

**SUPPLIER SELECTION:SELECTION CRITERIA FOR
ELECTRONICS MANUFACTURING IN THAILAND**



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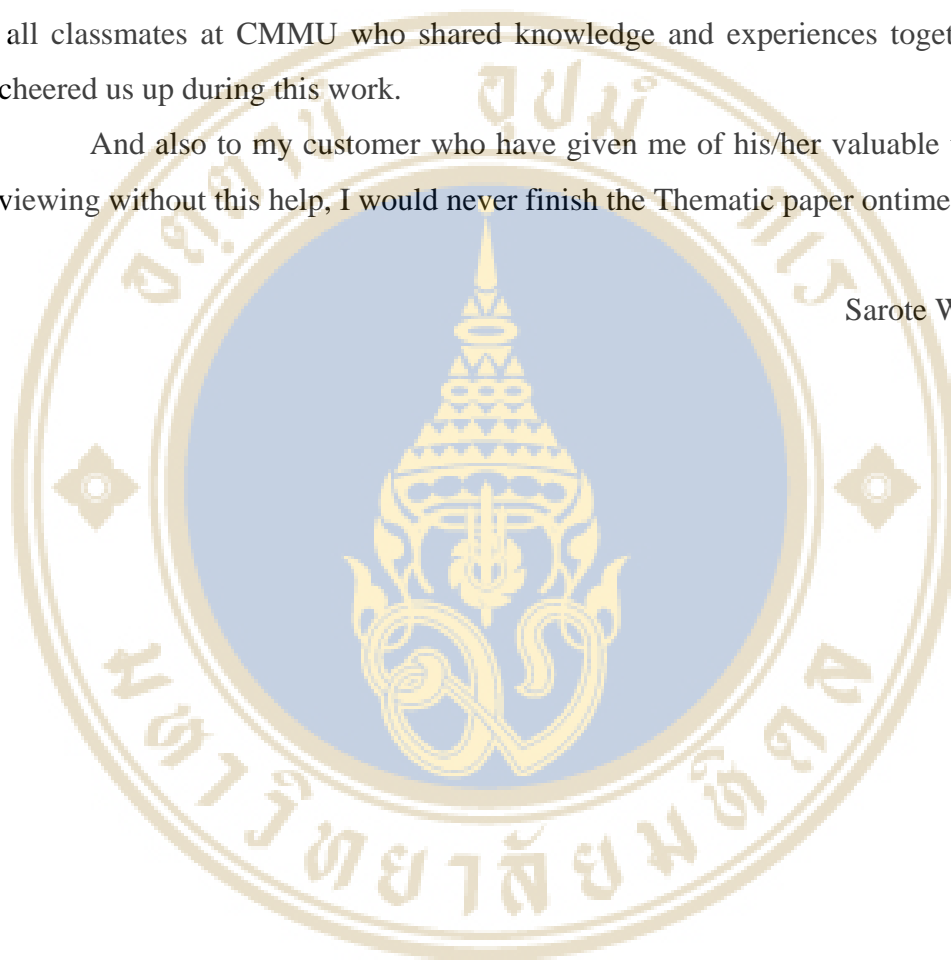
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SUPPLIER SELECTION: SELECTION CRITERIA TO ELECTRONICS MANUFACTURING IN THAILAND

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ABSTRACT

In Thailand, Electronics Manufacturing is one of importance economic sector, there are 2,055 manufactures and 592,956 of employments which worth 8,143.97 Million USD of export value in 2013 to understand clearly of Supplier Selection Criteria that customer mostly use would help industrials to prepare and adjust way of doing business to attract customer.

The researcher has designed interview Question base on G. W. Dickson who conducted research in 1966 and selected top 6 ranking criteria to use in this research as following (Cost, Quality, Delivery, Capacity and Technical support)

The finding from this paper showing that customer mostly concern to Cost and follow by Delivery, Quality and Flexibility but some also concern with other criteria that have not been listed from Dickson model such as working atmosphere and communication.

