

Analysis of Strengths, Weaknesses, Opportunities, and Threats (SWOT) for Business of Laboratory Competency Training

Novy Lousiane

Departemen Magister Manajemen

Universitas Komputer Indonesia

Bandung, Indonesia

novy.75218009@mahasiswa.unikom.ac.id

Deden Abdul Wahab Syaroni

Departemen Magister Manajemen

Universitas Komputer Indonesia

Bandung, Indonesia

Abstract—This study aims to analyze business opportunity of laboratory competency training and analyze development of the potential factor on the services of laboratory competency training. The subjects of this study are the expert chemical analysts in Bandung. This research method used descriptive qualitative using Strength, Weakness, Opportunity, and Threats (SWOT) analysis and Quantitative Strategic Planning Matrix (QSPM) as a tool to formulate management strategic of the laboratory competency training. The data collection was done through interviews, observation and literature review. The result shows that laboratory competency training is potential to develop a business opportunity in order to improve the competency of chemical analyst. The appropriate management strategies are development subject of training based on user requirement, development services in laboratory competency training, marketing optimization system with digital marketing, facilitation of latest equipment that used in training program, and responsiveness to the changing government policies

Keywords—SWOT, QSPM, Competency Laboratory, Chemical Analyst

I. INTRODUCTION

Globalization brings major changes in the economic, political, and social fields' culture, and ecology in every country. For supporting adaptation, the country needs to increase personnel competency in every sector. In scope of industry, chemical analyst has an important role for industrial quality controlling and product developing their competency of laboratory must be qualified. Analyst who has laboratory training provides high quality of research [10]. The Chemical analyst plays a role in export and import product. In Export section, they have to make improvement quality of products, diversification product, and industrial quality control. In Import section they have to

control quality of product that enter Indonesia are free from toxic materials, dangerous, and non-halal elements [1].

The competency of chemical analyst must be reliable and tested. Furthermore, chemical analyst needs laboratory competency training to improve their quality. Standard competency of chemical analyst is based on the Indonesian National Work Competency Standards (SKKNI) [1]. Required competency of chemical analyst in Industry and research is on fifth and sixth level [1]. Unfortunately, in formal education only provide until third level competencies. Fourth level to sixth level competency can be achieved by laboratory competency training. Thus, it is expected that Indonesian chemical analysts can compete with other countries' chemical analyst, both at in country and abroad.

The competency laboratory training is required to fulfill a reliable competent chemical analyst. Nowadays, the laboratory competency training is limited which makes the opportunity of business of competency laboratory training is wide open. However, it needs a right business strategic that can increase competitiveness, higher quality of customer satisfaction, facilitate implementation of employee motivation system, reduce costs, improve decision-making, and shorten delivery times [2].

Strength, Weakness, Opportunity and Threats (SWOT) analysis is a tool to evaluate all that involved factors in a business of training and other business scope [3]. The SWOT analysis is performed to obtain insights from the previous problem and at the same time, obtain solutions for the existing or potential problems in business fields [4]. SWOT analysis is implemented to get the data resulted from a scope of analysis and then categorize it into internal and external factors. The internal factors include of weaknesses and strengths, while

external factors include of threats and opportunities (see table 1) [3].

TABLE I. SWOT ANALYSIS MATRIX [7]

	Strength	Weakness
Opportunity	Strength is needed to acquire opportunities.	How do I minimize the bottlenecks from new opportunities?
Threats	Does applying the strengths can decrease the influence of threats?	How do I avoid the threats becomes reality by handling the weaknesses?

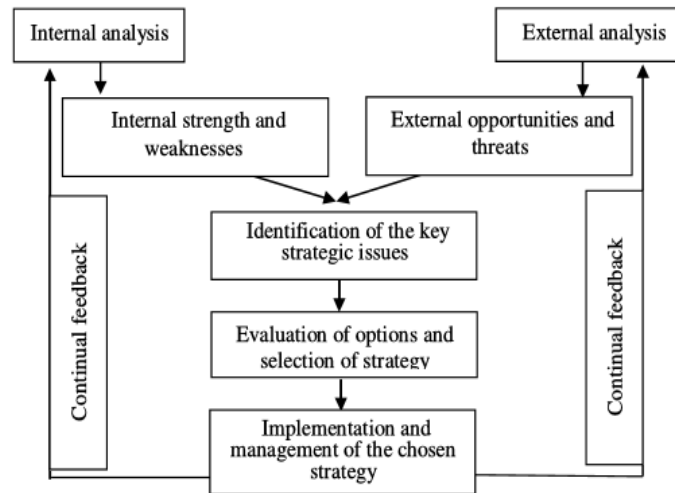


Fig 1. The SWOT Process [8]

