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Extent of Practice of Administrative Leaders in Green Quality Costs in Achieving Sustainable Development - An Applied Study of Administrative Leaders at the Sudanese Ministry of Higher Education and Scientific Research 2021-2023

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Abstract :
The study aimed to determine the extent of practice of administrative leadership in green quality costs in achieving sustainable development at the Sudanese Ministry of Higher Education and Scientific Research. This was done by presenting the problem, which involved understanding the extent to which the administrative leadership at the Sudanese Ministry of Higher Education practices green quality costs and its impact on achieving sustainable development. The descriptive-analytical method was used, and the Statistical Package for the Social Sciences (SPSS) software was utilized for survey analysis. The main tool of the study was the questionnaire based on the study hypotheses. The study found a highly positive response in the overall average of measuring the attitude towards the practice of green quality costs by the administrative leadership at the Sudanese Ministry of Higher Education and Scientific Research. This indicates that the Sudanese Ministry of Higher Education and Scientific Research serves as a suitable incubator for the practice of green quality costs that can be invested in and enhanced to promote advancement, creativity, and achieve sustainable development. The study also concludes that there is a strong relationship between the practice of green quality costs by the administrative leadership in the Sudanese Ministry of Higher Education and Scientific Research (r=0.000). The study provided a set of recommendations based on the results.

Keywords: Cost of Quality; Sustainable Development ; Senior Leadership ; Ministry of Higher Education and Scientific Research

1. Introduction

In light of the rapid economic and environmental developments worldwide, the opportunity to acquire new skills for leaders has become a significant challenge for many organizations. The success of an organization in achieving a competitive advantage is linked to the awareness of its leaders, especially awareness of quality, excellence, and attention to quality costs in achieving its goals, with customer satisfaction at the forefront, whether internal or external customers. Quality costs encompass all expenses incurred in the organization, whether productive or service-related, to ensure the delivery of products or services to customers that meet their requirements (Abu Hashish, 2012). Quality costs are important topics in the field of management and have received, and continue to receive, increasing interest through numerous research and studies that have linked the practice of quality costs to positive individual and organizational outcomes. These studies have highlighted the numerous benefits of quality costs, especially concerning the development of human and material resources (Hasnine, 2015). The concept of quality costs can be interpreted in the context of sustainable development through how leaders perceive the role of green quality costs in sustainable development, especially in educational organizations (Al-Qurashi, 2018). A leader who practices quality and proper work and expects anything from everything (the principle of quality) is the one who motivates leaders to strive for achieving more than self-interest for the organization's benefit and achieving sustainable development (Jung, 2014). A leader interested in quality costs fosters an ethical environment among employees, motivating them to achieve greater efficiency for their organization, instilling self-confidence to increase performance, creating new organizational systems that align with future requirements, enhancing the interest of supervisors, and deepening employees' awareness to look beyond their personal interests to perform roles that exceed official duties for the organization's benefit. Green quality costs consist of compliance costs, prevention costs, and evaluation costs, which focus on designing and developing training systems, improving quality programs and continuous development, and also include evaluation costs, which are the costs related to measurement, evaluation, and auditing to ensure compliance with quality standards or adopted criteria and specifications. Additionally, non-compliance costs (internal and external failure costs) are specific to the organization's internal environment concerning human resources and related internal or external factors within or

outside the organization.

The problem and questions of study

Sustainable development is a UN economic and social term, drawn by the United Nations to map out environmental, social, and economic development worldwide. Its primary goal is to improve living conditions for every individual in society, develop means of production and methods, and manage them in ways that do not deplete the natural resources of the Earth, so as not to burden the planet beyond its capacity. Sustainable development means not decreasing the level of well-being over time, in the sense that development is achieved by improving individuals' well-being to maximize the benefits of education. On the other hand, development is a continuous process that works towards modifying social behavior and its connection to sustainability, meaning striving to develop life and its quality to align with the environment and social structures. Green quality costs consist of compliance costs, prevention costs, and evaluation costs, which focus on designing and developing training systems, improving quality programs and continuous development, and also include evaluation costs, which are costs related to measurement, evaluation, and auditing to ensure compliance with quality standards or the standards and specifications followed. Also, non-compliance costs (internal and external failure costs) related to the internal environment of the organization concerning human resources and what is related to them inside or outside the organization. It is the total costs spent in the facility or production or service organization to ensure the delivery of the product to the consumer according to their requirements and desires. Green quality costs are the process of integrating targeted cost mechanisms and applying them in developing an environmental sustainability strategy to enhance the strength of practices and achieve more comprehensive results. *From the above, the research problem can be formulated in the following main question:*

- ✓ what extent do the administrative leaders at the Sudanese Ministry of Higher Education and Scientific Research practice green quality costs and its impact on sustainable development?

From the main question, sub-questions branch out as follows:

- ➢ Are the components of green quality costs concepts (compliance costs, prevention costs, evaluation costs) available (costs of planning, designing, and developing quality, training quality workers, costs of quality assurance for the supplier, costs of reviewing and analyzing quality data, and costs related

to quality improvement programs) for the administrative leaders at the Sudanese Ministry of Higher Education and Scientific Research?

- Are the components of green quality costs concepts (non-compliance costs, internal and external failure costs) available for the administrative leaders at the Sudanese Ministry of Higher Education?
- Are the components of sustainable development concepts (individual development, professional development, and well-being) available for the administrative leaders at the Sudanese Ministry of Higher Education and Scientific Research?