KEY WORDS: Supplier /Criteria /Electronics /Manufacturing /Selection

27pages

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CHAPTER I

INTRODUCTION

Electronics Manufacturing Services (EMS) is an industry based on providing contract design, manufacturing and product support services. Traditional services include PCB (print circuit board) assembly, box-build and testing. The business model for the EMS industry is to specialize in large economies of scale in manufacturing, raw materials procurement and pooling together resources, industrial design expertise as well as create added value services such as warranty and repairs. Today, EMS providers are numerous services such as supply chain management, global distribution, logistics, customer support and warranty repair. In Thailand, Electronics Manufacturing is one of importance economic sector, There are 2,055 manufactures and 592,956 of employments which worth 8,143.97 Million USD of export value in 2013 (Thai Electrical and Electronics Institute, 2013)

The electrical and electronics industry contributed almost 24% of Thailand's annual export revenues. Major export destinations were ASEAN (17%), the Europe (14%), China (14%), the United state (13%), Hong Kong (12%), and Japan (11%).According to the Thailand Electrical and Electronics Institute, Thailand's electrical appliance industry is predicted to increase 5%-7% in 2012, while Thailand's electronics industry is forecasted to expand about 10%-12% in 2012. (BOI ,2013)

Thailand's main electronics exports were hard disk drives (HDD) and integrated circuits (IC), which accounted for approximately 34% and 26% of total electronics exports, respectively. Thailand is ranked as the world's number #1HDD and components manufacturing base, commanding 40%-45% share of the worldwide HDD production. Major HDD producers – Western Digital, Seagate, Hitachi GST and Toshiba – have production bases in Thailand. The country holds a similarly remarkable reputation in the IC and semiconductor industries, and boasts one of the largest assembly bases for these products in Southeast Asia.(BOI ,2013)Considering the increase in global demand for high-technology consumer electronics, including

computers, flat panel displays, tablets, gaming consoles, and wireless devices, Thailand is the ultimate investment destination for the sector. Electronics investors will undoubtedly be able to benefit from this strong growth in demand, as well as the comprehensive support from the government of this global hub, in the electronics world. The international competitiveness of the Thai Electronics Manufacturing Services has been declined over the past few years comparing to rapid growth of Electronics Manufacturing Services in China, Vietnam, Cambodia, and other low labor wage in ASEAN.

Thailand is losing export grow and have to focus on other criteria rather that cost it is importance for the country to identify the other criteria that Thai's Electronics manufacturing should focus and improve in order to keep high ranking of investment destination for the sector as before.



Figure 1.1 Electronic Manufacturing Services (EMS)

Problem Statement

Since there are many criteria could influent customer in selecting supplier for Electronics Manufacturing Services, understanding the main criteria would help Thai's EMS Industrial sector to prepare and alight with customer strategies.

Research Question

What are the criteria customers select Thai's EMS as their main contract manufacturing other than other country?

Research Objectives

- 1) To understand what are the main criteria that customer prefer when choosing Electronics Manufacturing Services (EMS)
- 2) To find out what are the main criteria that customer perceive from Thai's Electronics Manufacturing Services (EMS)

Research Scope

The research will mainly focus to international customers who have at least one Thai's Electronics Manufacturing Services (EMS) for any kind of services in their supply chain such as design, prototyping, production ., etc. Their organization have been in this electronics manufacturing industrial with experience with multination Electronics Manufacturing Services in many country such as China, Vietnam , USA , UK and Thailand.

The aim of this study is to understand what are the main criteria that customer prefer when choosing Electronics Manufacturing Services. Chapter 2 is about literature review that study about previous research that is related to the topic. The previous research can help to understand general information and some background of the topic. Research methodology was developed to describe the research approach and methods of gathering data are present in Chapter 3.

Chapter 4 present of key finding and analysis follow by Chapter 5 for conclusions and recommendation.

CHAPTER II

LITERATURE REVIEW

With refereeing to the past research regarding to supplier selection model, most of them were focusing to decision making process or the method that customer use when selecting their main supplier which seem to be in the way of calculation in statistic information such as integer programming and goal programming, data envelopment analysis, AHP, analytical networking process, fuzzy set theory, and genetic algorithm. In order to get supplier selection criteria we will have to base on the studies about supplier selection on the years of 1960s. Dickson identified 23 criteria for supplier selection based on a survey of 273 purchasing manager. Showing that quality was perceived to be most important criteria followed by delivery and performance history (S. Talluri, 2003). It is never expected from a supplier being perfect, according to all supplier selection criteria. For example, a supplier product may have a high quality, but cost of the products may not be the lowest. On the other hand, another supplier' products cost may be the lowest, this is very good for a company, but on the same time delivery performance may be the worst. As it seen from the example, for making good decisions, supplier selection process must be handled systematically. There are many methods used in supplier selection such as

