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Research Article

Scenario Planning Development For Calibration Laboratory (Case Study PT Bekin Teknusa Unggul)

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Abstract: *Calibration laboratories are usually established for two reasons, to meet the internal organization needs or to meet applicable regulations. Calibration laboratories with the aim of meeting applicable regulations are usually very specific in certain fields. The Bekin Teknusa Unggul calibration laboratory is in the field of gas instrument calibration, the objective is to fulfil client needs to comply with the applicable regulations. This type of calibration laboratory usually has a niche market. However, because it is very dependent on regulations, market conditions are very vulnerable to change if the direction of regulatory policy changes. This research will explore the future business situation of the calibration laboratory and prepare scenario planning to face various possible situations in the next 5 years. The research began by analyzing the company and its business environment, using several methods, such as VRIN, SWOT, Porter Five Forces, and interviews with relevant stakeholders. Then continue with conducting a customer survey to obtain information regarding customer perceptions of the laboratory. From the analysis and survey, 9 driving forces were identified. The driving forces are assessed regarding the impact on the laboratory and its uncertainty. The assessment is carried out by presenting the driving forces to all laboratory stakeholders and asking them to provide a rating of the impact and its uncertainties. From the two driving forces, four scenarios that might occur in the future were prepared. For each of these scenarios, possible implications and strategy options that can be used by the laboratory are prepared.*

Keywords: *Business Environment, Calibration Laboratory, Environmental Regulation, Scenario Planning, Laboratory.*

I. INTRODUCTION

The gas instrument calibration laboratory business is a unique business, it has its own niche market. When PT Bekin Teknusa Unggul (hereafter, BEKIN) entered the gas instrument laboratory in 2015, at that time there were only 3 laboratories capable of calibrating gas instruments. The existing competitors at that time only focused on calibrating gas detectors for safety monitoring. BEKIN entered as a new laboratory with the most complete scope at that time, not only for gas detectors but also for all types of gas instruments. At that time, there was no regulation in Indonesia that required the calibration of gas instruments. Even at that time, gas instruments were still considered secondary testing, whereas the primary testing that was accepted for the purpose of fulfilling environmental regulations still used the conventional method (wet chemistry, non-instrument). However, there are many companies that use gas analyzer instruments to get quicker results or they need to do more frequent monitoring. Companies like this usually have above-average awareness of health, safety, and the environment.

A series of new regulations in 2021 changed the business environment calibration laboratory. There are 3 new regulations that tighten environmental monitoring and control, as shown in Table 1.

Table 1: New regulations in 2021 related to air quality monitoring

No	Regulation	Description	Impact
1	Government Regulation No 22/2021	Implementation of Environmental Protection and Management	Accepting instrumental methods in regulation compliance
2	Ministerial Regulation No 1/2021	Company Performance Assessment Program in Environmental Management (PROPER / Program Penilaian Peringkat Kinerja)	Require Industries to install CEMS (Continues Emission Monitoring System) and calibrate the CEMS periodically.
3	Ministerial Regulation No 13/2021	Information System of Continuous Industry's Emission Monitoring (SISPEK/ Sistem Informasi Pemantauan Emisi Industri secara Kontinu)	Require Industries to connect their CEMS (Continues Emission Monitoring System) to the SISPEK server belonging to the Ministry of Environment and Forestry.

These new regulations drastically increase the need for gas instruments and also gas instrument calibration. In 2021, BEKIN recorded a 500% increase in revenue. The increasing market attracts new entrants to enter the market. There are 10 new competitors entering the market within 1.5 years (April 2020-October 2021). The emergence of new competitors completely changes BEKIN's competition and business environment. BEKIN can no longer apply a niche product strategy because there are many new competitors with relatively the same service and minimum differentiation. Based on the August 2022 monthly report, the number of samples coming to BEKIN laboratory during the period Jan-Aug 2022 is 466 samples, an increase of 23% from 2021 (378 samples). This condition is expected due to the development and trend of regulation that tends to increase air quality monitoring and stricter the emission limit. However, when we look at the details, we found that some sample categories are decreasing compared to the 2021 result, as shown in Figure 1.

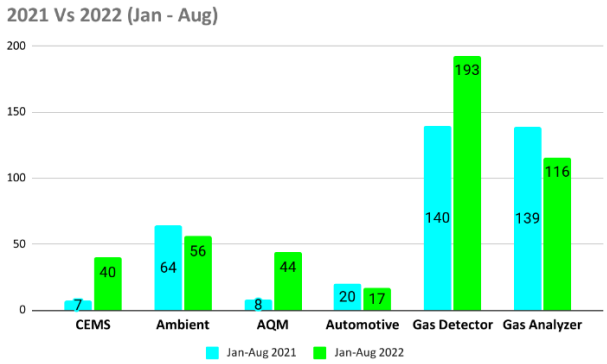

Figure 1: Number of samples received 2021 Vs 2022 (Jan-Aug period)

From Figure 1, we can see that there is a decrease in the sample received in the categories Ambient (-13%), Automotive (-15%), and Gas Analyzer (-17%). The decrease was caused by some clients moving to another new competitor who offers cheaper prices. New regulations in 2019-2021 create a huge new demand in gas instrument calibration but, at the same time, attract a lot of new entrances to enter the gas instrument calibration laboratory market. There were ten new competitors entering the market between 2020-2022. The emergence of new competitors has changed BEKIN's business environment. BEKIN is very late to respond to the change in the business environment. There was no specific strategy in 2021-2022 to prepare for the presence of new competitors in the market.

II. LITERATURE REVIEW

A company can have a strategic plan for a short-term period of operation, usually for 1-2 years ahead. However, the company also need to anticipate what will happen in the future, especially changes in the business environment and customer needs. A key challenge of managing change is the need for managers to operate in two time zones: they must optimize for today while preparing the organization for the future. One of the tools that can be used to manage strategies for the future is Scenario Planning (Grant, 2013). In a laboratory business, anticipation of the future is one of the key successes. The laboratory will need a longer time to develop a new capability. It can take 6 months to develop and validate a method and another 6-8 months to register and be accredited by the national accreditation body. In total, it will take six 12 to 14 months for a laboratory to commercialize a new product.

Scenario planning is one of the best methods for a company, especially a laboratory, to anticipate the future. Scenario planning is the process where a company encourages their imagination and creative thinking to have better preparation and anticipation of an unknown future. Scenario planning has been described as a technique for rehearsing the future in order to avoid surprises by dispelling the "illusion of certainty." (Garvin & Levesque, 2006). Several factors or components shown in Figure 2 contribute to a composite, comprehensive perspective of the future in scenario planning.

