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SWOT Technology Application on Tikrit University Engineering Consulting Bureau

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Keywords:
SWOT Analysis; Engineering Consulting Bureau; Weakness Confronting with Strength Technique; Tikrit University.

Highlights:

- *SWOT analysis reveals key strengths like academic expertise and fixed location in Tikrit University's Engineering Bureau.*
- *Identified critical weaknesses: limited geographic scope and high financial deductions hindering competitiveness.*
- *Proposed modernization strategies to leverage opportunities, including advanced equipment and standardization.*

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Abstract: Iraqi engineering consultancy bureaus have significantly contributed to resolving obstacles and issues encountered in various engineering projects, leading to their successful completion within the designated timeframe. However, these bureaus need continuous performance enhancement by implementing quality control tools and techniques. Consequently, the present research focused on evaluating the work quality of the Engineering Consulting Bureau of Tikrit University, using a Strengths, Weaknesses, Opportunities, and Threats using SWOT analysis as a research model. The study aims to identify the bureau's strengths, weaknesses, opportunities, and threats and propose strategies to improve its performance and output. The research employed a two-part methodology: a literature review and a field survey. Interviews, field visits, and data collection from former and current employees were conducted to gather information. The findings were then presented, analyzed, and discussed to shed light on the bureau's strengths and weaknesses, identify opportunities for converting weaknesses into strengths, and address potential challenges. The study provided an overview of the work conducted by the engineering consultancy bureau at Tikrit University and presented a research sample comprising strengths, weaknesses, challenges, and opportunities identified by bureau employees. The SWOT analysis revealed key findings about the Engineering Consulting Bureau. Its strengths include many professors with consultative degrees and a fixed location, distinguishing it from other bureaus. However, weaknesses were identified, such as the bureau's limited scope to Tikrit and neighboring cities. To capitalize on opportunities, the bureau should be equipped with modern devices to stay updated with industry advancements and undergo standardization and quality control to enhance result reliability. Mitigating risks involves preventing individuals from monopolizing work, involving more college competencies, and reducing high deduction rates, hindering competition with the private sector.

تطبيق تقنية SWOT على المكتب الاستشاري الهندسي بجامعة تكريت

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الخلاصة

لقد ساهمت المكاتب الاستشارية الهندسية العراقية بشكل كبير في حل العقبات والمشاكل التي واجهت المشاريع الهندسية المختلفة، مما أدى إلى إنجازها بنجاح ضمن الإطار الزمني المحدد. ومع ذلك، تحتاج هذه المكاتب إلى التحسين المستمر لأدائها من خلال تطبيق أدوات وتقنيات مراقبة الجودة. وبالتالي، ركز هذا البحث على تقييم جودة العمل في مكتب الاستشارات الهندسية بجامعة تكريت، باستخدام تحليل نقاط القوة والضعف والفرص والتهديدات كنموذج بحثي. هدفت الدراسة إلى التعرف على نقاط القوة والضعف والفرص والتهديدات داخل المكتب واقتراح استراتيجيات لتحسين أدائه ومخرجاته. تضمن البحث منهجية مكونة من جزأين تتكون من مراجعة الأدبيات والمسح الميداني. تم إجراء المقابلات والزيارات الميدانية وجمع البيانات من الموظفين السابقين والحاليين في المكتب. ثم تم عرض النتائج وتحليلها ومناقشتها لتسليط الضوء على نقاط القوة والضعف لدى المكتب، وتحديد فرص تحويل نقاط الضعف إلى نقاط قوة، ومعالجة التحديات المحتملة. قدمت الدراسة لمحة عامة عن العمل الذي قام به المكتب الاستشاري الهندسي في جامعة تكريت وقدمت عينة بحثية شملت نقاط القوة والضعف والتحديات والفرص التي حددها موظفو المكتب. كشف تحليل SWOT عن النتائج الرئيسية حول مكتب الاستشارات الهندسية. وتشمل نقاط قوتها عددًا كبيرًا من الأساتذة الحاصلين على درجة استشاري، مما يميزها عن المكاتب الأخرى. ومع ذلك، تم تحديد نقاط الضعف، مثل النطاق المحدود للمكتب في تكريت والمدن المجاورة. للاستفادة من الفرص، ينبغي تجهيز المكتب بأجهزة حديثة للبقاء على اطلاع بتطورات الصناعة والخضوع للتوحيد القياسي ومراقبة الجودة لتعزيز موثوقية النتائج. ويتضمن تخفيف المخاطر منع الأفراد من احتكار العمل، وإشراك المزيد من الكفاءات الجامعية، وخفض معدلات الاستقطاع المرتفعة التي تعيق المنافسة مع القطاع الخاص.

الكلمات الدالة: تحليل سوات، المكتب الاستشاري الهندسي، مواجهة نقاط الضعف، تقنية القوة، جامعة تكريت.