Study Hypotheses:

The study revolves around the following main hypotheses:

1. There is a statistically significant relationship in the perceptions of researchers towards the extent of practice of administrative leaders at the Ministry of Higher Education and Scientific Research in green quality costs attributed to demographic variables (age, gender, years of experience, marital status)?
2. There is a statistically significant relationship in the perceptions of researchers towards the application of sustainable development concepts (individual development, professional development, and well-being) by administrative leaders at the Ministry of Higher Education and Scientific Research (age, gender, years of experience, marital status)?
3. There is a positive statistically significant relationship between sustainable development (individual development, professional development, and well-being) as a "composite" or one-dimensional variable and green quality costs (conformance and non-conformance costs) as a "composite" or one-dimensional variable

The importance of the study

The importance of this study stems from the significance of green quality costs and what they can contribute to achieving sustainable development, especially concerning human resources. This study can provide benefits from both scientific and practical perspectives. From a scientific standpoint, the study can contribute to enriching the Arabic library with new literature in the field of green quality costs

and their role in achieving sustainable development for administrative leaders in the Sudanese Ministry of Higher Education and Scientific Research. From a practical perspective, it is hoped that the current study's results will help officials at the Sudanese Ministry of Higher Education and Scientific Research, the study's location, to have a clearer understanding of the concept of green quality costs and their impact on achieving sustainable development.

Study objectives: The study aims to achieve the following:

1. Determine the extent of the availability of sustainable development requirements (individual development, professional development, and well-being) among administrative leaders in the Sudanese Ministry of Higher Education and Scientific Research.
2. Identify the requirements and criteria of green quality costs (compliance and non-compliance costs) among administrative leaders in the Sudanese Ministry of Higher Education and Scientific Research.
3. Determine to what extent administrative leaders in the Sudanese Ministry of Higher Education and Scientific Research practice quality costs and their impact on achieving sustainable development.
4. Provide a set of recommendations to expand the base of sustainable development concepts (individual development, professional development, and well-being) and green quality cost concepts (compliance and non-compliance costs) among administrative leaders in the Sudanese Ministry of Higher Education and Scientific Research.

Study community and sample

The study population consists of leaders in the Sudanese Ministry of Higher Education and Scientific Research, as well as leaders in government and private universities in various administrative positions and functions. The study sample was selected using a purposive random sampling method, including all senior functional categories in the ministry and universities after obtaining information from the human resources departments of both the ministry and various universities. The sample size was determined according to the following equation:

$$\mathbf{n = Z^2(a/2) / \{ 4(E^2) + (Z^2(a/2) /N)\},}$$ where

n = sample size, Z = normal distribution coefficient (1.96), E = acceptable error (0.05), and N = statistical population size.

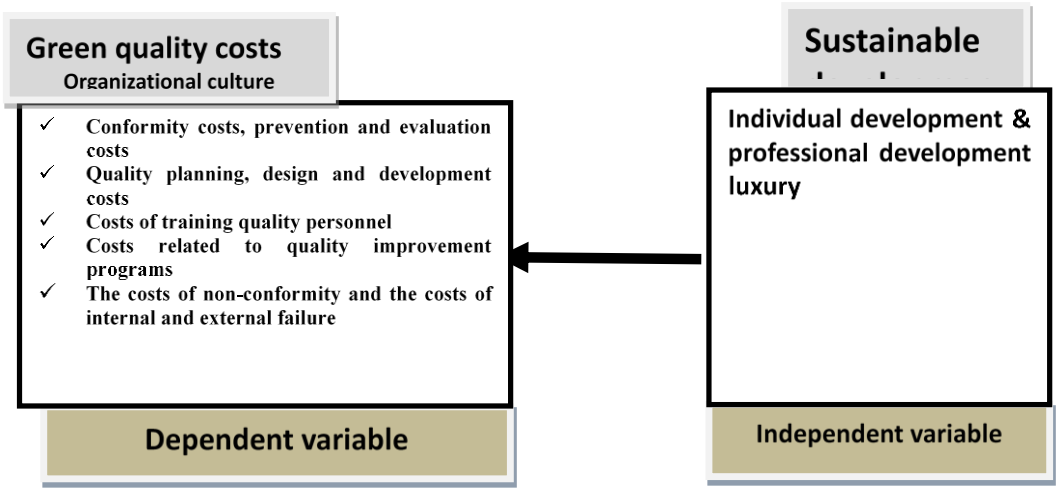
Statistical methods serving the study

To answer the study questions and test hypotheses, descriptive and analytical statistical methods were used, utilizing the Statistical Package for Social Sciences (SPSS). The statistical methods used included Alpha-Cronbach, Descriptive Analysis, and One Way Analysis of Variance (ANOVA).

Data collection sources

The study's data collection sources included primary sources such as personal interviews with leaders in the ministry and universities (traditional and electronic), observation by researchers, and questionnaires. Secondary sources included previous studies, journals, seminars, and papers presented in the field.

Study model: The study model is represented in Figure (1).



2. The theoretical framework and literature of the study

2.1. define quality : Quality is a distinguished culture in performance where managers and employees work continuously to meet consumer expectations and perform the required work correctly from the beginning while achieving better quality and high efficiency, and in the shortest time. It is more than just management operations; it is a culture and a way of life. Through it, the organization aims to

make fundamental changes in the way individuals (managers and employees) perform and behave in the organization. (Hassanin 2010) It is a cultural revolution in management thinking about quality improvement and an approach that expresses more shared sense in management practices, emphasizing two-way communication with a focus on statistical measures. It is a continuous change towards management that understands and manages processes in a way that achieves results and leads to cost reduction. (Mahfouz 2012). It is a collaborative form of work performance by mobilizing the talents and capabilities of both employees and management to continuously improve productivity and quality using work teams. Therefore, quality has distinctive characteristics that can be defined by performance, appearance, reliability, conformity, serviceability, aesthetics, safety, sensory perception of quality, and quality also has multiple dimensions that can be defined as follows:

1. Fitness for use: It is the quality of product or service performance for its specified purpose, as the beneficiary takes into account the direct characteristics of the developmental need or any other dimensions suitable for it, to judge the suitability of the product for it.
2. Expression of excellence: It means what the quality of service achieves for the beneficiary in terms of feelings of happiness, pride, and status, and thus excellence.
3. Value: Which means the way in which the service will achieve its specified purpose and in the way the beneficiary desires.
4. Conformance to specifications: The extent to which the product, whether tangible or service, conforms to the design specifications of either.