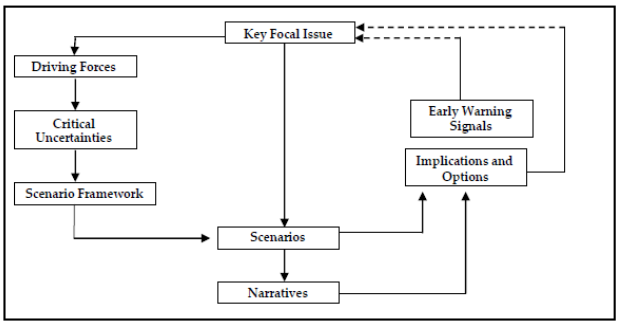

Figure 2: Scenario planning components (Garvin & Levesque, 2006)

The key focal issue is the identification and analysis of key drivers of change that could significantly impact the future development of a company. The scenario planning development would be built around this key focal issue.

Driving force is a condition and trend that will affect and influence the key focal issue. In scenario planning development, research in driving forces is an important part. It normally requires interviewing organization stakeholders and other parties that understand very well the company and its industry environment (Garvin & Levesque, 2006). Research on driving forces will start from inside the organization to the external environment of the organization, as described in Figure 3. Organizational driving forces are related to internal resources and capabilities, such as company operation efficiency, product uniqueness, etc. Transactional driving forces are an environment where the company interact with, such as clients, regulators, investors, suppliers, etc. The competitor also would be in the transactional area. Contextual environment refers to factors and conditions beyond the company's control, such as political issues, energy issues, exchange rates, macroeconomy, etc.

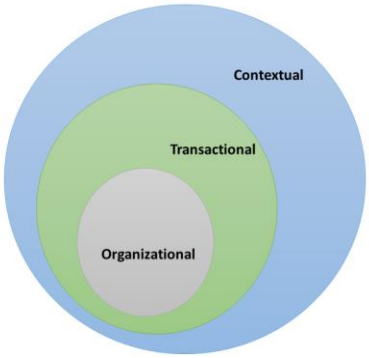

Figure 3: Driving forces contextual (adapted from Ramirez & Wilkinson, 2016)

After researching all the possible driving forces, the company needs to define the critical uncertainties. All the driving forces are ranked by level of uncertainty and impact on the company (as illustrated in Figure 4), and then the company need to choose the top two driving forces that have the most uncertainty and impact.

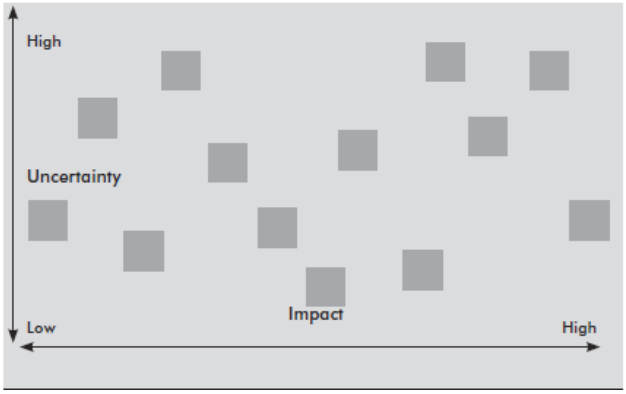

Figure 4: Rank driving forces by uncertainty and impact on the company (Chermack, 2011)

The scenario framework was built by plotting each of the two critical uncertainties to a single axis to create a 2x2 matrix and form four quadrants. A scenario will fill each quadrant, representing a different future that resulted from the interaction of two critical uncertainties selected. There was debate about the number of scenarios that should be developed, but four scenarios are the optimal number and can help avoid some common thinking traps (Chermarck, 2011). Each scenario is then developed and woven into a story or narrative. These tales should be consistent and logically coherent. The narrative should be well-written and flowing, with all possible plots.

Implication is the next development after narratives are completed. Based on each scenario and narrative, the company need to explore the possible implications. The implication will include the company's strengths and weaknesses and options to address challenges in every scenario.

Early warning signals are an indicator that leads to a possibly happening scenario. Any event taking place within or outside an organization can obviously be developed into a signal; it is critical for a company to recognize and interpret this signal (Martelli, A, 2014). Figure 5 shows how important the company's ability to sense a signal is since it is weak. The earlier the company can sense the signal the company will be able to respond faster and minimize the risk of diminishing returns.

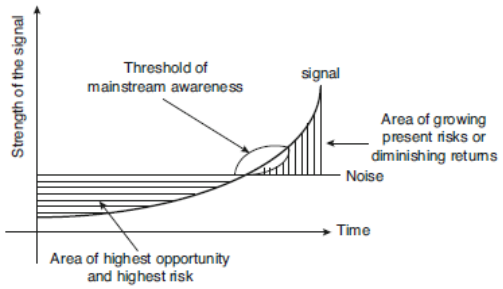

Figure 5: The usefulness of weak signals (Martelli, 2014)

III. RESEARCH METHODOLOGY

The activity of a business company takes place in an environment; thus, the business environment would be the basis of the conceptual framework (Martelli, 2014). In this research, the author will develop a scenario planning for BEKIN laboratory to adapt to the business environment changing in the future. The research will start with business environment analysis (external and internal) and customer perception analysis. These two analyses will be used to develop scenario planning and, finally, the strategy option for each scenario. The research methodology can be described in Figure 6.

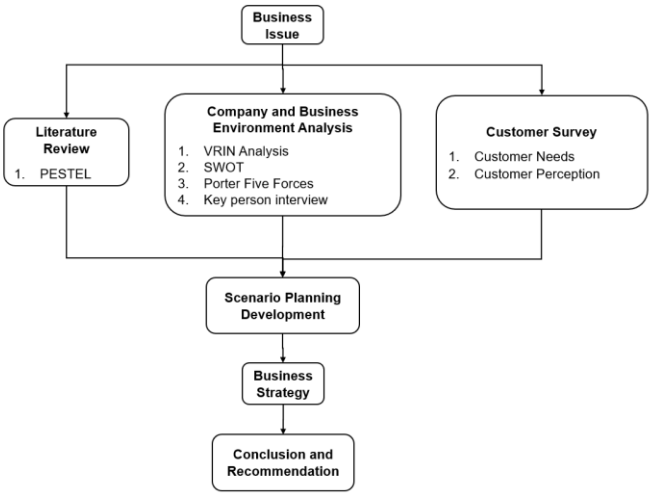

Figure 6: Research Methodology

There are two data collection methods in this research. The first method is the interview. This interview method was conducted to explore the internal organization's key person concerns and to determine key focal issues and driving forces. The interview was conducted in a semi-structured method. The interview would be conducted to define driving forces from internal and external business environments and when ranking the driving forces to determine the critical uncertainties. The list of interviewees is shown in Table 2.