1.INTRODUCTION

Most firms today use strategic planning to help direct how resources are allocated to accomplish goals. Efficient strategic management requires using a tool essential for the process [1]. Strategic management empowers organizations to proactively shape their future, allowing them to initiate and influence activities rather than simply reacting to them and taking charge of their destiny [2]. This process involves formulating, implementing, and evaluating decisions to lead an organization toward its goals. While SWOT analysis has been widely recognized as a reliable strategic analytical tool, it has also faced criticism for its limitations [3]. SWOT technique is a strategy tool that assesses a firm's strengths, weaknesses, opportunities, and threats compared to its competitors [4]. It is typically employed in the initial stages of decision-making to delve into the inner workings of a corporation. A SWOT analysis can help different organizations, such as businesses, governments, and NGOs [5], assess their strategic situation. Users who want to perform a SWOT analysis usually answer questions that provide useful information for each category and determine their edge over the competition. A SWOT analysis can help different organizations, such as businesses, governments, and NGOs [5], assess their strategic situation. SWOT analysis is a straightforward but effective tool for assessing an organization's resource capabilities and shortcomings, market possibilities, and external threats to its future [6]. It was also described as an examination designed to strike a balance between the organization's strengths and weaknesses as well as the opportunities and risks posed by the environment [7]. Vlados found that a SWOT analysis tends to study the business's strengths and weaknesses with an analytical dichotomy. When performing a SWOT analysis, users usually ask and respond to questions that produce pertinent data for each category and determine their strong points against the rivals. Based on various sources and by assessing an organization's capabilities and limitations, as well as the prospects and challenges posed by the external environment [8]. This analysis has become a powerful tool that can be used to evaluate the situation. It entails a methodical evaluation of the organization's internal capabilities and limitations, external prospects and challenges, and creating a strategy that aligns with this balance [8]. During the process, stakeholders identify the performance-related components, evaluate their impact and controllability, and determine future actions. However, it is often observed that businesses only perform the first of these responsibilities [9]. The main assumption underlying SWOT analysis is that a well-designed strategy can leverage the firm's strengths and opportunities while mitigating the impact of its weaknesses and threats [10]. The most popular strategy technique today may be the SWOT analysis, which has been around for decades. SWOT has several advantages, some of which are as follows: It is used by business, commerce, philanthropic, and volunteer groups, among others, which is a common subject in the curriculum of higher education courses on business and strategy. SWOT offers many advantages, some of which are as follows [11,12]:

1- SWOT is easy to understand because it is only a basic picture without math.
2- Providing and evaluating information are one of the most crucial strategic management duties. Based on this data, it can oversee and control a wide range of operations.

3- SWOT analysis can be applied at various organizational levels, ranging from an individual level to a team, business unit or division, and the overarching company strategy.
4- SWOT analysis can be used at several levels, from a high-level overview of simple circumstances to a more thorough study of larger or more complex problems.
5- SWOT analysis is easily communicated to other stakeholders because it is highly visible.

Despite its widespread use and the advantages mentioned above, SWOT has some downsides. Below are a few instances [11]:

1- Utilizing low-quality data, such as anecdotes or hearsay, and using generalized factors lacking specificity.
2- Allowing biases to influence the analysis, including personal perceptions, beliefs, and preferences.
3- Failing to distinguish between the different stages of the analysis, including data collection, evaluation, and decision-making.
4- Neglecting the underlying principles of SWOT analysis can result in factors being misplaced in the wrong analysis category and results in an ineffective strategy.

SWOT analysis is a framework that encompasses four fundamental domains: strengths, weaknesses, opportunities, and threats. The internal factors and characteristics of the organizational environment are referred to as strengths and weaknesses, while external elements and characteristics of the corporation are considered opportunities and threats [13]. The four-quadrant box format of SWOT analysis allows for a structured summary presentation, which can be organized under the four headings of strengths, weaknesses, opportunities, and threats. While external opportunities and threats are identified by examining factors outside the organization's environment, SWOT analysis reveals an organization's strengths and weaknesses by evaluating the aspects of its environment [13]. Using the engineering consulting bureau's actual operations as a case study, the present study examines and rates the engineering consulting firm's performance by identifying faults and defects and attempting to use SWOT Analysis to address them. The engineering consulting bureau of Tikrit University is a specialized office that creates designs and offers advisory and technical services, laboratory tests, and the public and private sectors, everything related to engineering and environmental affairs. These services are provided in the fields of civil, architectural, mechanical, chemical, and electrical engineering. In addition to the esteemed administrative and technical employees, the bureau has included highly skilled and eminent professors and consultants in the field of specialty among its board of directors and work teams since its founding in 1991.

2.RESEARCH SIGNIFICANT

By offering engineering guidance and identifying solutions for the projects' challenges, Tikrit University's engineering consulting bureau significantly aided in completing and success of construction projects of all kinds. As a result, consulting businesses should consider adopting SWOT analysis to continuously enhance their performance. Using the SWOT analysis technique, the performance of the aforementioned office is assessed through this research, and four strategies are suggested to enhance the outputs and outcomes of the engineering consulting bureau of Tikrit University.

3.RESEARCH OBJECTIVES

The present research aims to apply a new assessment technique to evaluate the engineering consulting office's performance, to identify its strengths and enhance them. Additionally, it aims to diagnose and address weaknesses and identify external opportunities and threats.

