-quality orchids because competitors from domestic and even international market have bigger size of land than Chung-Hsin. To compete with competitors, Chung-Hsin needs to achieve plants which are insect free in each transaction in the first step. After that, Chung-Hsin needs to work on achieving no air roots, no dots on the leaves, same size and same shape of each orchid. Once Chung-Hsin can control the details of common species, Chung-Hsin has a better basic knowledge to produce high quality of non-common species.

6.1.6 Supplier management

Both orchid growers mention the criteria of supplier selection include long-term reputation, proficient in tissue culture, stable supply, on time delivery and competitive pricing. Chung-Hsin is satisfied with the performance of their existent input suppliers who provide common species of orchids in flasks to Chung-Hsin for more than 10 years. However, if Chung-Hsin wants to produce uncommon species of orchids in the future, it is better to cooperate with other input suppliers with small orders in the beginning.

6.2 Opportunities of commissioner's organization

The Taiwanese environment benefits small-scale farmers because there is limited land size. If Chung-Hsin can provide extra value-added features through its own products, this way will enhance the overall competitive strength of Chung-Hsin such as empowerment and negotiating power.

6.2.1 Position of small-scale orchid grower

Through value chain analysis, the chain map shows the information flow is weak at the stage of orchids growers. It reveals two phenomena, firstly, small-scale growers are outsider in the chain. Secondly, TOGA(Taiwan Orchid Grower Association) doesn't meet the expectation of small-scale orchids growers because TOGA is more like a match platform for international buyers and wholesalers. Small-scale orchid growers are not their target group for service.

6.2.2 Interest and power of small-scale orchid grower

The stakeholder matrix based on findings reveals orchid producers just show their consideration with low power because orchid producers get the short end of the stick in the deals without powerful negotiation skills. The actors above orchid growers in orchid supply chain are key players. To join one of the key players in orchid chain, orchid growers need to increase their power by providing value-added products and keep contact with key players.

6.2.3 Added value of Chung-Hsin to stakeholders

In the Business Canvas Model of Chung-Hsin, the key activity is quite limited based on existing situation. They produce orchids and the only thing for additional value is Intime delivery which is easier to replace with other competitors. It enhances the possibility of breaking contracts for wholesalers because they dominate the business transactions.

6.2.4 Opportunities and weakness of Chung-Hsin in the future

The SWOT/PESTEC matrix of Chung-Hsin shows it is located in Taiwan Orchid Plantation where popular wholesalers set up their production base. It is good chance for Chung-Hsin to understand what wholesalers need exactly. If Chung-Hsin

can make an impressive performance to approve its value, it is also a good chance to match certain wholesalers who pursue high end market and are willing to purchase higher sell price of orchids.

6.2.5 The decision of producing certain size of orchids

Most profitable for production is small-sized orchid mericlones because of small cultivation space and a short cultivation time. However, the demands of small-sized orchid mericlone are not stable. Once, Chung-Hsin sells the small-sized orchids on a non-regular basis, Chung-Hsin needs to consider how to arrange the new schedule for target market in certain festivals.

7 RECOMMENDATIONS

The recommendations are formulated based on matrix which is about the position of the Chung-Hsin Orchid Nursery in different stage(see Figure 8).

7.1 Deciding the role in the market (From1 to 2)

From 202 to 2021, researcher suggests Chung-Hsin need to decide its position and function so it is easier for commissioner to develop strategy clearly. It takes one year for Chung-Hsin Orchid Nursery to build their own brand and test what kind of sized orchid they want to provide and who is their target consumers. The following steps are formulated in order to achieve the goal.

7.1.1 Concentrate on producing medium sized orchids

According to the finding 4.2.5, the stable and also profitable way for Chung-Hsin is producing medium sized orchids. If Chung-Hsin sell small-sized orchids, they do not have ability to deliver enough medium sized orchids to wholesalers in time. Once it happens, it will destroy Chung-Hsin reputation permanently.

7.1.2 Focusing the Americans' demands

Researcher suggests that commissioner should decide the target market. Although Chung-Hsin can sell orchids to different international market, Chung-Hsin might miss the certain date which consumers need the orchids in the future. If Chung-Hsin can decide their certain market, for example the Untied States, it is easier for them to find the wholesalers who have same objective. After matching the partners, Chung-Hsin can communicate regularly with wholesalers and provide them cultivation information, for instance, when and what kind of Chung-Hsin fertilizer do Chung-Hsin use during producing. It is easier for wholesalers to check the quality of Chung-Hsin's orchid and build the basic trust between each other.

7.1.3 Improving the design of greenhouse

For cultivation, commissioner can redesign the wind direction in greenhouse like Taiwan Sugar Cooperation's greenhouse so it can reduce the possibility of diseases and insects. After that, Chung-Hsin can provide this physical protection for additional value for their orchids.