In light of those concepts and dimensions related to quality, the concept of quality costs can be defined as the money spent by the organization to maintain the required level of quality, helping management make appropriate decisions to prevent losses incurred from neglecting quality. Despite the various efforts to give a specific definition of quality costs, they all agree on the connection between what should be spent to achieve a specific level of quality. Quality costs can be defined as "those costs incurred to prevent the production of a product or service of low quality or as the costs arising as a result of producing a product or service of low quality." Quality costs involve sacrificing the available economic resources of the organization to obtain future benefits determined by producing a product or service that satisfies beneficiaries and aligns with approved quality standards.

Certainly, focusing on measuring quality costs in all its forms is an essential part of a successful strategy and continuous improvement in the non-profit sector. This type of measurement has significant benefits that positively impact non-profit organizations, beneficiaries, and society in general. By measuring quality costs,

non-profit organizations can make informed decisions based on accurate data and numbers. This helps in determining where resources and efforts should be directed more effectively to achieve maximum possible value. Knowing quality costs allows organizations to identify areas that can be improved in terms of efficiency and cost reduction. This can lead to overall improvement in operations and services provided. Achieving quality in services and projects leads to satisfaction among beneficiaries and customers. Low quality costs contribute to providing better services, enhancing the experience of beneficiaries, and building strong and sustainable relationships. Providing accurate information about quality costs increases transparency within the organization and with donors and beneficiaries. This builds trust and contributes to enhancing the organization's reputation.

Considering quality costs as part of a strategy to achieve a positive impact in society, non-profit organizations can measure the effectiveness of their projects and programs in achieving the desired change and improvement. Therefore, focusing on measuring quality costs in the non-profit sector is not only about cost reduction but also contributes to achieving the desired goals and positive impact. These investments are essential for building strong institutions that contribute to improving the lives of communities and achieving sustainable change.

The costs of quality consist of prevention costs, training costs, quality planning costs, process control costs, information systems costs, and internal failure costs. These costs are difficult to measure and estimate, making it challenging to calculate or estimate them accurately. Quality costs are calculated by estimating all the costs associated with ensuring and improving quality in a non-profit organization. This includes costs for defect prevention, defect detection, and correction. Neglecting quality costs can lead to a decline in the services or products offered by the organization. This could result in a loss of trust and support from the community and the public, negatively impacting the organization's reputation and message spread. Neglecting quality costs can also lower employee satisfaction within the organization. When employees do not feel that quality is important, their urgency to achieve excellent performance and provide the best service may diminish. Quality has become a top priority for management in recent times, becoming one of the most important issues for any organization seeking to improve its performance and achieve success. Quality costs are crucial as they provide financial information that helps management make appropriate decisions to solve quality problems. The Cost of Quality (COQ) currently represents a significant portion of

production costs in many facilities, necessitating the provision of information on these costs. Managing quality should be accompanied by a similar focus on measuring its costs, as they now constitute a considerable percentage of company revenues. However, there is still a lack of financial and cost awareness among decision-makers in companies who believe that obtaining a high-quality product or service increases costs. This belief is not accurate or acceptable because comprehensive quality leads to optimal use of available resources, reduces waste and loss, decreases failure rates in production or services, saving material, labor, and expense costs, which are essential cost elements. The true value of any quality program is determined by its ability to contribute to customer satisfaction and profit maximization. Quality tools, techniques, and costs are among the most important tools that help management

strive for quality improvement and profit maximization. The implementation of a quality management system in service organizations has significantly increased due to the realization that quality is the key factor in retaining and developing customers, whether the organization is productive or service-oriented, a corrective action cost program is required.

2.2.The concept of sustainable development : poses a significant challenge in the modern world, as communities and countries strive to achieve economic and social progress and prosperity without compromising the environment and natural resources. This article aims to clarify the concept of sustainable development, define it, shed light on its various dimensions and components, in addition to discussing the importance of this concept and the challenges it faces. The concept of sustainable development requires a comprehensive understanding of the economic, social, and environmental dimensions of development. It is considered a development model that aims to meet the needs of current generations without compromising the ability of future generations to meet their needs. Thinking revolves around the alternative concept of economic growth that relies on sustainable resource utilization and achieving a balance between economic growth, environmental protection, and enhancing social justice. In addition to the environmental dimension, the concept focuses on economic and social dimensions. Sustainable development should contribute to promoting sustainable and equitable economic growth, providing employment opportunities and economic growth for all segments of society. Sustainable development must also include social justice, gender equality, and improving the quality of life for everyone. Sustainable

development is about meeting the needs of the present without compromising the ability of future generations to meet their needs, and sustainable development is about meeting the needs of the current generation without compromising the ability of future generations to meet their needs, focusing on the balance between the economic, social, and environmental dimensions of development. Sustainable development aims to achieve comprehensive and sustainable development, promote social justice, protect the environment, ensure the well-being of all, and the goals of sustainable development aim to achieve a positive and comprehensive transformation in the world by 2030.