The present study's goal is to use the SWOT analysis technique to assess the effectiveness and caliber of the work produced by Tikrit University's engineering consulting office. Specific goals were established to attain the research's major purpose to accomplish the following:

1- Describing and presenting the consulting office's current working methodology and identifying the site as the research case.
2- A SWOT may help identifying a situation's strengths, weaknesses, opportunities, and threats. It is possible to identify performance weaknesses and strengths within the office, including specialized staff and the tools and techniques currently utilized in the research sample. This analysis also helps determine the underlying reasons behind these strengths and weaknesses and assesses their impact on the office's future reputation and work.

4.RESEARCH METHODOLOGY

The research adopted the following methodology to achieve its objectives:

1- Literature survey: This phase involved thoroughly examining relevant literature, including journals, publications, conferences, and periodicals, focusing on the quality and advancements in engineering work.
2- Field survey: This phase consisted of the following steps:

a. Data collection through fieldwork, interviews, presentations, and analysis, followed by a discussion of the findings.
b. SWOT analysis was conducted to identify opportunities for converting weaknesses into strengths and to highlight the obstacles that need to be addressed to enhance the performance of the engineering consultancy bureau.
c. The results, observations, and recommendations for further research were presented.

By following this approach, the research aimed to gather insights from existing literature and conduct a comprehensive analysis of the field data to provide valuable findings and suggestions for improvement.

3- SWOT Analysis on The Engineering Consulting Bureau (University of Tikrit).

The SWOT analysis procedure is broken down into four sections and two dimensions. SWOT analysis consists of four sections: "The organization's internal factors and traits are its "Strengths" and "Weaknesses," while the external factors and traits of the environment are its "Opportunities" and "Threats." The most common way to present a SWOT analysis is through a four-quadrant box format, which enables a structured summary under the four sections. Table 1 is an example of a SWOT analysis, with four elements arranged in a Matrix of 2×2 [13].

Table 1 Components of SWOT Analysis.

Organization Strengths	Characteristics that give an advantage over others in performance.
Organization Weaknesses	Characteristics that place the organization at a disadvantage relative to others.
Environmental Opportunities	External elements in the environment that provide benefits to the organization.
Environmental Threats	External elements in the environment that could cause trouble for the organization.

SWOT is a planning technique that assesses the strengths and weaknesses of an organization by analyzing the internal factors of its environment, while external factors are explored to determine opportunities and threats. It is a useful tool for evaluating an organization's overall performance, identifying areas of strength and weakness, and determining potential opportunities and challenges. The manager's responsibility is to align the internal and external evaluation factors, aiming to balance the weaknesses and strengths of the organization in relation to the opportunities and threats present in the environment [14]. For presenting a comprehensive and detailed overview of an engineering consulting bureau's current situation, the most suitable tool to use for internal and external factors is a SWOT analysis. This research employs SWOT analysis to assess the bureau's performance and production by examining its strengths, weaknesses, opportunities, and threats. The researcher used the scientific method to use SWOT analysis by field survey, including monitoring the performance and output of the consulting bureau, conducting interviews, questioning the responsible academics and engineers, and observing problems and responses during the succession period of officials and employees in the bureau [15]. A SWOT technique is a good tool for comprehensively demonstrating the state of an organization concerning internal and external factors. SWOT technique helps the categorization and focus of an organization's strengths and weaknesses, which can help to facilitate progress towards greater success. Additionally, the external environment can be thoroughly examined and analyzed to assist in policy-making and decision-making for the future. To choose how many samples to collect in a field survey, it is required to consider how confident it is required to be in the results and what kind of distribution they follow, according to ASTM guidelines E122 (1979) [16]. Table 2 provides further details on sample size selection.

Table 2 Sample Size for the Required Confidence Level.

Required Confidence Level	Confidence Factor	Sample Size (N)	
		Normal Distribution	Triangular Distribution
95%	1.96	11	16
99%	2.58	19	28
99.7%	3.00	25	38

Table 2 indicates that to achieve a confidence level of 99.7% in a normal distribution, the required sample size (N) is 25. A sample size of 25 or higher will satisfy this criterion. Hence, the researcher created electronic and paper forms and handed them to the working engineers, academics, and those who can apply for work in the engineering consulting bureau at Tikrit University; 31 forms were collected. The experts are employees of the consulting office, and their place of work is in the office management. Their expertise includes those with a consulting degree, and their specializations are in civil engineering, environment, mechanics, electricity, and water resources, as shown in Table 3. After obtaining questionnaire data from experts working in this field, the data checked to ensure completeness of answers, covering most of the groups in the engineering consulting bureau. The research sample follows a normal distribution, and the number of received questionnaires exceeds 31, achieving a confidence level of 99.7%. The answers were categorized into five evaluation ranges representing degrees of influence: very high, high, medium, low, and ineffective. The class interval determines the evaluation score for each category, as shown in Table 4 [16].

Table 3 Experts Information.