7.2 Enhancing the stability of production (From2 to 3)

From 2021 to 2022, Chung-Hsin needs stable labour to cover the additional work in order to meet customers' demands. The following steps are formulated to achieve stable production.

7.2.1 Recording the input and out resource with quantitative data

During cultivation, one supervisor can record the processing such as when the use of pesticides and fertilizer and how much fertilizer and pesticide do workers use for each time. The information will give objective value for wholesalers. It will enhance the match of target customer as well.

7.2.2 Employee Promotion (Women involvement)

Taking the consideration into the composition of employees, three out of four employees are from Vietnam and also women. researcher suggests that commissioner can let them evolve in management jobs so they have high willingness to stay Chung-Hsin in the future. It will inspire employees to show a lot of initiative and decrease turnover rate. On the other hand, commissioner can more focus on networking and adjusting the strategy. It takes one year to train sub supervisors and recruit new staff.

7.2.3 Flexible contract for wholesalers

For the relationship of wholesalers, researcher suggests that commissioner can develop a flexible contract which can decrease the distrust issue. For example, if wholesalers can't afford the yield from Chung-Hsin Orchid Nursery, wholesalers need to notice commissioner before one month of the delivery deadline so commissioner has time to rearrange the access. It takes one year to adjust and monitor the status of using new contract.

11.3 Enhancing the activities of communication with growers (From3 to 4)

From 2022 to 2025, to increase the negotiate power for small scale orchid growers, it is better for smallholder growers to collect the power of the masses so they can turn the table on the inequality between wholesalers and growers. Commissioner needs to take time to networking with growers who provide orchids to same wholesalers so they have more power to negotiate with wholesalers.

7.3.1 Establishing farmer cooperation

Chung-Hsin has advantage to be a facilitator because it locates in Taiwan Orchid Plantation which gather a lot of orchid growers and TOGA. TOGA can assist orchid growers to establish the farmer cooperation based on their experience. If they can assist farmer cooperation, it is easier for them to procure orchids in order to host international orchid show.

7.3.2 Transparency of information flow

Researcher suggests the new farmer cooperation can cooperate with IT company who can provide them to Use blockchain in order to make sure transparency of information flow. It can reduce the distrust issue of the farmer cooperation so members can work closely based on same information.

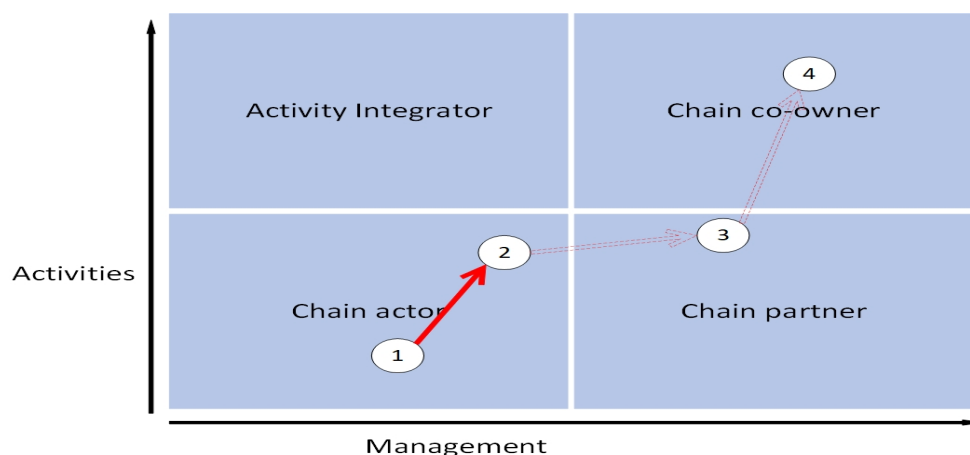


Figure 8: Scaling up the position of Chung-Hsin Orchid Nursery (KIT, 2006)

