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Evaluation the Reality of Strategic Clarity for Sustainable Development in Selected Universities in Iraq: An Analytical Study

1Ahmed Abdullah Danook, 2Hussain Elttayef Hamad, 3Mohammed Jawad Ahmed and 4Maan Ali Mohammed E-mail : ahmeddanook_hwj@ntu.edu.iq/ hussainelttayef-htc@ntu.edu.iq / mohammed.j_htc@ntu.edu.iq /maanali-htc@ntu.edu.iq

1Hawija Technical College/ Northern Technical University, Iraq Corresponding author:ahmeddanook_hwj@ntu.edu.iq

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Corresponding author:
Name: Ahmed Abdullah Danook
Affiliation : Northern Technical University
Email:
ahmeddanook_hwj@ntu.edu.iq

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A B S T R A C T

The study aims to assess the reality of strategic clarity in sustainable development within selected Iraqi universities by measuring dimensions such as clarity of activities, purpose, ref-erences, organizational structure, leadership roles, and staff roles. The study also explores the differences between public and private universities, focusing on academic leadership and analyzing them using statistical methods. The study highlights gaps in strategic clarity and their impact on sustainability.

The study targeted leaders (deans, assistant deans, and department heads) from six univer-sities: three public universities (Tikrit, Kirkuk, and Northern Technical University) and three private universities (Al-Kitab, Al-Qalam, and Imam Jaafar Al-Sadiq). 259 responses were collected via an online questionnaire, reflecting a relatively good level of overall strategic clarity. The scientific value of the study is determined by addressing the knowledge gap by focusing on academic leadership and using advanced statistical methods. The results contrib-ute to providing practical insights for improving resource management and enhancing strate-gic planning in educational institutions. The results showed no statistically significant differ-ences in most dimensions except for resource clarity. Private universities have outperformed public universities, which face challenges in allocating resources due to their flexible funding and administrative independence.

Keywords: Strategic clarity, sustainable development, leadership roles, resource clarity, Iraqi universities.

1. Introduction

Higher education institutions (HEIs) play a fundamental role in raising society's awareness of the importance of sustainable development. They implement various approaches and initiatives that contribute to achieving the Sustainable Development Goals (SDGs) set out in the 2030 Agenda for Sustainable Development. These activities include a wide range of outreach, collaboration, campus management, and research. Sustainability has become a central issue in higher education [1], Global universities are carrying out various activities to support sustainability on their campuses in line with the basic principles of sustainability. These activities are not limited to afforestation and improving green spaces but also include effective efforts to utilize available resources. Universities seek to encourage stakeholders on campus to explore new avenues and take active initiatives that promote environmental, economic, and social sustainability [23].

In this context, the Sustainable Development Goals consist of 17 goals and more than a hundred detailed targets. The education goal is embodied in the fourth Sustainable Development Goal (SDG), which seeks to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all." The SDGs are the product of a decades-long evolutionary process that has included UN efforts in other areas of sustainability, with the aim of clarifying the UN agenda and implementing it in a systematic and integrated manner. Clarification of the 17 SDGs was the result of a series of global committees, summits, and international conferences. Since the implementation of the SDGs began, there have been significant efforts to localize the international framework for sustainable development and establish monitoring systems to track progress. Two prominent examples of the adoption of the SDGs and indicators are emerging in Europe and the Asia-Pacific region: the European Union launched the 2020 Strategic Framework for Education and Training as part of this global effort [3], Strategic clarity is one of the most important topics that organizations are currently discussing, given its significant impact on how they operate. Clarity depends on removing ambiguity from future strategies, which must be based on clear principles and rules that are known to all employees in the organization and are consistent with its goals and ambitions. Many researchers in the field of strategic management believe that the success of the organization depends on its ability to reach a clear and integrated plan that can be actually implemented.

On the other hand, some believe that strategic clarity removes any doubts about resource policies and focuses on those policies instead of over-determining their strategies [4], Therefore, the research aims to know how strategic clarity, represented by the clarity of activities and procedures, clarity of purpose, clear use of references, clarity of organizational structure, clarity of leadership roles, and clarity of employee roles, is related to social sustainability, environmental sustainability, and economic sustainability. Here, we focus on the importance of using practices that achieve strategic clarity to direct the organization towards long-term goals, in addition to providing suggestions and recommendations for organizations operating in the Iraqi environment.

2 **Research methodology**

2.1 **Research problem:** Iraqi universities, both public and private, face increasing challenges in achieving sustainable development. These challenges are manifested in a clear lack of long-term visions and strategies that define courses of action, allocate leadership responsibilities, and provide an effective organizational framework that contributes to achieving sustainable development goals. Field observations, monitored by researchers through field interviews with university administrative leaders, revealed a tangible deficiency in the clarity of strategic objectives, weak monitoring and evaluation mechanisms, and ambiguity in leadership roles. These findings negatively impact the effectiveness of sustainable development programs and cause disparities in university performance in achieving these goals. At the cognitive level, a review of previous literature revealed a paucity of studies addressing strategic clarity for sustainable development in the Iraqi context in particular and a lack of systematic and accurate consideration of the differences between public and private universities in the

clarity of strategies directed at sustainable development, representing a clear knowledge gap. Based on the above, the problem of the study revolves around an attempt to evaluate the reality of strategic clarity for sustainable development in selected Iraqi universities and to determine the extent of the significance of the differences between public and private universities with regard to this strategic clarity, in light of the field and knowledge gaps referred to above, this leads to the following questions:

a. What is the extent of strategic clarity for sustainable development in Iraqi uni-versities?
b. Are there statistically significant differences between the average responses of researchers regarding the strategic clarity of sustainable development in Iraqi uni-versities according to university type (public or private)? This leads to the follow-ing questions:

- Are there statistically significant differences between the average responses of researchers regarding the clarity of sustainable development activities and proce-dures in Iraqi universities according to university type (public or private)?
- Are there no statistically significant differences between the average responses of researchers regarding the clarity of the sustainable development goal in Iraqi universities according to university type (public or private)?
- Are there no statistically significant differences between the average responses of respondents regarding the clarity of sustainable development references in Iraqi universities according to university type (public or private)?
- Are there no statistically significant differences between the average responses of respondents regarding the clarity of the organizational structure for sustainable development in Iraqi universities according to university type (public or private)? Are there no statistically significant differences between the average responses of respondents regarding the clarity of leadership roles for sustainable development in Iraqi universities, depending on the type of university (public or private)?
- Are there no statistically significant differences between the average responses of respondents regarding the clarity of staff roles for sustainable development in Iraqi universities, depending on the type of university (public or private)?

2.2 **Importance of the research:** Strategic clarity is one of the main factors that affect the effectiveness of implementing sustainable development plans in universities. Strategic clarity enhances the clear understanding of goals and ambitions and removes ambiguity, which helps universities direct their efforts and references toward achieving those goals. Therefore, when analyzing the levels of strategic clarity, it becomes clear that the following benefits are achieved for Iraqi universities:

a. Improving strategic planning: Helps universities develop clear and integrated strategic plans to achieve sustainable development.
b. Enhancing resource allocation: Contributes to improving resource allocation policies, which increases the effectiveness of using financial and human resources.
c. Improving the organizational structure: Provides a clear vision of the organiza-tional structure, which contributes to enhancing coordination and cooperation be-tween different departments.
d. Enhancing leadership roles: Increases the ability of leaders to direct teams and achieve strategic goals efficiently.

2.3 Research objectives: Many objectives can be achieved from the research, which are as follows:

a. Evaluating the level of strategic clarity for sustainable development in Iraqi universities by analyzing its various dimensions.
b. Analyzing the differences between public and private universities in terms of strategic clarity for sustainable development will determine whether there are fun-damental differences in planning and implementation between the two sectors.
c. Determining the relative importance of the dimensions of strategic clarity for sustainable development in the research sample universities

2.4 **Research Limits:**

a. Spatial Limits: The spatial limits of the study were three public universities (Tikrit University, Kirkuk University, and Northern Technical University) and three private universities (Al-Kitab University, Al-Qalam College, and Imam Jaafar Al-Sadiq College).
b. Temporal Limits: The temporal limits of the study were from February 2, 2025, to March 2, 2025.

c. The duration of the research in the studied field should be determined from the date of questionnaire distribution and data collection until the completion of data analysis.

2.5 Hypothetical diagram: Based on the research problem, its importance, and objectives, the hypothetical plan for the research was formulated, which is as follows:

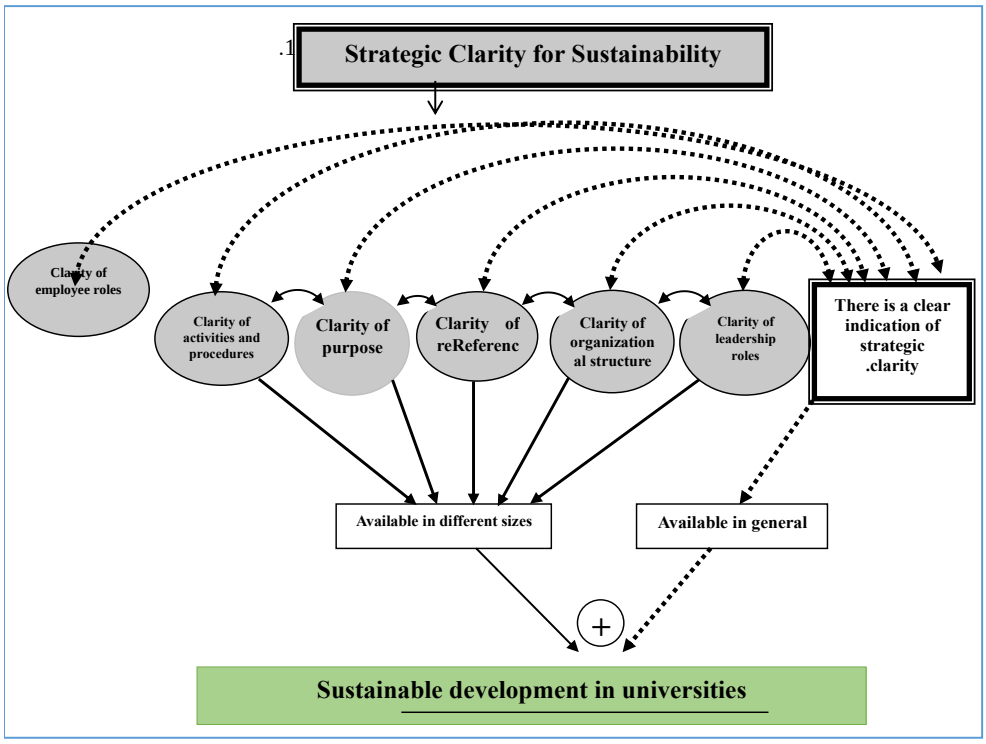


Fig. 1. A figure Hypothetical diagram

Source: Prepared by the researchers based on the studied dimensions.

2.6 **Research hypotheses:**

The first main hypothesis: Iraqi universities have a statistically significant level of strategic clarity for sustainable development.