Seq.	Scientific or Employment Title	Number of Participants for each Scientific Title	Years of Experience	Workplace or Employment
1 2 3 4	Professor	4	above 15	Civil Engineering 2 Environmental Eng. 2
5	Assistant Professor	24	10-15	Civil Engineering 24 Chemical engineering 2 Mechanical Engineering 2 Environmental engineering 3
6 7 8	Teacher	3	5-10	Civil Engineering 3

Table 4 Weight Value of Descriptive Frequencies.

Degree of Influence	Class Interval	Weight Value (WV)
Very High	80–100	90
High	60–80	70
Medium	40–60	50
Low	20–40	30
Ineffective	0.0–20	10

Drawing from the principles of general statistical theory, the Arithmetic Mean (AM) can be defined from Eq. (1) as follows [16]:

$$AM = \frac{\sum(Number\ of\ frequencies \times Weighted\ value\ for\ particular\ choice)}{Total\ Number\ of\ the\ Answers} \quad (1)$$

Because of the Weight values, the AM will have the same result as the Relative Importance Index (RII). For the ease and speed of extracting the values that represent (AM), the statistical package for social sciences (SPSS) can be used to extract the above values [17]. To prepare the selection criterion, it is suggested to consider only the answers according to general statistical theory; if the arithmetic mean (AM) of management personnel's overall selections is greater than or equal to fifty (AM ≥ 50), any answers with an average frequency of "Ineffective," "Low," or "Medium" should be disregarded. Conversely, if the AM is less than fifty (AM < 50), the scores should be determined based on the general assessments of management personnel [18,19]. The weight values used in the analysis ensure that the Arithmetic Mean (AM) and Relative Importance Index (RII) yield the same results.

5.ANALYZING AND DETERMINING THE INTERNAL FACTORS

The engineering consultancy bureau's internal factors are comprised of its behavior, performance, approved management system, and employee attitude. These factors highlighted the strengths and weaknesses of the bureau's performance. Analyzing the internal factors is crucial in identifying the source of the bureau's competitive advantage over other consulting firms. This analysis helps to identify areas that require improvement and sustainability to maintain competitiveness. For an engineering consulting bureau to generate higher profits than its current output, it is required to have a competitive advantage unique to the organization. Strategic management starts with the comprehensive evaluation of the bureau's performance and outputs, including assessing its internal resources, capabilities, and the services it offers. This evaluation is crucial in identifying the bureau's core competencies, which can be leveraged to create a competitive advantage.

5.1.Organizational Strengths

Strength can be defined as a characteristic that provides added value and makes something stand out from others. It refers to a positive, favorable, and unique aspect that gives something an advantage over others. The engineering consultancy bureau has various organizational strengths, collected by creating a questionnaire and distributing it to employees in this office, which are listed in Table 5:

Table 5 Strengths in the SWOT Analysis

Variable	Strength
S1	Being a governmental entity
S2	A specialized and efficient engineering staff is available in all disciplines.
S3	The possibility of benefiting from the college's laboratories
S4	Having a specific address and place for the bureau
S5	Experience in dealing with other state departments and signing legal contracts with detailed items that do not need clarification or detail
S6	The consulting bureau relies on distinguished consultants with extensive academic and practical scientific experience in various engineering fields.
S7	Several professors are also certified consultants in its staff.

Table 6 presents the strength variables' frequency and arithmetic mean (AM). All of the variables listed in Table 6 have a relative importance (as measured by the arithmetic mean) greater than 50%, indicating that all variables should be considered in the SWOT analysis.

Table 6 Responses and Average Scores for Strengths in SWOT Analysis.

Variable	Observed Frequency					AM	Rank
	10 Ineffective	30 Low	50 Medium	70 High	90 Very High		
S1	2	1	8	10	10	66.13	4th
S2	1	3	3	16	8	67.42	3rd
S3	1	3	14	8	5	58.39	7th
S4	1	2	4	13	11	70	2nd
S5	1	3	9	14	4	60.97	6th
S6	2	1	5	18	5	64.84	5th
S7	1	1	5	13	11	70.65	1st

5.1.1.Weaknesses in Organization

It refers to a negative, unfavorable, or disadvantageous characteristic, indicating a lack of necessary competence or resources. The engineering consultancy bureau has various organizational weaknesses identified in Table 7. Table 8 presents the frequencies and arithmetic means (AM) for weaknesses. Only variables with more than 50% AM were included in the SWOT analysis.

Table 7 Identification of Weaknesses in SWOT.

Items	Weakness
W1	High and exaggerated deduction rate from the cost of the work
W2	The bureau does not have laboratories or testing equipment
W3	Distributing work to everyone despite the incompetence and ability of some
W4	The bureau member's weakness in obtaining contracts from state departments
W5	The works entrusted to the office are not distributed in a manner that guarantees the participation of the largest number of professors in these works.
W6	There are specialized works that need a specialized work team. However, when distributing tasks in this type of work, it is noticed that members who do not have information related to this type of work participate or are not within their specialization, such as a consulting contract or soil investigations. The work team has some members specializing in environmental engineering, construction, or something else.
W7	Failure to obtain approval of the final accounts by the Financial Audit for each year on time
W8	Work is restricted to Tikrit and surrounding cities
W9	Lack of financial means

Table 8 Responses and Mean Scores of Weaknesses in SWOT Analysis.