REFERENCE

- Appian, 2017. *Appian*. [Online]
Available at: <https://www.appian.com/bpm/process-management/>
[Accessed 24 June 2019].
- Applebaum, E., Bailey, T., Berg, P. & Kalleberg, A., 2000. Manufacturing Advantage Why High Performance Systems Pay Off. *Journal of Human Resource and Sustainability Studies*, 2(4).
- Baser, H. a. P. M., 2008. *Capacity, Change and*, s.l.: European Centre for Development Policy Management.
- Besterfield, D. H., Besterfield-Michna, C., Besterfield, G. H. & Besterfield-Sacre, M., 1999. *Total Quality Management*. London: Prentice Hall.
- Breiter, D. & Bloomquist, P., 1998. *TQM in American Hotels: An Analysis of Application*, New York: Cornell Hospitality Quarterly.
- Briercliffe, T., 2019. *Flora Culture International*. [Online]
Available at: <https://www.floraculture.eu/minds/international-orchid-show-tainan/>
[Accessed 30th May 2019].
- Chandra De, L., Pathak, P., Rao, A. & Rajeevan, P., 2015. Commercial orchids. In: M. Golachowska & E. Monu, eds. Berlin: De Gruyter Open, pp. 208 - 212.
- Chang, C.-C. & Wu, C.-H., 2011. *A Study on the International Marketing and Branding Strategies of Taiwan's Phalaenopsis Orchid Industry*, Pittsburgh: Agricultural and Applied Economics Association.
- Chen, J.-Z., 2017. *BSE LAB*. [Online]
Available at: <http://amebse.nchu.edu.tw/services.htm>
[Accessed 1st June 2019].
- City, T. T. C. H. C. M., 2013. *Taiwan Trade*. [Online]
Available at:
<https://info.taiwantrade.com/biznews/%E8%B6%8A%E5%8D%97%E6%94%BF%E5%BA%9C%E8%A6%8F%E5%8A%83%E8%8A%B1%E5%8D%89%E7%A8%AE%E6%A4%8D%E5%9C%92%E5%8D%80-1271161.html>
[Accessed 16th June 2019].
- COA, 2018. *COA*. [Online]
Available at: <https://agrstat.coa.gov.tw/sdweb/public/trade/tradereport.aspx>
[Accessed 25th September 2019].
- Dale, B. G., Boaden, R. J., Wilcox, M. & McQuater, R. E., 1997. Sustaining total quality management: What are the key issues?. *The TQM Magazine*, 9(5), pp. 372-380.
- Fang, W., 2009. *Structure and Facilities of greenhouse and Phalaenopsis cultivation*. [Online]
Available at: [Structure and Facilities of greenhouse and cultivation](#)
[Accessed 6 June 2019].
- Guimarae, T. & Armstrong, C., 1998. Empirically testing the impact of change management effectiveness on company performance. *EUROPEAN JOURNAL OF INNOVATION MANAGEMENT*, 1(2), pp. 74-84.
- Hansson, J. & Klefsjö, B., 2003. A core value model for implementing total quality management in small organisations. *The TQM Magazine*, 15(2), pp. 71-81.
- Harris, K., 2012. *Writing Assistance*. [Online]
Available at: <https://www.writingassist.com/resources/articles-3/creating-vision/>

[Accessed 22th June 2019].

Hsin-I Hsiao, C.-C. C. a. C.-H. W. 2., 2015. Decision Making Factors for Country-of-origin Agriculture Branding in International Markets: The Case of Orchids in Taiwan. *Journal of Horticulture*, 2(2).

Jeston, J. & Nelis, J., 2006. *Business process management: practical guidelines to successful implementations..* First edition Linacre House: Elsevier Ltd.

Joycea, A. & Paquinb, R. L., 2016. The triple layered business model canvas: A tool to design more sustainable business models. *Journal of Cleaner Production*, Volume 135, pp. 1474-1476.

Keijzer, N. S. E. P. G. F. A., 2011. *Bringing the invisible into perspective. Reference paper for using the 5Cs framework to plan, monitor and evaluate capacity and results of capacity development processes.* [Online] Available at: <https://ecdpm.org/publications/5cs-framework-plan-monitor-evaluate-capacity-development-processes/>

[Accessed 6 June 2019].

KIT, 2006. *Chain Empowerment.* First edition KIT.

Kotler, P. & Levy, S. J., 1969. Broadening the Concept of Marketing. *Journal of marketing*, 1st January.

Kuo, C.-H., 2017. *A study on the Sustainable Development of Orchid Industry in Taiwan*, Kaohsiung: National Sun Yat-Sen University.

Lai, B.-Z., 2018. *Sci-Tech Vista.* [Online]

Available at: <https://scitechvista.nat.gov.tw/c/sTjz.htm>

[Accessed 17 June 2019].

Lin, S.-X. & Chen, N.-H., 2009. *Value Chain of Tai-Da Orchid Nursery*, Zhang-Hua: Kung-Hwa Management Foundation.

Lin, S.-Y., Chen, S.-J., Chung, R.-S. & Chang, Y.-C., 2013. Developmental Age of Phalaenopsis Affects its Tolerance to Substrate Salinity. *Taiwan Horticulture Journal*, 59(1), pp. 1-13.

Lin, X.-J., 2007. *Intelligence Resources Planning in Orchid Industry*, Tainan: Graduate Institute of Intellectual Property National Chengchi University.

Liu, C.-Y., 2005. *Blooming in Globalization: Phalaenopsis Orchid's Cross-border Commodity Chain as a Case of Taiwan's Agricultural Global Development*, Taipei: National Taiwan University.

Liu, Z.-Y., 2005. *Blooming in Globalization: Phalaenopsis Orchid's Cross-border Commodity Chain as a Case of Taiwan's Agricultural Global Development*, Taipei: National Taiwan University.

