The Resilience of Thai MSMEs in the Valves and Pipes: EPC Procurement Process and Importing from China Manufactures

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Abstract

Global economics has been agonized of SARS-Cov-2 and been mutating to various variant, in Thailand, it's been opened borders since 1st of July in 2022. From world to ASEAN countries as to Thailand, have been suffered to economy recession, in terms of MSMEs, the decline in sales, layoffs, arrears and bankruptcy, bear the brunt and face severe difficulties. The study aims on MSMEs, leaning on EPC project of fluid control equipment in Thailand in fields of project sale to end-user in annual renewal plans, replying on import industrial goods from China as to its bidding strategy to prospect price advantages. It is acknowledged from qualitative research and in-depth interview by MAXQDA from representatives in valves and pipes, results show this industry has not been affected as predicted. The research analyses according to the obtained results, corresponding suggestions for entrepreneurs to avoid risk and improve efficiency.

Keywords: Business Impact, Bidding, MSMEs, EPC, Thai-China

1. Introduction

Under the impact of the epidemic, many companies are facing the recovery of the post-epidemic era, especially the impact on small and medium-sized enterprises is more severe. In Thailand, many MSMEs, who join EPC bidding focus more on generate profit as their main source of revenue, and large wholesalers have also begun to participate in these projects, as well as annual procurements such as large factories to compete with. In the post-epidemic era, purchasers pay more attention to price cut and quality improve, especially more price orientated. The uncertainty and changes in the overall economic environment have created a shortage of funds in corporations and a rise in operating costs. Many small and medium-sized enterprises are struggling for survival. This article is mainly aimed at EPC-related bidders in Thailand and annual procurement at the factory side participants, such as sugar mills, petrochemical, steel plants, etc., who involve annual procurement and replacement of industrial products and other procurement needs. (Bag et al., 2020) In the current situation of rising costs, most MSMEs are involved in bidding with imported goods from China, striving to reduce costs and increase profits. This study will discuss from top to bottom, starting from the general economy of Thailand to the prospect of MSMEs. (Shafi et al., 2020)

Economically, inflation after the epidemic, rising raw materials cost and oil price substantial increase since 2021, the critical issue also caused by port closure, shipping schedule

delay as well as freight rate goes up dramatically. By World Bank indicator on GDP% growth, last year in 2021 is 1.6% to forecast of 3.95% and 4.3% in coming year 2022 and 2023, which has shown the recovery is still hovering in low gear.(World Bank, 2022a)

However, imports of goods and services (% of GDP) is higher compared with 2020 to 2021, shows 46.3% to 58.5% between world average is 25.6% to 28.1%.(World Bank, 2022b)

Which indicates pointedly that for EPC bidding process by importing industrial goods and services of consulting, enterprises have faced more risk by delays of customer payment, importing from China, bank loan payback and lead-time issue once joined the EPC bidding process and annual renewal purchase scheme. From WTO trade statistics in 2020 in intermediate goods and commercial services, China has played a big role to Thailand in terms of export and import.(WTO, 2022)

The paper will be inclined on Thailand MSMEs bidding process and procurement operating method between these two countries, due to economic dependency and trading perspectives are highly correlated. (Adams & Abhayawansa, 2022) In addition, for this related industry that has participated in the EPC bidding, the study will accomplish suggestions in the post-epidemic era to reduce business risks. (Pal et al., 2017)

2. Thai Economic After Covid-19 Spillover and Recovery in 2022

In the first two years of the epidemic, Thailand experienced the closure of enterprises and the depression of tourism. However, the Thai government has taken many measures to revitali ze the economy, but until the beginning of 2022, the effect is not very significant, as we can p erceive from the CEIC real GDP growth chart from 2016 to 2027 forecast by IMF. (CEIC, 20 22) After 2022, the growth level will return to the pre-epidemic level. Under the policy of ope ning to foreign tourists, the overall tourism industry will recover significantly in mid-2022. H ere we could examine the growth rate of the tourism industry is estimated to 3.1% year on yea r in 2rd quarter of 2022 (Reuters, 2022) that refer to IMF forecast by 3.3% increase this year and the epidemic situation in the WHO Thailand region, that providing us a intuitive resolutio n.(WHO, 2022)

In general, Thailand's economy relies heavily on tourism and trade with China. In 2020, it experienced a sharp decline in import and export trade and GDP. However, compared with th e systemic risks of large-scale financial crises such as the financial tsunami.(Jagannathan et a l., 2013) At the moment when the epidemic has been raging for two years, it is even more cru cial for the survival of small and medium-sized enterprises in Thailand, especially the EPC bi ds and production equipment of public works and factories. (Adams & Abhayawansa, 2022) T hroughout literature review from EPC relative studies, the model and focus will be leaning on efficiency of bidding to delivery period (Bajomo et al., 2022), profit improvement (Ishii et al., 2014), and cost management model (Toutounchian et al., 2018). Providing process and mode l derivation suggestions necessary for large-scale EPC industries, the renewal and replacemen t of MSMEs is also to prepare for the growth of the next year. This research mainly focuses o n the process management of EPC bids, and can also further explore the rebirth of MSMEs un der this crisis. (Shafi et al., 2020) It raises our concern, if there’s an alternative solution and ad vance sales for importers main product sources from China.