The second main hypothesis: There are no statistically significant differences between the averages of the researchers' responses regarding the strategic clarity of sustainable development in Iraqi universities according to the type of university (governmental or private).

The following hypotheses branch out from it:

1. There are no statistically significant differences between the averages of the researchers' responses regarding the clarity of activities and procedures for sus-tainable development in Iraqi universities according to the type of university (gov-ernmental or private).
2. There are no statistically significant differences between the averages of the researchers' responses regarding the clarity of the purpose of sustainable develop-ment in Iraqi universities according to the type of university (governmental or pri-vate).
3. There are no statistically significant differences between the averages of the respondents' responses regarding the clarity of reference for sustainable develop-ment in Iraqi universities according to the type of university (governmental or pri-vate).
4. There are no statistically significant differences between the averages of the respondents' responses regarding the clarity of the organizational structure for sustainable development in Iraqi universities according to the type of university (governmental or private).
5. There are no statistically significant differences between the averages of the respondents' responses regarding the clarity of leadership roles for sustainable development in Iraqi universities according to the type of university (governmen-tal or private).
6. There are no statistically significant differences between the averages of the respondents' responses regarding the clarity of the roles of employees for sustaina-ble development in Iraqi universities according to the type of university (govern-mental or private).

2.7 **Research Methodology:** The (descriptive-analytical) approach was used to achieve accuracy in understanding the components of an existing problem or phenomenon by analyzing it and revealing the relationships and influences between its variables, with the aim of interpreting it and reaching general conclusions that contribute to understanding and diagnosing reality. This approach is also consistent with the nature of the study and its objectives [5], In addition, it addresses Field frameworks that the current research focuses on by conducting tests to model structural equations.

2.8 **Research Limits:** The cognitive limits included (strategic clarity/sustainable development), spatial limits (selected Iraqi universities), temporal limits (since defining the problem at the beginning of 2024), and human limits (administrative leadership).

3 **Theoretical Framework of the Research**

3.1 **Strategic Clarity:** A relatively new concept that has received significant research attention. Many organizations have defined strategies but face challenges in translating these plans into actionable steps, often due to a lack of clarity in their strategy [6], addressing this ambiguity, which can impact performance across organizational activities, has prompted strategic management to seek new perspectives to raise organizational performance to higher levels. An effective organization can achieve the greatest possible benefit through a well-defined strategy and the use and control of physical and human factors to achieve its goals and achieve the best results [7], Strategic clarity is a concept that goes beyond traditional strategic planning as an integrated approach that engages the organization in developing strategies and implementation mechanisms in line with the organization's goals. Any organization can have a good plan, but with strategic clarity, it will truly become a strategic organization. This can be achieved through leadership skills, ease of communication between management and its employees, and optimal utilization of their performance, thus distinguishing them from the flexibility and rapid adaptation to confront potential and unexpected risks [8].

3. 1.1 Clarity of activities and procedures: any clarity of a system that exercises a set of management functions and controls the inputs and outputs of the organiza-tion's references [9, 10].

3.1.2 Clarity of purpose: understanding the organization's goals for adopting new products, as high-market business organizations are more likely to have good cus-tomer relationships and create superior value for them. Some empirical studies have also shown that market orientation can contribute to specific organizational outcomes such as innovation capacity or financial performance success [11, 12].

3.1.3 Clarity of references: that is, an organization can possess strategic refer-ences by having a sustainable competitive advantage [13].

3.1.4 Clarity of organizational structure: Organizational structure is essential in determining the size of the organization, as modern organizations increase their size in order to gain a competitive advantage over competitors by reducing produc-tion costs and increasing their market share, with large organizations accessing references at a lower price than small organizations [14].

3.1.5 Clarity of leadership roles: Leadership roles play an important role by influ-encing individuals who work towards a specific goal or mission pursued by the organization, making the organization cohesive and interconnected [15].

3.1.6 Clarity of employee roles: A selection of user roles to access system func-tions and metadata stored in the system [16].

Thus, strategic clarity refers to the extent to which objectives, references, activ-ities, organizational structure, and the role of employees are clear in achieving the strategic objectives of the organization. In universities, strategic clarity is essential to achieving sustainable development by directing efforts and references toward achieving sustainable goals [17].

4 **Sustainable development concept:**

It is an approach that aims to achieve a balance between economic, social, and en-vironmental development to ensure the well-being of present and future genera-tions. In the context of higher education, sustainable development aims to integrate sustainability principles into the curricula, research, and administrative practices of universities [18].

4.1 **Sustainable development importance in universities:** Sustainable development achieves many benefits for universities, which are as follows: [19, 20, 21],

4.1.1 **Promoting comprehensive education:** Contributes to improving the quality of education by integrating sustainability principles into curricula [22].

4.1.2 **Research and innovation**: Encourages research and innovation in the fields of sustainability, which contributes to developing sustainable solutions to envi-ronmental and social challenges.

4.1.3 **Social responsibility:** Enhances the role of universities in serving society by implementing sustainable projects and initiatives.

4.1.4 **International cooperation:** Opens horizons for cooperation with universi-ties and international institutions to achieve sustainable development goals.

5 Field framework

5.1 Formulating the Answers:

The five-point Likert scale was used in formulating the answers, allowing the par-ticipants to choose the extent of their agreement with the paragraphs from five options, which are completely agree, agree, neutral, disagree, completely disagree, and the degrees of the five-point scale used in the research were classified as fol-lows:

Table 1. Table Likert scale for answering the question paragraphs

Classification	Totally agree	Agree	Neutral	Disagree Totally	Disagree
Grade	5	4	3	2	1

Source: Prepared by the researchers, based on the Likert scale.