Li, Y.-H., Xu, R.-H., Chen, T.-J. & Wu, J.-L., 2011. *Talk about Orchid Kingdom*, Taipei: Taiwan Institute of Economic Research.

M4P, 2003. *Making Value Chains Work Better for the Poor: A Toolbook for Practitioners of Value Chain Analysis.* Version 3 Cambodia: Agricultural Development International.

Mazzarol, T., 2003. A model of small business HR growth management. *INTERNATIONAL JOURNAL OF ENTREPRENEURIAL BEHAVIOR & RESEARCH*, 9(1), pp. 27-49.

Mendes, L., 2012. Employees' involvement and quality improvement in manufacturing small and medium enterprise (SME): A comparative analysis. *African Journal of Business Management*, 6(23), pp. 6980-6996.

Nofal, A. A., Omais, N. A. & Zairi, M., 2005. Critical Factors of TQM: An Update on The Literature. *International Journal of Applied Quality Management*, 2(2), pp. 4-8.

O'Brien, R. C., 1995. Is Trust a Calculable Asset in the Firm?. *Business Strategy Review*, 6(4).

- Pickton, D. W. & Wright, S., 1998. What's swot in strategic analysis?. *Strategic change*, 3, 7(2), pp. 101-109.
- Plaggenhoef, W. v., 2007. *Integration and self regulation of quality management*. Wageningen: Wageningen University and Research Centre.
- Pun, K. F. & Chin, K. S., 1999. Bridging the needs and provisions of quality education and training:. *International Journal of Quality & Realiability*, 16(8), pp. 792-810.
- R., C., HURBURGH, JR. & HANSEN, R. S., 2012. *QUALITY MANAGEMENT SYSTEMS FOR AGRICULTURE*, s.l.: s.n.
- Reeuwijk, L. v. & Houba, V., 1998. In: *Guidelines for Quality Management in Soil and Plant Laboratories*. Rome: FAO.
- Rundle, D., 2017. *WORTHWHILE*. [Online]
Available at: <https://worthwhile.com/insights/2017/02/20/data-business-intelligence/>
[Accessed 22th June 2019].
- Sousa, R. & Voss, C. A., 2002. Quality management re-visited: a reflective review and agenda for future research. *Journal of Operations Management*, 20(1), pp. 91-109.
- Szwejczewski, M. et al., 2001. Supplier management in German manufacturing companies-An empirical investigation. *International Journal of Physical Distribution & Logistics Management*, 31(5).
- Tsai, H.-S., 2016. *Innovation and Spatial Organizations of Taiwan's Phalaenopsis Industry*, Kaohsiung: National Kaohsiung Normal University.
- Wei, S., Shih, C.-C., Chen, N.-H. & Tung, S.-J., 2010. Value Chain Dynamics in the Taiwan Orchid Indusrty. *Acta Horticulturae*, Volume 878, p. 441.
- Wu, H. F., 2004. Building The Structure of Exporting Excellent Phalaenopsis. *Technic Service of Taiwan Agricultural Research Institute*, Volume 60, p. 13.
- Zhang, Z.-h., 1997. *Developing a TQM quality management method model*, Groningen: University of Groningen.

Appendix 1. The procedure and margin of different stage of orchids

Production Process	Breeding		Cultivation			Flower induction and Domestication	
Product (Description of standard)	Seedlings	Mericlones	Small-sized mericlones	Medium-sized mericlones	Large-sized mericlones	Mericlones with flower-stalks	Potted orchid
	20-25 plants/flask	16 plants/flask	Distance between leaves is >12cm	Distance between leaves is >20cm	Distance between leaves is >30cm		
			The size of soft pot is 5.1cm	The size of soft pot is 6-7.5cm	The size of soft pot is 10.6cm		
Time from planting to harvesting	Growing in vitro for 10-12 months	Tissue culture for 10-12 months	3-6 months	3-6 months	4-6 months	4-5 months	
Yield/Unit area	151-302 flasks/m²		257 plants/m²	106 plants/m²	30 plants/m²	30 plants/m²	
Cost of production	0.09-0.14 EUR/plant	0.23-0.29 EUR/plant	0.49 EUR/plant	0.8 EUR/plant	1.7 EUR/plant	0.29 EUR/plant	0.57 EUR/plant
Sale price	0.11-0.17 EUR/plant	0.43-0.71 EUR/plant	0.9-1 EUR/plant	1.1-1.4 EUR/plant	2-2.9 EUR/plant	3.43-4.29 EUR/plant	
The average number of alive plants	80-90%		70-80%	85-90%	80-85%		

Source: Chun-Guang Hu, 1996; Chin-Mao Chen, 2006; Shi-Xian Chen, 2006; Shu-Min Chang, 2006; Xin-Yan Zhao, 2009; Interviewees Jia-Zhong Chen, Hong-Ming He, Jun-Bi Zeng and Wan-Rong Zhang.