Variable	Observed Frequency					AM	Rank
	10 Ineffective	30 Low	50 Medium	70 High	90 Very High		
W1	1	1	11	9	9	65.48	4th
W2	0	3	10	10	8	64.84	5th
W3	1	8	9	8	5	55.16	9th
W4	1	3	10	5	12	65.49	3rd
W5	0	7	6	5	13	65.50	2nd
W6	3	3	13	2	10	58.39	6th
W7	2	3	15	7	4	55.16	8th
W8	0	3	8	8	12	68.71	1st
W9	2	4	13	5	7	57.10	7th

5.2.Analyzing and Determining the External Factors

External factors are those factors that originate from outside the engineering consultancy bureau and have an impact on its operations and performance. These factors, including political, economic, social, technological, environmental, and legal aspects, can affect the bureau's performance and competitiveness. Understanding these external factors is essential for developing a strategic plan to benefit from the opportunities' advantages and mitigate or avoid potential threats. The SWOT analysis helps identify and assess these external factors, which can then be incorporated into the strategic process to ensure the long-term success of the engineering consultancy bureau.

5.2.1.Environmental Opportunities

External Opportunities are factors that may benefit the engineering consultancy bureau by leveraging its strengths, addressing its weaknesses, or mitigating threats. They refer to favorable conditions in the external environment that can help the bureau achieve its objectives. The opportunities available to the bureau are analyzed in Table 9, which includes factors, such as market growth, government policies and regulations, technological advancements, and changes in consumer preferences. By identifying and exploiting these opportunities, the bureau can enhance its competitive advantage and achieve its goals. Table 10 displays the frequency count and arithmetic mean (AM) for the opportunities identified. All variables with more than 50% AM were considered relatively important and, therefore, were included in the SWOT.

Table 9 Opportunities Points in SWOT.

Items	Opportunity
O1	Overcoming all threats and addressing the mentioned vulnerabilities
O2	Scientific and technical communication with government institutions and private companies
O3	Strengthening the Engineering Consulting Bureau and through the College of Engineering with modern equipment that keeps pace with developments in engineering consulting work and is subject to standardization and quality control to increase reliability with the results in the light of which recommendations are given.
O4	Openness to neighboring governorates
O5	Forming work teams to visit governmental and private institutions to exchange experiences and develop these cadres
O6	Seeking to obtain accreditation for the consulting bureau, both at the level of engineering staff and the equipment used in conducting laboratory tests periodically
O7	Independence in the space allocated to the bureau by working on constructing a building for it
O8	Seeking to purchase specialized machines and trucks that are involved in the work of the consulting bureau, such as the purchase of excavators for soil investigations, because they will increase the profits of the bureau as well as compete for the acquisition of contracts by reducing the prices of bids submitted by the bureau, as the prices of bids submitted by the office are governed by the prices and wages of these machines bureau does not own them.

Table 10 Frequencies and Arithmetic Mean Numbers for Opportunities.

Variable	Observed Frequency					AM	Rank
	10 Ineffective	30 Low	50 Medium	70 High	90 Very High		
O1	1	1	12	7	10	65.48	2nd
O2	0	3	9	14	5	63.54	3rd
O3	0	4	8	6	13	68.06	1st
O4	1	5	7	9	9	62.90	5th
O5	0	3	14	8	6	60.97	7th
O6	0	4	10	9	8	63.53	4th
O7	0	4	8	15	4	62.26	6th
O8	1	9	8	6	7	55.81	8th

5.2.2.Environmental Threats

Regarding the performance of the engineering consultancy bureau at the University of Tikrit, threats are considered factors that create obstacles or challenges that may hinder or prevent the bureau from achieving its product development goals. These threats have negative implications that must be addressed to avoid potential harm or negative impact on the bureau's performance. The aforementioned environmental threats affecting the bureau's work have been analyzed and presented in Table 11. Table 12 presents the frequency and arithmetic mean (AM) for threats and all variables with more than 50% of the arithmetic mean, indicating their relative importance. Hence, all the variables were considered in the SWOT analysis, presented in Table 12.

Table 11 Threat Points in The SWOT Analysis.

Items	Threat
T1	The monopoly of certain people in most of the work and assignments and not involving the rest of the competencies in the college in the work of the bureau
T2	The high deduction rate limits the possibility of competition with the private sector.
T3	The competition for engineering consulting work and the general economic situation continuously decrease the qualitative engineering work that requires engineering consultancy.
T4	The presence of non-licensed engineering bureaus is working to attract contracts from state departments through reduced prices and leniency in working within the approved engineering specifications.
T5	The security threats face work teams in contracts that require fieldwork, especially in dangerous areas from a security point of view.
T6	Lack of job opportunities

Table 12 Count of Frequencies and Arithmetic Mean for Threats.