Table 2: List of Interviewees

No	Name Initial	Position
1	AN	BEKIN Chief Executive Officer
2	DK	BEKIN Chief Technology Officer
3	ITA	BEKIN Sales Manager
4	DF	Sales Engineer
5	NA	Sales Engineer
6	M	Laboratory Associate Manager
7	AR	SB Laboratory Manager (BEKIN client)

The second method is customer surveys. This survey is also part of the SNI ISO/IEC 17025:2017 requirement that BEKIN accredited. The purpose of this survey is to find out what are the customer needs/expectations and customer perception and how BEKIN's performance is able to fulfil these needs/expectations.

IV. RESULTS AND DISCUSSION

A) PESTEL Analysis

A firm's external environment consists of all the factors that can affect its potential to gain and sustain a competitive advantage (Rothaermel, 2018). In this research, the author will use the PESTEL framework to analyze the BEKIN external environment and determine the driving force candidate.

a. Politics

BEKIN market and demand vary depending on the government regulations related to the environment. As explained in the previous section, a series of regulations issued in 2019-2021 (Table 1) significantly increased the market and demand. Although the sample received by BEKIN and revenue significantly increase, this condition also attracts new entrants to enter the competition. In 2024, there will be a general election in Indonesia to elect the president in the legislative. There will be political uncertainty both before and after the general election. Prior to the election in February 2024, there will be uncertainty in 2023. The potential of a minister reshuffle in 2023 contributes to one of the uncertainties. KLHK Minister Siti Nurbaya is said to be one of the ministers who will be replaced (Tempo.co, 2023).

The replacement of the Ministry of Environment and Forestry may have an impact on environmental government initiatives. Although it's not easy to change the Act and Government Regulation, the changing in ministerial regulation is possible. If there is a tightening of policies and regulations, BEKIN will benefit since the demand for environmental monitoring and equipment calibration would increase. In contrast, if there is a loosening of policies and regulations, the market and demand for BEKIN will decline.

The condition after the general election would be more uncertain since President Joko Widodo had been a president for two periods and could not be elected again, so in 2024, Indonesia will have a new president. There is no guarantee that the new president will have a similar policy in the environment. It is probable that environmental policy would be drastically changed. The same condition with the appointed Ministry of Environment and Forestry could impact the policy and regulation in the environment.

b. Economic

Data from the Indonesia Statistic Centre Bureau (BPS) showed that in the third quarter of 2022, the economy grew 5.72% year on year (BPS, 2002). It is slightly better than the Ministry of Finance projection of 5.7% (Ministry of Finance, 2022). This condition shows the continuity of economic recovery after being hit by the pandemic during 2020-2021. This trend fosters optimism that the Indonesian economy will recover and investment will increase. Every investment in Indonesia, especially when a new business is established, will increase the requirement for environmental monitoring, which will boost the demand for gas equipment calibration.

Another trend related to the economy is the growth of the Nickel and battery industry in Indonesia. Sulawesi is experiencing a tremendous increase in the Nickel and Battery industries. As an example, in Morowali, Konawe, and Wedabay. According to the Indonesia Nickel Miner Association, there will be 135 Nickel smelters in Indonesia by 2025 (CNBC Indonesia, 2023). The nickel smelter industry is one of the most energy-intensive and polluting sectors. Each smelter may have three to four emission sources. The expansion of the nickel industry will substantially boost the demand for emission monitoring and gas instrument calibration.

c. Social

According to the Kerry APMEA survey, one of the sociocultural impacts of COVID-19 is an increase in health awareness. 68% of Indonesians acknowledge paying greater attention to their health. One of the health awareness related to

the air quality. People's awareness will place pressure on all businesses and organizations to comply with regulations and ensure good air quality in the working environment. This circumstance will increase and sustain demand for air quality monitoring and gas instrument calibration.

A startup company in Jakarta, nafas.id, has installed hundreds of air quality monitoring systems/sensors to monitor air quality and make the data public. It will help educate the public and increase pressure on government and industry to control emissions and ensure air quality. The author believes that air quality will be one of the parameters monitored and managed in smart cities in the future.

d. Technology

BEKIN positions itself in Indonesia as a technology-oriented business. In its activities in Indonesia, BEKIN strives to introduce cutting-edge technology. For example, BEKIN is the first Indonesian manufacturer of gas instruments to assemble its equipment in Indonesia and to acquire TKDN (Tingkat Komponen Dalam Negeri)/Level of Local Component Used certification from the government. BEKIN's AQMS gas instrument is also still the gas instrument with the highest TKDN (52%) in Indonesia.

In the field of laboratory calibration, BEKIN has always been a pioneer in the implementation of gas instrument calibration methods and parameters. In addition, it is now a laboratory for gas calibration with the most comprehensive parameters in Indonesia.

BEKIN's dedication to the application of technology and its dedication to introducing the most advanced technology to Indonesia has contributed to the company's increased competitiveness. However, if technological development occurs too quickly, BEKIN's costs for conducting research and implementing new technology in Indonesia will be significantly increased.

e. Environment

There is a common belief that economic expansion and environmental conditions will be inversely proportional. In Indonesia, one example is the expansion of nickel mining in Morowali, Central Sulawesi. In his research, Syarifuddin (2011) determined that the increase in nickel mining activities in Morowali harmed the marine environment and negatively affected local fishermen.

Another illustration is the development of the Batang Coal Power Plant (PLTU) in Central Java. Even though the construction of the Batang power plant is deemed profitable by some in the economic sector, it is undeniable that behind this increase in the economy, environmental conditions have deteriorated, resulting in ecosystem inequality (Pramanik, Purnomo, and Kasiwi, 2020). These two examples illustrate the inverse relationship between industrial activity, economic growth, and environmental conditions.

The environmental Kuznets curve suggests that economic development initially leads to a deterioration in the environment, but after a certain level of economic growth, a society begins to improve its relationship with the environment and levels of environmental degradation reduce (economicshelp.org).

Ibrahim & Abbas (2022) investigate the relevancy of the environmental kuznet curve in the Java region in Indonesia. The result shows in the short term, per capita income growth brings damage to the environment. However, this relationship shifts in the long run and forms an N-shaped curve. The existence of an N-shaped EKC is detected but is insignificant, as shown in Figure 7.