3. Framework for EPC

3.1 Bidding Process

As illustration for government bidding process, while conducting procurement operations in Thailand, engineering, finance, or labor services, to ensure high-quality products and services, reasonable prices and to avoid the suspicion of profiting from specific suppliers. Once the purchase amount reaches a certain level, the bidding process must be carried out according to the law, and the relevant suppliers are invited to join the bidding and submit documents, to be honored the contract with the government agency. According to the Government Procurement Law, the bidding methods are divided into main three types: "general invitation method", "selection method" and "specific method". (Baker McKenzie, Procurement Procedures-Thailand, n.d.) Nowadays, for non-government procurement cases, selection and specific methods are common applied by factories or public companies, also cared social responsibility to environment issue as ESG concept, if the purchaser is in chemical industry, sugar mills etc., then price might not be the only consideration. (Mohammad & Wasiuzzaman, 2021)

Each invitation to tender has specific program requirements, however, three main topics are what bidders must attempt to:

(1) The key issue: Regarding tender content, what's the planned demand, final output, and the challenge behind the demand. Using an expert's point of view to break through the problem and establish professionalism and authority.

(2) Competitive advantage: Why is this case not for you? The strengths raised are best to answer the key questions or to pull back the key questions from your strengths. The analysis in place must be shown in the briefing and present the clear advantages overlap into a thick defensive barrier, making it difficult for opponents to cross.

(3) Tender briefing preparation must focus on relevant achievements: The execution of the plan is a beautiful imagination, and the relevant actual performance is the concrete reality. Evidence speaks for demonstrating that the team is good at analysis, planning, and has the pragmatic ability to implement projects.

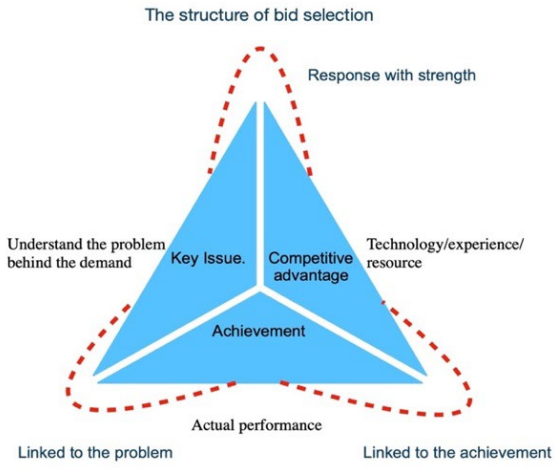

Figure 1

The Structure of Bid Selection: Three Main Topics

From figure 1, we could easily recognize that three main points are highly correlated, especially in cases related to general invitation method. Therefore, for related tenders such as EP

C from scaled factories and listed companies tend to use same method to select partners to co operate with. By adapting this concept, for most of MSMEs business entities should convert w inning projects by offering lowest price to fair quality product/services with affordable price. Surely, for enterprises who are in strong business ability and stable qualitied supply power mi ght walk away if frequent losing projects by price competition.(Jing et al., 2021) At the same t ime, the procurement and consulting teams from demand side must also have an efficient inter nal control system, which not only conforms to the ISO process, but also applies to its own ef fective implementation process. (ISO9001:2008 Quality Management Systems-Purchasing, n. d.) (ISO20400;2017 Sustainable Procurement-Guidance, n.d.)

3.2 Influence of EPC Bidding Management

As illustration for government bidding process, while conducting procurement operations in T hailand, engineering, finance, or labor services, to ensure high-quality products and services, r easonable prices and to avoid the suspicion of profiting from specific suppliers. Once the purc hase amount reaches a certain level, the bidding process must be carried out according to the l aw, and the relevant suppliers are invited to join the bidding and submit documents, in order t o be honored the contract with the government agency. According to the Government Procure ment Law, the bidding methods are divided into main three types: “general invitation method”, “selection method” and “specific method”. (Baker McKenzie, Procurement Procedures-Thail and, n.d.) Nowadays, for non-government procurement cases, selection and specific methods are common applied by factories or public companies, also cared social responsibility to envir onment issue as ESG concept, if the purchaser is in chemical industry, sugar mills etc., then pr ice might not be the only consideration. (Mohammad & Wasiuzzaman, 2021)

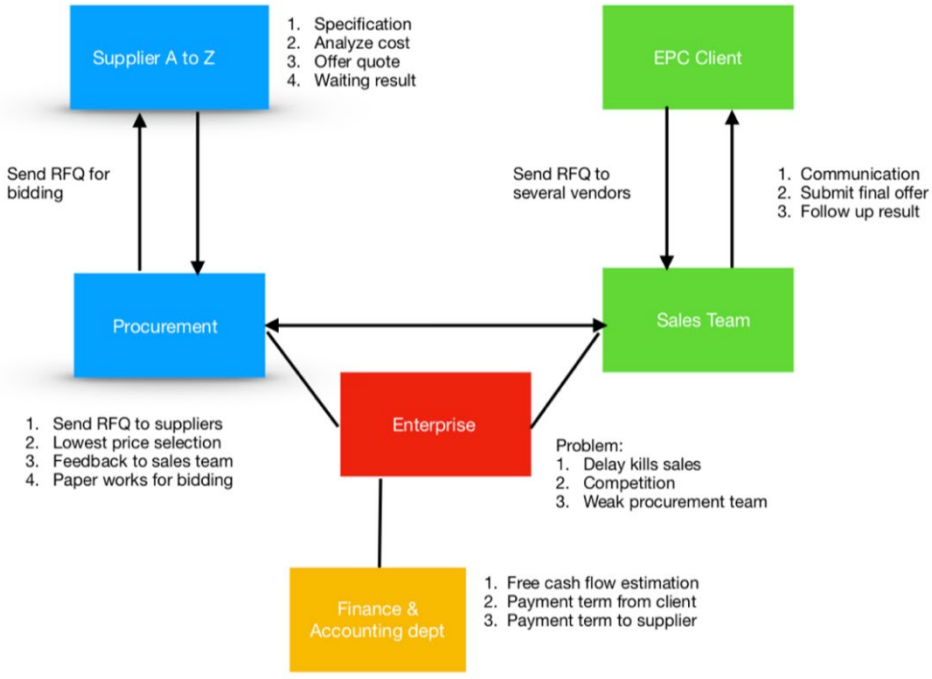

Figure 2

EPC Project Procedure and Framework (Lee et al., 2021)

