Evaluation of Business Model and the Supplier Selection of XYZ Company Using AHP Method

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Abstract

This study aims to see PT XYZ problem in the big picture, the company's business model is analyzed using Business Model Canvas, and the supplier selection is calculated using Analytical Hierarchy Process (AHP) method. The criteria considered by the managers when picking the right supplier are quality (71.68%), delivery system (20.9%), and procurement system (7.4%). The result proposed the best suppliers for duck meat according to the preferences are supplier 2 (52%), supplier 3 (21.9%), supplier 1 (13.5%), and random selection (12.6%). The result proposed the best suppliers for boneless chicken according to the preferences are supplier 1 (51.3%), supplier 3 (19.6%), supplier 2 (18.7%), and random selection (10.4%). The result proposed the best suppliers for mineral water according to the preferences are supplier 3 (36.4%), supplier 1 (23.9%), supplier 2 (23.5%), and random selection (16.4%). Compared to the previous practice of selecting suppliers based solely on an "approximate" system, AHP questionnaires have proven that managers consider selecting one particular supplier better than random selection, as evidenced by the value of random supplier selection having the lowest weight in all three categories of materials which are calculated using AHP.

Keywords
Business Model, AHP Method, Exploratory Research, Case Study and supplier.

1. Introduction
Data from the Central Bureau of Statistics shows that the food sector has the largest number of players, nominal inputs and outputs, and percentage of population consumption per capita in Indonesia; this shows the significance of this industry in the economy. One of the players in the food industry is XYZ Company, a new coffee shop that was founded in late 2015, located at Menara Bidakara, Gatot Subroto, Jakarta. According to the interview with the managing managers, XYZ Company has a problem in the supply chain sector, like changing suppliers for raw materials that are important in business continuity, for example, duck meat, boneless chicken meat, and mineral water. This affects business performance, both from the quality of non-standardized products, cost components that are difficult to predict and fluctuate, and other aspects of the business (Chan 2008, Ho et al. 2010, Ishizaka 2009, Saaty 2008).

So, the researchers adopted a study conducted by Dudin et al. (2015) which states that problems in business components (one of which is the relationship with suppliers) can be analyzed with Business Model Canvas. Then, Saaty (2008) also stated in his writings that alternative selection could use the Analytical Hierarchy Process (AHP) method. Therefore, researchers decided to combine these two methods - Business Model Canvas to analyze the overall business model and confirm the impact of supply chain problems on other business components, as well as the AHP method to help companies directly choose the best alternative suppliers - based on research Bonnazi and Zilber (2014) who show that Business Model Canvas can be combined with other methods - in this study, researchers chose the AHP method (Jain et al. 2007, Sekaran 2015, Walliman 2010).

Therefore, the following are the formulations of the problem, limitations, and research objectives.
Formulation of the Problem:
1. How are the results of the analysis of XYZ Company's business model based on the Business Model Canvas concept?
2. What is the better supplier evaluation and analysis results for XYZ Company according to the Analytical Hierarchy Process (AHP) method?
3. What is the impact of supplier selection according to the AHP method on XYZ Company's business model?

Limitation of the Problem:

1. The selection of suppliers for the most problematic stock items, according to interviews with the manager of XYZ Company, are suppliers of duck meat, boneless chicken meat, and mineral water.
2. The research will only analyze the elements of XYZ Company's business model without changing the overall business model.
3. The Business Model Canvas consists of 3 types, there are: 9 Blocks Business Model Canvas, Value Proposition Canvas, and Business Model Environment Map. Researchers will only use the 9 Blocks Business Model Canvas analysis so that the discussion remains focused on the main problems faced by the company (supply chain) and its impact directly, without having to spread too broadly.

Purposes of the Problem:
1. To find out the impact of supply chain problems faced by XYZ Company on business with Business Model Canvas analysis.
2. To help XYZ Company choose the right supplier with the Analytical Hierarchy Process (AHP) method.
3. To suggest improvements to a better business model through the selection of permanent suppliers.

2. Research Methods / Design

The research to be conducted at XYZ Company is exploratory research. "Explorative research is research conducted when not much information is known because it has never been encountered before (Sekaran and Bougie 2015)." In addition, exploratory research was chosen as a research objective because there are already some known facts, but deeper information still needs to be explored. This type of research relies on many literature studies as a reference for research and qualitative approaches for data collection, such as informal discussions and formal approaches (interviews, focus group discussions, etc.). In addition, the final results of the study cannot generalize the population, so it is only applicable to the research unit. This is in accordance with the researcher's goal, which is to provide solutions to improve XYZ Company.