2.1 Total cost approach

In the total cost approach all important of no direct cost evaluation criteria considered are being replaced by a cost factor such as time may calculate in to dollar amount per hour which is either added (in case of negative performance or delay on a criterion) or subtracted from the quoted price. The suppliers are in the end rated by their lowest unit total cost. A disadvantage of this approach is that valuing non-monetary criteria (or no direct cost), such as lead time, quality performance or after-sales service, can be hard and subjective to value. (Porter 1993; Bhutta and Huq 2002)

2.2 Total cost ownership

Total cost ownership (TCO) is a methodology comparable to the total cost approach with the difference that it puts value on actual costs and not on non-monetary criteria, which means organizations need to have a good look at their cost and include costs like order placement costs, transportation costs, receiving, inspecting, warehousing costs etc. There are evaluation approaches similar to TCO, like life-cycle costing and cost-ratio methods, but it is TCO that receives most support given it is not the most complex of all the costing-based approaches and it can be used both for supplier selection and for ongoing supplier performance evaluation. Disadvantages are that there are various models to choose from, TCO is situation-specific, it can be expensive to implement and using TCO might require a cultural change in the organization from price towards cost orientation. (Timmerman 1986; Degraeve, Labro and Roodhooft 2000; De Boer, Labro and Morlacchi 2001; Mendoza 2007; Tahriri et. al. 2008)

2.3 Categorical Methods

Categorical methods are qualitative in nature in the sense that they help decision makers pre-qualify suppliers based on performance categories using historical data and buyers 'experience. Performance categories can focus on price, customer focus, delivery requirements, communication, innovation, problem solving capacity, etc. on a scale (eg. 'positive', 'neutral' and 'negative') and an overall rating following the same scale. Categorical methods are easy to use, are inexpensive and have limited data need, but highly rely on the evaluator's judgment and all criteria are assumed equally important.(Timmerman 1986; De Boer, Labro and Morlacchi 2001; Mendoza 2007; Ordoobadi and Wang 2011)

2.4 Quality, Time, Cost & Flexibility Approach

Competitive Priorities, In 1984 Hayes and Wheelwright suggested that companies compete in the marketplace by virtue of one or more of the following

competitive priorities: Quality, Lead-time, Cost and Flexibility(University of Cambridge,2014)

On the basis of the literature reviewed above it has been observed that the basic criteria typically utilized for selecting the suppliers are pricing structure, delivery, product quality, and service etc. While most buyers still consider cost to be their primary concern, few more interactive and interdependent selection criteria are increasingly being used by the manufacturers. With most of the theory they are 23 criteria have been ranked as the most use in supplier selection as table 2.1

Table 2.1 Rank of supplier selection criteria in Manufacturing Service

No.	Criteria	No. of Papers	%
1	Quality	74	97.37
2	Delivery	72	94.74
3	Cost	72	94.74
4	Production facility and capacity	52	68.42
5	Flexibility and reciprocal arrangement	52	68.42
6	Technical capacity and support	49	64.47
7	Repair services and follow-up	45	59.21
8	Information technology and communication systems	41	53.95
9	Financial status	40	52.63
10	Innovation and R&D	38	50.00
11	Operating controls	34	44.74
12	Quality system	33	43.42
13	Management and organization	32	42.11
14	Personnel training and development	24	31.58
15	Product reliability	24	31.58
16	Performance history	23	30.26
17	Geographical location	23	30.26
18	Reputation and references	21	27.63

Table 2.1 Rank of supplier selection criteria in Manufacturing Service (cont.)

No.	Criteria	No. of Papers	%
19	Packaging and handling ability	18	23.68
20	Amount of past business	18	23.68
21	Customer relationship	18	23.68
22	Warranties and claim policies	15	19.74
23	Procedural compliance	15	19.74

Note :No. of Papers: Number of papers that appeared the criterion

%: Counted fractions of the criterion to the overall in percentages

(G. W. Dickson,1966)

From the research in 1960 by Dickson, 76 relevant papers were reviewed and summarized as shown in Table 2.1., the rank of selected criteria by the number of paper counted in percentages. It indicates that the most considered criteria in the high level ranking with the percentages over 90 are quality, delivery, and cost. The medium level ranking range from 50 to 70 percentages contains production facility and capacity, flexibility and reciprocal arrangement, technical capacity and support, repair services and follow-up, information technology and communication systems, financial status (, and innovation and R&D, respectively. The criteria in which fall between 10 and 50 percentages are considered as the low level ranking criteria.

