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The Responsiveness of Scales to Scientific Research Methodologies in University Theses

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ABSTRACT

The research aims to define scales and their criteria and measure the extent of research methodologies' responsiveness to these scales by utilizing a sample comprising 50 university theses and dissertations in the field of information and knowledge technology from 2015 to 2023. A standardized measurement system was constructed to assess the level of research methodologies' alignment with the established criteria utilized in scientific research. The research adopted a descriptive-analytical approach as the execution method, employing direct examination and reference listing as data collection tools. Data analysis was conducted using Microsoft Excel, and graphical curves were plotted. The results demonstrated the existence of 14 criteria associated with scales that enhance the effectiveness and responsiveness of research methodologies in scientific investigations. The responsiveness levels of research methodologies to the utilized criteria exhibited variation, ranging between 30% and 80%, contingent upon the research domain. The study revealed that the effectiveness ratio of criteria performance in hypothesis achievement within the study domain reached 51%, while the ratio of non-achievement of criteria performance stood at 49%.

INTRODUCTION

Scales are considered important tools in scientific research as they are used to measure significant variables and phenomena. However, these scales must have good responsiveness and strong reliability to be trustworthy and effective in the context of scientific research. They should also be capable of detecting actual changes in the variable they aim to measure. When a scale is applied to a group of individuals or different samples, it should interact appropriately with the expected changes in the phenomenon being measured. The responsiveness of scales reflects their compatibility with scientific research methodologies, and evaluating them is a necessary challenge to ensure the accuracy and quality of the results obtained through their use, relying on scientific analysis that relies on efficient statistical methods and high scientific standards that enhance the responsiveness of these standards to scientific research methodologies, based on several criteria that must be met when choosing any scale.This is why attention has been focused on this research, directed towards specific questions representing the research problem: "What is the level of responsiveness of the scales used in scientific research to research methodologies, and their ability to accurately represent the phenomena to be measured with high reliability? Therefore, the research results may contribute to enhancing scientific understanding and development in various fields. As for the research hypothesis, it was directed towards: "There are statistically significant differences between the responsiveness of scales and the effectiveness of research methodologies.

LITERATURE REVIEW

The Fundamental Concepts of the Research Scales

According to the (Hauser, & Katz, 1998), scales are defined as a set of numbers that provide information about a specific process or activity. A scale is a standardized tool used in research and studies to measure and evaluate a specific variable. Scales are often employed in data collection based on individuals' responses and reactions to a series of questions or statements designed to determine the level of the variable under consideration. Scales can take the form of a questionnaire consisting of a series of specific questions or as an instrument (such as a balance) to measure weight, length, or temperature. Regardless of the scale's format, it is designed to be simple, accurate, objective, and effective in measuring the desired variable. Scales are considered essential tools in scientific research as they can be used to collect and quantitatively document study phenomena. Using scales helps control factors that may influence a particular study and contributes to making the results precise and reliable (Alaawna, 1996)

Scientific Research

Scientific research is the process of collecting, recording, and analyzing facts and data regarding a specific problem to identify alternative solutions within specific conditions (Abu al-Nasr, 2004). The data collection process relies on three elements: a sample from which data is collected, a design to aid in data collection, and tools used to gather data from the chosen sample (Abu Al-Aalam, 2014). Scientific research possesses specific characteristics, including: Objectivity: Objectivity in scientific research refers to the pursuit of uncovering and discovering the truth, whether it aligns with the researcher's preferences or not, both in the research process and in presenting the results (Abu Al-Aalam, 2014). Precision: Precision involves defining the meaning of concepts and procedures used (Abu al-Nasr, 2004). Repeatability and Generalization: Scientific experiments should be repeatable, meaning if another person replicates the experiment, they should obtain

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the same results (Flom, 2018). Methodology: Scientific research adopts an organized plan to collect and analyze data about the problem under study (Mondal, 2020).

Master's Thesis

A master's thesis is a scientific research project at the postgraduate level. The thesis encompasses an idea adopted by the researcher, along with defined objectives, and the researcher works towards achieving these objectives through specific variables that are studied, measured, analyzed, tested, and so forth. Based on the outcomes, the researcher is awarded a Master's degree (Spencer, 1986).Standard: Standards are defined as the accepted knowledge or method for performing things in a standardized manner. Standards can encompass a vast array of activities and objectives undertaken by institutions and are used by beneficiaries in a standardized fashion. They represent the wisdom derived from experts in their field and those who understand the needs of institutions (Abdullah Hassan, 2015).

Scale levels

There are four levels of scales that can be explained as follows: (Al-Mabrook, 2016) and (Abu Shaqif, 2015).

Nominal Scale

It involves categorizing or classifying data solely by name and represents the simplest level of measurement. For example, dividing individuals by gender (males, females). If the researcher assigns the number 1 to males and the number 2 to females, it does not imply any quantitative relationship, and 1 is not less than 2 or vice versa. The numbers in this case are purely categorical labels, much like nationality (Sudanese, Syrian, Yemeni, Nigerian, Saudi, etc.), or classifying books by subject (educational, mathematics, statistics, psychology, sociology, Islamic studies, etc.). The statistical methods suitable for this scale are non-parametric methods.