The range of the five-point scale used in the research was calculated as follows:

Range calculation = (5 – 1)/5 = 0.80

- From 1.00 to 1.80 represents a very low degree.
- From 1.80 to 2.60 represents a low degree.
- From 2.60 to 3.40 represents a medium degree.
- From 3.40 to 4.20 represents a sufficient degree.
- From 4.20 to 5.00 represents a very sufficient degree.

5.2 Research community:

The research community consists of all directors and heads of administrative units (deans, assistant deans, and heads of departments) in a group of Iraqi public and private universities, namely (Tikrit University, Kirkuk University, Northern Tech-nical University, Al-Kitab University, Al-Qalam College, and Imam Jaafar Al-Sadiq College). Table No. (2) shows the distribution of the research community in these universities, which were selected based on their age and size, as they are consid-ered among the largest active educational institutions in Iraq. One of the reasons for selecting these universities and limiting them to them is the diversity of aca-demic programs and the educational environment they offer, which contributes to achieving the research objectives.

Table 2. Table Distribution of the Research Community

	Public universities				Private Universities			
Position	**Tikrit university**	**Kirkuk university**	**Northern Technical university**	**total**	**AL-Kkitab university**	**AL-salaam university**	**Imam Jaafar Al-Sadiq university**	**Total**
Dean	**23**	**18**	**16**	**55**	**12**	**1**	**4**	**17**
Assistant Dean	**46**	**36**	**32**	**110**	**24**	**2**	**8**	**34**
Head of Department	**114**	**80**	**85**	**279**	**35**	**22**	**8**	**65**
Total	**183**	**134**	**133**	**444**	**71**	**25**	**20**	**116**

Source: Prepared by the researchers

1.1 Research sample:

The research community consisted of all individuals who hold senior administrative positions in selected Iraqi public and private universities. To determine the sample size from the original community, Stephen Thompson's equation was used in the following manner:

Determining the sample size for directors of public and private universities:

$$N = (N \times p(1-p)) / [N-1 \times (d^2 \div z^2)] + p(1-p)] \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where:

N: population size.

Z: standard score corresponding to the significance level (0.95) and equals (1.96).

d: error rate and equals (0.05).

By applying the equation of the community of managers in public universities, the following becomes clear:

Table 3. Table Calculating the sample size in public universities according to Stephen Thompson's equation

Details	**Code**	**Value**
community size	**N**	**444**
Standard score (Z-score) at significance level (0.05) and confidence level (0.95)	**Z**	**1.96**
Error rate	**d**	**0.05**
Probability value	**p**	**0.5**
Sample size	**n**	**206**

By applying the equation to the community of managers in private universities, the following becomes clear:

Table 4. Table Calculating the sample size in public universities according to Stephen Thompson's equation

Details	Code	Value
community size	**N**	**116**
Standard score (Z-score) at significance level (0.05) and confidence level (0.95)	**Z**	**1.96**
Error rate	**D**	**0.05**
Probability value	**P**	**0.5**
Sample size	**N**	**89**

After applying the equation to all categories of the Research community, it becomes clear that the sample size was determined in proportion to the size of each university to ensure the accuracy of the results extracted from the field research.

Table 5. Table Details of the research sample and the number of distributed and returned questionnaires

Universities	**Sample**	**Questionnaires distributed**	**Questionnaires returned**	**Questionnaires valid for analysis**	**Percentage**
Government	**206**	**206**	**190**	**185**	**89.90%**
Private	**89**	**89**	**77**	**74**	**83.14%**

Total	**295**	**295**	**267**	**259**	**87.79%**

Source: Prepared by the researchers in light of field research data.

In this way, the scientific objectives of the study are achieved through accurate analysis based on data collected from the research community in a balanced and reliable manner. Table (6) shows the demographic characteristics of the sample individuals

Table 6. Table Demographic characteristics of the sample individuals

Variable	Categories	Frequencies	Percentage	Total
Gender	**Male**	**181**	**69.9%**	**259**
	Female	**78**	**30.1%**	
Age	**Less than 30 years**	**18**	**6.9%**	**259**
	30-39 years	**68**	**26.3%**	
	40-49 years	**118**	**45.6%**	
	50-59 years	**39**	**15.1%**	
	Over 60 years	**16**	**6.2%**	
Years of experience	**Less than 5 years**	**25**	**9.7%**	**259**
	5-10 years	**68**	**26.3%**	
	10-15 years	**117**	**45.2%**	
	15-20 years	**40**	**15.4%**	
	Over 20 years	**9**	**3.5%**	
Job position	**Dean**	**33**	**12.7%**	
	Assistant Dean	**74**	**28.6%**	
	Head of Department	**152**	**58.7%**	
Academic attainment	**PhD**	**229**	**88.4%**	**259**
	Masters	**30**	**11.6%**	
university type	**Government University**	**185**	**71.4%**	**259**
	Private University	**74**	**28.6%**	
Total		**295**	**100%**	**295**

Source: Prepared by the researchers based on the outputs of SPSS V.27.