* Area unit conversion is “1 ping = 3.30579 m²”.

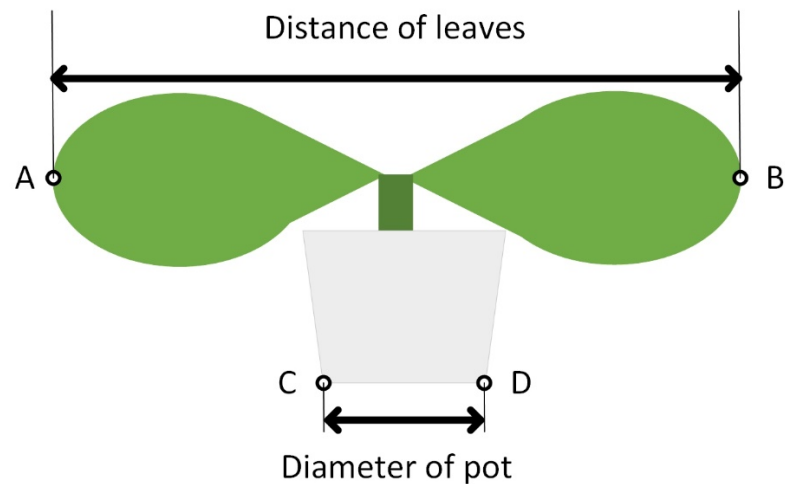
** For Yield/unit area, the figures are rounded off to the first digit before the decimal point.

***The exchange rate is “35 TWD = 1 EUR”.

****For cost of production and sale price, the figures are rounded off to the second decimal place.

*****The distance between leaves in an orchid plant “V3” is calculated from A to B (see following picture).

*****The size of a soft pot is determined in the diameter of a soft pot (from C to D).



Appendix 2. The questionnaire of Employees' Satisfaction Survey

It will not mention your name during the survey. The personal information will be used to analyse the finding. You each answer will be kept a secret during research.

A. Personal information

1. Gender: ☐Male ☐Female
2. Age: ☐20-30 ☐31-40 ☐41-50 ☐51-60 ☐Above 61
3. Working year: _____ year

B. Evaluation of the organization's performance

The survey is done by 5-point scale. You can choose Very Agree/Agree/Ok/Disagree/Very Disagree(from left to right) in each question.

Description of Question	Very Agree	Agree	OK	Disagree	Very Disagree
1. I get emotional identification from my job.					
2. I feel I am professional when I do my job.					
3. I feel independent and self-conscious from my job.					
4. I feel satisfied about the workloads and time.					
5. I understand the organization's policies and objectives.					
6. I feel that supervisor mention clearly about the tasks.					
7. I feel satisfied about the advice which is given from my supervisor.					
8. I think my salary is in proportion to my output.					
9. I feel satisfied when I ask question to my supervisor.					
10. The organization take good care of employee's healthy and protect employee during work.					

Appendix 3. Transcription of interview with Jing-Kai Yan (Commissioner)

R=Researcher and I=interviewee, Jing-Kai Yan

R: What kind of orchids do you produce?

I: I produce mainly medium-sized mericlones to international markets such as the US and Japan. Recently, the percentage of small-sized mericlones for sale is 40%, while the percentage of medium-sized mericlones is 50% and large-sized mericlones is 10%. When I expect that orchid is out of stock, I will sell small-sized mericlones.

R: Can you introduce the procedure of producing in your greenhouse?

I: Firstly, wholesalers will tell me what kind of species they want. Secondly, I will order the mericlones from input suppliers which produce mericlones in flasks. After the mericlones in flasks arrive, my employee or I will put them in the greenhouse for one week. During the week, if some mericlones are going wrong. We will remove it. The planting time starts from putting orchids in the soft pots. During changing bigger size soft pots, we will enhance the moss which is cover the root of orchids. Before shipping, we will put orchid in the room with air-conditioner in order to pre-cooling.

R: What is your strategy of supply?

I: I sale 80% orchid to 2 large-scale companies(wholesalers) and sale directly 20% orchid to domestic customers. Recently, I get information about one of my customers which has financial problem so I try to find another reliable wholesaler.

R: Where do you get this information?

I: We have a farmer group in social media where we discuss and exchange the information every day. According to business model and land size, one wholesaler needs to cooperate with other orchid growers so they can deal with the order from international markets. So, I can get information from other farmers who also provide orchid to same wholesalers through the social media.

R: How about Taiwan Orchid Growers Association? Do you join them?

I: Yes, I joined them. But I can't get practical information from them. Only global market information of the seasonal magazine is useful for me.

R: How do you manage the planting in your greenhouse?