Ordinal or Ranking Scales

This represents a higher level than nominal scales because it includes the property of order, sequence, and differences in ranks that reflect differences in the measured attribute. For example, the academic achievement levels of students in a test: F, D, C+, C, B+, B, A. Consequently, a student receiving an "A" grade, representing excellent performance, definitely has a higher level of achievement than a student receiving a "B+" grade, representing very good performance, and so on. Similarly, ranking students as first, second, third, etc., is an example of ordinal scaling. Ordinal scales are used in the Likert scale questionnaire, which consists of three or five scale points. The researcher assigns a score of 5 for strongly agree, 4 for agree, 3 for neutral, 2 for disagree, and 1 for strongly disagree. Non-parametric statistical methods are most suitable for analyzing data from this type of scale.

Categorical Scales

These scales are used to classify and evaluate data according to specific categories and present them in separate and non-sequential classifications. Categorical scales rely on categorizing and partitioning data based on specific criteria and variables. Examples include:

Gender Scales: Used to classify individuals based on gender, such as male and female.

Ethnicity and National Origin Scales: Used to classify individuals based on ethnicity or national origin, such as white, black, Asian, Indian, and others.

Education Scales: Used to classify individuals based on their level of education, such as elementary, secondary, undergraduate, and postgraduate.

Economic Status Scales: Used to classify individuals based on their economic status, such as poor, middle-class, and wealthy.

Ratio Scales

Ratio scales are a type of measurement used in scientific research to measure data in a way that allows for the determination of absolute ratios between values. Ratio scales are considered the most detailed and precise among all types of scales. The distinctive feature of ratio scales is that they contain an absolute zero value, allowing for the measurement of absolute differences between values. Researchers can perform various statistical and arithmetic operations with ratio scales, such as percentages, arithmetic means, and standard deviations.

For example, in the case of weight measurement, weight is measured in standardized units like kilograms or grams, and absolute differences between weights can be determined. Similarly, age is measured in time units like years, and absolute differences between ages can be determined. Distance can be measured in units like meters or kilometers, and absolute differences between distances can be determined. Ratio scales excel in enabling the measurement of relative relationships and comprehensive quantitative analysis. Advanced statistical operations can be used with these scales, including analytical tests, experimental analysis, and probabilistic predictions.

Measurement Criteria

There are several criteria for measuring scales that can be clarified as follows:

Validity of the Scale

This refers to the scale's ability to measure what it is supposed to measure by examining the relationship between the scale's results and the performance of the variable that should be measured. (Kyriazos, & Stalikas, 2018)

Reliability of the Scale

The scale must be reliable and replicable, meaning it should measure the trait or variable under study consistently and regularly, by obtaining consistent results at different times. (Fitzner, 2007)

Ease of Use of the Scale

This refers to the scale's ability to be easy to use and apply

by simplifying the process and making instructions clear and easy to understand. (Davis, 1989)

Scale Availability
The scale should be readily available and accessible to researchers. Established scales from previous research can be used, or a specific scale can be developed for the study.

Applicability
This is the scale's ability to be used in different areas of scientific research by diversifying the categories and elements it covers. (Qandilji and Al-Samaraie, 2018)

Statistical Effectiveness
The scale should have good statistical properties, such as its ability to differentiate between different groups and measure changes over time. It should have a wide measurement range to detect significant changes, along with quantitative interpretive significance. (Ali and Bhaskar, 2016; Alsomaidaee *et al*., 2023)

Cost of the Scale
This refers to the scale's ability to be cost-effective and affordable, making it available in the market at reasonable and researcher-friendly prices.

Sensitivity
This is the scale's ability to detect minor changes in the phenomenon being measured, capturing those changes accurately and objectively. (Fok, & Henry, 2015)

Fairness
This is the scale's ability to treat all participants fairly and equally by eliminating any bias or discrimination that could affect measurement results. (Robinson, 2018)

Preliminary Testing of the Scale
The process of repeatedly testing the scale allows researchers or experts to assess the scale's performance and identify any problems that may arise over time. It also allows them to improve the scale and make necessary adjustments to enhance its quality. (Shaker Majid, 2013)

Comprehensiveness
Scales should be comprehensive and cover multiple aspects of the phenomenon under study. They can include behavioral, cognitive, and emotional factors related to the concept being measured. (Ertl, Hartmann, and Heine, 2020)

Validity and Reliability
Validity refers to the scale's ability to measure what it is intended to measure accurately and correctly. Reliability means the stability of the scale in measuring the phenomenon over time, place, and different conditions. (Abu Al-Am, 2014)

Utility
Scales should provide useful information to researchers and enhance the quality of scientific research. (Shrestha and Steel, 2018)

Test-Retest Reliability
This involves measuring the stability of results over multiple time periods, where the scale should yield similar results when used again after a certain period of time. (Wollack and Cohen, 2003)