2.5 Framework

In this research, we will only focus into criteria that have ranking more than 60% which are 6 criteria as a main factor for supplier selection in Thai's Electronics Manufacturing Services (EMS) as shown in Figure 2.1

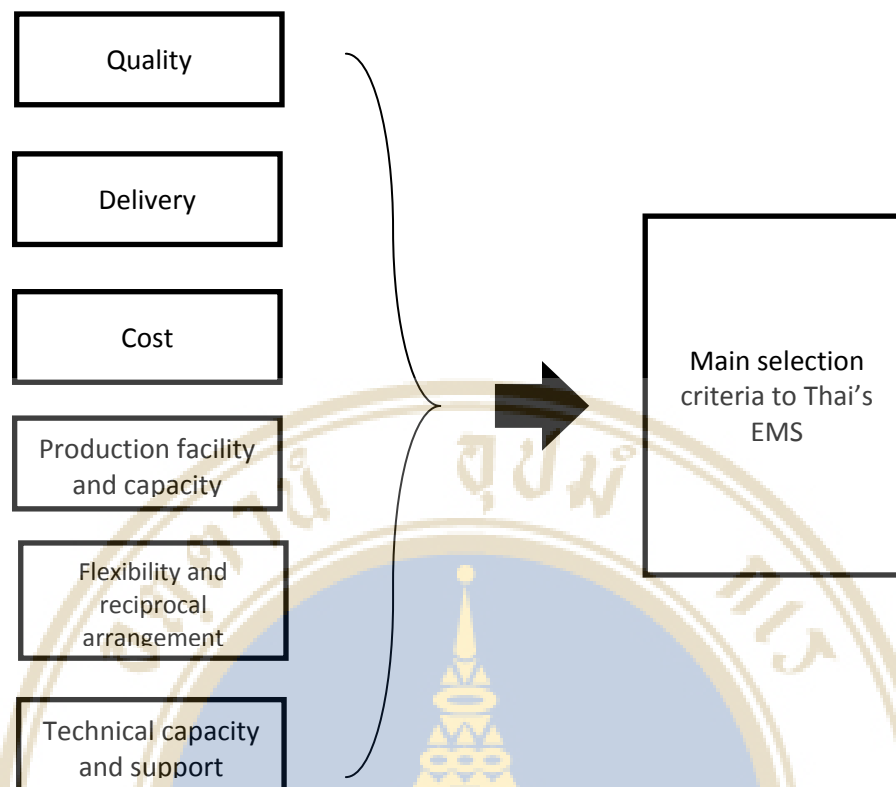


Figure 2.1 Propose of framework in supplier selection criteria to Thai's EMS

With significant percentage of reference of these criteria in the past paper, we are expecting to find out the importance of each criterion that concern to customer when select Electronics Manufacturing Services in Thailand not the way of how they make decision. In each factor would show difference importance in customer mind which we could identify while do information collecting in the next chapter.

CHAPTER III

RESEARCH METHODOLOGY

3.1 Methodology

There are two basic methodology in collecting information and analysis first is quantitative method which aim to collecting data from respondents to find statistic relationship between factor which require large samples size and descriptive result from statistic calculation (John D. Anderson,2006), The second method is qualitative is much more subjective than quantitative research and uses very different methods of collecting information, mainly individual, in-depth interviews and focus groups. The nature of this type of research is exploratory and open-ended. Small numbers of people are interviewed in-depth and/or a relatively small number of focus groups are conducted. Participants are asked to respond to general questions and the interviewer or group moderator probes and explores their responses to identify and define people's perceptions, opinions and feelings about the topic or idea being discussed and to determine the degree of agreement that exists in the group. The quality of the finding from qualitative research is directly dependent upon the skills, experience and sensitive of the interviewer or group moderator. This type of research is often less costly than surveys and is extremely effective in acquiring information about people's communications needs and their responses to and views about specific communications (John D. Anderson,2006).