The strategy in this research is a case study, in which this research is carried out based on existing case studies on the object of research conducted. Case research is an intensive longitudinal study of a phenomenon at one or several research sites with the aim of understanding the details and understanding the dynamic process of a phenomenon (Bhattacherjee 2012). This definition fits with research at XYZ Company because, at the end of the study, researchers will provide solutions to improve XYZ Company according to the study.

Because this study is a case study of XYZ Company, the research unit in this study is the organization (XYZ Company itself). This research also does not have a hypothesis because this case study aims to analyze and provide solutions and not to test assumptions.

The involvement of researchers in this study is minimal because researchers get data from companies without going directly to the field. Therefore, researchers will not have direct contact with the operations of the cafe. This also causes the study setting in this study is a natural situation or non-contrived where the whole process occurs naturally without engineering with existing conditions.

This research uses qualitative and quantitative methods. Qualitative research emphasizes processes and meanings that are not numerically measured in number, intensity, or frequency. In contrast, quantitative research emphasizes the measurement and analysis of causal relationships between variables and not processes. In contrast to qualitative research, quantitative research involves numbers, logic, and objectives. Generally, data is collected through structured research instruments with a sample size as a representation of the population; Data forms are numbers and statistics in tables, graphs, and other non-textual forms (Walliman 2010). The study uses both methods, adjusted for the type of data to be searched.

For this study, researchers used primary and secondary data. Primary research data was obtained from observations and interviews with the cafe management. For other supporting data, XYZ Company management is willing to provide data directly to researchers.

For data processing, researchers used two methods, namely Business Model Canvas (BMC) and Analytical Hierarchy Process (AHP).

1. Business Model Canvas
   The initial step in this research is the researcher will conduct a general business analysis to find out the business processes that take place at XYZ Company. The researchers will analyze the company's business model using the Business Model Canvas concept.

With the information obtained by researchers from interviews with cafe managers, researchers can make that information as a reference in determining the company's business model. In accordance with interviews conducted with the Management of XYZ Company before, researchers have known that the problem in the business model is the supply chain. Therefore, this research will focus on the key partnership elements (suppliers) in the business model and how the problems in these elements affect other Business Model Canvas elements.

2. Analytical Hierarchy Process (AHP)

To solve specific supply chain problems, researchers will distribute questionnaires to be filled out by manager managers. The aim is to find out the criteria weights and weights of each supplier and get the results in the form of the best supplier priority order to facilitate the company in selecting suppliers. This analysis will be calculated using the Analytical Hierarchy Process (AHP).

After the questionnaire is filled in by five managers, the results of the questionnaire will be entered in the following table to make it easier for researchers to calculate calculations (Table 1).

Table 1. Example Questionnaire Calculation

Pairs of Criteria	Alternative 1									Alternative 2							
Manager 1	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Manager 2	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Manager 3	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Manager 4	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Manager 5	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Pairwise Comparison																	
Reciprocal																	

Following are step-by-step calculations with the AHP method:
1. Make a pairwise comparison of the results of filling out the questionnaire
   The values given by each respondent for the criteria and suppliers are entered in the matrix table as follows in Table 2 and Table 3.

Table 2. Scale of Pairwise Comparison

Criteria / Alternative (K)	1	2	3	n
1	1	$K_{1,2}$	$K_{1,3}$	$K_{1,n}$
2	$K_{2,1}$	1	$K_{2,3}$	$K_{2,n}$
3	$K_{3,1}$	$K_{3,2}$	1	$K_{3,n}$
n	$K_{n,1}$	$K_{n,2}$	$K_{n,3}$	1
Sum	Sum 1	Sum 2	Sum 3	Sum n

2. Normalized pairwise comparison and vector priority tables

Table 3. Normalizing and Determining Vector Priority

Normalization	Alternative 1	Alternative 2	Alternative 3	Alternative n	$\bar{X}$ (Vector Priority)
Alternative 1	1/Sum 1	$K_{1,2}$/Sum 2	$K_{1,3}$/Sum 3	$K_{1,n}$ /Sum n	$\bar{X}1$
Alternative 2	$K_{2,1}$/Sum 1	1/Sum 2	$K_{2,3}$/Sum 3	$K_{2,n}$ /Sum n	$\bar{X}2$
Alternative 3	$K_{3,1}$/Sum 1	$K_{3,2}$/Sum 2	1/Sum 3	$K_{3,n}$ /Sum n	$\bar{X}3$
Alternative n	$K_{n,1}$/Sum 1	$K_{n,2}$/Sum 2	$K_{n,3}$/Sum 3	1/Sum n	$\bar{X}n$