Types of Research Methods
There are different types of scientific research methods, and we will outline the most common and widely used ones below:

Historical Method
The historical method focuses on studying events and phenomena that occurred in the past and continue to happen in the present. It involves the analysis, division, and interpretation of data and information. The historical method not only describes past phenomena but also studies, analyzes, and interprets them to reach facts and generalizations that aid in understanding the past, present, and predicting the future. The historical method employs both deductive reasoning, starting from generalities and ending with particulars, and inductive reasoning, starting from particulars and ending with generalities. (Anwar Badr and others, 2013)

The Descriptive Method
It is a way to study phenomena or scientific problems by systematically describing them in a scientific manner and then arriving at logical interpretations supported by evidence and proof that give the researcher the ability to establish specific frameworks for the problem. This is used in determining the results of the research. To carry out research using the descriptive method, there are several methods that can be clarified: Survey Method: A method to obtain facts related to a specific phenomenon in the present time and within a specific environment and community. Case Study Method: It involves an in-depth study of a specific case by collecting comprehensive and detailed data and information about it. The aim is to gain a deeper understanding of the studied phenomenon or event by collecting data and information about both the current and past situations. Content Analysis Method: This research method is used to objectively describe content, either quantitatively or qualitatively, aiming primarily to gather information about a specific phenomenon or problem by referring to various information sources.
Comparative Causal Study Method: This method aims to understand the causal relationship between two or more phenomena by comparing different sets of data. Comparative causal studies attempt to explain how and why a specific phenomenon occurs. This method stands out for its ability to control variables and study the effect

resulting from the change in the value of a specific variable on another variable. (Abu Samra and Al-Tayti, 2019)

Experimental Method

The experimental method aims to understand the role and impact of each variable in the study by exploring the relationship between the variables responsible for a specific phenomenon and the effects on it. Therefore, the researcher repeats the experiment several times and observes the effect of the variable being changed each time. There are several methods used in the experimental method, and the most important types of these designs, as well as the most commonly used ones, are as follows: A. Single-Group Design: This design relies on selecting a single group, which is subjected to the experimental test. Measurements are taken from the group in both cases, before and after the experiment. Any difference observed is a result of the group's exposure to the independent variable. B. Equivalent Group Design: In this approach, the researcher selects two equivalent groups. One of these groups is exposed to the independent variable and is called the experimental group, while the other group, called the control group, is not exposed to the independent variable. At the end, the performance of both groups is measured to detect any changes that occurred in the experimental group's performance. (Abu Al-Am, 2014)

METHODOLOGY

As for the study community, it consists of a collection of academic theses and dissertations in the Department of Information and Knowledge Technologies. Their total number is 50, spanning from 2015 to 2023. A simple random sample was employed during the specified period. Regarding the adopted methodology, a descriptive approach was utilized to obtain a precise understanding of the elements of the problem and achieving a better and more accurate comprehension of potential solutions. The research also incorporated an analytical method within the descriptive approach since description is one of the fundamental processes in scientific research. A set of scales was employed, which will be elucidated as follows.

Strength Scale

The comparison included the Pareto Law, cumulative ascending frequency, cumulative descending frequency, and identifying the mode.

Reliability Scale

This included weighted mean, percentage, and standard deviation. Additionally, a three-point scale (3, 2, 1) was used to represent high response, moderate response, and low response to the criteria, respectively.

Effectiveness and Quality Scale

The global graded quality scale (10, 5, 0) (fully achieved, partially achieved, and not achieved) was used along with a checklist and gap measurement.

Criteria for the scales were established and presented to a group of experts. Data collection tools included direct examination of university theses, in addition to a collection of books, articles, and Arabic and foreign studies, as well as the virtual library. The research boundaries were framed as follows:

Formal Boundaries

University theses in the Department of Information and Knowledge Technologies at the College of Arts, Al-Mustansiriya University.

Time Boundaries: 2015-2023.

RESULTS AND DISCUSSION

The applied aspect of the research was based on data related to (50) master's theses and doctoral dissertations in the field of information and knowledge technologies during the period (2018-2023), as mentioned in the research introduction. A scale was used to assess the strength of the indicator used to determine the extent of responsiveness of the measures produced by the theses and dissertations in the field of study. A set of criteria was developed based on reliable scientific sources, and information was collected through interviews and direct observations during the research period. The extent of the responsiveness of the study curricula to the adopted criteria was determined, as shown in Table (1) - the extent of responsiveness of the study curricula to the criteria.