These goals have been set by the United Nations and form a global framework for working towards sustainable development in all countries. Sustainable development aims to achieve comprehensive and sustainable development, promote social justice, protect the environment, ensure well-being for all, and eliminate poverty in all its forms and dimensions. It also includes improving nutrition, increasing agricultural productivity, ensuring good health and well-being for all, providing quality education and sustainable learning opportunities for all, achieving gender equality, empowering women, managing water resources sustainably, ensuring access to sustainable and affordable energy, promoting comprehensive and sustainable economic growth, creating decent and sustainable employment opportunities for all, fostering innovation, enhancing environmental sustainability, achieving sustainable and safe urban development, promoting access to adequate housing and public transportation, and providing green spaces. Achieving these goals requires cooperation and coordination among all stakeholders in society, including governments, non-governmental organizations, the private sector, and civil society. Sustainable development relies on a set of key principles that seek to achieve a comprehensive balance between the economic, social, and environmental dimensions of development, including social justice, good governance, efficiency, economic sustainability, integration, interaction, diversity, adaptation, intergenerational responsibility, and ensuring the sustainability of economic, social, and environmental growth, enhancing the quality of life for current and future generations. The dimensions of sustainable development include the environmental dimension, which involves protecting biodiversity, conserving natural resources, reducing pollution, adapting to climate change, and promoting environmental sustainability; the economic dimension, which includes promoting investments and innovation, developing sustainable

industries, providing decent employment opportunities, enhancing fair trade, and promoting a green economy; the institutional dimension, which works to enhance effective and transparent governance; the cultural dimension, which works to enhance communication and understanding among different cultures and promote cultural identity; and the social dimension, which includes providing education, healthcare, housing, clean water, and sanitation for all, as well as promoting gender equality, women's rights, and minority rights. Sustainable development consists of sustainable environment and governance, involving citizen participation, non-governmental organizations, and the private sector in decision-making and implementation. It aims to ensure accountability, justice, enhance cooperation among all, sustainable technology, and sustainable economy,

including the development of green industries, promoting renewable energy, and transitioning to low-carbon economic models. Sustainable society aims to promote social equality and justice, protect human rights, enhance empowerment, and community participation.

2.3. Previous studies:

Study by Saroor (2018) titled "Measurement and Application of Green Target Costing and its Role in Improving Product Quality and Reducing Costs" at the University of Baghdad addressed the main problem of the current circumstances faced by Iraqi companies due to intense competition resulting from the invasion of local markets by a large number of foreign products with lower prices compared to local products. This has put Iraqi companies under significant pressure for various reasons, including the high cost of their products, low quality levels, lack of application of modern cost-effective technologies, and failure to develop competitive strategies to help them overcome their current situation. Particularly in Iraq, there are many problems that units can take advantage of to gain a competitive advantage, with one of the major issues being the problem of electricity shortage, as well as harmful gases emitted into the air due to the operation of electricity generation stations. This requires economic units to focus on using modern cost-effective and environmentally friendly technologies to offer products at reduced costs that align with modern environmental changes. The study aimed to highlight the cognitive foundations of green target costing technology and explain the reasons for the transition from traditional target costing to green target costing. It successfully reached an environmentally friendly product at a green target cost lower than the cost of traditional products, achieving a competitive advantage.

Another study by Shahadah (2014) titled "The Role of Green Supply Chain Preparation Activities in Managing Environmental Quality Costs" aimed to use green supply chain preparation activities in managing environmental quality costs in a way that reduces internal and external failure costs by giving importance to prevention and evaluation costs. The study concluded with several key results, including that adopting green supply chain preparation activities leads to creating a competitive advantage for the company and achieving environmental cost management in an appropriate manner.

In a study by Sayyah and Halalma (2013) titled "Strategic Balance and its Relationship with Quality Costs: An Experimental Study in the Jordanian Chemical Industries Sector," the study aimed to assess the relationship between strategic balance and quality costs in chemical industries in Jordan. The results showed a significant relationship between strategic balance and quality costs, emphasizing the importance of focusing on strategic balance and customer feedback for cost management.

The study by Zuarab (2012) titled "Using the Six Sigma Standard Deviation Approach to Streamline Quality Costs in Palestinian Stock Exchange Listed Service Companies: A Field Study" aimed to shed light on the role of the Six Sigma approach in optimizing quality costs in service companies listed on the Palestinian Stock Exchange. The study found that companies in this sector vary in their readiness to implement Six Sigma, but its application can lead to improved service quality and cost efficiency. There is also a correlation between implementing Six Sigma and customer satisfaction. The study recommended promoting the theoretical and practical concepts of Total Quality Management and adopting the Six Sigma approach with clear methodological steps by companies in the service sector to enhance quality and cost efficiency. It emphasized the importance of companies providing information on quality costs through reports to identify quality issues, take corrective actions, and implement quality cost accounting systems for effective planning and decision-making.

The study by Al-Mousawi and Al-Ghorban (2010) titled "Integration of Total Quality Management (TQM) and Activity-Based Costing (ABC)" highlighted the significance of integrating TQM and ABC costing systems as key elements for success within a company. The study, conducted practically on the General Company for Battery Industry under the Ministry of Industry and Minerals in Iraq, revealed that TQM enhances a company's competitive advantage by improving

quality, while ABC costing supports competitiveness by reducing costs. The study recommended studying and linking activity-based costing with TQM due to their shared elements that enhance a company's competitive edge. It also stressed the importance of the company adopting modern costing methods and quality practices for long-term profitability.

The study by Al-Halabi (2010), titled "A Study of Quality Cost Accounting System and its Impact on Profit Income," aimed to clarify the concept of total quality and its importance on cost, productivity, and profitability. It discussed the ISO 9000 quality measurement system, components and principles of quality cost system, accounting principles in measuring quality costs, and the impact of

quality concept and system on income measurement and profitability. The study was applied to several industrial companies in the United Kingdom. The key findings of the study were that the important justifications for adopting quality in companies are the fundamental relationship between quality, productivity, and profitability. This can be summarized as high quality levels leading to a decrease in defective units, which in turn reduces material and labor waste, maximizes output from the same inputs, and ultimately lowers the unit cost of the product. The quality cost system is a branch of cost accounting system, relying on the same principles as cost accounting. Quality costs represent a significant portion of total costs, ranging from 5-10% of total industrial costs and sales value. The study recommended designing a cost system capable of measuring and recording costs and benefits of quality programs implemented by the company, disclosing all items affecting performance quality evaluation, and avoiding the transfer of some items to other categories.