The demographic results of the sample members indicate that the vast majority of participants are males at 69.9%, reflecting the dominance of men in administrative positions in Iraqi universities. The most represented age group is between 40-49 years at 45.6%, followed by the 30-39 age group, indicating that most academic leaders are in the middle of their careers. As for years of experience, most participants have 10-15 years of experience, reflecting a long experience in academic management. In terms of job positions, department heads constituted the largest percentage at 58.7%, followed by assistant deans, while the rate of deans was the lowest. In terms of academic achievement, the majority of the sample holds a doctorate at 88.4%, reflecting the high educational level of the participants. In terms of university type, 71.4% of the sample belongs to public universities compared to 28.6% to private universities

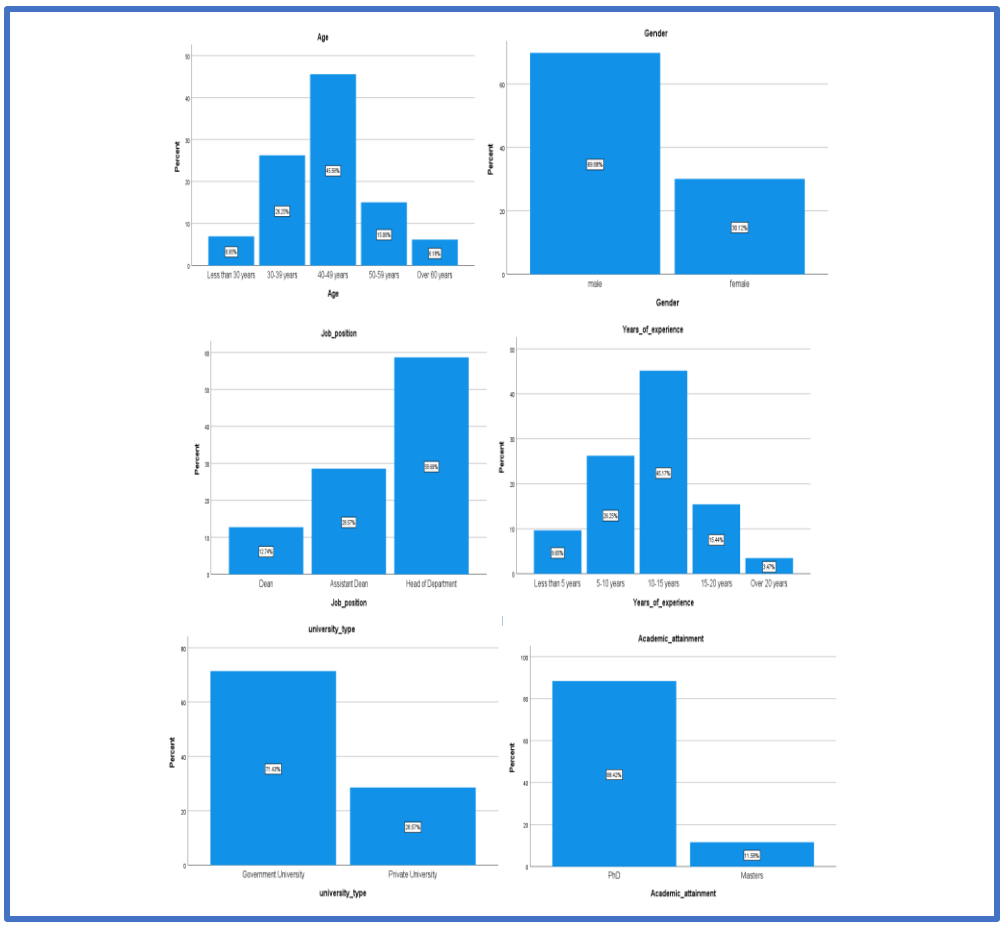


Fig 2. Figure Graphical representation of the distribution of sample individuals according to demographic characteristics.

Source: Prepared by the researchers based on the outputs of the SPSS V.27 program.

1.2 Stability of the study tool:

Cronbach's Alpha was used to measure the consistency and reliability of the research tool, as it reflects the degree of correlation between the paragraphs that measure the same concept. The closer the Cronbach's Alpha value is to 1, the higher the stability level and stability is considered acceptable if ($\alpha \geq 0.7$) [23].

Table 7. Table Cronbach's Alpha Stability Coefficient for Strategic Clarity for Sustainable Development Dimensions

Sequence	Variable	Number of Items	Cronbach's Alpha Value

1	Clarity of activities and procedures	5	0.820
2	Clarity of purpose	5	0.800
3	Clarity of references	5	0.747
4	Clarity of organizational structure	5	0.842
5	Clarity of leadership roles	5	0.765
6	Clarity of employee roles	5	0.768
	Strategic Clarity for Sustainable Development	30	0.946

Source: Prepared by the researchers based on the outputs of the SPSS V.27 program.

The results of Cronbach's alpha reliability coefficient showed a high level of reliability, as the overall reliability of the strategic clarity of sustainable development reached (0.964), which reflects an excellent degree of reliability. The clarity of the organizational structure recorded the highest reliability value (0.842), while the clarity of references recorded the lowest value (0.747). All dimensions recorded acceptable values less than 0.70, which confirms the reliability of the research tool.

1.3 Analysis of research variables and dimensions and testing hypotheses:

1. Analysis of research variables and dimensions and testing of the first hypothesis

The first hypothesis stated that (Iraqi universities have a statistically significant level of strategic clarity for sustainable development) and to test this hypothesis, arithmetic means, standard deviations, ranks, and (t) test were used for each dimension of the strategic clarity questionnaire for sustainable development, and Tables (8) illustrate this.