Table 1:

N. / Standard	Validity of the Scale	Reliability of the Scale	Ease of Use of the Scale	Scale Availability	Applicability	Statistical Effectiveness	Cost of the Scale	Sensitivity	Fairness	Preliminary tests of the scale	Inclusiveness	Honesty and consistency	Benefit	Time Stability Test	Reiteration	%
1	×		×		×			×	×			×	×		7	50%
2	×	×	×	×	×	×	×	×	×	×		×	×	×	13	92%
3	×	×		×	×	×	×	×	×	×		×	×	×	12	86%
4	×		×		×			×	×			×	×		7	50%
5	×	×	×		×	×		×	×	×	×		×		10	71%

6	×	×		×		×	×	×		×		×		×	9	64%
7	×	×	×	×	×	×		×	×			×	×	×	11	78%
8	×		×		×	×		×	×	×	×	×	×		10	71%
9	×	×								×		×	×	×	6	43%
10			×	×								×	×	×	5	36%
11	×	×	×	×	×	×	×	×	×	×	×	×	×	×	14	100%
12			×					×		×		×			4	28%
13		×	×	×		×				×		×		×	7	50%
14		×		×		×				×				×	5	%36
15	×		×					×		×		×		×	6	43%
16		×	×	×		×		×		×		×		×	8	57%
17	×	×	×	×	×	×	×		×	×		×	×	×	12	86%
18	×		×		×			×	×				×		6	43%
19	×	×	×	×	×	×		×	×	×		×	×	×	12	86%
20	×				×			×		×		×		×	6	43%
21		×	×	×		×				×		×		×	7	50%
22			×	×	×		×	×		×			×	×	8	57%
23			×			×			×			×			4	28%
24		×	×	×		×		×		×		×		×	8	57%
25		×	×	×		×		×		×		×		×	8	57%
26	×		×		×			×	×				×		6	43%
27	×	×	×	×	×	×	×	×	×	×		×	×	×	13	93%
28	×	×	×	×	×	×		×	×	×		×	×	×	12	86%
29	×	×	×	×	×	×	×	×	×	×		×	×	×	13	93%
30	×	×		×	×	×		×	×	×				×	9	64%
31	×	×	×		×	×		×	×	×		×		×	10	71%
32		×	×	×	×		×	×	×	×		×		×	10	71%
33	×	×		×		×	×	×	×	×	×	×	×	×	12	86%
34	×		×		×			×	×	×	×	×	×	×	10	71%
35	×	×	×		×	×		×	×		×		×		9	64%
36		×		×		×	×	×			×		×		7	50%
37	×	×	×	×				×	×	×		×		×	9	64%
38	×	×	×					×	×	×	×	×	×	×	10	71%
39		×	×	×	×	×	×	×	×	×	×	×	×	×	13	93%
40	×	×	×	×	×	×		×	×	×	×	×	×	×	13	93%
41		×	×	×	×			×	×	×	×	×	×	×	11	78%
42	×		×			×		×		×		×		×	7	50%
43		×	×			×				×		×		×	6	43%
44	×			×	×	×					×		×		6	43%
45	×		×			×				×				×	5	36%
46		×	×	×		×		×		×		×		×	8	57%
47	×		×	×		×	×		×	×	×	×	×	×	11	78%
48	×	×	×			×		×	×		×		×		8	57%
49	×	×	×	×	×	×	×	×	×	×	×	×	×	×	14	100%
50	×				×					×		×		×	5	36%
Reiteration	34	33	40	30	28	34	15	38	30	39	15	39	30	38		

%	%68	%66	%80	%60	%56	%68	%30	%76	%60	%78	%30	%78	%60	%76	Reiteration	%

This analysis can be visualized based on the percentages displayed within it and arranged in descending order to represent the strength of response to each criterion vertically for all university theses (field of study). The strength of response to individual criteria for all standards can be represented in ascending order according to Table (2) as follows:

We find that the intersection of the value curves in the previous table at the midpoint indicates that half of the data points are greater than it, and the other half are smaller, which means there are no outliers, and the deviations are significantly lower. Furthermore, it was observed that the sequences (16, 22, 24, 25, 46, 48) for all the criteria intersect with the standard (scale reliability) by 57%. This means that there is a relationship present by 57%, along with other variables. Therefore, the value of 57% represents the median value of all values, with 50% of the values higher and 50% lower. The second paragraph in the power scale: The Pareto Law, also known as the "Law of the Vital Few vs. the Trivial Many," is applied. It is named after its originator, Fredo Pareto, an Italian expert in economics. The Pareto Law is one of the most commonly used statistical tools in addressing qualitative aspects. It allows the identification and treatment of the few influential factors before moving on to the more impactful ones. It involves creating a bar chart that is used to illustrate relative importance within three regions: Region (A), Region (B), and Region (C). Region A represents the highest investment, not exceeding 20%, but the lowest criteria are highly invested in. Next is Region B, which is a medium investment area. Region C represents the lowest investment and the highest criteria. Each region is determined at the first bend in the graph curve, and then the second, and likewise the third for the third bend, respectively. The Pareto curve is a useful method for prioritizing and focusing only on the influential elements.