The study aimed to test the relationship between conformance quality and failure costs in software companies in the United States. The study collected primary information from three sources: the company itself to understand software specifications and instructions for applications, tracking methods to determine the volume of complaints and malfunctions resulting from using these software, and general statistics from within the company. The key findings of the study were that lower failure costs were strongly associated with higher software conformance quality to specifications, as well as smaller software size. The study recommended further research in the field of software quality.

Another study focused on quality cost program implementation in the manufacturing environment. It aimed to identify important factors and measures contributing to the successful implementation of a quality cost program. The study

used a questionnaire to gather data from factories and manufacturing experts, with 63 respondents. The key results showed that factors contributing to the success of quality cost programs included: managerial support, effective system implementation, collaboration with other departments, and understanding the concepts related to quality costs. The study recommended conducting more studies to explore the nature of factor analysis and methods of controlling internal and external failure costs. It also advised quality experts to educate company management on quality concepts and benefits, the importance of measuring costs, and providing practical examples of successful companies that have implemented these systems. It emphasized the need for professionals to continue research and provide more ways to advance quality cost programs.

Study (Al-Zaidi and Al-Nasser, 2009), titled: "Using Taguchi Model to Estimate Hidden Quality Costs to Deviate from Targeted Quality Specifications by Applying it to the Spinning and Textile Factory in Mosul". The study aimed to highlight the importance of measuring hidden quality costs in the spinning and textile company in Mosul, and applying the Taguchi model to estimate hidden quality costs within the company. To achieve these objectives, the researcher used the inductive method by analyzing financial data obtained from within the company and applying the Taguchi model to this data. The main results were that using the Taguchi loss function (Taguchi model) is an important tool to adjust and guide product characteristics and specifications through information available about expected losses resulting from any deviation in specifications. It was believed by the company's employees that quality costs only depend on non-conformance costs without considering defective products discovered by consumers. The study recommended focusing on hidden quality costs as they represent the largest aspect of quality costs, adopting indicators extracted from the Taguchi model to achieve the highest performance levels, and continuing research and development in models for measuring hidden quality costs. Study (Jasim, 2008), titled: "The Relationship between Quality Costs using Taguchi Method and their Impact on Reducing Quality Costs". This study aimed to determine the extent of the impact of the modern perspective on quality costs (which argues that the optimal level of quality occurs at zero defects) on reducing quality costs, and to test the relationship between the modern perspective on quality costs and the Taguchi method. The deductive method was used in this study where it reviewed the theoretical aspects related to the concept of quality and its costs, the relationship between quality costs and the

Taguchi method, the quality loss function, and the targeted quality. The main results of this study were that analyzing quality costs into conformance costs (prevention and appraisal) and non-conformance costs (internal and external failures) contributes to improving quality. The quality loss function (X (L) is the measure that assesses the deviation from the target value, measuring social loss rather than just the loss resulting from defect discovery. There is an inverse relationship between the quality loss function and conformance costs (prevention and appraisal), and a direct relationship between the quality loss function and non-conformance costs (internal and

external failures). The study recommended using the Taguchi method, which focuses on robust product design in the early stages of manufacturing, leading to producing high-quality products at lower costs. It also emphasized applying the modern quality perspective with the Taguchi method to reduce failure costs.

The study by Mohammed (2008), titled "The Impact of Quality Costs on Improving Financial Performance: A Case Study in Baghdad Soft Drinks Company - Private Shareholding Company," aimed to clarify the impact of measuring and analyzing quality costs on improving the financial performance of Baghdad Soft Drinks Company. The study was conducted in Iraq, using personal interviews, questionnaires, and practical financial statement analysis methods. The key findings included the company's lack of ability to classify quality costs scientifically, analyze these costs, and distribute them to appropriate cost centers. The study also revealed that the company's preventive costs were low despite management's interest in evaluation costs. The study recommended that senior management and financial management focus on measuring and analyzing quality costs, involve the company's accountants in specialized courses on distributing, measuring, and analyzing quality costs to benefit from quality improvement, and measure the company's financial performance to clarify the relationship between financial performance and quality costs.

In another study by Uyar (2008) on quality costs in Turkish manufacturing companies, the aim was to assess the application of quality cost systems in Turkish industrial companies, evaluate changes in company performance after implementing quality cost systems, and determine the purpose of measuring and reporting quality costs. The study distributed questionnaires via mail to 500 of the largest industrial companies in Turkey, selected based on market share. Key findings included that a percentage of companies surveyed applied quality cost systems, and implementing these systems led to reduced customer complaints,

decreased defective products, lower warranty expenses, and increased sales volume. Accountants were identified as the most supportive group for the proposed objectives in the study. The study recommended applying these findings to other sectors and not generalizing the results to all industries.

The study aimed to determine the extent of application of quality cost measurement models in academic institutions in Canada and identify the most common models used in evaluating and measuring quality costs. The study conducted a survey based on published studies on various quality cost methodologies and their success reports to provide a better understanding of quality cost methods. The study focused solely on studies applied to academic institutions in Canada and extracted results by comparing previous study results. The key findings of the study were that the majority of quality management programs do not use quality cost methodologies. Academic institutions in Canada that do not adopt the concept of Cost of Quality (COQ) are successful in reducing quality costs and improving quality for their customers. The most common method of cost calculation was found to be the Failure-Appraisal-Prevention (F.A.P) model, although other quality cost models are successfully used in some companies. The study recommended that quality cost systems must be part of quality management programs. The field study included directors of general administrations, departments, heads of departments, and administrative staff at the Ministry of Higher Education and Scientific Research, as well as government and private universities.

3. Experimental study

The total number of community members surveyed was 53, and the researcher used a sampling method and statistical tables to determine a sample size of 40 individuals with a confidence level of 96% and a significance level of 56%. To ensure the sample represented the community naturally, the most suitable choice for the sample type was to select a purposive stratified sample through proportional distribution across community layers.