This research will collect information by qualitative method to explore in depth understanding of supplier selection criteria to Thai's EMS data will be collected by interviewing one on one via telephone or Skype program with Audio recording in order to check whether all questions are asked and answered, The interviewees are current customer who are at least have one or more contract with Thai's Electronics Manufacturing Services. All of respondents are from foreign company who are working in supplier selection position. Respondents have a main role of making decision whether their organization will stay or leave supplier. The interviews will

begin with an open-ended question. Subsequent questions are conversational in an attempt to get the respondents to discuss further something. Open-ended questions are those to which the respondent replies in her or his own words. The advantage of this type of question is respondents will provide the researcher with a rich array of information. The respondent's answers are based on his or her personal frame of reference and described in real-world terminology rather than laboratory and marketing jargon. Open-ended questions may suggest additional alternatives not listed in a closed-ended response format. Often, open-ended questions require probing. Probing means that an interviewer encourages the respondent to elaborate or continue discussion. Powerful probes will advance a discussion quickly away from top-of-mind responses and seat-of-pants answers and access deeper information, allowing insight into the baseline thinking that drives behavior (McDaniel, C., & Gates, R., 2003).

The set of interview questions will be about their experience and criteria about selecting Electronics Manufacturing Services in Thailand comparing with other countries. The questions have been designed based on *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (Creswell, J., 2010) which said Qualitative research questions use neutral, exploratory language and refrain from conveying an expected direction (or non-directional outcome). Begin with the words "how" or "what" rather than "why".

3.1.1 Screen Questions

- a) Have you currently had at least one contract with Thai's Electronics Manufacturing Services?
- b) If not, did you have in the past or would you plan or tend to have in the future considering to have a contract with Thai's Electronics Manufacturing Services?

The screening questions were used as a tool to screen unqualified respondents. The respondents should have at least one contract with Thai's Electronics Manufacturing Services or plan to have one in the near future.

3.1.2 General Questions

c) How many years have you been in the Electronics manufacturing environment?

d) Why have you selected Thai's Electronics Manufacturing Services? And how many years have you been with them?

e) Do you have any other Electronics Manufacturing Services in other country?

3.1.3 Specific Questions

f) What are the importance criteria when selecting Electronics Manufacturing Services?

g) What are the differences in services between Thai's EMS and (specific country from "e")?

h) What are the best parts of Thai's EMS if somebody asks you to describe?

i) What are the parts that Thai's EMS need to improve in your opinions?

j) Have you ever thought about moving from Thai's EMS to other country? Why or Why not?

If respondents do not have current Thai's EMS, this question will be skipped.

k) How is the cost concern when selecting Electronics Manufacturing Services?

This question is to get in depth of real importance criteria which respondents may come up with differences from question "f"

l) What is the most conversation topic when you contact with EMS?

This question is to understand current service performance of Thai's EMS, conversation topic would tell other key criteria

3.1.4 Demographic Questions

m) Which country are you working?

n) What is your position?

o) How many years have you worked with current company?

p) How many products do you have with Thai's EMS?

CHAPTER IV

DATA ANALYSIS AND DISCUSSION

This section describes findings of the study. The interviewing was conducted via Skype and recorded conversation in Audio file for detail analysis, we have ten people were interviewed which all of them have been working or used to work in the Electronics Manufacturing Services (EMS) for more than 10 years in several positioning that direct contact with Thai's EMS.

4.1 Respondent Profiles

More than 50% of them have more than one EMS other than Thailand such as China, Malaysia and Mexico. 100% of the respondents have started EMS contract with other country before moving into Thailand, 40% already moved out from Thailand to other country and one is looking to move from China to Mexico.

The average contract years with Thai's EMS is 5.7 years with several of products such as Radiation detective devices, Security panel for home and commercial use, Dolphin detective devise for fisherman, etc., which are in difference area of market and experience with EMS.

All of them are working in international company such as USA, UK, Malaysia and Australia. The table 4.1 below will show demographic information including experience year and service with Thai's EMS.

Table 4.1 Respondent profile (number of people is 10)

No.	Nationality	Company head office	Year on experience	Service year with Thai's EMS
1	USA	USA	25	10
2	USA	USA	28	8
3	Malaysia	UK	17	5
4	USA	USA	12	4
5	UK	UK	17	5
6	UK	UK	22	5
7	UK	UK	12	5
8	Australia	Australia	8	5
9	Malaysia	USA	7	4
10	USA	USA	20	6

The interview started with screening question to make sure that they have or used to have a service with Thai's EMS continue with their experience year of Industrials environment which would help interviewer able to get in dept detail and be sure that they are the target group to be interviewed. With the specific question regarding to Selection Criteria, Most of them mention to Cost , Delivery , Quality and Supply chain or ability to sourcing material with competitive price. The top 3 criteria are Cost which have been mentioned by 7 respondents (70%) , 50% of respondents mentioned about delivery and 50% of respondents mentioned about quality as shown in Table 4.2. Which are similar to research criteria in Chapter 2.