Table 8. Table Arithmetic mean, standard deviation, and t value for research variables

Variable	Mean	Standard Deviation	T	Sig	Trend	Rank
Clarity of activities and procedures	3.6332	0.84136	12.112	0.000	Acceptable	5

Clarity of purpose	**3.7768**	**0.76498**	**16.343**	**0.000**	**acceptable**	**1**
Clarity of references	**3.7436**	**0.71728**	**16.685**	**0.000**	**acceptable**	**3**
Clarity of organizational structure	**3.6185**	**0.86891**	**11.456**	**0.000**	**acceptable**	**5**
Clarity of leadership roles	**3.7583**	**0.75089**	**16.252**	**0.000**	**acceptable**	**2**
Clarity of employee roles	**3.7058**	**0.73522**	**15.449**	**0.000**	**Acceptable**	**4**
Strategic Clarity for Sustainable Development	**3.6332**	**0.84136**	**17.268**	**0.000**	**acceptable**	

Source: Prepared by the researchers based on the outputs of SPSS V.27.

The results of Table (8) show the level of strategic clarity for sustainable development in Iraqi universities through analyzing the arithmetic means and standard deviations, in addition to the t-test and Sig values that indicate a strong statistical significance for all variables at a significance level (0.000). These results suggest that the sample members generally agree on the existence of a good level of strategic clarity in sustainable development, although there is a disparity between some dimensions. The following is an explanation of the results of the research dimensions according to their sequence from highest to lowest according to the arithmetic mean:

a. Clarity of purpose

The Clarity of purpose dimension obtained the highest arithmetic mean (3.7768), indicating that the strategic goals for sustainable development in Iraqi universities are relatively clear and specific. This increase in the evaluation can be interpreted as a result of the general trends in higher education institutions towards aligning their goals with global sustainable development strategies, especially with the increasing international and local pressures to enhance sustainability in the educational sectors. In addition, the increased interest in global academic rankings such as the QS ranking and the Times Sustainability ranking may be an incentive for universities to set clear goals that are in line with sustainable development.

b. Clarity of leadership roles

The clarity of leadership roles dimension ranks second with an average of (3.7583), reflecting a clear awareness of the role of academic leaders such as deans in directing and implementing sustainable development strategies. This can be explained by the existence of an administrative structure that supports decision-making regarding sustainability, as senior management plays a crucial role in directing efforts towards achieving strategic goals.

c. Clarity of references

The clarity of the references dimension achieved an average of (3.7436), which is an indication that Iraqi universities have a relative awareness of the availability of references necessary to achieve sustainability. However, this dimension may face real challenges on the ground, as some studies indicate that financial and material references in Iraqi universities are still insufficient to fully support sustainable development projects, as this clarity may be linked to the availability of human references more than it reflects the availability of funding or advanced infrastructure.

d. Clarity of staff roles

The clarity of staff roles dimension achieved an average of (3.7058), indicating that there is a general understanding among the teaching and administrative staff about their responsibilities towards sustainability. However, it is still less clear compared to the leadership. This may reflect a gap between strategy formulation and implementation at the executive level, as policies may be clear at the higher administrative level. Still, they need more effective mechanisms to ensure their integration into the daily practices of employees and teaching staff.

e. Clarity of activities and procedures

The clarity of activities and procedures dimension came with an average of (3.6332), which indicates that there is a degree of ambiguity or lack of understanding of the frameworks and executive procedures for sustainability within Iraqi universities. The reason for this may be the absence of detailed regulations or weak implementation and evaluation mechanisms, as many universities rely on general strategic plans without clear systems for monitoring implementation or measuring the actual impact of activities related to sustainability.

f.Clarity of organizational structure

The dimension of clarity of organizational structure achieved the lowest average (3.6185), indicating that Iraqi universities still need to develop their organizational structures to support sustainable development strategies more efficiently. This may be related to the absence of specialized units or permanent committees concerned with sustainability within universities, or to the weak integration between institutional policies and actual activities implemented on the ground. The lack of clarity of accountability and responsibilities within organizational structures is likely to be a reason for the low level of this indicator, leading to the absence of actual implementation of strategies even if the goals are clear.

g. Strategic clarity of sustainable development

The overall average for the variable of strategic clarity of sustainable development was (3.6332), reflecting a good level of strategic clarity in Iraqi universities with regard to sustainable development. Since all variables received approval from the participants, with a difference in the degree of clarity between the different dimensions, these results indicate that there is a general understanding and good awareness of the Sustainable development concept within universities. However, it still needs further development, especially with regard to executive procedures and organizational structures. We conclude from the previous results that there is a clear awareness of the importance of this concept within higher education institutions, which confirms the acceptance of the first hypothesis, which states that (Iraqi universities have a statistically significant level of strategic clarity for sustainable development).

Table 9. Table Results of the T-test (Independent Samples Test)

Group Statistics

	University Type	N	Mean	Std. Deviation	T	Sig. (2-tailed)	Mean Difference
Strategic clarity	Public University	185	3.6823	0.614140	-0.916	0.360	-0.08297
	Private University	74	3.7653	0.758080	-0.838	0.404	-0.08297

Clarity of activities and procedures	Public University	185	3.6097	0.813550	-0.709	0.479	-0.08216
	Private University	74	3.6919	0.910330	-0.676	0.500	-0.08216
Clarity of purpose	Public University	185	3.7762	0.703620	-0.021	0.984	-0.00216
	Private University	74	3.7784	0.905730	-0.018	0.985	-0.00216
Clarity of references	Public University	185	3.6800	0.719360	-2.276	0.024	-0.22270
	Private University	74	3.9027	0.691430	-2.315	0.022	-0.22270
Clarity of organizational structure	Public University	185	3.6043	0.829340	-0.415	0.678	-0.04973
	Private University	74	3.6541	0.965880	-0.389	0.698	-0.04973
Clarity of leadership roles	Public University	185	3.7449	0.715810	-0.455	0.650	-0.04703
	Private University	74	3.7919	0.836460	-0.425	0.671	-0.04703
Clarity of staff roles	Public University	185	3.6789	0.700030	-0.930	0.353	-0.09405
	Private University	74	3.7730	0.817830	-0.870	0.386	-0.09405

Source: Prepared by the authors based on the outputs of the SPSS V.27 program.