Variable	Observed Frequency					AM	Rank
	10 Ineffective	30 Low	50 Medium	70 High	90 Very High		
T1	1	1	6	5	18	74.52	1st
T2	0	0	9	9	13	72.58	2nd
T3	0	0	12	14	5	65.48	3rd
T4	2	4	5	9	11	64.84	4th
T5	1	5	11	7	7	59.03	6th
T6	2	0	10	11	8	64.83	5th

5.2.3.SWOT Matrix in Engineering Consulting Bureau

SWOT analysis helps assess the organization's internal strong and weak points and the external factors that can help or harm it. It provides a framework to identify and prioritize key areas for improvement, highlighting potential opportunities that can be leveraged. By examining internal and external factors, the engineering consultancy bureau can develop a more comprehensive understanding of its performance and create a strategic plan to enhance its strengths, overcome its weaknesses, and capitalize on the opportunities that present themselves while warding off the threats that might happen. Table 13 summarizes the SWOT analysis for the engineering consultancy bureau at Tikrit University.

Table 13 SWOT Analysis for Engineering Consulting Bureau.

Strengths		**Weaknesses**	
S1	Being a governmental entity	W1	High and exaggerated deduction rate from the cost of the work
S2	A specialized and efficient engineering staff is available in all disciplines.	W2	The bureau does not have laboratories or testing equipment
S3	The possibility of benefiting from the college's laboratories	W3	Distributing work to everyone despite the incompetence and ability of some
S4	Having a specific address and place for the bureau	W4	The bureau member's weakness in obtaining contracts from state departments
S5	Experience in dealing with other state departments and signing legal contracts with detailed items that do not need clarification or detail	W5	The works entrusted to the office are not distributed in a manner that guarantees the participation of the largest number of professors in these works.
S6	The consulting bureau relies on distinguished consultants with extensive academic and practical scientific experience in various engineering fields.	W6	There are specialized works that need a specialized work team. However, when distributing tasks in this type of work, it is noticed that members who do not have information related to this type of work participate or are not within their specialization, such as a consulting contract or soil investigations. The work team has some members specializing in environmental engineering, construction, or something else.
S7	Several professors are also certified consultants in its staff	W7	Failure to obtain approval of the final accounts by the Financial Audit for each year on time
		W8	Work is restricted to Tikrit and surrounding cities.
		W9	Lack of financial means
Opportunities		**Threats**	
O1	Overcoming all threats and addressing the mentioned vulnerabilities	T1	The monopoly of certain people in most of the work and assignments and not involving the rest of the competencies in the college in the work of the bureau
O2	Scientific and technical communication with government institutions and private companies	T2	The high deduction rate limits the possibility of competition with the private sector.
O3	Strengthening the Engineering Consulting Office and through the College of Engineering with modern equipment that keeps pace with developments in engineering consulting work and is subject to standardization and quality control to increase reliability with the results in the light of which recommendations are given Openness to neighboring governorates	T3	The competition for engineering consulting work and the general economic situation continuously decrease the qualitative engineering work that requires engineering consultancy.
		T4	The presence of non-licensed engineering bureaus is working to attract contracts from state departments through reduced prices and leniency in working within the approved engineering specifications.
O4	Forming work teams to visit governmental and private institutions to exchange experiences and develop these cadres	T5	The security threats face work teams in contracts that require fieldwork, especially in dangerous areas from a security point of view.
O5	Seeking to obtain accreditation for the consulting bureau, both at the level of engineering staff and the equipment used in conducting laboratory tests periodically	T6	Lack of job opportunities
O6	Independence in the space allocated to the bureau by working on constructing a building for it		
O7	Seeking to purchase specialized machines and trucks involved in the work of the consulting bureau, such as the purchase of excavators for soil investigations, because they will increase the profits of the bureau as well as compete for the acquisition of contracts by reducing the prices of bids submitted by the bureau, as the prices of bids submitted by the office are governed by the prices and wages of these machines if the bureau does not own them.		
O8	Overcoming all threats and addressing the mentioned vulnerabilities		

5.3.SWOT Strategies in Engineering Consulting Bureau

By leveraging the strengths and reducing the weaknesses identified through SWOT analysis, potential tactical strategies can be initiated to benefit from opportunities or defend against threats. The resulting SWOT matrix can be used to guide the development of the Engineering Consulting Bureau. Based on this analysis, four strategies have been identified in Fig. 1 to improve the bureau's efficiency.

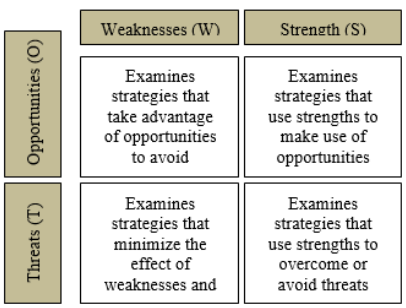

Fig. 1 SWOT Strategies in the Engineering Consulting Bureau.