4. Research Design and Methodology

4.1 Sample Description

This paper will be by qualitative approach, in order to gain a better insight of MSMEs who join the EPC project in Thailand or experience in bidding by selection and specific methods, the object will be procurement team of the corporations and entrepreneurs by semi-structure interview due to the study will be leaning on MSMEs who importing from China and join bidding, it's the niche market orientation. (Monforte & Úbeda-Colomer, 2021) As verbal exchange of idea by in-depth interview will provide us a more vivid vision in this field and expressed business strategy into key factors. (Thunberg & Arnell, 2021)

For interviews, due to they have been in the industry for a long time, and the suppliers have a deeper understanding of EPC's tenders, they are also very familiar with the process and could provide more practical implementation difficulties and insights than pure questionnaires. (Bates et al., 2017) Throughout topic-based questions, the two parties could have more detailed discussions, such as analyzing the for of bids, the rate of winning bids, its profitability and technical difficulties of product or services descriptions. Leading to the result of sharing and listening of the opinions of both parties. (Monforte & Úbeda-Colomer, 2021) (Smith, 2019) Additionally, the insight of the procedure could be diverse between business owner and procurement manager/staff.(Lyndon & Edwards, 2021) The interview questions will be applied by diffractive methodology as table 1 shown. Then, we identified and covered to our framework of EPC and bidding management to detect if entrepreneurs allied with its goal planning. (Mazzei, 2014)

Table 1

Interview Question List Refer to Research Content, Descriptions, and Code.

Question	Research Context	Description	Code
1	What's the Thailand economic change you feel from 2020-2022 to post-epidemic? (Score 1 to 5; No affect to severe)	Covid-19 impact within 2020-2022 and post-epdimic from macroeconomic perspective. Range from strong postive to negative for scale.	Economy in Thailand/ Score Problems
2	Does it affect business significantly? (Score 1 to 5; No affect to severe)	Degree of impact by sales and cost aspects by participants. Range from strong postive to negative for scale.	Business impact/ Score / Problems
3	Do you believe 2023 will be recovering soon; if not, what's your opinion? And when you think it's going to be recovery? (Score 1 to 5; Fast to slow)	Expectations in mind and if reflects the economic growth rate from MSMEs. Range from strong postive to negative for scale.	Economy in Thailand/ Score / Problems
4	Have your company implemented employee cut-off plan? If yes, what's the percentage % of it? (Score 1 to 5; 1= 0-20%, 2=21-40%, 3=41-60%, 4=61-80%, 5=81-100%)	Unemployeement and inflation problems affection in MSMEs. Range from strong postive to negative for scale.	Business impact/ Score / Solution
5	For EPC project how many cases per year in your company average? (Amount over 1 million baht) Is there any decrease (by percentage %) within 2020-2022? (Score 1 to 5; 1= 0-20%, 2=21-40%, 3=41-60%, 4=61-80%, 5=81-100%)	Understand potential risk on cash flow and examine importing goods/services from China has dropped or not? Range from strong postive to negative for scale.	EPC project impact/ Import from China/ Case number/ Score
6	Refer to point 5, what's your opinion why EPC cases have been decreased? And do you think it will be boost up or bids (tenders) keeps small in post-epidemic? (Score 1 to 5; Strong to weak demand)	Analyze the key issue from Q5. Range from strong postive to negative for scale.	Business impact/ Problem/ Score
7	In EPC bidding, what's the difficulties, your company has been facing? 1.technical support 2.product range to complete the bidding 3.price issue with competitors 4.document or paperwork efficiency 5.customer payment term 6.others Please specify	EPC bidding management by corporation. Selection to high frequency numbers to understand main issues for MSMEs bidding hardness.	EPC project impact/ Impact factor / Score / Problems / Price issue / Payment term / Others
8	Do you think your company could improve the bidding rate? How? (Score 1 to 5; Positive to negative)	The structure of bid selection and open quesiton to figure out differenct solution refer to Q7. Range from strong postive to negative for scale.	EPC project impact/ Score / Solution
9	Do you think to import products from China is still a long-term trend? What's your opinion? (Score 1 to 5; Positive to negative)	Import from China is the main trend for valves & pumps business in Thailand, is it still a long-term trend or lost of advangtages. Range from strong postive to negative for scale.	Economy in Thailand/ Import from China / Score
10	Do you look positive in your business? (Score 1 to 5; Positive to negative)	To measure business confidence in the post-pandemic era. Range from strong postive to negative for scale.	Business impact/ Score / Solution / Problmes