I: As you can see, my greenhouse can divide into 2 spaces. First one is planting for mericlones which just arrive. Second one is planting small- and medium-sized mericlones. Both of two spaces maintain 28°C from day and night. I set up 10,000Lux in the greenhouse. During hot weather, the greenhouse will cover automatically. There are some sensors set up in the spacing so I can read the data with my cell phone.

R: What is the criteria of orchid quality when your wholesalers purchase your orchids?

I: The basic standard strong plant, free insect and disease. There is no clear criteria like quantitative standard because orchid is alive. It is hard to control them.

R: If there is no criteria, how do you manage the relationship with your wholesalers?

I: I will purchase orchid mericlones by myself so I don't need to worry about controversial issues. For example, if they break the contracts or have high possibility to do that, I will sale orchids to other wholesalers so I can reduce the risk.

R: What is kind of orchid on the shelf outside? Is it for sale now?

I: This order just refused by our wholesaler because of pest, red spiders. They mentioned that there are some red spiders on orchids but there are not any red spiders in my greenhouse. It is very tricky.

R: How do you do for objected orchids?

I: We remove the plants which have red spiders and spread some pesticides. After that, we will sale to other wholesalers.

R: When do you use pesticides? Do you use pesticides before sale it?

I: No, I don't like to use pesticides expect in hot and humid weather. The orchids are easier to infect.

R: What kind of factors do you need to take consider into when you order orchid mericlones from input suppliers?

I: Firstly, it is very important, they are reliable like my mericlone providers who deliver orchid on time. Secondly, free disease. Thirdly, cheaper. I usually buy certain species that I don't need to pay additional fee of using authority.

R: What is the average price for one orchid which sold to wholesalers?

I: This price of orchid is following some unspoken rules so we usually sale the same price to our wholesalers if both of us follow the contracts.

R: How many employees do you have? How do you train them?

I: Now I have four employees. I will teach them the whole procedure face to face for two weeks. To let them do quickly, I simplify the procedure. For something complicated like the rate of fertilizer, I will make a copy and post on the whiteboard in workspace.

Appendix 4. Transcription of interview with Mao-De Lin (grower)

R=Researcher and I=interviewee, Mao-De Lin

R: What kind of orchids do you produce?

I: I mainly produce the Large-sized mericlones. Someone who do flower induction will buy mericlones. My responsibility is helping him to produce Large-sized mericlones so I only receive the processing charges. The orchid I produce will deliver at domestic market.

R: How do you manage the planting in your greenhouse?

I: My habit of management is putting as many orchids as I want in the greenhouse. Although there are some disadvantage such as crowded and high possibility of pest and disease, there is lower cost during process. In contrast, if you keep more spacing for orchids, you will spend more cost.

R: What is the criteria of orchid quality when your wholesalers purchase your orchids?

I: There is no clear criteria when wholesalers purchase my Medium-sized mericlones. I think it is hard to give a quantitative quality for orchids because they are alive. On the other hand, Taiwan belongs to sub-tropical area so we have more insects. There are a lot of external factors to impact the quality of orchids.

R: If there is no criteria, how do you manage the relationship with your wholesalers?

I: Some wholesalers are easier to break the contract with unclear criteria of orchid quality. For example, during demands more than supplies, some wholesalers are willing to purchase the whole orchids from his greenhouse. In contrast, during supplies more than demands, some wholesalers usually break the contract although they have already signed the contracts. Sometimes the tricky thing is wholesalers buy only beautiful flowers not the whole orchids. The contracts can't let them obey the rules so the only thing I can do is cooperate with few believable wholesalers. In case of risks, I also join the farmer group to find possible wholesalers based on other farmer's opinions. Recently, the wholesalers are less than before. There are some large-scale orchid companies that go bankrupt. These issue has strong impacts to bank so the bank isn't willing to give the loan to orchid farmers.

R: What kind of factors do you need to take consider into when you order orchid mericlones?

I: Because elevation here is 200 meter, the night temperature is lower than the southern part of Taiwan. The night temperature is a key factor to plant orchid because orchids start to grow during night. The appropriate night temperature is 27-28°C. To compete with southern orchid growers in Taiwan, I try to plant orchids with heavy and dark green leaves which can reduce the damage ratio during delivering.

R: What is the average price for one orchid which sold to wholesalers?

I: It depends on the variety and the yield. If there is certain variety which wholesalers are interested in, they are willing to give high price.

R: Is there any platform in Taiwan to know the average price of orchids?

I: No, there isn't. The average price of orchids is more unclear than vegetable and fruit in Taiwan. Like some growers are insolvent when they sale orchids to wholesalers. In this case, growers usually sale them with lower price. Sometimes growers compete with each other so the orchid price is lower and lower. It becomes destructive competition.

R: What is the information platform for you to realize the orchid knowledge?