Table 2: Strength of Response to Criteria

The strength of response of all study curricula to the single criterion in descending order		**The strength of response of the individual study to all criteria in ascending order**	
Criterion Sequence	**Percentage %**	**Sequence of Theses and Dissertations**	**Percentage %**
Ease of Use of the Scale	80%	12,23	28%
Initial Testing of the Scale, Validity, and Reliability	78%	10,14,45,50	36%
Sensitivity, Test of Temporal Stability	76%	9,18,20,26,43,44	43%
Scale Validity, Statistical Effectiveness	68%	1,4,13,21,36,42	50%
Scale Reliability	66%	16,22,24,25,46,48	57%
Scale availability	60%	6,30,35,37	64%
Fairness	60%	5,8,31,31,32,34,38	71%
Benefit	60%	7,41,47	78%
Applicability	56%	3,19,17,28,33	86%
Scale Cost	30%	2,27,29,40	93%
Inclusiveness	30%	11,49	100%

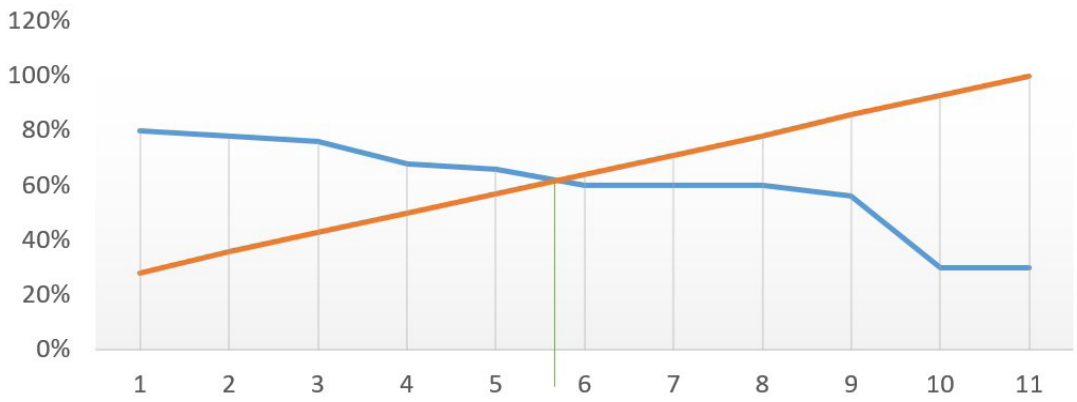

Figure 1: Response Strength of Criteria

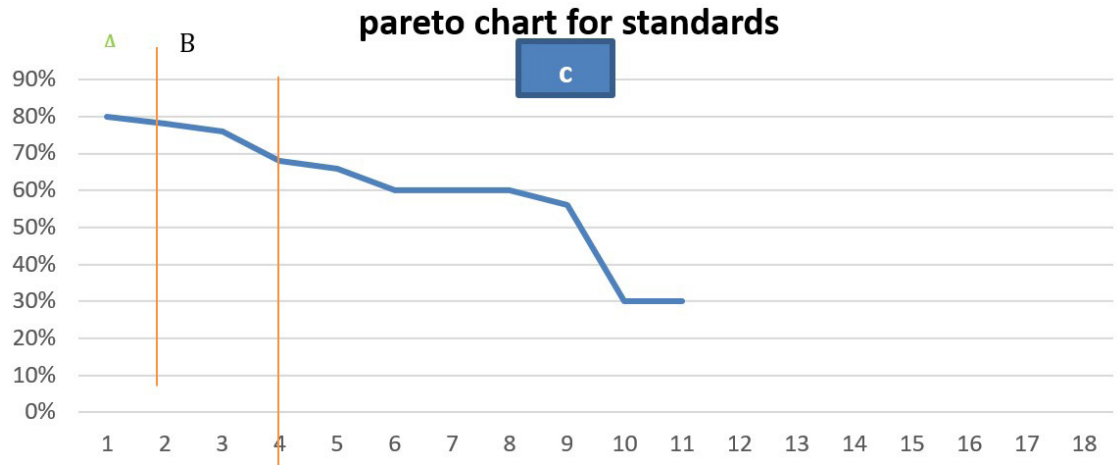

Figure 2: Power Scale Criteria Pareto Law

Figure (2) indicates that the Pareto technique for improvement has separated the criteria of the scales into three main regions, as follows: (1) Region (A) represents the highest investment area for a single criterion, as indicated by all studies. This area represents the investment in the "Ease of Use of the Scale" criterion at a rate of 80%. (2) Region (B), at the second bend, represents the "Reliability and Trustworthiness" criterion at 78% and the "Validity" criterion at 78%. (3) Region (C) in the analysis represents the least investment area for the criterion by all study samples. The strength of response of each research approach from a single study sample for all criteria, according to the Pareto chart and analysis (C, B, A), is illustrated in the following figure.

According to the analysis (A, B, C) or the Pareto law, after converting the ratios cumulatively, the graphical curve presented three distinct regions as follows: (1) Region (A) is represented by the study sample that invested the most in the produced standards with the sequences (11,49) at a percentage of (100%) and the sequence (2,27,29,40) at a percentage of (93%). (2) In region (B), at the second bend, the standard (confidence and reliability) accounted for 78%, and the standard (validity) accounted for 78% as well. (3) In the third region, during analysis (C), it represents the least investment area for the standard by all study samples.