Table (2) shows the sample distribution from the researchers' field study in 2023.

Statement	Case study	%	sample
University administrators	4	8	3
Senior department managers	11	17	6
middle administrations	38	76	31
Total	**50**	**100%**	**40**

Data analysis: Conducting stability and validity tests for the questionnaire items used in all data,

Using Cronbach's Alpha coefficient as a measure of stability and calculating the

validity through the root of the stability coefficient.

Table (3) presents the field study - statistical analysis.

no	Axis	Number of statements	Reliability	Validity
1	Quality costs	9	0.963	0.994
2	sustainable development	11	0.971	0.986
3	Improvement and development	9	0.995	0.979
Total		**23**	**0.985**	**0.989**

Data analysis: Conducting stability and validity tests for the questionnaire items used in all data,

Firstly, describing the sample characteristics: Gender variable:

Table (4) describes the sample according to gender

	Gender	no	%
1	Male	31	77.5%
2	Female	9	22.5%
Total		**40**	**100 %**

Data analysis: Conducting stability and validity tests for the questionnaire items

used in all data,

with males comprising 77.5% and females 2.55%, indicating the empowerment of women in leadership positions at the Ministry of Higher Education and Scientific Research in Sudan.

Table (5) describes the study sample according to age,

	AGE	NO	%
	40-50	10	25%
	50-60	17	42.5%
	60-70	13	32.5%
TOTAL		**40**	**100%**

Data analysis: Conducting stability and validity tests for the questionnaire items used in all data,

Showing the distribution of individuals in the study sample by age. Individuals aged between 50-60 years ranked first, accounting for 42.5%, while individuals aged between 60-70 years ranked second at 32.5%. Those aged between 40-50 years occupied the last stage with a percentage of 25%. This confirms that the leadership in the ministry has accumulated extensive experience and high knowledge.

Table (6) describes the study sample according to years of experience

	Years of experience	NO	%
1	Less than 5 years	4	10%
2	From 5 - 10 years	19	47.5%
3	From 10 - 20 years	11	27.5%
4	More than 20 years	6	15%
TOTAL		**40**	**100%**

Data analysis: Conducting stability and validity tests for the questionnaire items used in all data,

showing the distribution of individuals in the study sample based on years of experience. The highest category was individuals with 5-10 years of experience, with 19 individuals and a percentage of 47.5%. The second rank was for those with 10-20 years of experience, with 11 individuals and a percentage of 27.5%. The third rank was for individuals with over 20 years of experience, with 6 individuals and a percentage of 15%. The last rank was for individuals with less than 5 years of experience, with 4 individuals and a percentage of 10%. This confirms that the leadership in the Ministry of Higher Education and Scientific Research has high and professional expertise, ensuring the achievement of its goals.

Table (7) describes the study sample according to marital status

	Marital status	**NO**	**%**
1	Married	35	87.5%
2	Unmarried	5	12.5%
TOTAL		**40**	**100%**

Data analysis: Conducting stability and validity tests for the questionnaire items used in all data,

Showing the distribution of individuals in the study sample based on marital status. The highest category was for married individuals at 87.5%, followed by single individuals at 12.5%.

Table (8) describes the study sample according to educational qualification

م	**Position**	**NO**	**%**
1	lecturer	2	5%
2	Assistant Professor	5	12.5%
3	Associate Professor	18	45%
4	Professor	15	37.5%
TOTAL		**40**	**100%**

Data analysis: Conducting stability and validity tests for the questionnaire items used in all data,

Showing the distribution of individuals in the study sample based on educational qualification. The highest category was associate professors at 45%, followed by professors at 37.5%, assistant professors at 12.5%, and lecturers at 5%. This confirms that the administrative leadership in the ministry and its various departments are fully qualified to hold these positions. Components of quality costs among the researchers at the ministry are also highlighted.

Table (9) Components of quality costs among respondents at the Ministry

Components	Reliability	coefficient Regression	t-test			F-test	
			t-value	Sig	Label sig	f-value	Sig
The costs of internal failure	1.50	0.014	0.160	0.88	significant		
The costs of external failure		-0.004	0.021	0.96	significant		
Development and training costs		0162-	-0.323	0.371	significant		
Quality costs						**5.03**	**0.004**

Data analysis: Conducting stability and validity tests for the questionnaire items used in all data,

In the face of the alternative hypothesis (H0): There are differences between the average responses of quality costs on sustainable development among administrative leaders in the Sudanese Ministry of Higher Education. The previous table indicates that my homogeneity tests (Levine's Test for Equality of Variances) and mean comparisons through a t-test (t-Test for Equality of Means). From the first test, it is evident that there is no significance as the p-value is 0.473, which is greater than 0.05, indicating homogeneity in quality costs among administrative leaders. It is also clear from the table that the t-value = 0.276 and the p-value = 0.791, which is greater than the significance level of 0.05, leading us to accept the null hypothesis, suggesting no statistically significant impact of total quality costs at the 0.05 significance level on quality costs in sustainable development among administrative

leaders in the ministry.

The hypothesis test states: There is a statistically significant positive relationship between sustainable development (individual development, professional development, and well-being) as a composite or unidimensional variable and green quality costs (conformance and non-conformance costs) as a composite or unidimensional variable. The results show that the partial correlation coefficient between quality costs as a composite or unidimensional variable and sustainable development, after isolating internal failure costs (0.825), is statistically significant, with degrees of freedom = 79. However, when calculating the correlation coefficient between quality costs as a composite or unidimensional variable and only external failure costs, we obtain the following results. It is evident from the previous results that the correlation coefficient between quality costs as a composite or unidimensional variable and sustainable development is 0.985, but after external failure costs, it becomes 0.83. This means that the partial correlation value decreased, indicating that external failure costs act as a moderating factor or have a positive influence on the relationship between quality costs as a composite or unidimensional variable and sustainable development at the 0.01 significance level.