I: I don't rely on the support from research centre because most researches are done without practical way. For example, we need plant 10,000 orchids in the greenhouse but researcher only plant 50 orchids for the research. It is

easier for them to control the external factors. However, growers can't do like this. We need to produce more. So most of growers like to discuss together and share information from each other. In the past, I asked the researchers how to deal with different diseased orchids but they usually gave me similar answers with different diseases. After that, I distrust them.

R: Is there any standard about potted orchids?

I: Nope. Most of people do potting based on their experience. Most of growers have different preference for their own orchids. In the beginning, I also asked different growers' opinion about how to plant and the answers were quite similar. Then I do experiment to find out how to plant in my space.

R: What do you feel to plant in between Tainan and Taichung?

I: Although it is easier to find channel in Tainan but it is difficult to manage in Tainan. For example, each greenhouse is close with each other in Taiwan Orchid Plantation so the fans are easier to bring the disease from outside into the greenhouses. Growers there solve this problem with a lot of pesticides. Especially the growers export orchids to international markets. They use pesticides at least once a week. Once I have been there, I had a headache.

R: What is the procedure of planting orchids?

I: The procedure of planting orchids can divide in covering with moss, changing the soft pots, watering, guiding roots into moss and weeding. Among of them, covering with moss and changing the soft pots need more labour to do. In my case, if I have time, I will change soft pots.

R: Who is your customer?

I: My customer is someone who do flower induction. I have many years to cooperate with him. He purchases whole year. He also have his channel to sell orchid. My orchids are not beautiful (bling green) but strong because of heavy light. This is my customer demand because he needs to deliver the orchids to the mountain where he do flower induction.

R: so you mean you use heavy light so your orchids leaves is dark green?

I: Yes. So like if you plant orchid in dark, the leaves become bigger and thin.

R: What is the criteria for you to choose the input suppliers?

I: I take consider into my customer's opinion because if there is any deformed mericlones in their greenhouse. They will think it's my fault. But the possibility of deformed mericlones depends on the technique of seedling providers. They don't provide the information so I usually cooperate the one I believe.

R: What do you do when there is a diseased orchid in you greenhouse?

I: I will remove the diseased one and others close to it. But the most important thing is I will make sure it is clean inside the greenhouse. Such as weeding regularly.

R: How you can decide the orchid species?

I: The one who do flower induction will provide orchids mericlones to me and I plant for him. I rely on him strongly because we cooperate many times. We have good teamwork. It is difficult for me to change customers because they have high risk to break the contract. It is very common thing in orchid field. For example, wholesalers receive the orchids in February but they can pay in May.

Appendix 5: Transcription of interview with Jia-Zhong Chen (Supporter)

R: Mr. Chen. I know you because you wrote a lot of articles about Taiwanese orchids online. Would you mind to share why you concentrate to orchids?

I: I was secretary of orchid cooperation which ended up in 2016 in the United states. Now I collect 12 Taiwanese orchid farmers to become an orchid cooperation. My career is planner in this orchid cooperation. My responsibility is coaching them and designing the greenhouse. The target customers of orchid cooperation are the United States, Japan and Singapore. We have tried 7 years to maintain the stability of this cooperation and now we have stable channel to sell orchids.

R: What kinds of actors in your cooperation?

I: We have input suppliers who provide orchids in flask and breed, serval orchids farmers who provide medium and large size of orchid and one wholesaler whose responsibility is dealing with orders. According to the characteristics of species, we divide three kind of greenhouses which include high demands, medium demand and low demand of quantity of light.

R: How do you decide the schedule to produce or deliver to your target market?

I: It is related to their festival and culture. For example, in the Singapore, there are some Muslim population. During Ramadan, the demands of white flowers increase so we export white orchids, V3, to Singapore.

R: What is the common way for orchid growers from your orchids cooperation to realize market information?

I: Because we are closed market, it is easier for actors in this chain to communicate with each other. Our customers will tell us what they want and we share this information to our members. For internal information, we have once a month gathering. I also deal with global information so I usually take flights to above countries in order to collect first hand news.

R: What is exist situation in Taiwan orchid industry?

I: The figure of orchid growers decreases gradually because of aging population.

Appendix 6: Transcription of interview with Hong-Ming He (Input supplier)

R: What kind of service do you provide?

I: Our company produce orchids in flasks and also develop our own species. We also sell our own species and other public species orchids.

R: Who are your customers?

I: We concentrate on international market such as the Netherlands and Germany.

R: What kind of material of containers do you use for orchids?

I: We develop our own square and plastic boxes which is lighter than flasks. This box can reduce the cost by aircraft and use widely for the space. Nowadays, Taiwan orchid nurseries still use flasks which are old system. The production cost of orchids in flasks is cheaper than our system.

R: Why don't you sell orchid mericlones in Taiwan?