4.2 Data Collection and Coding

Based on research theme, our study is to measure the impact from business entity and prospect to post-epidemic EPC bidding rate, thus, our data collection is by different aspect from upper stream to lower stream companies in Thailand and China, who are in mainly import or export positions. Our interviewees have been covered by valves manufacturers, pipe suppliers, casting factories and in Thailand to wholesaler, factory-owned distributor, leading companies in public & private sectors of EPC projects (Høyland et al., 2019), also trading companies who joined small projects have been included to create matrix and layered consideration from top to bottom in valves & pipes industry in Thailand. Table 1 displays the frequency of coding with a code configuration for every interview question. The impact factor is divided into six main categories. The following table will explore the primary concerns arising from each coding, ranked by items that represent the difficulties encountered since the Covid pandemic. (Wibowo et al., 2015) Referring to Table 2, respondents chose to support procurement by using import and representative companies that were on the end-user's bid list. There is, however, a noted exception in which participating business bid on the same sorts and avoid selecting competitors. For instance, as explained in Appendix B, a single business, such as Thai Petroleum, or a sizable sugar factory was chosen for the interview from the purchase list.

Table 2

Sample Characteristics

Number	Code	Company Description	Position	Document	Length
1	A1	Thailand Trading firm target to direct and in-depth factory end user	Sales manager	Appendix-Interview A1	11:08m
2	B1	Thailand wholesaler to direct sale and customer base in Thai-China economic development Zone	Owner/ general manager	Appendix-Interview B1	12:48m
3	F1	Thailand trading firm to direct sale and customer base in Rayong economic development Zone	Owner/ general manager	Appendix-Interview F1	15:16m
4	J1	Steel piping supplier and exporter in Wenzhou, China	Owner/ purchase manager	Appendix-Interview J1	8:26m
5	K1	Valves supplier in Taiwan, China export to Thailand biggest wholesalers	Sales director	Appendix-Interview K1	N/A
6	L1	Vales supplier in China and branch in Thailand to direct users and wholesalers	General manager	Appendix-Interview L1	10:06m
7	N1	Leading conpany in Thailand of PVC valves & pipe	Owner/ purchase manager	Appendix-Interview N1	13:27m
8	T1	BOI stell piping system manufacturer in Thailand	Regional manager	Appendix-Interview T1	15:58m
9	W1	Leading company in Thailand for public company bidding and wholesaler	Purchase manager	Appendix-Interview W1	13:09m
10	W2	Leading company in Thailand for public company bidding and wholesaler	Owner	Appendix-Interview W1	12:06m

In table 3, the code relations from research question listed in table 1, the 3 major factors a re economy in Thailand, business impact and EPC project impact, from interviewees' feedbac k, we could also see the code relations with other factors we want to analyze into score, impac t factor, case number for EPC project import from China and problems are facing as well as it s solution to MSMEs entrepreneurs. (Samantha, 2018)

Table 3
Code Relation Browse

Code System	EPC...	Eco...	Busi...	Imp...	Imp...	Score	Pro...	Solu...	Cas...	Pric...	Pay...	Oth...	Tec...	Pro...	Doc...	Oth...
Others	1															
Technical support																
Product selection																
Price issue	9			9												
Documentary work																
Payment term	6			6												
Others																
Case number	7				4											
Problems	9	17	13													
Import from China	4	7							4							
Solution	11	4	5													
Impact factor	10									9	6					
Score	28	30	37													
EPC project impact			5	10	4	28	9	11	7	9	6	1				
Business impact	5					37	13	5								
Economy impact in Thailand					7	30	17	4								

The cluster of distance code map illustration clearly on its relations within 3 major factor s of impact with other factors in table 3 and code map to illustrate its relationship, that corresp ondingly in our interview records, code classification is carried out for valves and pipes relate d companies, to facilitate data analysis on the frequency of subsequent coding and digging fur ther the difficulties in EPC bidding and expose the solution. (Chesbrough, 2020) (Diego et al., 2013) From the relationship diagram of the above chart, we will next classify the three major categories of research problems. And respondents were asked to rate in several major categor ies the validity of the sample has been statistically analyzed.

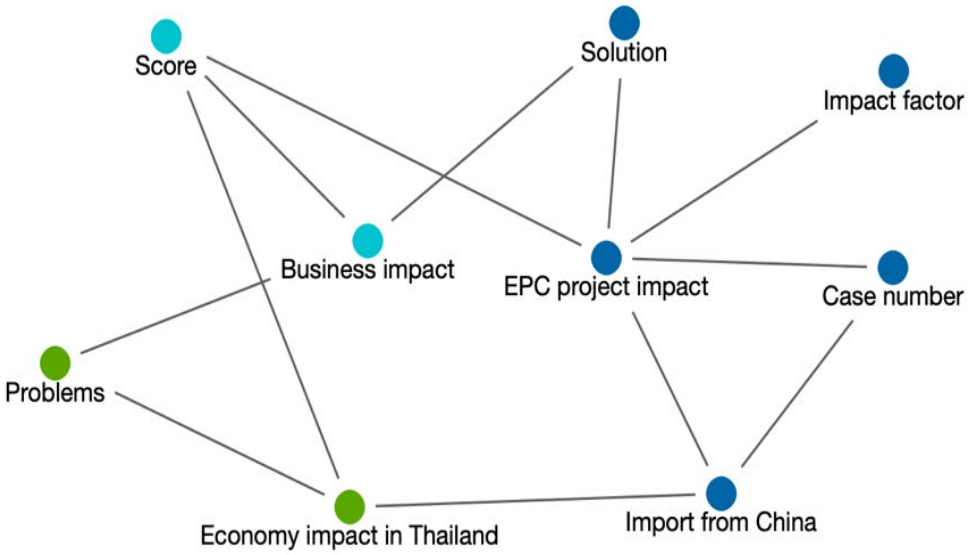

Figure 3
Code Map

4.3 Data Analysis and Results

From three major clusters, firstly we assume that the epidemic had not caused an impact on MSMEs bidding numbers for EPC, business sales turnover, and execute layoff plan as well as pessimistic reality. Second part, if entrepreneurs remain pessimistic about the future, then t he result should show the average number over benchmark. In other words, statistics for past and future expectations in this industry category should have no significant impact.