The principal of strategic management is the concept that strategy produce a chain between an internal factor are strengths and weaknesses on the one side and its external opportunities and threats on other side [5]. When it is completed, SWOT analysis assign what can support in achieving its purposes and what problem must be conquer or reduce to get the required results [6].

The research result indicated that the following categories were identified according to its priority as follows:

- (i) Increasing the requirement of chemical analyst with qualified competency.
- (ii) Competency development that is influenced by technological development.

- (iii) Increasing chemical analyst graduates with a limited competency as a target consumer.
- (iv) Extensive network to the expert chemists as a trainer.
- (v) The role of chemical analysts in every sector is needed.

The aim of this study is to analyze business opportunity in applying the strategy concepts that will assist as guidelines in formulating policy and strategy of laboratory competency training by implementing a potential factor of external and internal strategies based on SWOT analysis. The results of this study are expected to be useful for getting opportunity of business training with developed strategies in Bandung.

II. METHODS

The research used SWOT analysis technique to determine the problem and possibilities of the business opportunity of laboratory competency training in Bandung. The respondents of this study are the expert of expert chemist in industry such as quality assurance manager and product development manager, in education region such as a chemical analyst teacher and lecturer.

The following stage was used in this research:

1. Formulating external and internal factors matrix.
2. Analyzing SWOT matrix.
3. Formulating Quantitative Strategic Programming Matrix (QSPM).
4. Finding the priority scale for strategies which are identified from the research result.

III. RESULTS AND DISCUSSION

Formulate matrix to classify the external and internal factors.

Table 2 showed the next stage of the study. The evaluation of the external factors (opportunities and threats) and internal factors (strengths and weaknesses) that influence business opportunity of laboratory competency training were performed.

The chemists identified the rate and the coefficient ration based on its importance. The calculation resulted score of the internal and external factors by 3.25 and 3.50.

TABLE II. INTERNAL AND EXTERNAL FACTORS

	External factor	Weight	Rating	Weighted score
Opportunities	Increasing requirement of chemical analyst	0.10	5	0.50
	Increasing in chemical analyst graduates as a target consumer	0.10	5	0.50
	Development of technologies in analytical method	0.10	4	0.40
	Education taught at school is still limited	0.10	4	0.40
	The role of chemical analysts in every sector is needed	0.10	3	0.30
Total		0.50		2.10
Threats	The existence of new business actors	0.10	3	0.30
	New competitors	0.10	3	0.30
	There is a substitute product	0.10	3	0.30
	Government support	0.10	3	0.30
	Competitor's marketing system is more reliable	0.10	2	0.20
Total		0.50		1.40
Total Weighed Scored		1		3.50
	Internal factor	Weight	Rating	Weighted score
Strength	Extensive network to the expert chemists	0.10	5	0.50
	Training materials in accordance with the latest government regulations and industry requirements	0.15	5	0.75
	Services of Laboratory competency training	0.10	3	0.30
	Information system of training service	0.10	3	0.30
	Nationally recognized training certificates	0.05	3	0.15
Total		0.50		2.20
Weakness	The lack of operational labor	0.10	3	0.30
	Experts are not permanent employees	0.10	3	0.30
	Marketing system is not optimal	0.15	2	0.30
	Adaptation to changes in government policy is slow	0.10	2	0.20
	The training place is not fixed	0.05	3	0.15
Total		0.50		1.25
Total Weighed Scored		1		3.25