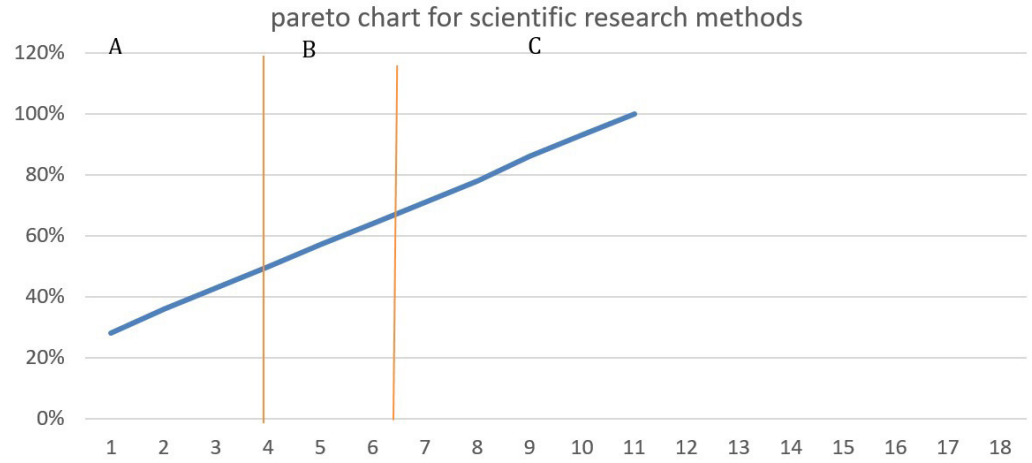

Figure 3: Power Scale Criteria Pareto Law

The Reliability Scale for Standards and Their Responsiveness to Research Methodologies

A three-weight scale (1, 2, 3) was applied to ensure that the weights correspond to the marking field. This scale encompasses achieving standards that include varying degrees of reliability (high, medium, low). The weighted mean and percentage are calculated according to the following table:

The table (3) explains that if the weighted mean value for a paragraph falls within the range (1-1.6), then the response strength is not achieved. However, if the weighted mean value for the paragraph falls within the

Table 3: Field Weights for the Degree of Hypothesis Response to Standards within the Selected

Low reliability	Medium reliability	High reliability	Alternatives
1	2	3	Weight

Alternatives

Table 4: Reliability of Scientific Research Methodologies' Response to Standards

S	Weighted mean	Alternatives	Results of the response of research methods to standards
1	3 - 2.4	High reliability	High response
2	1.7-2.3	Medium reliability	Medium response
3	1-1.6	Low reliability	Low response

range (1.7 - 2.3), then the response strength is partially achieved, and the weighted mean value is considered low. On the other hand, if the weighted mean value for the paragraph falls within the range (2.4 - 3), then the response strength is achieved significantly, and the response is considered high. The following table provides a quantitative representation of this

For the purpose of applying the reliability of measures to scientific research methodologies, the study employed the following: (1) A table was designed that illustrates the produced standards alongside the level of their performance based on three categories: (high reliability, moderate reliability, low reliability). (2) The study used weighted means, percentages, and repetitions.

(3) The values obtained from the direct examination of each study and the applied standards were entered and analyzed using Microsoft Office Excel 2016. The analysis results are as follows:

The results show that Criterion (3), which is conciseness and clarity, achieves the highest level of reliability, with a study sample response rate of 81% and a weighted mean of 2.43, which is very high. Meanwhile, the values of the criteria in sequences (1, 2, 4, 5, 6, 7, 8, 9, 12, 13, 14, 16, 17, 20, 21, 24) range from 2.21 to 1.63 in the weighted arithmetic mean, indicating a moderate level of reliability, with a weight percentage ranging from 73% to 64%. On the other hand, the sequence (10, 11, 15, 18, 19, 22, 25, 7), representing the remaining eight criteria, shows the lowest level of reliability in the weighted mean and a lower weight percentage than required. This indicates that the hypotheses are not responsive to these seven criteria, confirming the study's hypothesis that the decreased efficiency of the hypotheses in the study sample is due to their ineffectiveness in responding to standard criteria.

Table 5: Reliability of Standards with Response to Scientific Research Methodologies (Study Sample)

S	Scale standards	Repetitions to the level of reliability in response to research curriculum for standards			Weighted arithmetic mean	Celsius weight	Reliability in the response of hypotheses to standards
		High reliability	Medium reliability	Low reliability			
High response	80%	2.42	5	19	26	Scale Validity	1
Medium response	66%	2	15	20	15	Scale Reliability	2
High response	76%	2.3	10	15	25	Ease of use of the scale	3
Medium response	70%	2.12	14	16	20	Scale availability	4
Medium response	64%	1.94	17	19	14	Applicability	5
Medium response	72%	2.18	11	19	20	Statistical effectiveness	6
Low response	57%	1.72	27	10	13	Scale cost	7
Medium response	70%	2.1	12	23	15	Sensitive	8
Medium response	57%	1.72	14	21	10	Fairness	9
Low response	60%	1.8	24	12	14	Scale preliminary test	10
Low response	54%	1.64	29	10	11	Inclusiveness	11
Medium response	63%	2.08	10	21	14	Honesty and consistency	12
Medium response	58%	1.74	24	15	11	Benefits	13
Medium response	70%	2.12	10	24	16	Time Stability Test	14

The Scale of Effectiveness and Quality for Criteria

Paragraph 1: Adopting the Quality Scale (Fully Achieved, Partially Achieved, Not Achieved).

