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DETERMINANTS AND ENABLERS OF SCIENTIFIC RESEARCH DEVELOPMENT IN OMANI HIGHER EDUCATION

FATORES DETERMINANTES E FACILITADORES DO DESENVOLVIMENTO DA PESQUISA CIENTÍFICA NO ENSINO SUPERIOR DE OMÃ

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Abstract
This study sought to systematically analyze prior research pertaining to the challenges facing scientific research in Omani higher education institutions, published during the period from 2019 to 2024. Using the available sampling method, a sample size of (10) studies was obtained. A content analysis form was used to analyze the content of the studies using systematic objective description. The face validity and reliability of the form were also verified. The findings revealed that the descriptive-quantitative approach, employing survey questionnaires as research instruments, was predominantly employed to study the requirements for developing scientific research in higher education institutions in the Sultanate of Oman. As for the content analysis of the outcomes of previous studies, (6) main themes were extracted, namely: Inadequate research funding, inadequate research infrastructure, limited collaboration with the private sector, teaching workload for researchers, and lack of research skills. The results also showed that previous studies targeted, in their recommendations, increasing funding by raising spending to (1%) of the gross domestic product, establishing a national fund for scientific research to enhance infrastructure by developing laboratories for electronic publishing platforms, academic-industrial cooperation by establishing partnerships between universities and the private sector, and developing personnel by offering training programs in methodologies. Modern research, stimulating scientific publishing by

Resumo
Este estudo teve como objetivo analisar sistematicamente as pesquisas anteriores relacionadas aos desafios enfrentados pela pesquisa científica nas instituições de ensino superior de Omã, publicadas no período de 2019 a 2024. Utilizando o método de amostragem disponível, obteve-se uma amostra de (10) estudos. Um formulário de análise de conteúdo foi utilizado para analisar o conteúdo dos estudos por meio de uma descrição sistemática e objetiva. A validade aparente e a confiabilidade do formulário também foram verificadas. Os resultados revelaram que a abordagem descritivo-quantitativa, empregando questionários de pesquisa como instrumentos de investigação, foi predominantemente utilizada para estudar os requisitos para o desenvolvimento da pesquisa científica nas instituições de ensino superior do Sultanato de Omã. Quanto à análise de conteúdo dos resultados de estudos anteriores, foram extraídos (6) temas principais, a saber: financiamento inadequado para pesquisa, infraestrutura de pesquisa inadequada, colaboração limitada com o setor privado, carga horária de ensino para pesquisadores e falta de habilidades de pesquisa. Os resultados também mostraram que os estudos anteriores visavam, em suas recomendações, aumentar o financiamento elevando os gastos para (1%) do produto interno bruto, estabelecer um fundo nacional para pesquisa científica a fim de aprimorar a infraestrutura por meio do desenvolvimento de laboratórios para

supporting peer-reviewed journals and linking them to global databases. The analytical review of the national R&D survey concluded that spending on research relative to the gross domestic product (GDP) is low, and private sector funding is weak.

Keywords: Scientific Research Development. Research Challenges. Sultanate of Oman. Higher Education Institutions.

plataformas de publicação eletrônica, promover a cooperação acadêmico-industrial por meio do estabelecimento de parcerias entre universidades e o setor privado, e desenvolver o pessoal oferecendo programas de treinamento em metodologias. Pesquisa moderna, estimulando a publicação científica por meio do apoio a revistas com revisão por pares e vinculando-as a bancos de dados globais. A revisão analítica da pesquisa nacional de P&D concluiu que os gastos com pesquisa em relação ao produto interno bruto (PIB) são baixos e que o financiamento do setor privado é fraco.

Palavras-chave: *Desenvolvimento da Pesquisa Científica. Desafios da Pesquisa. Sultanato de Omã. Instituições de Ensino Superior.*

1 INTRODUCTION

Scientific research is considered one of the essential and important components of higher education and the backbone of establishing universities and scientific research centers. It also plays a pivotal role in enhancing faculty members' competencies in their fields of specialization and in the success of the teaching process, in addition to achieving the goals sought by society (Belhout, 2020).

The Sultanate of Oman is one of the Arab countries that focuses on scientific research. It "operates in accordance with the Scientific Research Strategy 2040, which seeks to link scientific research outputs to the production sector and promote social research to support decision-making and the integration of disciplines" (Al-Hadrami, 2021, p. 457). "The mission of scientific research is to build an integrated system for scientific research, consistent with global trends, providing researchers with multiple areas of development, monitoring the implementation of the National Strategy for Scientific Research and Development, and striving to promote and support research using all available means, both material and moral" (Tariq, 2020).