Anyway the interesting finding is that 20% of respondents mention to the best criteria of Thai's EMS concern to services quality and behavior of Thai employee, the smile , environment of working with Thai's staff and the way of how Thai's EMS treat worker in production line.

Customers feel it is more friendly and relax working with Thai's EMS comparing with another country. Even this is not the main criteria of selection but it seems to be the key criteria to keep them stay with Thai's EMS.

The result of criteria have been mention during the interview been ranking below in table 4.2,

Table 4.2 Criteria ranking result of Supplier Selection model for Thai's Electronics Manufacturing Service

No.	Criteria	No. of customer mentioning (by person)	%
1	Cost	7	70
2	Delivery	5	50
3	Quality	5	50
4	Flexibility and reciprocal arrangement	2	20

It is not surprise that cost is ranked number one in Selection Criteria with competitive environment in the industrials, cost is always the major criteria for all business. In the Electronics Manufacturing Services, customer comparing for Total cost of ownership (TCO) (Ellram, 1994a; Ellram and Siferd, 1998), which mean it is not just the cost of Goods but also the other services cost which generate from EMS or either within customer organization when contacting or making activities with Thai's EMS. Delivery and Quality of products come in second and Third ranking, with 50% of customer were saying during the interview that the delivery is the most topic when having conversation with Thai's EMS and following with Quality. The Quality have been mentioned just a parts of standard manufacturing services in term of ISO (International Organization for Standardization) and working procedure, the last criteria is Flexibility which mean that EMS should have ability to make thing change in time that customer expecting and able to turn around thing quick with still keeping other criteria within the same standard of service. This Flexibility also mean to the ability to pull in , push out delivery for customer, according to market situation the delivery plan might change from time to time depend on the market demand which it is more importance in globalization market nowadays (Rajshekhar (Raj) G. Javalgi et al , 2005)

According to QCDF approach, these 4 criteria have been used as a standard of company selection (Hayes and Wheelwright,1984) it had suggested that companies compete in the marketplace by virtue of one or more of the following competitive priorities which are Quality, Cost, Delivery and Flexibility. Customer may not know about this approach but what they have said are about the main key criteria that have been used since 1984.

Another specific question have used in order to get more focus on Thai's EMS criteria in customer opinion is that what are the best parts of Thai's Electronic Manufacturing Services. The answers come in several criteria in tangible and intangible such as cost, flexibility, sourcing ability and working atmosphere in Thai's EMS. Table 4.3 showing the best criteria from respondents.

Table 4.3 Best Criteria ranking result of Thai's Electronics Manufacturing Service

No.	Criteria	No. of customer mentioning (by person)	%
1	Cost	9	90
2	Delivery	5	50
3	Flexibility	5	50
4	Working atmosphere	2	20

Cost is always the main criteria which perceived by customer that Thai has lower than other country with similar capacity. From 10 person ,90% mention that Thai's EMS perform better in term of cost spending comparing with China and their own country. Other criteria have been mentioned but still could not compare to cost.

The next issue id what customer think Thai's EMS should be improved, there are several criteria have been mentioned which might depend on their experience with Thai's EMS performance in the past such lead-time to new product, supply chain ability, communication, lead-time to mass production and cost. Tables 4.4 showing the criteria that customer think Thai's EMS should be improved.

50% of respondents mentioned to Lead-time to new product, 50% of respondents mentioned to Lead-time to mass production, 30% of respondents mentioned to Communication and Cost.

Table 4.4 Criteria ranking result of Thai's Electronics Manufacturing Service need to be improved

No.	Criteria	No. of customer mentioning (by person)	%
1	Lead-time to new product	5	50
2	Lead-time to mass production	5	50
3	Communication	3	30
4	Cost	3	30

Thai's EMS need be improved the first and second ranking are about lead time to delivery which are for new product and mass production but customer perceive that Thai's EMS seems to use too much lead time in order to get product out for delivery.