It is noted from the results of Table (9) that the value of (t) reached -0.916 at a significance level (Sig = 0.360) greater than 0.05, meaning that it is not statistically significant. These results indicate that there are no statistically significant differences between the averages of the respondents' responses regarding the strategic clarity of sustainable development in Iraqi universities according to the type of university (governmental or private). Thus, the second main hypothesis can be accepted.

a. Testing the first sub-hypothesis: There are no statistically significant differences between the averages of the respondents' responses regarding the clarity of activities and procedures for sustainable development in Iraqi universities according to the type of university (governmental or private).

It is noted from the results of Table (9) that the value of (t) reached -0.709 at a significance level (Sig = 0.479) greater than 0.05, meaning that it is not statistically significant. These results indicate that there are no statistically significant differences between the averages of the respondents' responses regarding the clarity of activities and procedures in Iraqi universities according to the type of university (governmental or private). Thus, the first sub-hypothesis can be accepted.

b. Testing the second sub-hypothesis: There are no statistically significant differences between the averages of the respondents' responses regarding the clarity of the purpose of sustainable development in Iraqi universities according to the type of university (governmental or private).

It is noted from the results of Table (9) that the value of (t) reached -0.021 at a significance level (Sig = 0.984) greater than 0.05, meaning that it is not statistically significant. These results indicate that there are no statistically significant differences between the averages of the respondents' responses regarding the clarity of the purpose

of sustainable development in Iraqi universities according to the type of university (governmental or private). Thus, the second sub-hypothesis can be accepted.

c. Testing the third sub-hypothesis: There are no statistically significant differences between the averages of the respondents' responses regarding the clarity of reference for sustainable development in Iraqi universities according to the type of university (governmental or private).

It is noted from the results of Table (9) that the value of (t) reached -2.276 at a significance level (Sig = 0.024), which is less than 0.05, meaning that it is statistically significant. These results indicate the existence of statistically significant differences between the averages of the respondents' responses regarding the clarity of references in Iraqi universities according to the type of university (governmental or private), as the differences were in favor of private universities that recorded a higher average than governmental universities. Thus, the third sub-hypothesis can be rejected.

d. Testing the fourth sub-hypothesis: There are no statistically significant differences between the averages of the respondents' responses regarding the clarity of the organizational structure for sustainable development in Iraqi universities according to the type of university (governmental or private).

It is noted from the results of Table (9) that the value of (t) reached -0.415 with a significance level (Sig = 0.678) greater than 0.05, meaning that it is not statistically significant. These results indicate that there are no statistically significant differences between the averages of the respondents' responses regarding the clarity of the organizational structure in Iraqi universities according to the type of university (governmental or private). Thus, the fourth sub-hypothesis can be accepted.

e. Testing the fifth sub-hypothesis: There are no statistically significant differences between the averages of the respondents' responses regarding the clarity of the leadership roles for sustainable development in Iraqi universities according to the type of university (governmental or private).

It is noted from the results of Table (9) that the value of (t) reached -0.455 at a significance level (Sig = 0.650) greater than 0.05, meaning that it is not statistically significant. These results indicate that there are no statistically significant differences between the averages of the respondents' responses regarding the clarity of leadership roles in Iraqi universities according to the type of university (governmental or private). Thus, the fifth sub-hypothesis can be accepted.

f. Testing the sixth sub-hypothesis: There are no statistically significant differences between the averages of the respondents' responses regarding the clarity of the roles of employees for sustainable development in Iraqi universities according to the type of university (governmental or private).

It is noted from the results of Table (9) that the value of (t) reached -0.930 with a significance level (Sig = 0.353) greater than 0.05, meaning that it is not statistically significant. These results indicate that there are no statistically significant differences between the averages of the respondents' responses regarding the clarity of the roles of

employees in Iraqi universities according to the type of university (governmental or private). Thus, the sixth sub-hypothesis can be accepted.

6 Utilizing Iraqi Universities' ACO Algorithm as an Interpretive Tool to Gain an Understanding of the Reality of Strategic Clarity for Sustainable Development

In order to better understand the level of strategic clarity inside Iraqi institutions and their capacity to allocate resources toward attaining Sustainable Development (SDG4), this study used the Ant Colony Optimization (ACO) algorithm as an interpretative framework.The premise behind the use of ACO is that educational institutions, like ant colonies, rely on interactive collective behavior that is impacted by the degree of strategic signals, which in this case are the clarity of the vision, mission, strategic objectives, and execution procedures.

Universities use the degree of strategic clarity to discover the most effective path toward attaining sustainable development, just like ant colonies use pheromone concentration to choose the best course.The road to high-quality education gets clearer and more effective the more strategic clarity there is, and vice versa.

First: Interpreting ACO within the Context of Strategic Clarity

In the ACO algorithm:

- Ants use the concentration of pheromones on successful routes to select the optimal way.
- Ants look for alternate routes when impediments arise and give priority to the one with the strongest signal concentration.

In universities:

- Similar like pheromones, the vision, mission, and strategic objectives serve as guiding signals.
- The components of the swarm are instructors, students, leadership, quality units, and digital infrastructure.
- The "signal" is stronger and decisions tend to converge toward the best path to SDG4 achievement when the approach is clear.
- Weak strategic signals lead to dispersed paths, which increases time and effort waste.