Table 4

Code Matrix Browser

No.	Code	Code Color	Description	Interview No.	A1	B1	F1	J1	K1	L1	N1	W1	W2	T1	Avg	Std	Benchmark
1	Economy impact in Thailand				4	5	2	4	4	4	3	4	4	5	3.90	0.83	3.00
2	Business impact				1	2	2	3	4	4	2	4	4	4	3.00	1.10	3.00
3	Economy impact in Thailand		Covid impact in 3 codes		2	1	3	4	3	2	3	3	2	3	2.60	0.80	3.00
4	Business impact				1	1	1	2	1	1	1	1	2	1	1.20	0.40	3.00
5	Epc project impact			Score	1	2	2	3	4	1	1	3	5	4	2.60	1.36	3.00
6	Epc project impact				2	2	3	3	3	2	2	1	2	2	2.20	0.60	3.00
8	Epc project impact		Optimism about the future in 3 codes of post-epidemic		1	2	2	2	2	2	3	2	1	4	2.10	0.83	3.00
9	Economy impact in Thailand				1	1	2	2	2	1	1	1	1	3	1.50	0.67	3.00
10	Business impact				1	2	2	3	2	3	3	1	2	2	2.10	0.70	3.00
7				Selection	3	3	3/5	6	3/5	3/5	3	3/5	3/5	3/5			

Score Definition:	
Strongly positive	1
Positive	2
Neutral	3
Negative	4
Strongly negative	5

Selection definition		No.	%
Technical support	1	0	0%
Product range to complete the	2	0	0%
Price issue with competitors	3	9	56%
Document or paperwork	4	0	0%
Customer payment term	5	6	38%
Others	6	1	6%
Frequency Distribution Table		16	100%

Ordinal scale

In terms of difficulties that business have been facing in EPC bidding, it indicates that pr oduct and technical specification are not major issues in documentation, paperwork for tender preparation, Respondents either had no other opinion, mainly issues are price competition pre ssure of competitors and the payment term of customers, which companies encounter a seriou s impact on cash flow. From figure 4, it shows 56% interviewees 'reply in price competition b etween tenders, and 38% in customer payment term, postponing to over 90 days is normal con dition. Only 6% replied other is problem in customer relation for bidding.

Therefore, excluding code 7, we divided rest of codes to two groups and assess the actual stances at the time of the outbreak of Covid within 2020-2022 and after Thailand's influenza policy of it on 1st of Oct 2022. Measuring the actual impact and expected goals of these two t ime periods to see if there's a significant impact. (Phillips-Wren & Hoskisson, 2015) This ana lysis involves forecasting and statistical modeling to identify future possibilities (Joseph & Jo hnson, 2013), determining the cause-effect relationship among our interview question setting

and striving to make a reasonable judgment on the current situation and future expectations of the industry based on the perceived external environment. Categorically, second cluster for future business positive tropism is according to corporate management and business execution capabilities of MSMEs. (Rehman et al., 2016)