3. Consistency Testing

To find out whether the data is consistent or not, a consistency testing phase consists of:
   a. Eigen max= $(\text{Sum 1} \times \bar{X}1) + (\text{Sum 2} \times \bar{X}2) + (\text{Sum 3} \times \bar{X}3) + (\text{Sum n} \times \bar{X}n)$
   b. Consistency Index (CI)= (Eigen max – n)/ n – 1
   c. Consistency Ratio (CR)= CI/ RI
      *The RI value is obtained from the RI Table 4, Table 5, Table 6.

Table 4. List of Random Index (RI)

Matrix Order	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49

4. Make a priority vector table for each supplier according to criteria

To determine the best alternative, the researcher needs to calculate the weight of each alternative according to existing criteria. The alternative with the highest weight is the best alternative Table 5.

Table 5. Vector Priority

Criteria	Supplier 1	Supplier 2	Supplier 3	Supplier n
Criteria 1	$\bar{X}_{1,1}$	$\bar{X}_{1,2}$	$\bar{X}_{1,3}$	$\bar{X}_{1,n}$
Criteria 2	$\bar{X}_{2,1}$	$\bar{X}_{2,2}$	$\bar{X}_{2,3}$	$\bar{X}_{2,n}$
Criteria 3	$\bar{X}_{3,1}$	$\bar{X}_{3,2}$	$\bar{X}_{3,3}$	$\bar{X}_{3,n}$
Criteria n	$\bar{X}_{n,1}$	$\bar{X}_{n,2}$	$\bar{X}_{n,3}$	$\bar{X}_{n,n}$

5. Calculate the weight of each supplier based on the criteria weights. The best supplier is the supplier with the highest total weight.

Table 6. Weight Calculation Method

Criteria	Weight	Criteria 1	Criteria 2	Criteria 3	Criteria n
Criteria 1	B_1	$B_1 \bar{X}_{1,1}$	$B_1 \bar{X}_{1,2}$	$B_1 \bar{X}_{1,3}$	$B_1 \bar{X}_{1,n}$
Criteria 2	B_2	$B_2 \bar{X}_{2,1}$	$B_2 \bar{X}_{2,2}$	$B_2 \bar{X}_{2,3}$	$B_2 \bar{X}_{2,n}$
Criteria 3	B_3	$B_3 \bar{X}_{3,1}$	$B_3 \bar{X}_{3,2}$	$B_3 \bar{X}_{3,3}$	$B_3 \bar{X}_{3,n}$
Criteria n	B_n	$B_n \bar{X}_{n,1}$	$B_n \bar{X}_{n,2}$	$B_n \bar{X}_{n,3}$	$B_n \bar{X}_{n,n}$
Sum	1	Sum 1	Sum 2	Sum 3	Sum n