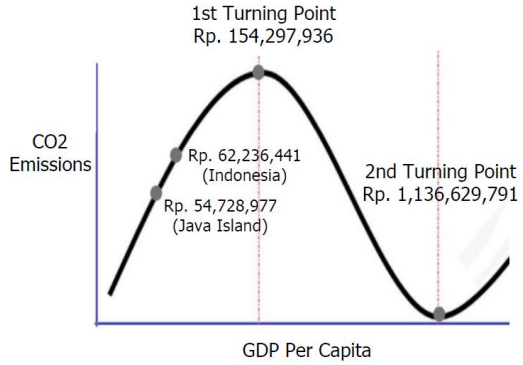

Figure 7: Economic Growth Vs CO2 Emission in Indonesia (Ibrahim & Abbas, 2022)

The rise and decline of environmental conditions in Indonesia will influence the government's policies and regulations. Tighter policies and regulations will increase demand for BEKIN laboratories. However, it will also result in the emergence of new competitors.

f. Legal

Legal aspects have been demonstrated to affect BEKIN's competitiveness. As described previously, several government regulations issued between 2019 and 2021 have increased the demand for instrument gases and instrument gas calibration, thereby expanding the market for BEKIN laboratories. Nonetheless, economic and political conditions in Indonesia cannot be isolated from legal considerations. In addition to technical considerations, regulations are frequently influenced by economic and political conditions, which can result in relatively rapid regulatory changes.

For example, is when the government of Indonesia issued Government Regulation No. 1 of 2014. In this regulation, the government eases restrictions on mineral exports for mining companies that intend to construct mineral refining facilities (smelters) within the country. This new government regulation softens the 2010 regulations. This relaxation is necessary because Indonesia cannot afford to lose the export value of mineral ores.

In relation to Indonesia's political situation, legal uncertainty will be extremely high in 2024, when Indonesia will hold presidential and regional elections. In the forthcoming 2024 elections, Indonesia will elect a new president. Changes in the president and the composition of political parties in the legislative can impact environmental law. There is a chance that the new president and legislature will have different views on environmental policy, so extant legal products may undergo further modification. This could impact BEKIN's market position in the calibration laboratory sector.

B) SWOT Analysis

SWOT analysis was conducted to identify the internal condition (strengths and weakness) and external challenges faced by BEKIN Laboratory.

Table 3: SWOT Analysis

BEKIN Laboratory SWOT Analysis	
Strength	**Weakness**
1. Good brand and reputation since BEKIN lab is the 1st accredited laboratory in Indonesia for gas instrument scope. 2. Good relationship with the Ministry of Environment and Forestry (MoEF). 3. Competencies and Expertise acknowledge by MoEF. Always involved in regulation discussion and development in Indonesia. 4. Has a dedicated engineer that is capable of doing maintenance and repair of gas instruments, so BEKIN is able to offer end-to-end solutions to clients.	1. Salesforce capability and experience. All the sales staff experience < 2 years. 2. Most of the client is power plant and environment labs. BEKIN laboratory is still less exposed and has limited access to other industries like the marine industry, chemical industry, petrochemical industry, pharmacy industry, etc.
Opportunities	**Threat**
1. Indonesia's policy and regulations related to the environment are getting stricter both in emission standard limit and monitoring frequency. This regulation will increase the demand for calibration. 2. There is a new regulation that requires 10 types of industries to use CEMS and integrate their CEMS into the MoEF SISPEK (Sistem Informasi Pemantauan Emisis secara Kontinu) system. This regulation significantly increases the calibration market.	1. The expansion of the market for gas instrument calibration has resulted in the emergence of numerous competitors. 2. New competitors offer 40-50% cheaper price. 3. Competitors recruit formerly BEKIN sales staff that have access to the TRUSUR client database.

C) VRIN Analysis

VRIN is a shorthand reminder standing for Valuable, Rare, Imitable, and Non-substitutable. The first two analyses (valuable and rare) determine whether a resource or capability can support a competitive advantage, and the other two determine whether the competitive advantage can be sustained (Thompson, Peteraf et al., 2022)

There are three BEKIN resources and capabilities. The first resource is the good branding as the first calibration laboratory for gas instruments in Indonesia. This branding not only attracts customers but also causes the government to

acknowledge and recognize the BEKIN laboratory as an expert in gas instrument calibration. BEKIN is frequently invited by the government and involved in focus group discussions prior to the creation of new policies or laws.

The second resource is the ability to do gas instrument maintenance and repair, in addition to core competency in instrument calibration. This ability is quite unique and not owned by other competitors. BEKIN can also provide spare parts for various brands of gas instruments and can provide new instruments. This additional service makes BEKIN able to provide a one-stop service that is able to fulfil all customer needs.

The third resource is Information Technology ability. BEKIN can do system integration between client instruments and the SISPEK server owned by the Ministry of Environment and Forestry, particularly for CEMS gas instruments that are required by regulations to be integrated and connected to the SISPEK server.

Using the VRIN framework, the analysis of BEKINS resources and capability can be seen in Table 3.

Table 3: VRIN Analysis

Capability	Valuable	Rare	Costly to Imitate	Non Substitutable	Competitive Consequence	Implication
Good Branding	Yes	Yes	Yes	No	Sustainable competitive advantage	Above Average Return
Instrument Maintenance and Repairment	Yes	Yes	No	No	Temporary competitive advantage	Average to Above Average Return
IT System Integration to SISPEK	Yes	Yes	Yes	No	Sustainable competitive advantage	Above Average Return

D) Porter Five Forces Analysis

Porter's five forces allow a company to analyze all players using a wider industry lens, which in turn enables a deeper understanding of an industry's profit potential. (Rothaermel, 2018).

The threat of new entrants describes the risk of potential competitors entering the market. In the field of gas instrument calibration laboratory, there is no barrier for competitors to enter the market. Everyone can make their own calibration laboratory. The cost of creating a laboratory from scratch is relatively low; it is estimated to be less than one billion rupiah. However, it might take a longer time to get accreditation from KAN. It might take twelve to eighteen months to get accreditation, starting from the preparation, application, and accreditation process. In summary, the threat of new entrants is high.

The threat of a substitute product or service is a risk of another product and service being able to replace calibration. In this industry, it's almost impossible to replace the calibration. Despite the rapid development of instrument technology, even the most sophisticated instruments will require calibration. In addition, almost all quality management systems in the world require calibration to maintain the quality of a product or service. In addition, regulations in Indonesia require periodic calibration of all quality-affecting instruments. With this condition, the threat of substitute products or services is low.