Table (10) homogeneity test (Levene's Test for Equality of Variances) and comparison of means through a t-test (t-Test for Equality of Means)

	Levine's Test for Equality of Variances		t- test for Equality of Means						
	F	Sig.	t	df	Sig.(2-tailed)	Mean Difference	Std. Error Differences	95% Confidence Interval of the Difference	
								Lower	Upper
Total Equal varian Assumed	0.80	0.370	0.25	159	0.77	0.051	0.192	-0.33084	0.44052
Equal variances Not Assumed			0.27	156.0	0.79	0.048	0.1861	-0.3212	0.43034

Data analysis: Conducting stability and validity tests for the questionnaire items

used in all data,

In the face of the alternative hypothesis (H0): There are differences in the average responses of quality costs on sustainable development among the administrative leaders at the Sudanese Ministry of Higher Education. The previous table indicates that my homogeneity test (Levine's Test for Equality of Variances) and comparison of means through a t-test (t-Test for Equality of Means). From the first test, it is evident that there is no significance as the p-value is 0.473, which is greater than 0.05, indicating homogeneity among the quality costs of the administrative leaders. It is also evident from the table that the t-value = 0.276 and the p-value = 0.791, which is greater than the significance level of 0.05. Here, we accept the null hypothesis, which states that there is no statistically significant impact of total quality costs at the 0.05 significance level on the quality costs of sustainable development among the administrative leaders at the ministry.

The table also shows that my homogeneity test (Levene's Test for Equality of Variances) and comparison of means through a t-test (t-Test for Equality of Means). From the first test, it is evident that there is no significance as the p-value is 0.375, which is greater than 0.05, indicating homogeneity among the quality costs of the administrative leaders. It is also evident from the table that the t-value = 0.594 and the p-value = 0.533, which is greater than the significance level of 0.05. Here, we accept the null hypothesis, which states that there is no statistically significant impact of total quality costs at the 0.05 significance level on sustainable development among the administrative leaders at the ministry.

Hypothesis test: There is a statistically significant positive relationship between sustainable development (individual development, professional development, and well-being) as a composite or unidimensional variable and green quality costs (conformance and non-conformance costs) as a composite or unidimensional variable.

Table (11) Correlation Between of quality costs & internal failure costs

Correlations			
		sustainable development	External failure costs
sustainable development	Pearson Correlation	1	0.986**
	Sig. (2-tailed)		0.000
	N	80	83
internal failure costs	Pearson Correlation	0.985**	1
	Sig. (2-tailed)	0.000	
	N	83	83
**. Correlation is significant at the 0.01 level (2-tailed).			

Data analysis: Conducting stability and validity tests for the questionnaire items used in all data,

The results indicate that the partial correlation coefficient between quality costs as a total or one-dimensional variable and sustainable development, after isolating internal failure costs, is 0.825, which is statistically significant at a degree of freedom of 79. However, when calculating the correlation coefficient between quality costs as a total or one-dimensional variable and only external failure costs, we obtain the following results:

Table (12) Correlation Between of quality costs & external failure costs

Partial Correlations				
Control Variables			sustainable development	quality costs
quality costs	sustainable development	Correlation	1.000	.915
		Significance (2-tailed)		.000
		Df	0	80
	External failure costs	Correlation	0.825	1.000
		Significance (2-tailed)	0.000	.
		Df	79	0

Data analysis: Conducting stability and validity tests for the questionnaire items used in all data,

It is evident from the previous results that the correlation coefficient between quality costs as a total or one-dimensional variable and sustainable development is 0.985. However, after isolating external failure costs, it becomes 0.83. This means that the partial correlation coefficient decreased, indicating that external failure costs act as a contributing factor or have a positive impact on the relationship between quality costs as a total or one-dimensional variable and sustainable development at a significance level of 0.01.

Table (13) Partial Correlation Between of quality costs & sustainable development

Control Variables		sustainable development	quality costs
quality costs– sustainable development	Correlation	1.000	-0.154
	Significance (2-tailed)	.	0.172
	Df	0	76
sustainable development variable's	Correlation	-0.154	1.000
	Significance (2-tailed)	0.172	.
	Df	76	0

Data analysis: Conducting stability and validity tests for the questionnaire items used in all data,

It is evident from the results that the partial correlation coefficient between sustainable development as a total or one-dimensional variable and quality costs, after isolating the impact of other sustainable development variables such as well-being, is -0.154, with a significance value of 0.172, which is greater than the significance level of 0.01, indicating no statistically significant effect (relationship) at a degree of freedom of 76. It is evident from the previous results that the correlation coefficient between sustainable development as a total or one-dimensional variable and quality costs is 0.984. However, after isolating the well-being variable, it becomes -0.154. This means that the partial correlation coefficient decreased, indicating that well-being acts as a contributing factor or has a positive impact on the relationship between sustainable development as a total or one-dimensional variable and quality costs at a significance level of 0.01.

4. Conclusion

Based on the results presented and discussed regarding the impact of quality costs on sustainable development for leadership in the Ministry of Higher Education

and Scientific Research in Sudan, the researchers have reached the following conclusions:

1. There is a strong correlation between quality costs and sustainable development,

with a correlation coefficient of 0.994. However, after isolating internal failure costs, this correlation decreased to 0.814. This suggests that internal failure costs have a positive influence on the relationship between quality costs and sustainable development at a significance level of 0.01.

2. There are statistically significant differences in the perceptions of quality costs and sustainable development among administrative leaders in the Ministry of Higher Education and Scientific Research, attributed to demographic variables.

3. There is coherence between quality costs and sustainable development among administrative leaders in the Ministry, with a significance value of 0.375, indicating a positive relationship.