5.3.1.The Strategy of Weakness Opportunities (WOS)

The weakness-opportunities strategy, also known as the searching strategy, involves capitalizing on external opportunities while addressing internal weaknesses that hinder the organization's growth. This strategy aims to eliminate weaknesses by leveraging available opportunities. This goal is achieved by maximizing the available opportunities, for example, overcoming all threats and addressing the weaknesses mentioned, scientific and technical communication with government institutions and private companies, and strengthening the engineering consulting bureau through the College of Engineering with modern equipment that keeps pace with developments in engineering consulting work and is subject to standardization and quality control to increase the reliability of the results in the light of which recommendations are given and openness to neighboring governorates. Forming work teams to visit governmental and private institutions to exchange experiences and develop these cadres. In addition to working on obtaining the reliability of the consulting bureau at the level of the engineering staff and the equipment used in conducting laboratory tests regularly, independence in the place designated for the office by working on constructing a special building for the bureau, and working on purchasing specialized machines that enter into the work of the consulting bureau, such as purchasing excavators, especially for soil investigations because it will increase the profits of the bureau as well as competition for obtaining contracts by reducing the prices of bids submitted by the bureau, as the prices of bids submitted by the bureau are governed by the prices and wages of these machines if the bureau does not own them, these points are listed in Table 14.

Table 14 Weaknesses Opportunities Strategy (WOS).

• High and exaggerated deduction rate from the cost of the work. • The bureau does not have laboratories and testing equipment. • Distributing work to everyone despite the incompetence and ability of some • The bureau member's weakness in obtaining contracts from state departments. • The works entrusted to the office are not distributed in a manner that guarantees the participation of the largest number of professors in these works. • There are specialized works that need a specialized work team. However, when distributing tasks in this type of work, it is noticed that members who do not have information related to this type of work participate or are not within their specialization, such as a consulting contract or soil investigations. The work team has some members specializing in environmental engineering, construction, or something else. • Failure to obtain approval of the final accounts by the financial audit for each year on time. • Work is restricted to Tikrit and surrounding cities. • Lack of financial means.	• Overcoming all threats and addressing the mentioned vulnerabilities. • Scientific and technical communication with government institutions and private companies. • Strengthening the Engineering Consulting Bureau and through the College of Engineering with modern equipment that keeps pace with developments in engineering consulting work and is subject to standardization and quality control to increase reliability with the results in the light of which recommendations are given. • Openness to neighboring governorates. • Forming work teams to visit governmental and private institutions to exchange experiences and develop these cadres. • Seeking to obtain accreditation for the consulting bureau at the level of engineering staff and the equipment used in conducting laboratory tests periodically. • Independence in the space allocated to the bureau by working on constructing a building for it. • Seeking to purchase specialized machines and trucks involved in the work of the consulting bureau, such as the purchase of excavators for soil investigations, because they will increase the profits of the bureau as well as compete for the acquisition of contracts by reducing the prices of bids submitted by the bureau, as the prices of bids submitted by the office are governed by the prices and wages of these machines if the bureau does not own them.

5.3.2.Strength Opportunities Strategy (SOS)

The Strength opportunity strategy in the second quadrant involves maximizing internal strengths and external opportunities. The organization can use its strengths to seize opportunities, which is a perfect scenario. The engineering consulting bureau should focus on utilizing the opportunities identified in the Opportunity Points strategy to compensate for weaknesses and further enhance its internal capabilities. Firstly, being a government agency, the presence of specialized and competent engineering staff in all disciplines, benefiting from the laboratories and equipment of the college, the presence of a fixed address for the office and a specific location, experience in dealing with other state departments through the conclusion of legal contracts not subject to the interpretation of their clauses to interpretation as shown in Table 15. Also, the consulting bureau works with distinguished consultants with great academic and practical experience in various engineering fields, in addition to many professors with a consultant degree.

Table 15 Strength Opportunities Strategy (SOS).

• Being a governmental entity. • A specialized and efficient engineering staff is available in all disciplines. • The possibility of benefiting from the college's laboratories • Having a specific address and place for the bureau. • Experience in dealing with other state departments and signing legal contracts with detailed items that do not need clarification or detail. • The consulting bureau relies on distinguished consultants with extensive academic and practical scientific experience in various engineering fields. • Several professors are also certified consultants in its staff.	• Overcoming all threats and addressing the mentioned vulnerabilities. • Scientific and technical communication with government institutions and private companies. • Strengthening the Engineering Consulting Bureau and through the College of Engineering with modern equipment that keeps pace with developments in engineering consulting work and is subject to standardization and quality control to increase reliability with the results in the light of which recommendations are given. • Openness to neighboring governorates. • Forming work teams to visit governmental and private institutions to exchange experiences and develop these cadres. • Seeking to obtain accreditation for the consulting bureau at the level of engineering staff and the equipment used in conducting laboratory tests periodically. • Independence in the space allocated to the bureau by working on constructing a building for it. • Seeking to purchase specialized machines and trucks involved in the work of the consulting bureau, such as the purchase of excavators for soil investigations, because they will increase the profits of the bureau as well as compete for the acquisition of contracts by reducing the prices of bids submitted by the bureau, as the prices of bids submitted by the office are governed by the prices and wages of these machines if the bureau does not own them.