Delivery become the criteria that concern and may push them away from Thailand. It is interesting that from the most conversation topic that customer contacting with Thai's EMS almost 100% is product delivery which shown in table 4.5. This does not mean that delivery is now more importance than Cost at the first place but once customer already have had service with Thai's EMS later delivery is the most importance since Cost and other Criteria should not be changed.

Table 4.5 Conversation topic when contact to Thai's EMS

No.	Criteria	No. of customer mentioning (by person)	%
1	Shipping schedule	9	90
2	Technical discussion	3	30
3	Other	3	30

At the end there would be four basics Criteria that customer use when they will select EMS in Thailand which will be comparing to their current EMS. The other Criteria that have been found out either best or worst in customer opinions could be used as additional benefit to compete with another country which will be discussed in Chapter 5.

CHAPTER V

RECOMMENDATIONS/CONCLUSIONS

The last section is about recommendation and conclusion. This part will summarize all of the research and recommendation. The key finding will be useful for Thai's Electronics Manufacturing in order to maintain and improve ability of competitiveness to other country.

5.1 Summary

From the research question that “What are the criteria customers select Thai's EMS as their main contract manufacturing other than other country? “

This research interviewed 10 customers from several countries who have or used to have services with Thai's EMS, Table 5.1, most of them consider Cost when select Thai's EMS and it is also the main criteria of leaving Thailand to other country. Customers have not considered cost of product but they seems to focus to Total cost Ownership (Ellram, 1994a; Ellram and Siferd, 1998), that they have to pay in order to get things done with EMS which include in many dimension such as delivery cost, visiting cost, communication ,etc.

The other three criteria are Delivery, Quality and Flexibility combined with Cost will be defined in terms of capabilities (cost, delivery, quality and flexibility) that must be in place in order to compete in the industrial environment (Miller and Roth, 1994).

The perception of Thai's EMS performance to customer, Cost is still the major criteria follow by Delivery, Flexibility and Working atmosphere.

Table 5.1 Criteria ranking result of Supplier Selection model for Thai's Electronics Manufacturing Service

No.	Criteria	No. of customer mentioning (by person)	%
1	Cost	7	70
2	Delivery	5	50
3	Quality	5	50
4	Flexibility and reciprocal arrangement	2	20

5.2 Recommendations

For Electronics manufacturing services industrial in order to maintain competitiveness toward international market, they have to focus on main criteria that customer use when selecting Thai's EMS it is recommended to promote their key benefit that align with these criteria which are Cost, Delivery, Quality and Flexibility. We might differentiate from other country by adding working atmosphere.

Since customer looking for several main criteria and Cost is ranked in the most importance criteria for customer in order to select EMS. To stay in line with cost competitive, Thai's EMS may apply cost reduction improvement to operation such as lean manufacturing, Kaizen, 5S or adding more automatically equipment to reduce labor and operation cost. However in long term other development country which have lower wage than Thailand such as Vietnam, Laos or Cambodia would win in the cost strategy situations. China is facing the problem that a lot of customer is moving out to other country because total cost of manufacturing in China become higher and higher every year (The Economist, 2012).

Thai's Electronics Manufacturing Service should shift to value add service, Hi-Technology manufacturing services, High Mix, Low Volume, prototype building. As this strategy lowest cost may not be key criteria. This is due to global competition in Electronics Manufacturing Service. Low cost production with huge amount of

product to gain economy of scale with low cost of employee would not fit to advance economic anymore (McKinsey Global Institute, 2012)

5.3 Limitations

The qualitative research mainly focuses to prove if the frame work is correct before future research which from the result it seems that selection criteria can be explained by Theory such as Total cost ownership and Quality, Time, Cost & Flexibility approach. In this research we interviewed to only 10 customers. The samples are too small and do not cover all kind of Electronics Manufacturing Services in Thailand also size of business. With difference in business detail they might require difference criteria in selection process.

Interviewing have been done via Skype and phone call which could not receive fully response of body's language during the interview so we might lack of some understanding and extra information.

5.4 Future research

With Selection Criteria to Thai's Electronics Manufacturing service it is only the first part of Supplier evaluation process (L. de Boer et al,2001) to get whole picture of how customer select supplier and evaluation. We should include evaluation criteria from Pre-selection and Post-selection to understand the whole process since the Criteria at the selection state and after selection state could be difference. Future research could be more specific to similar size of business and products also collecting more samples to be analysis which can be Qualitative or Quantitative method.