Accordingly, ACO was used as a metaphorical interpretive model to assess:

1. the effectiveness of institutions' existing strategic pathway.
2. The "optimal route" toward sustainable growth might be chosen by the universities.
3. the extent of the deviations brought about by a lack of strategic clarity.

Second: Practical Analysis Using the Evaluation Equation

The following mathematical model was used in the study:

$$Y = X + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5$$

Where:

- X_1: Vision clarity
- X_2: Mission clarity
- X_3: Strategic objectives clarity
- X_4: Implementation mechanisms clarity
- X_5: Clarity of linking the strategy to SDG4

And **Y** represents: **the effective strategic pathway toward sustainable development.**

Estimated values:

$$Y = 0.2053 + 0.0402 + 0.0822 + 0.0652 + 0.0331$$

All parameters were estimated using an optimization process aimed at minimizing the **Root Mean Square Error (RMSE)**.

Optimal result:

$$RMSE = 0.0010$$

Implications:

Strong strategic clarity
A well-organized institutional route
great effectiveness in reaching SDG4
Obtaining a high-quality education requires little time, money, or effort.
This is comparable to how ants determine the optimal route based on the concentration of pheromones.

Third: Scenario of Weak Strategic Clarity

When testing a scenario of a weak and unclear strategy, the results were:

$$Y = 0.9821 + 0.0008 + 0.1892 + 0.0673 + 0.0320$$

And the model's fitness:

$$RMSE = 1.0103$$

This reflects:

- A notable reduction in the clarity of the strategic pathway
- An increase in time, money, and effort waste
- Challenges in Reaching SDG4
- Unpredictable resource behavior, such ants losing their pheromone signals
- Universities are classified as Level 2 Strategic Maturity.

Fourth: Interpretation of Results Across Iraqi Universities

1. Northern Technical University

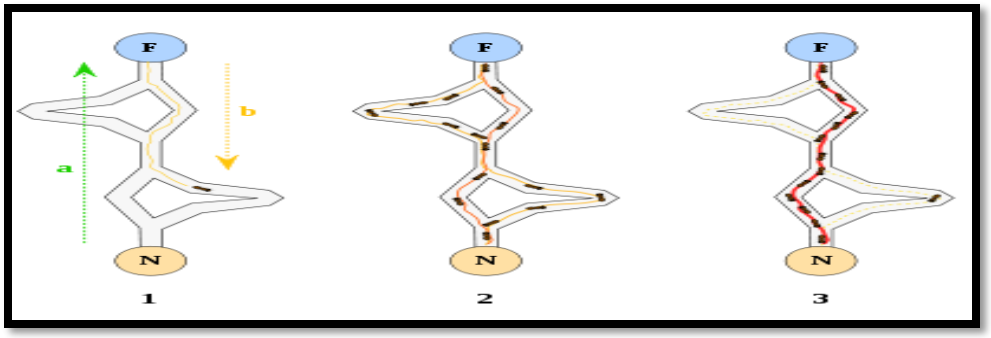
- maximum degree of strategic lucidity
- Low RMSE values
- Like a swarm of ants with a powerful signal
- A quick route to SDG 4

2. University of Kirkuk

- Level of clarity is moderate.
- Variable strategic conduct
- Several paths are not completely optimized.

3. University of Tikrit

- lowest degree of clarity
- Maximum RMSE values
- More work is needed to get comparable results.



(Figure 3) represents the movement of ants to reach the target with minimal effort, time, and cost.

Source: Dorigo Marco, IEEE Member, Vittorio Maniezzo, and Alberto Colorni (1996), "The Ant System: Optimization by a Colony of Cooperating Agents," IEEE Transactions on Systems, Man, and Cybernetics–Part B, Vol. 26, No. 1, pp. 1–13.

7 Conclusions: The research conclusions can be summarized as follows:

These results generally confirm that Iraqi universities have a relatively good level of strategic clarity for sustainable development, with a strong awareness of sustainability goals and leadership roles. However, the actual implementation of these strategies still needs to be developed, especially with regard to procedures and organizational structures. These universities can improve the clarity of their strategies by enhancing executive planning, allocating sufficient references, and developing more supportive organizational structures for sustainability, which will enable them to achieve more efficient sustainable development in the future.

The results indicate that the responses of the respondents, whether governmental or private, suggest that they have a similar level of strategic clarity for sustainable development, with no statistically significant differences in most dimensions, except for resource clarity, as private universities had a higher level, which may be attributed to the flexibility of funding and administrative independence in these universities compared to governmental universities that may face challenges in allocating and managing references. This indicates the need to develop more efficient strategies for resource management within governmental universities, as well as to enhance planning and implementation mechanisms to ensure that sustainable development is achieved more effectively.

2 **Suggestions**: Based on the findings, some suggestions can be made to enhance the strategic clarity of sustainable development in Iraqi universities:

1. The clarity of activities and procedures should be enhanced, as universities need to develop detailed implementation plans with clear performance measurement mechanisms to ensure effective implementation of strategies.
2. Specialized units or centers should be developed within universities that are concerned with following up on the achievement of sustainability goals and linking them to academic and administrative practices.
3. Awareness and training should be increased for staff and lecturers, as despite the clarity of leadership roles, there is a need to raise the level of understanding and readiness among faculty members and administrative staff to ensure the actual implementation of strategies.
4. It is recommended that the allocation of financial and technical reReferences be enhanced, as although the clarity of reReferences was high, there is an actual need for more economic and technical support to improve the effective implementation of sustainable development strategies.
5. Coordination between different departments and units within universities should be improved to ensure that sustainability principles are integrated into daily operational policies and not just as part of general strategic plans.

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