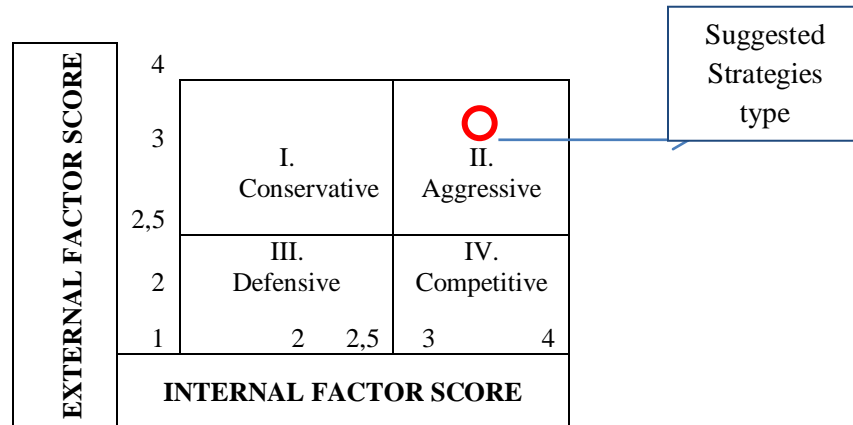


Fig 2. Space Matrix

The evaluation matrix of the external factor (EFE)

The main stage of EFE analysis consists of external observations that influence business. The external observation enabled to identify the major problem. This problem cannot be removed; however, it can be minimized. Therefore, Matrix EFE is used to assess the current business condition to help minimize the identified problem. The advantages of external analysis are listed as below [8]:

1. Sharpening the awareness of managerial toward the changing of the environment.
2. To create more qualified decision in the allocation of the resources.
3. Facilitating risk management.
4. As a great early warning system.
5. Focusing on the main impacts of strategic change.

The following stages are conducted in the process of The EFE matrix:

1. List the things of external factors which have integration and split them into two groups of: threats and opportunities.
2. Determination of weight: Weight is determined to each factor. The range value is 0 to 1. Zero is for factor that is unimportant and vice versa. Furthermore, the total value of weights should equal 1.
3. Rate factors: Rating is determined to each factor; the value is 1 to 4. Rating shown what effective the current strategies respond to the factor.
Rating for threat is 1 for major threats and 2 for minor threats; however, rating for opportunity is 3 for minor opportunity and 4 for major opportunity.

4. Calculate weighted score by multiply weights by ratings for each external factor.
5. Calculate total value of weight and weighted score for each opportunity and threat, furthermore, calculate Total all weighted scores by totalize the total value of weight and weighted score for each opportunity and threat.

Internal factor evaluation (IFE) matrix

The strategically management device that used weaknesses and strengths evaluation in functional areas were called Internal Factor Evaluation (IFE) matrix. The formulation strategy device that used is to evaluating the strategy of a planning then identified internal strengths and weaknesses of a company

Implementations of the IFE matrix analysis are following as below:

1. List the things of internal factors which have integration and split them into two groups of strength and weakness.
2. Determination of weight: IFE matrix determines a range of weight from 0 to 1. Zero is for factor that is not important and in reverse. Furthermore, the total value of weights should equal 1. [2]
3. Determine rating the factors with the following value are 1 to 4.

The Matrix of Strategic position and action evaluation (SPACE)

The matrix of strategic position and action evaluation (SPACE) is a management device served to analyzing a strategy business. It is served to establish how variety of strategy a business must be successful. The SPACE matrix is divided into four quadrants, which are each quadrant refer to a diversification variety of strategy: aggressive, conservative, defensive and competitive. The matrix of SPACE analysis was divided into two internal and two external strategic dimensions (see figure 2).

The Matrix of Strengths, Weaknesses, Opportunities and Threats (SWOT)

The first step of planning strategy is SWOT analysis and it assists development on important subjects. SWOT method is a device served in businesses to plan the strategic

management. The strategic groups of SWOT matrix comprise as below:

- (1) How to get benefit of opportunities from maximize the strength.
- (2) How to get benefit of opportunities from reduce the weaknesses.
- (3) How to be diminished the implication of threats by the strengths.
- (4) How to overcome this threat to be reality by potential weaknesses.