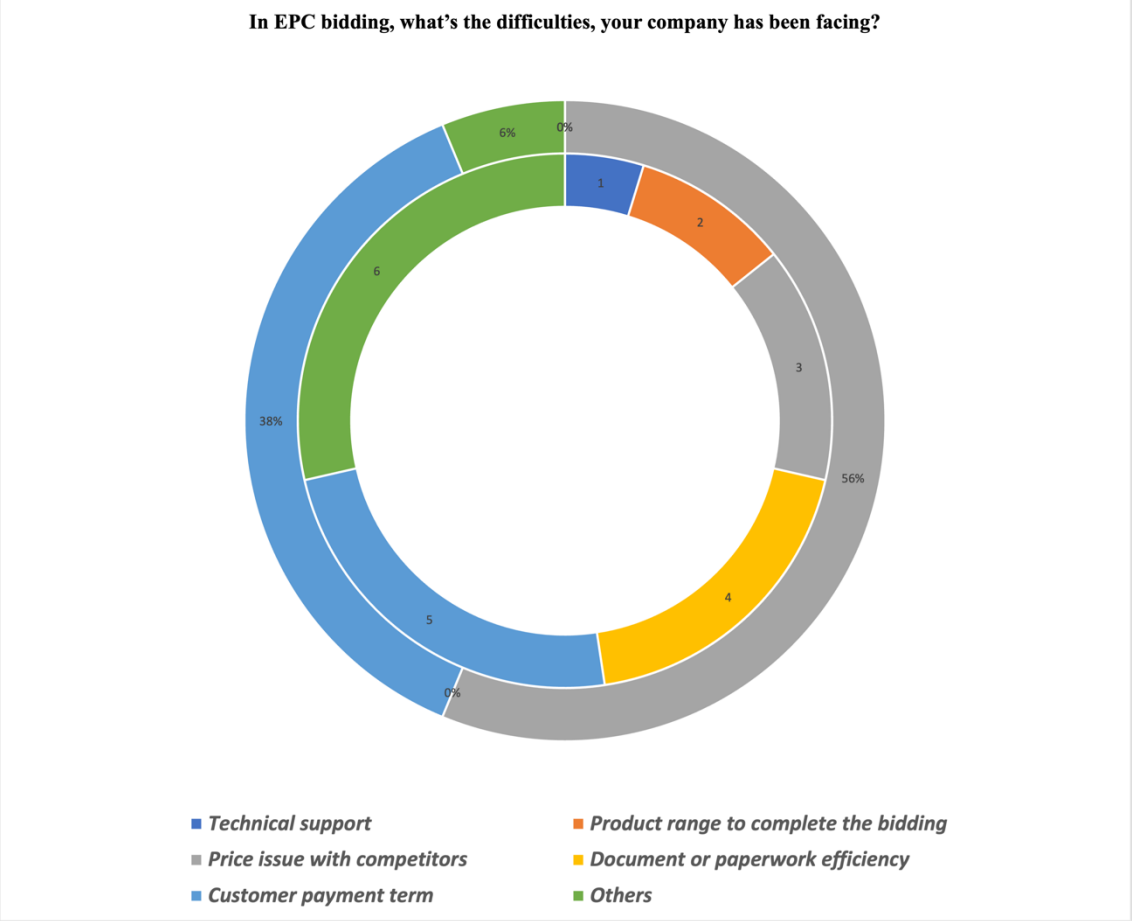

Figure 4

Major Impact Factors on EPC Bidding Refer to Question 7 Research Context.

4.4 Relative Important Index

To understand the perception and actual impact of the interviewees on the three main categories, we use the RII Likert Scale to judge the score and rank its impact. Refer to table 3, the rating we applied 5 points of score definitions and its extent as followings:

Strongly positive – 1

Positive – 2

Neutral – 3

Negative – 4

Strongly negative – 5

This is to analyze the 3 clusters (economy impact in Thailand/ EPC project impact/ Business impact) in coding system from code matrix browser, connecting to respondents' reply by further used relative important index. (Özdem, n.d.) (Samantha, 2018)

The formula is calculated by:

$$RII = \Sigma W / (A*N)$$

Where,

W is the weighting given to each score by respondent

A is the highest weighting. (Point 1 to 5 in this study)

N is number of respondents. (Total N is 90 refer o table 4)

Codes are grouped by 3 clusters by:

Economy impact in Thailand – Code 1/3/9

EPC impact – Code 5/6/8

Business impact – Code 2/4/10

Based on calculation, finding that economy impact is the most influencing factor ranked i n top at 0.53, following with EPC impact at 0.46 and last is business impact at 0.42. From the perspective of the overall economy, the public's overall perception of the external environmen t is relatively pessimistic. High frequency in the code 1 of table 4, it can be found that almost all respondents are pessimistic. However, from the perspective of EPC, the frequency of impa ct distribution is scattered but the overall impact is not large, especially from the perspective o f the proportion of layoffs in terms of the company's business impact, some companies have n ot even laid off staff, which shown in the code 4 of table 4.

What is relatively interesting in this research is that the external environment is very seve re of other consuming industries, such as retailers, food and beverage and household consump tion due to unemployment rate is high and psychological unsafety reasons. Conversely, in val ves and pipes industry is affected by the external environment at a psychological level and fee ls very bad, but in the actual EPC bidding or business activities, most of the companies haven' t been exaggerated as dramatically as it might have imagined.

4.5 Descriptive Statistics, T-Test and One-Way ANOVA

Based on descriptive statistics, the result has shown the mode is 2.6 that occurs most ofte n, and the median value is 2.2, which's skewed to the right, the majority value is less than 3. While we study the data and visualized through box-and-whisker plot in figure5. Referring to table 3 code color indicated in 3 cluster, corresponding to respondents' frequency, the rank of RII in table 4 could also be seen its trend of hierarchy- negative per external, but positive per i nternal business activities. The sample was relatively positive (M=2.3356, SD=0.8017)

Furthermore, while implementing t-test refers to table 3 data:

H0 = No impact on MSMEs for EPC bidder in valves & pipes industry

H1= Not neutral or positive/negative on business

Based on descriptive statistics, the result has shown the mode is 2.6 that occurs most ofte n, and the median value is 2.2, which's skewed to the right, the majority value is less than 3. While we study the data and visualized through box-and-whisker plot in Figure 5. Referring t o table 4 code color indicated in 3 cluster, corresponding to respondents' frequency, the rank o f RII in table 5 could also be seen its trend of hierarchy- negative per external, but positive pe r internal business activities. have no impact on MSMEs for EPC bidder in valves & pipes ind ustry. This matches the respondents' replies while we refer to table 4 of code 5, its dispersed w hile facing EPC project decrease and question 7 in table 3, that most MSMEs has common iss ues in price competitors and customer's payment term from buyers. Moreover, few of the bidd ers have encounter over 90 days customer payment term.