5.3.3.The Strategy of Strength Threats (STS)

The Counterforce Strategy, also known as the Threat Counterstrategy, aims to use the firm's internal strengths to overcome external threats from competitors, industry, or the broader environment. However, organizations with significant market power need to be careful when dealing with threats in the external environment. The Counterforce Strategy seeks to leverage internal strengths to mitigate environmental threats. In the case of the engineering consulting bureau, this strategy would involve maximizing the internal strength, as mentioned earlier in the SOS, to face and overcome environmental threats, although the consulting bureau has to deal with all environmental threats with caution. Certain people monopolize most of the work and assignments and do not involve the rest of the competencies in the college with office work. The high deduction rate limits the possibility of competition with the private sector and competition in engineering consulting work in addition to the general economic situation that causes a continuous decrease in specific engineering works that need engineering consultancy. The presence of non-licensed engineering bureaus working to attract contracts from state departments through the reduction in prices and leniency in working within the approved engineering specifications, then the security threats facing the working teams in contracts that require field or fieldwork, especially in dangerous areas in terms of security, as well as the lack of jobs chances, these points shown in Table 16.

Table 16 Strength Threats Strategy (STS).

• Being a governmental entity. • A specialized and efficient engineering staff is available in all disciplines. • The possibility of benefiting from the college's laboratories • Having a specific address and place for the bureau. • Experience in dealing with other state departments and signing legal contracts with detailed items that do not need clarification or detail. • The consulting bureau relies on distinguished consultants with extensive academic and practical scientific experience in various engineering fields. • Several professors are also certified consultants on its staff.	• Certain people monopolize most work and assignments, and the rest of the college's competencies are not involved in the bureau's work. • The high deduction rate limits the possibility of competition with the private sector. • The competition for engineering consulting work and the general economic situation continuously decrease the qualitative engineering work that requires engineering consultancy. • The presence of non-licensed engineering bureaus is working to attract contracts from state departments through reduced prices and leniency in working within the approved engineering specifications. • The security threats face work teams in contracts that require fieldwork, especially in dangerous areas from a security point of view. • Lack of job opportunities

5.3.4.Weaknesses Threats Strategy (WTS)

The fourth quadrant of the SWOT matrix, also known as the Weaknesses Threats Strategy or Avoiding Strategy, represents a scenario where the firm aims to decrease the weaknesses and external threats. The primary objective is to mitigate the weaknesses and avoid potential threats from its environment that may impede organizational growth. To implement this strategy, the engineering consulting bureau should focus on reducing internal weaknesses and taking measures to minimize the effect of external threats, especially in the case of high and exaggerated deduction rates from the cost of business and addressing the office's lack of laboratories and equipment examining his own and finding a way to distribute the work to everyone and address the weakness on the part of the members of the bureau in obtaining contracts from the state departments and distributing the work entrusted to the bureau in a way that guarantees the involvement of the largest number of professors in these works, assigning the work to its specialists, and obtaining approval of the final accounts by financial supervision for each year on time, in addition to expanding and spreading the work outside Tikrit City, as well as supporting the bureau financially, these point listed in Table 17.

Table 17 The Strategy of Weaknesses Threats (WTS).

• High and exaggerated deduction rate from the cost of the work • The bureau does not have laboratories or testing equipment • Distributing work to everyone despite the incompetence and ability of some • The bureau member's weakness in obtaining contracts from state departments • The works entrusted to the office are not distributed in a manner that guarantees the participation of the largest number of professors in these works • There are specialized works that need a specialized work team. However, when distributing tasks in this type of work, it is noticed that members who do not have information related to this type of work participate or are not within their specialization, such as a consulting contract or soil investigations. The work team has some members specializing in environmental engineering, construction, or something else. • Failure to obtain approval of the final accounts by the Financial Audit for each year on time • Work is restricted to Tikrit and surrounding cities • Lack of financial means	• The monopoly of certain people in most of the work and assignments, and the rest of the college's competencies are not involved in the bureau's work. • The high deduction rate limits the possibility of competition with the private sector. • The competition for engineering consulting work and the general economic situation continuously decrease the qualitative engineering work that requires engineering consultancy. • The presence of non-licensed engineering bureaus is working to attract contracts from state departments through reduced prices and leniency in working within the approved engineering specifications. • The security threats face work teams in contracts that require fieldwork, especially in dangerous areas from a security point of view. • Lack of job opportunities.

6.CONCLUSIONS

A SWOT analysis was conducted to study the reality of the bureau and to arrange several strengths and weaknesses and opportunities and threats. Where it was found first as a point of strength, the presence of a large number of professors working in it with a consultant degree, in addition to the existence of a fixed address for the office and a specific location, which is one of the most important points of strength that distinguishes the bureau from others. Then, it was concluded the need to confront weaknesses, including that working in the office is as if it is confined to the city of Tikrit and the surrounding cities, in addition to not distributing the work entrusted to the office in a way that guarantees the involvement of the largest number of professors in these works. After that, the opportunities available to the engineering consulting bureau must be enhanced by equipping the College of Engineering with modern equipment that keeps pace with developments in the engineering consulting work and is subject to standardization and quality control to increase reliability with the results in the light of which recommendations are given, in addition to overcoming all threats and addressing the mentioned weaknesses. Also, it was found that the way to overcome the risks facing the work of the office is by preventing certain people from monopolizing most of the work and assignments and not involving the rest of the competencies in the college with the office work, in addition to reducing the high deduction rate that limits the possibility of competition with the private sector.

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