The bargaining power of a supplier is the risk that the supplier can exert their power to reduce the profit of a company. Powerful suppliers can raise the raw material cost and, in the end, reduce the profitability of a product or service. In the field of gas instrument calibration, the main raw material is certified reference gases. Unfortunately, there are only a few suppliers in Indonesia that are able to provide certified reference gases to the industry. Alternative suppliers can be found overseas, but due to the import process and delivery, the cost is more expensive. The characteristic of the gases also has an expiration date of one to two years, so BEKIN cannot stock and purchase in very big quantities. In addition, it is not possible for BEKIN to do vertical integration to acquire a gas producer company or create a gas production facility since it will cost very huge. However, to minimize the risk, BEKIN can cooperate with suppliers and agree on a price contract to make sure that BEKIN gets a competitive price. Good BEKIN branding helped to make this contract happen. In summary, the risk to the bargaining power of suppliers is moderate.

The bargaining power of buyers is the risk when buyers demand a lower price or higher product/service quality. Although in the last few years, a lot of competitors have entered the market, the demand is still very high. The demand came from the regulation that requires periodic calibration for an instrument. This condition makes the risk of bargaining power of buyers moderate.

The rivalry between the existing competitors describes the risk caused by how intense the companies within the industry jockey the market share and profitability. Currently, a lot of competitors offer much cheaper prices to the industry, and some of the competitors offer 40-50% cheaper prices. Some clients even start to switch to other competitors. This is exacerbated by the low costs customers must incur to switch from BEKIN to other competitors. However, since the demand is still growing fast due to regulations constantly evolving and becoming more stringent, BEKIN is still able to acquire new customers. Another BEKINS strategy to minimize the risk is to differentiate the service and develop the ability to maintain and repair the gas instrument, in addition to calibration service. However, in summary, the rivalry among existing competitors is still high.

The summary of Porter's Five Forces is shown in Table 4.

Table 4: Porter Five Forces Analysis

No	Forces	Condition	Risk
1	Threat of new entrance	• No barrier to creating a calibration laboratory. • Low capital to create a calibration laboratory. • Long accreditation processes.	High
2	Threat of substitute product/service	• No substitute product/service that can replace the calibration.	Low
3	Bargaining power of supplier	• Few suppliers in Indonesia. • BEKIN cannot stock due to gas expiration of 1-2 years. • BEKIN have price contracts with suppliers.	Moderate
4	Bargaining power of the buyer	• Low cost for buyers to switch from BEKIN to competitors. • Demand is growing faster than the growth number of competitors.	Moderate
5	Rivalry among existing competitors	• Competitors offer a much cheaper price. • Demand is growing faster than the growth number of competitors.	High

E) Customer Perception Analysis

It is crucial for BEKIN to understand customer needs and how customer perceptions of the company align with those needs. BEKIN conducts a consumer feedback survey for this purpose. The results of this survey's analysis will be used to develop scenario planning. A gap between customer needs and BEKIN's ability to fulfil them could be a driving force in scenario planning development.

The survey was conducted between 20 July and 16 August 2022. Of more than 100 customers that reached, there were 63 customers responded to the survey.

In the survey, there are two sections of questions. The first section is related to customer needs. Customer will rate their needs related to ten aspects. Rating scale of one to five, with five meaning very important for the customer. The second section of the survey describes how customers perceive BEKIN's performance to meet their needs. The author applies the same parameters as in the previous section. Table 10 contains the list of questions. For each question, the customer will rate BEKIN's ability to fulfil their needs. On a scale of one to five, when customers rate one, it means the customer strongly disagrees with the statement; thus, BEKIN cannot meet their needs. In contrast, when a customer rates five, then the customer strongly agrees to the statement, and BEKIN is considered able to fulfil customer needs.

When the rating in the first section (customer needs) is more than in the second section (performance), then we can see that customers perceive BEKIN's performance below their expectations. When the rating in the first section is the same as the second section, then customers perceive BEKIN's performance meets their expectations. When the rating in the first section is lower than the second section, then customers perceive BEKIN's performance above their expectations. The survey results can be seen in Figure 8.

Figure 8: Customer Perception Survey Result

In general, most of the customers perceive BEKINS performance to meet and exceed customer expectations; however, if we sort the percentage of factors that are perceived as not meeting the customer expectation (Table 13).

Table 5: Customer perception rating for "below average"

No	Factor/Customer Needs	Percentage of "Performance below expectation"
1	Fast calibration/turnaround time	38%
2	Ability to repair instrument and sensor replacement	35%
3	Competitive price	33%
4	Laboratory location	33%
5	Accreditation scope	32%
6	Respond to inquiries and complaints	32%
7	Additional complimentary service	29%
8	Flexible payment term	19%
9	Validity of calibration	17%
10	Gas reference brand/standard	8%

We can find that thirty percent of customers or more perceive BEKIN's performance as below customer expectations on six factors (no 1-6). These factors could be a driving force in scenario planning development.

F) Scenario Planning Development

As explained in the previous section, scenario planning development is conducted based on input from company and business environment analysis, literature review, and customer survey. The scenario planning development process begins with the identification of the key focal issue, followed by the identification of the driving forces. The driving forces were then ranked in the questionnaire process to identify the two most influential driving forces in terms of impact and uncertainty.

The final phase of scenario planning development involves determining the framework, narrative, and early signals, as well as the company's implications and options.

a. Key Focal Issues

Scenario planning development begins with determining the key focal issue. Key focal issues were obtained from stakeholder analysis, internal and external analysis, and interviews. The author determines there are two key focal issues. The first key focal issue is how change in the business environment affects BEKINS's business. The second key focal issue is how BEKIN responds to changes in the business environment.

b. Driving Forces

Based on company and business environment analysis, literature review, and customer survey, the author determines nine driving forces:

1. Internal BEKIN technical capability (in doing calibration and instrument maintenance/repairment)
2. BEKIN's ability to adopt new technology and implement the technology in Indonesia
3. BEKIN's financial capability to keep up with the business expansion.
4. The emergence of new competitors (tighter competition)
5. Price sensitive market
6. Regulation related to the environment
7. Indonesia politic situation
8. Indonesia economic condition
9. Indonesia environment condition

The authors asked each respondent, based on the obtained driving forces, to rate the impact and uncertainty of each driving force on BEKIN's business. On May 21-22, 2023, the rating was conducted using the Google Form tool. Each respondent is asked to provide a rating between one and ten, with ten representing the most impactful and most uncertain. The rating results are shown in the table 6 and 7.