Future research could also investigate in to characteristic of services that customer willing to pay higher if EMS could return specific services to customer which will help Thai's EMS changing their strategy in to the new level of competitiveness.

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APPENDICES

Appendix A : Interview Transcribed note

3.1.1 Screen Questions

a) Have you currently had at least one contract with Thai's Electronics Manufacturing Services?

Answer :Yes

3.1.2 General Questions

c) How many year have you been in the Electronics manufacturing environment?

Answer :We have two , with Frontrow at first and now Medcom, I think it'd been since 2006 so 8 years.

d) Why have you selected Thai's Electronics Manufacturing Services?

Answer :So at first it was a cost and also we were Low volume-High mix, And there were more opportunity in Thailand for that model than China. China generally like High volume.

And how many years have to been with them?

Answer : 28 years now.

e) Do you have any other Electronics Manufacturing Services in other country?

Answer :Yes, in China currently we use a company call V-Tech same people that make microphone. They have a contract manufacturing service. And we are now soon looking at new Vender in Mexico.

3.1.3 Specific Questions

f) What are the importance criteria when selecting Electronics Manufacturing Services?

Answer :There are several of course, One importance part is transparency especially during quoting process. We do like to have an open costing model. It's not fully detail but how much the cost to pay for single component. In generally it that to know for us to estimate product cost going to be when design the product.

Secondly of course technical components, they should have any ISO certified just good procedure in place and we can audit them against their procedure.

g) What are the difference in services between Thai's EMS and China?

Answer :Well, in my experience the more positive in Thailand. People are more open and responsive to you especially a smaller account. We are typically 3-5 Mil USD with CM (contract manufacturing) per year. In Thailand it is more a little bit more potential, in China not so much. We are very small piece of their totally yearly sell. It is very difficult to get think moving in China versus Thailand.

h) What are the best parts of Thai's EMS if somebody asks you to describe?

Answer :It is nice to walk into the factory to see a worker smile , in China it typically a small cabin room. Let's say it is a better business atmosphere. It feels better doing business in Thailand versus China. It is also difficulty in China for ECO (Engineering change order) implementation, part procurement, thing seems to take a lot of time. Samples we have firm order out six months. The lead-time is six months. It is very difficult to adjust forecast to correct, it is very difficult to adjust in and out so sell good is very difficult to bring in, and sell down it is very difficult to push out. We end up trying to procure material for them.

i) What are the parts that Thai's EMS need to improve in your opinions?

Answer :I think sometime it is communication, but that seems to get better over the year since I start working in Thailand maybe I learn how to deal with Thai business and culture as well

j) Have you ever think about moving from Thai's EMS to other country? Why or Why not ?

Answer :Currently Frontrow is not in Thailand but in China and we are looking at Mexico, I can give you a reason to that which would be similar if we currently in Thailand. How is the biggest going to take away to Mexico, we are in same time zone and distant travel. When we have to send our team of engineer to Asia rather be Thailand or China. It is a lot of opportunity cost we are not spending our time in our office designing new product with supporting CM to bring in our line. Course 20 hours trip versus 2 hours flight while cross the border, I don't know how it going to work out yet. We are going to Mexico over this weekend for the first time.

k) How is the cost concern when select Electronics Manufacturing Services?

Answer :Yes, it is not the number one thing. We are willing to pay a little bit more for curtain distribute, curtain thing that CM has lean and again if they are easy to work with and if they were transparency on the costing model.

l) What is the most conversation topic when you contact with EMS?

Answer :Generally is the part. I can't find the parts that it is typically hey it is in Digikey and they loose with the time. They (Thailand) seem able to do that but in China it is very difficult. They have very close relationship with their vender and only one prefers for them and it is a lot of democracy in their purchasing department. So another difficulty is finding about end of life part. Very mess so only when become a crisis so when they go to order and find its end of life. They should have relationship with distributor to narrow it and tell us a lot sooner before end of life.

3.1.4 Demographic Questions

m) Which country are you working?

Answer : United State.

n) What is your position?

Answer :I am a senior design engineer.

o) How many years have you worked with current company?

Answer :27-28 years almost.

p) How many products do you have with Thai's EMS?

Answer :Currently we have a one product to two.