Table 3 explanation was based on The SPACE matrix, group II strategies (stage of aggressive) are the suggested strategies for development (see table 3)

TABLE III. SWOT MATRIX

Internal Factors	Strengths (S) S1: Extensive network to the expert chemists S2: Training materials in accordance with the latest government regulations and industry requirements S3: Services of Laboratory competency training S4: Information system of training service	Weaknesses (W) W1: The lack of operational labor W2: Experts are not permanent employees W3: Marketing system is not optimal W4: Adaptation to changes in government policy is slow W5: The training place is not fixed
External Factors	S5: Nationally recognized training certificates	
Opportunities (O) O1: Increasing requirement of chemical analyst O2: Increasing in chemical analyst graduates as a target consumer O3: Development of technologies in analytical method O4: Education taught at school is still limited O5: The role of chemical analysts in every sector is needed		Aggressive Suggested Strategies (WO): WO 1: Development services in laboratory competency training WO2: Responsive to the government policies changing WO3: Optimization marketing system with digital marketing WO4: Facilitate the latest equipment that used in training program WO5: Development subject of training based on user requirement
Threats (T) T1: The existence of new business actors T2: New competitors T3: There is a substitute product T4: Government support T5: Competitor's marketing system is more reliable		

Quantitative strategic planning matrix (QSPM)

QSPM is a basic principle is businesses require to thoroughly measure external and internal scope, perform study, evaluate the inhibitor and supported factor in variety alternative, carry out analyses, and then determine upon a certain of action [9].

The approach of QSPM is able to identify the best strategy for business. The SWOT analysis and SPACE matrix containing of the proper alternative strategies originated showed in the first row. The QSPM shows

attractiveness scores which called AS that mean how significant the strategies will be influence to the business. The range of attractiveness scores is 1 to 4 as following not, somewhat, reasonably, and highly attractive [10].

The interconnecting of attractiveness of each potential factor and the individual strategy is the Total Attractiveness Scores (TAS). Thus, the calculation of sum the total attractiveness value is Sum Total Attractiveness Scores (STAS) in every strategy column of the QSPM.

TABLE IV. QSPM

Key Factor	Weight	WO1		WO2		WO3		WO4		WO5	
		Attractive Scores	Total Attractive Score	Attractive Scores	Total Attractive Score	Attractive Scores	Total Attractive Score	Attractive Scores	Total Attractive Score	Attractive Scores	Total Attractive Score
O1	0.30	4	1.20	2	0.60	3	0.90	3	0.90	3	0.90
O2	0.20	4	0.80	2	0.40	3	0.60	2	0.40	4	0.80
O3	0.25	3	0.75	2	0.50	3	0.75	3	0.75	4	1.00
T1	0.05	2	0.10	2	0.10	2	0.10	2	0.10	2	0.10
T2	0.10	2	0.20	2	0.20	2	0.20	3	0.30	2	0.20
T3	0.10	2	0.20	2	0.20	2	0.20	3	0.30	2	0.20
S1	0.30	4	1.20	4	1.20	4	1.20	2	0.60	4	1.20
S2	0.30	3	0.90	3	0.90	3	0.90	2	0.60	3	0.90
S3	0.10	2	0.20	2	0.20	2	0.20	3	0.30	2	0.20
W1	0,20	2	0.40	3	0.60	3	0.60	3	0.60	3	0.60
W2	0,10	2	0.20	2	0.20	2	0.20	3	0.30	2	0.20
W3	0.10	2	0.20	2	0.20	2	0.20	3	0.30	2	0.20
STAS			6.35		5.3		6.05		5.45		6.5
Priority			2		5		3		4		1

The most attractive strategy displayed on the sum of QSPM total attractiveness scores. Table 4 shows the connected of external and internal factors that could be influence the strategic decision. The WO strategies are prioritizing based on the results of QSPM as follows:

1. WO5: Development subject of training based on user's requirement.
2. WO1: Development services in laboratory competency training.
3. WO3: Optimization marketing system with digital marketing.
4. WO4: Facilitate the latest equipment that used in training program.

5. WO2: Responsive to the government policies changing.

IV. CONCLUSION

SWOT analysis shown a structure to assist identify and determine the best strategies of attaining purpose. Analyzing Strengths, Weaknesses, Opportunities, and Threats are a SWOT technique of businesses. In every country, chemical analyst is the critical factor in industry practices and security. Furthermore, the ability for chemical analyst must to be improve with apply training of standardized laboratory competency based on standardized government policy. Based on the results, the evaluation strategies are identifying business opportunity in laboratory competency training. The critical strategies that must be conduct are development subject of training based on user requirement, development services in laboratory competency training, optimization marketing system with digital marketing, facilitate the latest equipment that used in training program, responsive to the government policies changing.

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