Table 6: Driving forces rating based on impact

Driving Force	Rating from respondents							Average
	ITA	NA	M	AN	AR	DK	DF	
1	8	10	10	10	10	10	9	9.6
2	9	8	10	10	8	9	8	8.9
3	8	10	10	10	10	10	9	9.6
4	8	10	10	10	10	8	7	9.0
5	7	9	10	8	6	9	8	8.1
6	8	10	10	10	10	10	7	9.3
7	7	8	5	5	3	5	5	5.4
8	8	10	7	8	3	8	6	7.1
9	5	10	5	10	8	8	6	7.4

Table 7: Driving forces rating based on uncertainty

Driving Force	Rating from respondents							Average
	ITA	NA	M	AN	AR	DK	DF	
1	6	5	5	1	3	2	4	3.7
2	5	7	6	1	6	3	5	4.7
3	6	7	8	1	6	7	6	5.4
4	4	3	5	3	7	2	5	5.3
5	5	3	6	1	1	3	4	3.3
6	5	4	4	3	3	5	6	5.4
7	5	6	5	5	10	5	7	6.1
8	7	5	6	5	5	4	6	5.4
9	8	6	7	3	2	3	6	5.0

The average of impact and uncertainty ratings is then plotted on a graph, as seen in Figure 9. On the far right (in red circles) of this graph, we can see the most impactful and the most uncertain driving forces.

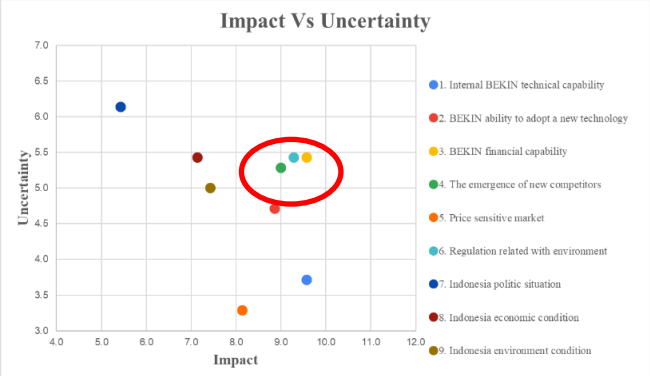

Figure 9: Driving forces impact Vs uncertainty

The position on the far right represents the driving force with the most impact and the most uncertain to BEKIN business. In discussions with BEKIN Management (CEO and CTO), they thought that BEKIN's financial capability is not an uncertain driving force, as it is a controllable aspect of the business. Several respondents give a high rating of BEKIN's financial capability, possibly because some respondents have no and/or limited access and knowledge of BEKIN's financial capability. On this premise, the authors conclude that the emergence of new competitors and regulations related to the environment are the two driving forces with the most impact and the most uncertain to BEKIN business.

c. Critical Uncertainties

The two driving forces that have the most impact and most uncertain to BEKIN's business generate two critical uncertainties. As described in the preceding chapter, the authors select the following two critical uncertainties:

1. The emergence of new competitors (tighter competition)

   The emergence of a new competitor is a critical factor that can directly affect BEKIN's business. The fewer competitors that appear will certainly benefit BEKIN. The small number of competitors will allow BEKIN to maximize its profits. On the other hand, increasing the number of competitors will make competition tighter. The more competitors there are, the greater the potential for price wars. This will cause BEKIN difficulty in maximizing its profits.

   Porter's Five Forces analysis (Table 4) shows that the risk of a new entrance is high. There are almost no barriers that can prevent the emergence of new competitors. It is true that there is an obligation for accreditation from KAN for a new calibration laboratory, but this accreditation is only a technical barrier that aims to maintain quality. Technical barriers do not require big cost implications. Other costs in terms of infrastructure and equipment needed to set up an accredited laboratory are not big. It is estimated that it only requires capital of under two billion rupiah to establish an Accredited Laboratory, a relatively small amount compared to the potential market.

2. Regulation related to the environment

   The impact of environmental regulations on BEKIN's business is of utmost importance. The implementation of more stringent environmental regulations will result in a rise in both the quantity and diversity of air quality monitoring activities. Consequently, there will be a corresponding increase in the demand for the calibration of air monitoring equipment. Therefore, the potential market for BEKIN is expected to expand as a result of the implementation of more stringent environmental regulations.

   On the other hand, a loosening of environmental regulations may potentially yield negative implications for the BEKIN business. Regulatory easing usually involves the reduction of environmental obligations imposed on companies. For example, the frequency reduction, postponement, or complete elimination of air monitoring duties.

d. Scenario Framework

Based on the 2 critical uncertainties that have been determined, the author forms a scenario in a 2x2 matrix, with each critical uncertainty as the axis. This matrix will form 4 scenarios, as shown in Table 8 and Figure 10. In this research, the author uses sports competition as an analogy and narrative for each scenario.

Table 8: Scenario Framework

No	Condition	Analogy
1	Less competition and environmental regulations become stringent	Fishing Competition
2	Tighter competition and environmental regulations become stringent	Running Competition
3	Less competition emerges, and environmental regulation loosens	Chess Competition
4	Tighter competition and environmental regulation loosening	Boxing Competition

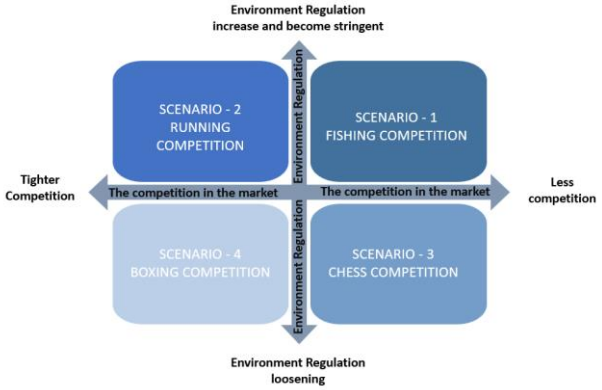

Figure 10: Scenario Matrix

e. Scenario and Narratives

Based on the four scenarios formed by two critical uncertainties, the narrative for each scenario can be seen as follows:

Scenario 1: Fishing Competition

In the second period of President Joko Widodo (2019-2024), the Indonesian government showed a big concern for the environment and forestry. President Joko Widodo re-appoint Siti Nurbaya as a minister of environment and forestry. Siti Nurbaya is one of the ministers appointed for the second period (2019-2024) by President Joko Widodo. Re-appointing Siti Nurbaya for the second period is one of the indications that the Indonesian government has more concern in the environmental and forestry sector.

Policies and regulations issued in the following years strengthened the indication that the Indonesian government has more concern for the environmental sector. Table 2 shows the series of regulations issued by the Indonesian government related to the environment, especially in ambient air quality and air emission monitoring.