I: Because the orchid growers prefer to buy cheaper and free disease orchids. According to the exist technique, it is easier to reach so we can't compete other competitors if we don't produce something special. Based on this reason, we change our policy and then develop new species and containers for 7 years. After that, we provide high quality products which are free 5 common orchid's disease and export to Europe.

R: During producing orchids mericlones, how do you do disease management?

I: We test the disease by ourselves. In Taiwan, I think only our company do this way. Most of orchid farmers ask third party to inspect their orchids. We have our own equipment so we inspect each box of orchid mericlones in order to maintain free disease.

R: How do you operate your business? Original entrusted manufacture or original brand manufacture?

I: We have both. Only 5% if original entrusted manufacture which means customers buy materials to us and we plant for them. Most of time, we get orders from our customers and then produce for them.

Appendix 7: Transcription of interview with Jun-Bi Zeng (Supporter)

R: Can you introduce your background first?

I: I was orchid farmers before and grow orchids in China. After that, I replaced the position of TOGA Secretary-general.

R: What do orchid growers take consideration into when they start to grow orchids?

I: There are three points including good input suppliers with positive reputation, species and time. The business characteristics of a species include the figures of flower straws, flower colour, the diameter of the flower straws, the height of the flower straws. The height of the flower straws is the key point when you take consideration of delivery. For example, there are two layers in one trolley. Most of wholesalers don't want this species because the cost of delivery is high. The demands of species impact by consumers. For example, Taiwanese consumers prefer one straw and big flowers. When we talk about time, it is relative to the festival. For example, during new year, the demands of orchid in Japan, China, Taiwan and Vietnam increase a lot. It is a peak period to import orchids in above countries. In Europe and the United States, they also have peak months but not like Asia. The cost of producing orchids are higher than other flowers because of long cultivation and relevant bills such as water and electricity. If orchid growers don't have target customers, they cannot sell orchids in the end. After that, they need triple space to grow medium size orchids in wrong time.

R: What is the average price of orchids of different size?

I: We usually say that flowers are gold and also sand. If you sell orchids before the festival, you will get a good price. In contrast, if you sell after the festival, you will get the lower price. For example, 16th August is Moon Festival. If you buy moon cakes on 15th August, the price is higher than 17th August. According to the same theory, if you buy flowers during Chinese New Year, the price is higher than after Chinese New Year. Let' us pretend Chinese New Year in January. At this moment, markets need mature orchid plants. In September, orchid growers need to do flower induction. In April, it's time for orchid growers to grow large sized orchid mericlones. In December, they need medium size orchid mericlones. In August, they need small size orchid mericlones. Orchid growers need to take consider into this schedule.

R: Do small scale orchid growers have any channel to get market information?

I: Because small scale orchid growers have multi-tasking, they have limited ability to realize and organize the domestic and global market. Although small scale orchid growers have opportunity to keep contact with international importer, they don't know the basic information such as regulation and scale. Sometimes, these events impact the wholesalers because of price war. It destroy deeply the stability of Taiwanese orchid chain. I suggest that wholesalers can divide their markets like A company is responsible for Europe market. Other small orchid growers provide their orchids to certain wholesalers.

Appendix 8: Transcription of interview with Wan-Rong Zhang (Wholesaler)

R: What kind of orchids do you provide your customers?

I: Our large sized orchids mericlone are sold to the United States. We produce 95% by ourselves and only 5% purchase from other orchids growers.

R: Do you only purchase large size orchids from orchids growers?

I: No, we also buy medium sized orchids mericlones. If we buy medium size orchid mericlones, we follow the original process management. If we purchase large sized orchid mericlones, it takes two to three weeks for orchids to adapt the environment.

R: what are the quality criteria when Tai Sugar purchase the orchids?

I: Firstly, free diseases and insects. For medium sized orchids, we prefer to buy orchids with 5 to 6 roots. For larger sized orchids, we prefer six to seven roots. For mature orchids, we prefer seven to nine roots. Each root should be round and be covered by moss. At the leaves distance, we prefer 40cm of medium sized V3 orchids and 50cm of large size V3 orchids. The colour of leaves should be dark green and thick.

R: It seems like your company have strict standard. How can you let orchids sell to you?

I: Our purchase price is as same as other wholesalers but we purchase orchids stably. So orchids growers are not worried about defaulting.

I: What kinds of orchids in flasks do you purchase?

R: We buy orchids in flask because it is cheaper and we can also recycle to use the containers.

R: What's your production process?

I: When orchids in flask arrive our greenhouse, they need 2 weeks to adapt the new environment. The night temperature maintains above 26°C. In the stage of small sized orchids, orchids are centralized to manage in order to maintain stability. In the stage of medium sized orchids, the night temperature maintains above 28°C. During cultivation, we rely on labour to change the direction of roots because of airtight medium. We water the orchids around once ten days but it depends on weather and moisture of moss. Before the date delivering large-sized orchids, we use pesticides in two weeks.