Paragraph 2 in the scale: Measuring Effectiveness.

Paragraph 3 in the scale: Hypotheses Performance Gap.

The details are as follows:

Paragraph 1: Adoption of the Quality Scale (Fully Achieved, Partially Achieved, And Not Achieved):

The quality scale was adopted based on three levels (weighted for each paragraph): (10) for fully achieved, (5) for partially achieved, and (0) for not achieved, based on the matching table.

Since the research relied on (50) research methodologies for the theses and university dissertations (study area) for (14) criteria, the fully achieved score for all of them would be (500) points. If the response of the scales to the scientific research methodologies is (10) for each of them, and if it's (5), the scale's response is considered partially achieved, as it is not fully compliant with the standard criteria, and the score would be 250 for all research methodologies (study area). If it is not, there is no response to the produced scales, and the score is (0).

The following table illustrates this:

The number of university dissertations that fully mastered their response to the criteria weighted at (10) points was only (9), with a total score of (90) resulting from (9 * 10 = 90). It is evident from the table above that the total points achieved for the criteria that fully complied with the scientific research methodologies for the theses and university dissertations (study area) amounted to 90. The number of university dissertations that partially mastered their response to the criteria weighted at (5) points was (30), with a total score of (150) resulting from (5 * 30 = 150).

The number of university dissertations that did not master their response was (11)

Table 6: Measurement of the Quality and Mastery of Hypotheses in Applying Standard Criteria

S	Totally achieved 10	Partially achieved 5	Not achieved 0	Total	Cumulative ascending repetition	S	Totally achieved 10	Partially achieved 5	Not achieved 0	Total	Cumulative ascending repetition
1	×	5	×	5	5	26	×	×	0	0	110
2	×	5	×	5	10	27	10	×	×	10	120
3	10	×	×	10	20	28	×	5	×	5	125
4	×	5	×	5	25	29	×	×	0	5	130
5	×	5	×	5	30	30	×	5	×	5	135
6	×	×	0	5	35	31	×	5	×	5	140
7	×	×	0	0	35	32	×	5	×	5	145
8	×	5	×	5	40	33	10	×	×	10	155
9	×	5	×	5	45	34	10	×	×	10	165
10	×	5	×	5	50	35	×	5	×	5	170
11	×	5	×	5	55	36	×	5	×	5	175
12	×	5	×	5	60	37	×	5	×	5	170
13	×	5	×	5	65	38	10	×	×	10	180
14	×	5	×	5	70	39	10	×	×	10	190
15	×	×	0	0	75	40	10	×	×	10	200
16	×	×	0	0	75	41	10	×	×	10	210
17	×	5	×	5	80	42	×	5	×	5	215
18	×	5	×	5	85	43	×	×	0	0	215
19	×	5	×	5	90	44	×	×	0	0	215
20	×	5	×	5	95	45	×	5	×	5	220
21	×	5	×	5	100	46	×	5	×	5	225
22	×	5	×	5	105	47	10	×	×	10	235
23	×	×	0	0	105	48	×	×	0	0	235
24	×	5	×	5	110	49	×	5	×	5	240
25	×	×	0	0	110	50	×	5	×	5	245
Totally achieved							9				
Partially achieved							30				
Not achieved							11				

Effectiveness Measurement

Data was analyzed, and both partial and overall effectiveness were extracted to determine the extent of response of the produced scales to the scientific research methodologies for the theses and university dissertations (study area) according to the law of effectiveness, which is (Achieved/Planned Total X 100). We can find the details of overall effectiveness, partial effectiveness, and ineffectiveness through the previous table, which we explain as follows:

Table 7: Effectiveness Measurement

Effectiveness results	Law applying	Effectiveness
24%	100*=90/500	Totally achieved
27%	100*=150/500	Partially achieved
The total effectiveness is 210/410 X 100= 51%	The total effectiveness = the sum of what has been achieved from both overall and partial excellence on the total number	

The produced scales that were fully achieved (90/500 * 100 = 18%) were fully achieved. The total of the produced scales that were partially achieved was (150), with a weight of 5 each, which equals (150/500 * 100 = 30%) partially achieved. Thus, %18 + %30 = %48 represents the percentage achieved both fully and partially. Meanwhile, the non-achieved portion is 100% - %48 = %52, representing the actual extent of the response of the produced scales to the scientific research methodologies for the theses and university dissertations (study area) that were not achieved.