From the competition point of view, there were few laboratories focused on gas instrument calibration when the environmental regulation tightened within the 2019-2021 period. At that period, BEKIN was one of the market leaders in gas instrument calibration. Table 1 shows that only three laboratories in Indonesia are accredited for gas instrument calibration scope.

The period from 2019 to 2021 is a suitable illustration of the first scenario, in which environmental regulation becomes more stringent, but competition in laboratories that calibrate gas instruments remains loose. This situation fits in with an analogy to a fishing competition that takes place in a pond filled with fish. Simply by casting their hooks, the participants just need to await the fish's eating of the bait.

During this period, BEKIN benefited from the strict environmental regulations in place. As shown in Figure 1, the quantity of CEMS and AQM samples received by the BEKIN laboratory has increased by more than 400%. However, there were no significant changes to the marketing strategy or approach. This is the result of new regulations governing CEMS and ambient air monitoring, as well as less industry competition.

Scenario 2: Running Competition

In this second scenario, running competition describes a condition where regulations related to the environment are getting tighter, as well as competition in the calibration and environmental laboratory industry. In a running competition, every runner will likely reach the finish line, but the fastest runner will be the champion and get the biggest prize.

Every laboratory will most likely benefit from increasingly stringent regulations, and the laboratories that are fastest and most aggressive in market penetration will gain the greatest benefits.

A scenario like this occurs in the 2021-2023 period and is likely to continue until 2025. In this period, several regulations related to the environment were issued which significantly increased the market for environmental laboratories and gas instrument calibration. Table 18 shows several regulations related to the environment that have been issued during 2021-2023. These regulations require industries to do more monitoring and/or analysis of the ambient air quality and emissions from all businesses/activities. As a result of the implementation of these regulations, the need for instrument gas calibration has significantly increased; in other words, the market for BEKIN has also increased significantly.

However, the increasing market for gas instrument calibration has also invited the emergence of new competitors, both from new laboratories and existing laboratories, that are expanding their scope into gas instrument calibration. These conditions require BEKIN to aggressively penetrate the expanding market, both coming from the new customers and from the expanding of existing customers' needs.

Scenario 3: Chess Competition

The third scenario describes a condition where both competition and environmental regulation loosen. In general, Indonesian environmental regulations tend to be more loose compared to international standards. One of the examples is in the Air Quality Standard. Table 19 shows the difference between Indonesia Air Quality Standard and WHO guidelines.

Table 9: Indonesia Air Quality Standard Vs WHO Standard

Parameter	Averaging Time	WHO Guidelines[1]	Indonesia Regulation[2]
$PM_{2.5}$	Annual	5	15
	24-hour	15	55
PM_{10}	Annual	15	40
	24-hour	45	75
SO_2	Annual	-	150
	24-hour	40	75
NO_2	Annual	10	
	24-hour	25	65
	1-hour	-	200

O_3	Annual	-	35
	8-hour	100	100
	1-hour	-	150
CO	24-hour	4000	
	1-hour		10000
	8-hour		4000

[1]WHO, 2021
[2]Government regulation No. 22/2021

The table above shows that Indonesia is quite behind in terms of Air Quality Standards. This is usually followed by weak law enforcement. An example is law enforcement in terms of monitoring air emissions from vehicles. There are several regulations regarding vehicle air emissions monitoring. Starting from the Ministry of Environment and Forestry (MoEF) Ministry Regulation No 05/2006 (Threshold for Motor Vehicle Exhaust Gas Emissions). This MoEF regulation was revised several times and last updated on MoEF Ministry Regulation No 8/2023. Vehicle emission is also regulated in Government Regulation No. 22/2021, and in Jakarta, the Governor of DKI Jakarta has also strengthened it with Governor Regulation No. 66 of 2020

However, in real practice, law enforcement for motor vehicle emissions monitoring is very weak. Only a few people do the emission test, and there is no law enforcement for those who don't do the emission test.

The loosening of regulations and law enforcement is happening many times in many conditions. There is no certainty that this condition will not happen in the future.

Loosening environment regulation and less competition are the conditions described in this third scenario. The author analogized this situation to a chess competition. Two players in the chess game describe the less competitor and less competition. Both players in the chess game will most likely be able to take down the opponent's pawn, but the player who can take down the opponent's king would be a winner. Align with this analogy, BEKIN will most likely be able to get a portion of the market because the less competition. However, BEKIN has to implement suitable strategies to grab the right market and maximize profit.

Scenario 4: Boxing Competition

The fourth scenario is the worst scenario for the industry players. In this scenario, the environmental regulation becomes loosening, but the competition is tightening. In boxing, the purpose of the game is to beat the opponent. However, a boxer most likely will receive and feel the opponent's punch even though he finally wins. In some games, we can see a boxer who wins with a bruised face.

This scenario could happen when the environmental regulation suddenly loosens while competition is still tight. Some regulation exception or weak law enforcement could loosen it.

One example of environmental regulation suddenly loosening is the regulation about emissions monitoring in the power plant. On 23 April 2019, the Ministry of Environment and Forestry (MoEF) issued Minister Regulation No. 15/2019 regarding the Emission Limit of the Thermal Power Plant (Ministry of Environment and Forestry, 2019). This regulation requires all power plants with a capacity over 25MW to install Continues Emission Monitoring System (CEMS) for online emission analyzers. This regulation requires all power plants to fulfil all the requirements at the latest two years after the regulation is issued (at the latest on 23 April 2021). On 24 Mei 2021, MoEF issued another regulation no13/2021 that requires all power plants to connect their CEMS to the MoEF system called SISPEK (Sistem Informasi Pemantauan Emisi Industri Secara Kontinu). This minister's regulation clearly mentions that the deadline for the CEMS-SISPEK connection is 1 January 2023.

The players in the CEMS Industry (laboratory, instrument manufacturer/distributor, etc), including BEKIN preparing their capabilities to support this regulation. Since the number of power plants and other relevant industries for this CEMS-SISPEK integration is huge, a lot of companies are trying to enter this market. Table 5 shows a lot of companies entering this market and becoming BEKIN competitors and ready to support these new regulations. The emergence of new competitors makes the competition tightened.

In real conditions, the market growth at that time was not as big as expected; a lot of power plants still had not installed the CEMS and integrated their emission data into MoEF SISPEK. On 27 October 2022, less than three months from the SISPEK Integration deadline, the Directorate General of Pollution and Environmental Damage Control (a part of MoEF) issued a Directorate General regulation No P.17/PPKL/2022 (Ministry of Environment and Forestry, 2022) regarding technical guidance and criteria for Performance Rating Assessment Program (PROPER Program) in monitoring air emission of thermal power plant. In this regulation, there is a relaxation for power plants that have not installed CEMS and integrate their emission monitoring to SISPEK. Instead of pushing the SISPEK integration, this regulation allows power plants to submit their road map and planning for this SISPEK regulation. Until this research is written (June 2024), there are still a lot of power plants that have not integrated their emission monitoring to SISPEK.