3. Results and Discussion
3.1 Analysis of Company Profile
Researchers analyzed the company profile using Value Proposition Canvas analysis and SWOT Analysis in Figure 1 and Figure 2.
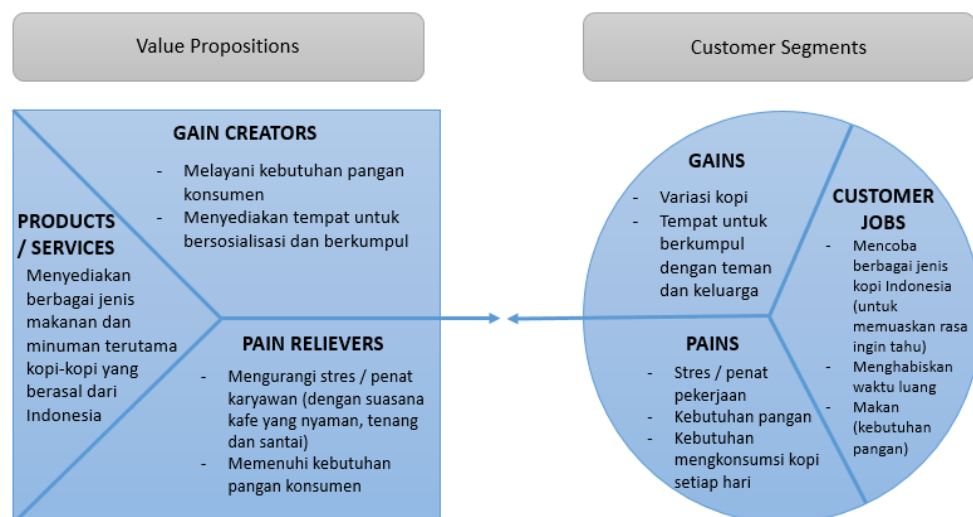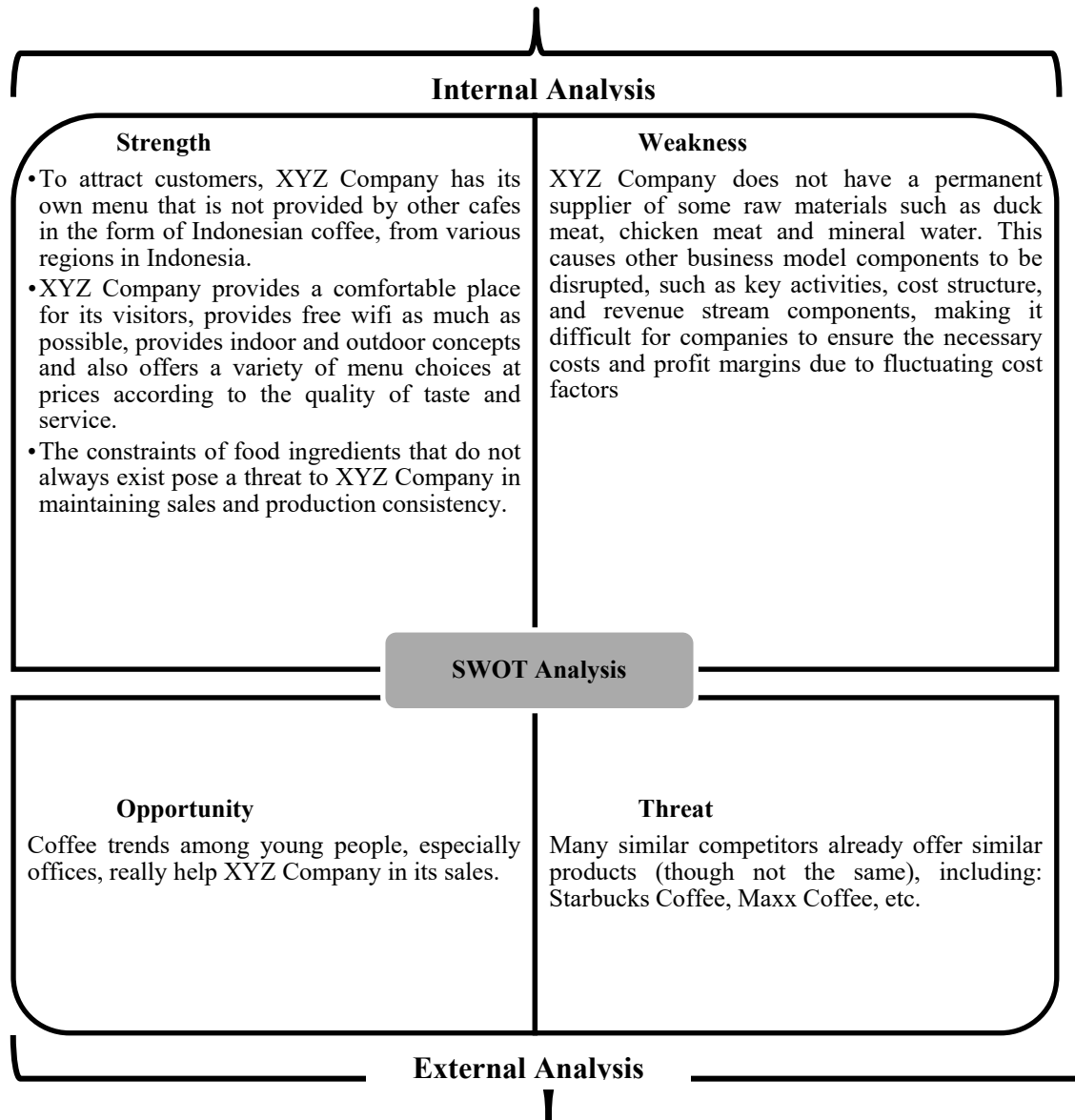

Figure 1. Value Proposition Canvas

Internal Analysis

Strength

- To attract customers, XYZ Company has its own menu that is not provided by other cafes in the form of Indonesian coffee, from various regions in Indonesia.
- XYZ Company provides a comfortable place for its visitors, provides free wifi as much as possible, provides indoor and outdoor concepts and also offers a variety of menu choices at prices according to the quality of taste and service.
- The constraints of food ingredients that do not always exist pose a threat to XYZ Company in maintaining sales and production consistency.