Table 5

Relative Important Index Refer to Table 4 Frequency

Relative Important Index

Code	Description		*Frequency*	*Total Number (N)*	*Total*	*A x N*	*RII*	*Rank*
		Strongly positive (1)	0					
		Positive (2)	1					
1		Neutral (3)	1					
		Negative (4)	6					
		Strongly negative (5)	2					
		Strongly positive (1)	1					
		Positive (2)	3					
3	Economy impact in Thailand	Neutral (3)	5	30	80	150	0.53	1
		Negative (4)	1					
		Strongly negative (5)	0					
		Strongly positive (1)	6					
		Positive (2)	3					
9		Neutral (3)	1					
		Negative (4)	0					
		Strongly negative (5)	0					
		Strongly positive (1)	3					
		Positive (2)	2					
5		Neutral (3)	2					
		Negative (4)	2					
		Strongly negative (5)	1					
		Strongly positive (1)	1					
		Positive (2)	6					
6	Epc project impact	Neutral (3)	3	30	69	150	0.46	2
		Negative (4)	0					
		Strongly negative (5)	0					
		Strongly positive (1)	2					
		Positive (2)	6					
8		Neutral (3)	1					
		Negative (4)	1					
		Strongly negative (5)	0					
		Strongly positive (1)	1					
		Positive (2)	3					
2		Neutral (3)	1					
		Negative (4)	5					
		Strongly negative (5)	0					
		Strongly positive (1)	8					
		Positive (2)	2					
4	Business impact	Neutral (3)	0	30	63	150	0.42	3
		Negative (4)	0					
		Strongly negative (5)	0					
		Strongly positive (1)	2					
		Positive (2)	5					
10		Neutral (3)	3					
		Negative (4)	0					
		Strongly negative (5)	0					

From the t-test, summarizing from three code cluster, it shows within code cluster 1-3 an

d all.

The mean is 2.05, 2.15, 1.65 and 2.16, the variance is 0.605, 0.005, 0.405 and 0.3513 res pectively. While setting alpha values equal to 0.1, 0.05 and 0.01, p-value is 0.3341, 0.0374, 0. 2048 and 0.0052. showing that EPC project impact and all codes are significant at significant level 5% and 1% and reject H0., regarding to economy impact in Thailand and business impa ct.

Table 6

Summary of Descriptive Statistics

Descriptive Statistics	
Mean	2.3556
Standard Error	0.2672
Median	2.2000
Mode	2.6000
Standard Deviation	0.8017
Sample Variation	0.6428
Kurtosis	0.7429
Skewness	0.5534
Range	2.7
Minimum	1.2
Maximum	3.9
Sum	21.2
Observations	9
Confidence (95.0%)	0.61627

Table 7

ANOVA

One-Way ANOIVA

Summary

Group	N	Sum of Score	Average	Variance
A1	9	14	1.56	1.03
B1	9	18	2.00	1.50
F1	9	19	2.11	0.36
J1	9	26	2.89	0.61
K1	9	25	2.78	1.19
L1	9	20	2.22	1.44
N1	9	19	2.11	0.86
W1	9	20	2.22	1.69
W2	9	23	2.56	2.03
T1	9	28	3.11	1.61

ANOVA

Source of Variation	*SS*	*Df*	*MS*	*F*	*P-Value*	*F Critical*
Between groups	17.96	9	2.00	1.62	0.12	2.00
Within groups	98.67	80	1.23			
Total	116.62	89				

Accept H0 No difference opinion from respondents

To test whether 10 group of interviewees have no difference opinion while answering the se 9 questions (excluding question 7) from table 3 listed. Agreeing in valves & pipes industry in EPC bidding and import from China are sharing opinion in the same direction. An One-way ANOVA showed that the opinion from these MSMEs respondents was not significant, F(9,80) =1.62, p=0.12. Furthermore, there were no significant differences found in the data when the T-test was used to analyze the questionnaire's three main theme items from table 4 and shown in table 8. The interview questions are repeated in this segment as well. The majority of those involved in this business have not been greatly impacted by the pandemic and are hopeful abo ut neutral ideas and trends in the wake of it.

Table 8
T-Test of 3 Clusters

T-test : Two Sample Assuming Unequal Variances

Code Cluster	*Mean*	*Variation*	*Df*	*t -stat*	*p-value*
1 Economy impact in Thailand	2.67	1.44	2	-0.4806	0.6783
2 Epc project impact	2.30	0.07	2	-4.5826	0.0445*
3 Business impact	2.10	0.81	2	-1.7321	0.2254
4 All	2.36	0.6428	8	-2.4114	0.0424***

*** Denotes the significant is at 1% level and accept H0, P(T<=t) two-tailed

* Denotes the significant is at 5% level and reject H0, P(T<=t) two-tailed

5. Conclusion and Recommendations

As illustration for EPC bidding exertion, while conducting interview, question 7 has been excluded for statistics refer to figure 3 percentages shown, referring to code hierarchy in figu re 5, the subcode onto it, 2 major factors expressively are price issue and payment term. Com pared with other options, this is also a common difficulty encountered when fighting for EPC bids. It is said that the impact of the epidemic in this industry is relatively low, although in ter ms of end-user procurement plans and demand had declined, payment period had been extend ed, competitive price comparison is inevitable. During the nearly two-year epidemic of Covid period within 2020 to 2022, MSMEs in this industry, if the entrepreneur does not have a large amount of standard inventory prepared, the relative impact of a high EPC ratio will be greate r. The study shows that the future remains positive, even though respondents are still relativel y concerned about the exchange rate risk, Thai baht appreciation and the trend of price increas e of import from China due to manufacturing overhead rally and volatility of market price cha nge of raw materials. At the same time, all agreed that the products imported from China for c ustomer’s engineering and installation have not yet been replaced by other countries or region s in the world in terms of quality, price, and delivery lead-time efficiency, consequently, they r emain high optimistic. Additionally, owners and directors proposed corresponding solution in figure 4 and figure 6. Lists as coded segments ranking, A1,38 indicates that suppliers work clo sely with better communication, that improve local user’s demand and payment. B1,34/T1,41