4. Total sustainable development does not have a statistically significant impact on quality costs among administrative leaders, as the calculated value is 0.266, which is greater than the significance level of 0.05.

5. Internal failure costs have a positive impact on the relationship between quality costs and sustainable development, with a correlation coefficient of 0.984. However, after isolating external failure costs, this correlation decreased to -0.154, indicating that external failure costs also play a role in this relationship.

6. The study shows that administrative leaders in the Ministry understand the concepts of quality costs and sustainable development, regardless of their managerial levels, years of experience, and educational qualifications.

7. Knowledge management is identified as an important strategic factor for organizational behaviors, guiding behavior towards public interest and reflecting the individual's stance towards the organization.

8. Transformational leadership inspires a culture of advancing private interests for the public good, fostering individual commitment to organizational goals and continuous dedication to them.

9. Transformational leadership is considered a modern concept that is still subject to varying interpretations, with agreement among scholars that it is a fundamental administrative principle for organizations to achieve excellence and wealth.

5. Recommendations

Based on these findings, the researchers recommend the following:

1. Emphasize the adoption of modern scientific methods, knowledge management, administrative empowerment, and innovative initiatives to create a conducive work environment for creativity, development, and improvement.

2. Encourage administrative leaders to embrace the concepts of sustainable development through training programs to equip them with necessary skills and promote teamwork, problem-solving, and positive dialogue.
3. Focus on quality costs, especially internal and external failure costs, among administrative leaders to achieve sustainable development through scientific and professional methods.
4. Prioritize quality and training for employees and administrative leaders to achieve goals professionally and proficiently.
5. Develop professional development programs for individuals by enhancing specialized professional programs to ensure job satisfaction and organizational success through quality cost management.

These recommendations aim to enhance the understanding and implementation of quality costs and sustainable development within the Ministry of Higher Education and Scientific Research in Sudan

5. bibliography

1. Al-Rjoub, I. (2008). Calculating quality costs associated with production processes in plastic industrial establishments operating in Hebron and Bethlehem Governorates: An applied case study. Hebron University, Palestine.
2. Al-Zaidi, M. F., & Al-Naser, K. H. (2009). Using the Taguchi model to estimate hidden costs for deviation from targeted specifications. Rafidain Development Journal, University of Mosul, 94(31).
3. Al-Sayeh, A. M., & Al-Halalmeh, M. A. (2013). Strategic balance and its relation to quality costs - An experimental study in the Jordanian chemical industries sector. Jordanian Business Management Journal, 9(3).
4. Al-Khannaq, N. M., & Al-Rubaie, J. J. (2005). The importance of measuring and disclosing quality costs. Al-Taqni Journal, 18(4).
5. Mohammed, F. J. (2008). The impact of quality costs on improving financial performance. Journal of Economic Sciences, 20, College of Management and Economics, University of Basra.
6. Jassim, H. (2008). The relationship between quality costs and the Taguchi method and their impact on cost reduction. Journal of Management and Economics.
7. Al-Hadithi, S. K. R. (2010). The role of controlling manufacturing quality costs in improving the financial performance of Jordanian pharmaceutical companies. Middle East University for Graduate Studies.
8. Zarab, H. S. (2012). Using the Six Sigma approach to streamline quality costs in service sector companies listed on the Palestine Stock Exchange - A field study. Islamic University Journal for Economic and Administrative Studies, 20(2).
9. Hammoudi, H. A., & Al-Naemi, H. F. (2007). The role of budgeting in controlling quality

costs. Al-Taqni Journal, 20(2).

10. Fatima Saleh Mehdi. (2010). Integration between Total Quality Management (TQM) and activity-based costing (ABC). Journal of Management and Economics, 80.
11. Hooshim, B. B. (1993). Developing quality standards for property management. University of California, Los Angeles.
12. ISO. (2012). Quality management principles. ISO Central Secretariat, Switzerland.
13. Bisgaard, S. (2007). Quality management and Juran's legacy. Quality and Reliability Engineering International, 677(23), 665.
14. Karg, L. M., Grottke, M., & Beckhaus, A. (2009). Conformance quality and failure costs in the software industry - An empirical analysis of open-source software. University of Erlangen-Nuremberg, Nürnberg, Germany.
15. Mehta, A. V. (2012). Cost of Quality. MBA project report, Halo Technologies and Training Pvt. Ltd.
16. Mullins, L. J. (1995). Management and organizational behavior (3rd ed.). Pitman Publishing.
17. Mullins, L. J. (1996). Management and organizational behavior (4th ed.). Pitman Publishing.
18. José, F., Liopos, J., & José, T. (1999). Developing measures to assess quality management in certified firms. University of Alicante, Spain.
19. Juran, J. M., & Godfrey, A. B. (1999). Juran's Quality Handbook. McGraw-Hill.
20. Khan, M. Y., & Jain, P. K. (2008). Management accounting text, problems, and cases. Tata McGraw-Hill Irwin.
21. Kunnanatt, J. T. (2007). Impact of ISO 9000 on organizational climate. International Journal of Manpower, 28(2).
22. Campanella, J. (1999). Principles of quality costs (3rd ed.). American Society for Quality.
23. Capon, C. (2000). Understanding organizational contexts. Prentice Hall.
24. Cokins, G. (2006). Economic case for quality: Measuring the cost of quality for management. ASQ Organization.
25. Crainer, S. (1999). Financial Times Handbook of Management. Pitman Publishing.
26. European Commission. (2012). Quantifying Quality Costs and the Cost of Poor Quality in Translation. Publications Office of the European Union, Luxembourg.
27. Garrison, R. H., Noreen, E. W., & Brewer, P. C. (2010). Managerial Accounting (13th ed.). McGraw-Hill Irwin.
28. Horngren, C. T., Datar, S. M., & Rajan, M. V. (2012). Cost Accounting: A Managerial Emphasis (14th ed.). Prentice Hall, New Jersey.