The second example of the loosening environmental regulation is the case of vehicle emissions monitoring. Regulation regarding vehicle emission monitoring has been issued since 2006 by MoEF. The Jakarta province governor strengthened the regulation by issuing Governor Regulation No. 66 of 2020. Industry players, including BEKIN, see this regulation as a huge market and opportunity since the number of vehicles in Jakarta is more than twenty-one million (BPS, 2022). If this regulation is implemented with good law enforcement, then the market for automotive gas analyzers will dramatically increase, including the instrument itself and instrument calibration.

Table 5 shows that a lot of companies entered the gas instrument calibration market because of CEMS regulation and also to anticipate the vehicle emission monitoring regulation. The emergence of these competitors makes the competition tighter; however, the regulations tend to loosen because of a lack of law enforcement. These conditions make the fourth scenario happen.

f. Implications and Options

Scenarios developed based on a combination of two critical uncertainties. Each scenario has implications for BEKIN's business. BEKIN, as an organization, must be aware of the implications and prepare a suitable strategy to overcome the scenario. Here are the implications and options for each scenario.

Table 10: Implications and Options

Scenario	Implications	Options
Scenario 1 Fishing Competition	1. Relatively easy to sell a product and services. 2. Relatively easy to maximize profit. 3. The customer has limited options, lowering customer bargaining power	1. Increase selling price to maximize profit. 2. Able to push terms and conditions, arrange schedules, and other conditions that can maximize profit 3. Able to choose customers in terms of better payment terms, high profile, etc 4. Increase the quantity of sales force to grab all expanding markets. Opportunity to recruit and train junior sales 5. Good time to do product development to improve existing products or new product development
Scenario 2 Running Competition	1. Relatively easy to sell products and services 2. Relatively easy to maximize profit Customer has some other options, but the bargaining power is relatively low.	1. Monitor the competitors present in the market. Whenever possible, increase the selling price to maximize profit. 2. Increase the quantity of sales force especially for junior and middle level sales. 3. Whenever possible, negotiate terms and conditions with customers (schedule, payment terms, etc) to maximize profit. 4. Review all the operations and find the opportunity to do the efficiency in operation.
Scenario 3 Chess Competition	1. Customer bargaining power might be low, but they also have the option to postpone environmental compliance and focus on their core business. 2. The market starts to become price-sensitive due to their core business becoming slower.	1. Focus on the customer with high standards of environmental compliance (usually a multinational company). 2. Train all sales force for skill to sensing and probing the customer needs so sales can offer suitable pricing for the customer. Might not be able to maximize profit but are still able to avoid the minimum profit.
Scenario 4 Boxing Competition	1. Customer bargaining power is high. 2. Difficult to maximize profit The market has become very sensitive to the price	1. Increase customer intimacy. Customer intimacy will be able to reduce price sensitivity. 2. Focus on securing the top 20 clients (by value). 3. For new customer acquisition, try to hijack competitor sales, so able to increase the network and at the same time reduce competitor access to the market. 4. Product differentiation to add additional value to the product/services 5. Reduce target selling price to lowest bottom price. Focus on sales volume 6. Do efficiency as much as possible in operation

g. Early Warning System

Early warning signals are an indicator that leads to a possibly happening scenario. Any event taking place within or outside an organization can obviously be developed into a signal; a company must recognize and interpret this signal (Martelli, A, 2014). Early warning signals are very important in the scenario planning implementation. BEKIN, as an organization, must be able to detect any circumstances that happened in the market and/or industry that indicate a scenario is starting to happen. Detection of early warning signals will be an indication for BEKIN to implement available options in each scenario.

Early signals for each scenario are as follows:

Table 10: Implications and Options

No	Scenario	Early Warning Signal
1	Fishing Competition	1. Decreasing of number of competitors. A competitor might stop operation, temporarily vacuum, or change their focus to another business. 2. Inquiry from new clients or new industry. Signal for increasing market and demand. 3. New environment regulation.
2	Running Competition	1. Inquiry from new clients or new industries. Signal for increasing market and demand. 2. New competitors emerge, which can be indicated in the tender. 3. New environment regulation.
3	Chess Competition	1. Decreasing of number of competitors. A competitor might stop operation, temporarily vacuum, or change their focus to another business. 2. Lost recurring job. The reason because BEKIN products/services are not relevant/applicable anymore for clients (due to regulation relaxation or decreased frequency). 3. Some environmental regulations become loosening (relaxation or lack of law enforcement).
4	Boxing Competition	1. New competitors emerge. 2. Lost recurring job. The reason because BEKIN products/services are not relevant/applicable anymore for clients (due to regulation relaxation or decreased frequency). 3. Lost customer due to change to another competitor. 4. Price war. 5. Some environmental regulations become loosening (relaxation or lack of law enforcement).

V. CONCLUSION

BEKIN laboratory was established in 2015. At the first time operational, the gas instrument calibration laboratory was a niche business. Only a few competitors in the industry, and BEKIN Laboratory is the market leader in this business. Starting in 2019, there are a lot of new regulations related to air emissions and air pollution that significantly increase the demand for gas instruments and their calibration. Besides increasing the market demand, these new regulations also attract competitors to enter the market and increase competition. BEKIN laboratory did not realize this business environment was changing and did not prepare for this change. As a result, BEKIN just realized in 2022 that the number of samples has decreased due to some clients moving to another competitor.

This research develops a scenario planning to BEKIN anticipate future business environments changing. Scenario planning development starts with determining the key focal issue. The key focal issues for this case are what is the plausible change in the business environment of BEKIN and how BEKIN anticipates the changes. Ensuring the sustainability of BEKIN labs' business is of utmost importance. To answer these key focal issues, driving forces are determined from external and internal analysis, interviews, and customer perception surveys. There are 9 driving forces obtained and then rated by BEKIN stakeholders to generate 2 of the most impactful and uncertain driving forces and defined as critical uncertainties. A 2x2 scenario matrix was developed from critical uncertainties and produced four scenarios that were named *Fishing Competition, Running Competition, Chess Competition, and Boxing Competition*. The implication of each scenario is then analyzed, and this research provides a strategy option to anticipate all the implications in each scenario. BEKIN can implement these options when the expected scenario happens. To detect which scenario will happen, this research defines an early warning system applicable to each scenario.

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