Weakness

XYZ Company does not have a permanent supplier of some raw materials such as duck meat, chicken meat and mineral water. This causes other business model components to be disrupted, such as key activities, cost structure, and revenue stream components, making it difficult for companies to ensure the necessary costs and profit margins due to fluctuating cost factors

SWOT Analysis

Opportunity

Coffee trends among young people, especially offices, really help XYZ Company in its sales.

Threat

Many similar competitors already offer similar products (though not the same), including: Starbucks Coffee, Maxx Coffee, etc.

External Analysis

Figure 2. SWOT Analysis

3.2 Business Model Analysis

From the perspective of the Business Model Canvas, the supply chain is part of the café key partnership, which plays a very important role in determining the quality and availability of raw materials in the aspects of supply chain management (key activity). If the supply chain continues to change without the right selection system, this will affect other business components. Directly, problems in the supply chain aspect cause the supplied resources to fluctuate in quality (Key Resources). This causes the Key Activities that the company runs, namely food and beverage production, to become non-standardized in taste and quality. This is also realized by loyal customers (Customer Segment) of XYZ Company, who often submit complaints due to differences in taste (Table 7).

Table 7. Business Model Canvas of XYZ Company

Key Partnership • Supplier of raw materials • The building manager	Key Activities • Direct production (cooking) • Promotion via social media (marketing) Key Resources • Competent HR • Raw material	Value Proportitions • Only offer Indonesian coffee	Customer Relationship • Personal approach • Reward in the form of compliment for loyal consumers Channel • Physical shop in Bidakara Tower	Customer Segments • Office employee • Young people and students
Cost Structure • Marketing • Maintenance • Rental • Employee salary • Raw material			Revenue Stream • Food and beverage sales at XYZ Company • Packaging sales • Rental income for certain events	

In addition, changing suppliers is also felt by the company causing material costs (Cost Structure) and profit margins (Revenue Stream) to fluctuate and change. Supplier replacement does not directly affect Customer Relationships, Value Propositions, and Channels.

So, in this case, it can be concluded that the source of the problem is supplier selection in the aspect of key partnership can have a negative impact on other aspects, namely key activities, cost structure, and revenue stream. Therefore, this research will proceed to the next stage to help companies choose the best supplier to improve the overall business model. Thus, it is hoped that resolving the source of the problem can help the company improve its business performance, especially in business components directly.

3.3 AHP Calculation

Judging from the vector priority, it can be concluded that the manager considers that the most important criteria of the supplier are quality (71.68%), delivery system (20.9%), and payment system (7.4%). These criteria and their weights will be used to calculate the weights of suppliers to determine the priority of the best suppliers (Table 8, Table 9, Table 10 and Table 11).

Table 8. Priority Supplier Criteria According to Manager Managers

Criteria	Quality	Payment system	Delivery system	Average (Vector Priority)
Quality	0.735269001	0.650793651	0.764453961	0.71684
Payment system	0.089666951	0.079365079	0.053533191	0.07419
Delivery system	0.175064048	0.26984127	0.182012848	0.20897

Table 9. Duck Meat Supplier Priority

Criteria	Weight	Supplier 1	Supplier 2	Supplier 3	Random
Quality	0.716838871	0.042	0.375	0.190	0.110

Payment	0.074188407	0.048	0.016	0.007	0.004
Delivery	0.208972722	0.045	0.129	0.022	0.013
Total	1.000	0.135	0.520	0.219	0.126

So, according to AHP calculations, the best suppliers are supplier 2 (52%), supplier 3 (21.9%), supplier 1 (13.5%), and random supplier selection (12.6%).