Focus more on retailer/wholesalers' channels have less customer payment term issue. Increase inventory level and direct sales, which quick supply to users and improve cash flow status. B 1,41/F1,44/N1,37 China manufacturers product quality had been improved that price term and product range provided advantages for importers and customer selection. K1,40/L1,37 By tec hnical support and professional advice to be differential from competitors. J1,37/W1,40 Custo mer relationship improve and increase visit frequency. Obviously, the risk of exchange rates fr om importers and raw materials is relatively difficult to control, nonetheless from feedback an d business operations, it is known that increasing the inventory of basic products and increasi ng the main sales channels at a relatively good timing can relatively reduce risks in valves and pipes industry. Further than focusing solely in EPC bidding, although it provides higher proje ct in total amount, except increase cash flow risks due to longer payment term issue, a combin ation sales strategy should be implement.

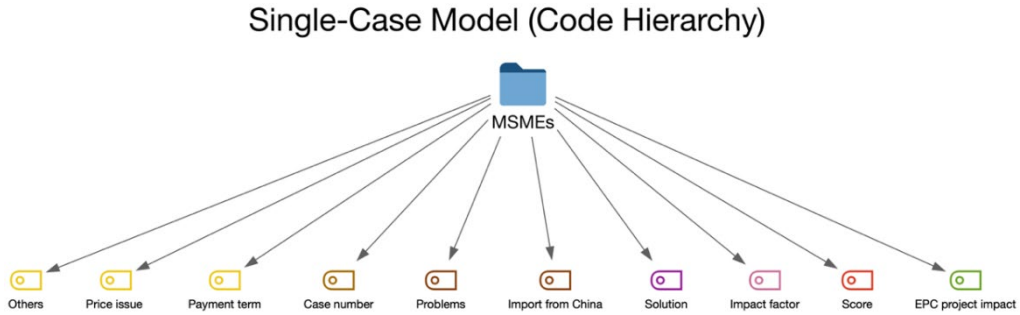

Figure 5

MSMEs-Single-Case Model (Code Hierarchy)

Codes display by 5 levels of subcodes, and 10 most frequent codes and coded segments display maximum by 5 segments. Aggregate frequencies for parent codes.

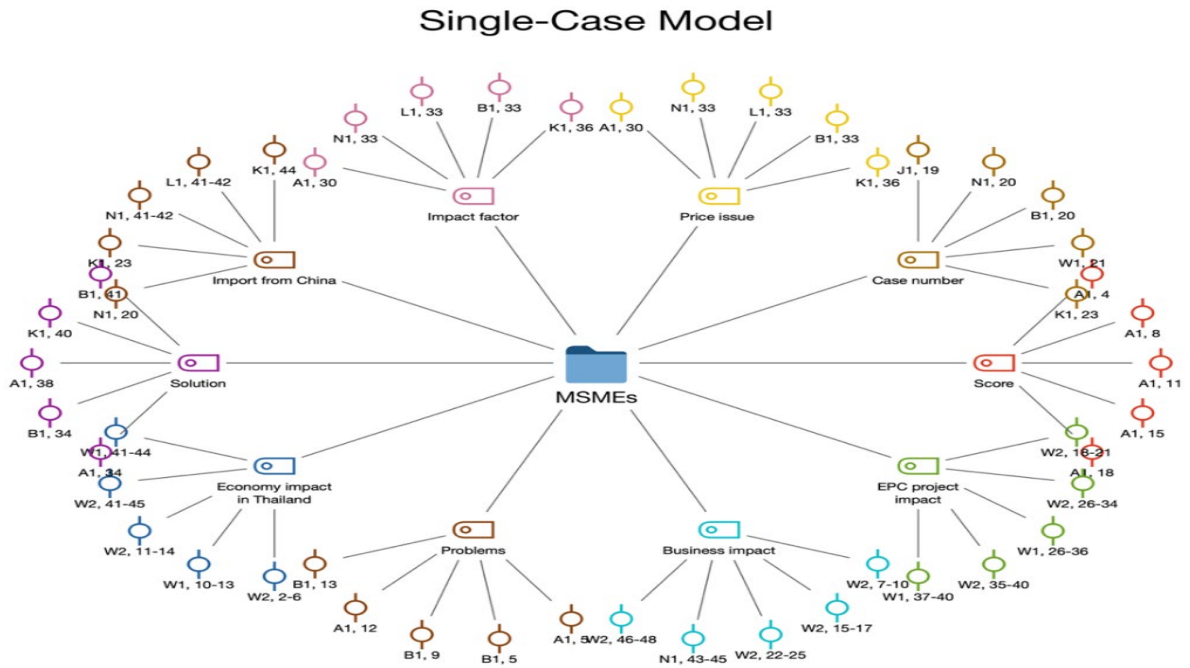

Figure 6

MSMEs - Single-Case Model (Code Segments)

Code display arranged by 10 most frequent codes and coded segments display maximum by 5 segments.

6. Declaration of Competing Interest

The authors declare that they have no competing financial interests or personal relations hips that could appeared to influence the work reported in this paper.

7. Data Availability

No data was used for the research describe in this article.

8. Appendix

Appendix A described overall of codes by MAXDQA
Appendix B interview data export listed all codes of figure 5

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