Identifying the Gap

The gap represents the extent to which the scientific research methodologies for the theses and university dissertations (study area) fall short in their response due to their limited compliance with the standard criteria, which total 500 points as mentioned in this scale in the previous paragraph. To implement this, the following steps were taken: (1) Establishing the cumulative ascending repetition for the ideal state of achieving each hypothesis by 10 points and graphically representing it. (2) Utilizing the cumulative ascending repetition for the overall or partial achievement of each hypothesis, as mentioned in the previous table number (9), and representing it graphically. To avoid redundancy, we refer to the table containing the curve data. (3) Determining the area of effectiveness and high efficiency in the performance of the hypotheses and vice versa. () Identifying the gap and its type, whether it's a positive gap, a negative gap, or an absence of a gap, The following figure illustrates this:

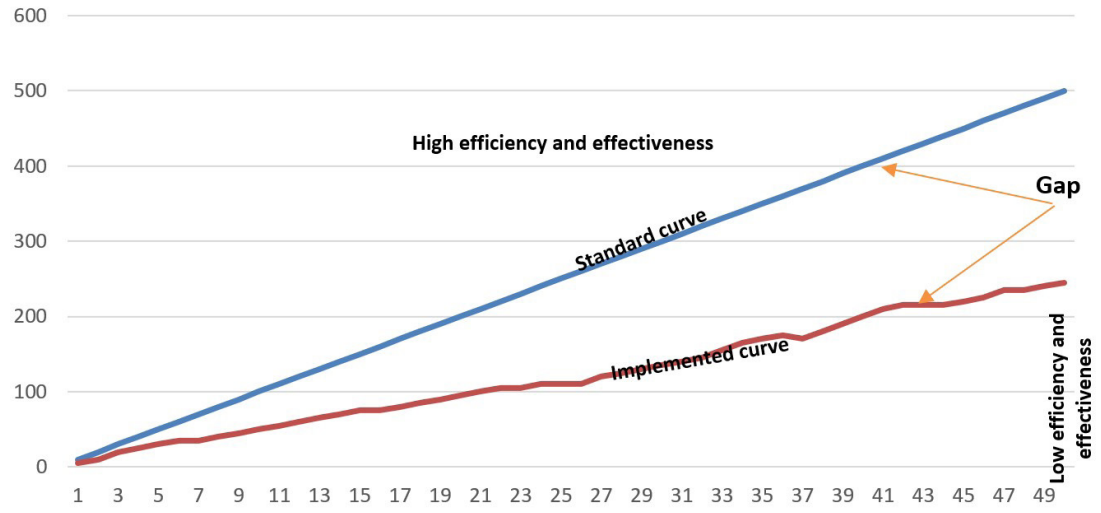

Figure 4: Identifying the gap

CONCLUSION

In this study, we argue that there is an urgent need to unify and better control standards related to scientific research methods to enhance the homogeneity of research and the quality of results, In addition, researchers and specialists in this field should work together to develop and improve standards and effectively supervise their implementation, The study emphasizes the importance of continuous work to develop standards and increase awareness of their importance in the field of scientific research. Unifying and improving the response of research methods to these standards will contribute significantly to enhancing the quality of research and advancing scientific knowledge in various fields, despite the presence of challenges and difficulties in fully achieving all the required standards in the field of research , This indicates the need to do more work and improvement in achieving these standards in future research. Researchers

should work on improving their methodologies and developing their skills to increase the percentage of fully achieving the required standards , They must also focus on learning from the successes and mistakes of their previous research to ensure the development of quality and efficiency in future research. Using these standards, researchers can improve the quality of their research and increase the accuracy of the results they obtain In addition, this will contribute to the standardization of standards and metrics in the field of research, making it easier for researchers and institutions to better evaluate and compare their performance and research results , The current study contributes to increasing its effectiveness and enhancing its responsiveness to scientific research methods. This research demonstrates a commitment to the highest standards of rigor and seriousness in investigation and analysis , Through these standards, future researchers can greatly benefit from this work and use it as a valuable guide in their own research, as it can have a significant positive impact on the advancement of science and knowledge. Moreover, the scientific and academic sectors and research institutions can adopt the application of the standards and standards proposed in curricula. This research will contribute to enhancing the quality of scientific research and increasing effectiveness in the field , Based on the results and analyzes conducted in this research, it becomes clear that it is extremely important to activate and adopt strategies to uncover the reasons for the poor response to most of the criteria used in the study. We must keep this in mind as an essential step towards improving performance and raising the quality of scientific research , Scientific research and development of standards are essentially the cornerstone of the advancement of knowledge and science. Based on this, it becomes necessary to encourage researchers and those interested in the field of scientific research to participate extensively in workshops and events related to standards and standards, as researchers' participation in workshops contributes greatly to building strong social and professional networks. These networks can open new doors for collaboration, joint research and exchange of experiences with colleagues from different backgrounds and specializations.

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