Table 10. Boneless Chicken Meat Supplier Priority

Criteria	Weight	Supplier 1	Supplier 2	Supplier 3	Random
Quality	0.715	0.452	0.073	0.149	0.041
Payment	0.079	0.036	0.025	0.012	0.006
Delivery	0.206	0.026	0.089	0.035	0.057
Total	1.000	0.513	0.187	0.196	0.104

So, according to AHP calculations, the best suppliers are supplier 1 (51.3%), supplier 3 (19.6%), supplier 2 (18.7%), and random supplier selection (10.4%).

Table 11. Mineral Water Supplier Priority

Criteria	Weight	Supplier 1	Supplier 2	Supplier 3	Random
Quality	0.7168389	0.161	0.132	0.310	0.114
Payment	0.0741884	0.016	0.048	0.004	0.006
Delivery	0.2089727	0.062	0.055	0.050	0.042
Total	1.000	0.239	0.235	0.364	0.162

So, according to AHP calculations, the best suppliers are supplier 3 (36.4%), supplier 1 (23.9%), supplier 2 (23.5%), and random supplier selection (16.4%).

4. Conclusions and Suggestions
4.1 Conclusion
Based on the Business Model Canvas concept that analyzes elements of XYZ Company's business model, it is found that the Key Activity elements (production, marketing, supply chain management) are influenced by the availability of Key Resources (raw materials and HR) and Key Partnership (suppliers and building managers) for operations business. Without these two elements, Key Activity will not work. The key activity appears to serve the Customer Segment, namely employees and young people located around the Bidakara Tower. XYZ Company uses a personal and complementary approach for loyal customers to maintain Customer Relationships. For Value Proposition, XYZ Company is here to introduce various types of coffee from Indonesia that are offered through XYZ Company's physical outlets. For the cost component, XYZ Company spends the budget on marketing, maintenance, employee salaries, place rent, and the cost of raw materials (Cost Structure) and gets income from direct and indirect sales (Revenue Stream). From the results of the analysis conducted by researchers, it was found that XYZ Company has a problem in the Key Partnership section that is still changing. Therefore, researchers help XYZ Company get a permanent supplier to solve problems in the Key Partnership element so as not to interfere with other business elements.

According to supplier evaluation and analysis using the AHP method, the results show that XYZ's best duck meat supplier is supplier 2 with a percentage of 52%, followed by supplier 3 at 21.9%, supplier 1 at 13.5% and a random selection of suppliers at 12 6%; XYZ's best boneless chicken meat supplier is supplier 1 with a percentage of 51.3% followed by supplier 3 at 19.6%, supplier 2 at 18.7% and random supplier selection at 10.4%. In comparison, XYZ's best mineral water supplier is supplier 3 with a percentage of 36.4%, followed by supplier 1 at 23.9%, supplier 2 at 23.5% and random supplier selection at 16.4%.

Compared to the previous practice of selecting suppliers based solely on an "approximate" system, AHP questionnaires have proven that managers consider selecting one particular supplier better than random selection, as evidenced by the value of random supplier selection having the lowest weight in all three categories of materials which are calculated using AHP.

This research does not change the business model drastically but proposes improvements to the Key Partnership element. After the researchers solved the problem at the company's Key Partnership by proposing the selection of permanent suppliers on raw materials for ducks, boneless chickens and mineral water, the other elements were no longer affected by suppliers changing every time they ordered raw materials. Thus, overall business performance can be improved.

4.2 Suggestion

1. Improving its Key Partnership element by having a permanent supplier which will ultimately impact the smooth Key Activities (supply chain), stability of Cost Structure (expenses for fixed raw materials and reduce unnecessary additional expenses) and stability of the Revenue Stream (profitability predictable because the price of raw materials is fixed). The selection of suppliers can still be done by the AHP method that researchers have proposed to determine supplier priorities that must be chosen.
2. From the results of the analysis conducted by researchers, it was found that XYZ Company has a problem in the Key Partnership section that is still changing. Therefore, researchers help XYZ Company get a permanent supplier to solve problems in the Key Partnership element so as not to interfere with other business elements.
3. It is expected that XYZ Company already knows which suppliers need to become permanent suppliers. XYZ Company still needs to maintain good relations with other suppliers in case something unexpected happens to selected suppliers, so that in such circumstances, XYZ Company has an alternative supplier with the second-best weight, and so on.
4. Even though this research does not holistically change XYZ Company's business model, this research has shown that the combination of Business Model Canvas and Analytical Hierarchy Process (AHP) can be combined for this case study. Researchers suggest that similar cases be analyzed by methods similar to this method.

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