In general, scientific research in Arab countries faces many challenges, some of which relate to policies, some to human capital, some to funding, others to the relationship with the private sector, and other challenges (Al-Banna, 2008). This study analyzes the challenges previously addressed in previous studies, with the aim of gathering and analyzing these obstacles. This contributes to drawing a comprehensive picture of these challenges and enhances our understanding of the various dimensions that affect the quality of scientific

research in the Sultanate of Oman, and the consequent importance of finding effective solutions to improve research performance in all higher education institutions in the Sultanate of Oman.

2 NEED OF THE STUDY

Al-Sawi and Al-Sabry (2020) emphasize that developing scientific research requires strengthening and building self-research capacity to advance a knowledge-based economy, while enhancing the role of universities in the research system and working to create partnerships with the private sector to transform research into economic projects that increase the added value of knowledge to the national economy. Therefore, Al-Sayed's study (2018) recommends the need to support scientific research, provide a supportive research infrastructure, and guide it toward application by linking it to societal issues and problems.

The Sultanate's efforts are being made to achieve a qualitative shift by focusing on providing diverse and sustainable funding sources that support scientific research in various fields, strengthening the bonds of true partnership between academic and research institutions and private sector institutions, and fostering this culture within them, so that the government plays an enabling role in strengthening this partnership. This will lead to improving the Sultanate's ranking in these fields at the regional and global levels (Al Sinani, Palanissamy, & Magd, 2021).

Omani studies have addressed various aspects of the challenges facing scientific research. Some addressed challenges facing qualitative research, such as the study by Al-Muzdadi *et al.* (2024). Others addressed challenges resulting from the weak role of universities in scientific research, such as the study by Al-Dhuhli and Al-Rashidi (2022) and Al-Musafir (2020). Others addressed challenges facing Omani scientific research centers, such as the study by Al-Hadrami *et al.* (2019), challenges related to publishing, such as the study by Al-Hadrami *et al.* (2024) and Al-Jaradi (2021), economic and societal challenges, such as the study by Karashida *et al.* (2019), and personal challenges, such as the study by Karashida *et al.* (2019).

Combining these challenges into a single framework allows for a deeper understanding of the research environment, as research in multiple fields and addressing disparate challenges separately can lead to fragmented efforts and a lack of integrated knowledge. Therefore, combining these challenges in a single study contributes to building a strong knowledge base. It outlines a clear plan for the priorities for developing scientific research in higher education institutions in particular, and at the University of Nizwa in particular. Accordingly, the study answers the following questions:

- What are the methodological characteristics (research methodology, sample, and data collection tools) of research related to the challenges of scientific research in higher education institutions in the Sultanate of Oman during the period from 2019 to 2024, and what are the common recommendations?
- What are the most prominent trends in the results of previous educational research addressing the challenges of scientific research in higher education institutions in the Sultanate of Oman during the period from 2019 to 2024?
- What are the common themes in the research recommendations related to addressing the challenges of scientific research in higher education institutions in the Sultanate of Oman during the period from 2019 to 2024?
- What are the results of linking the results and recommendations of previous studies with the results of the 2022-2023 national R&D survey?

3 STUDY OBJECTIVES

By analyzing previous studies on the challenges of scientific research in higher education institutions in the Sultanate of Oman, the current study aims to:

- Identify the methodological characteristics of research related to the challenges of scientific research in higher education institutions in the Sultanate of Oman during the period from 2019 to 2024.
- Identify the prevailing trends in the results of educational research addressing the challenges of scientific research in higher education institutions in the Sultanate of Oman during the period from 2019 to 2024.
- Identify the common theme in research recommendations related to addressing the challenges of scientific research in higher education institutions in the Sultanate of Oman during the period from 2019 to 2024.
- Link the results and recommendations of previous studies with the results of the 2022-2023 national R&D survey.

4 IMPORTANCE OF THE STUDY

The study contributes to the compilation and analysis of the literature related to scientific research in the Sultanate of Oman, providing a comprehensive resource for the

academic community and researchers to understand the challenges and current reality of scientific research in the Sultanate. The study's integration of a comprehensive analysis of previous studies and official national R&D surveydata contributes to providing an accurate diagnosis of scientific research challenges using 17 quantitative and qualitative indicators. It transforms theoretical recommendations into actionable action plans based on clear priorities. It also directly contributes to achieving the goals of Oman Vision 2040 in the field of research. The integrated resource will also provide guidance to researchers on areas that need further study and investigation, enhancing the quality of future research and contributing to increased knowledge production.

5 STUDY LIMITATIONS

Subject Limitations: The analysis was limited to higher education institutions in the Sultanate of Oman, excluding other sectors, within 10 previous research studies on scientific research challenges.

Temporal Limits: The study focuses on analyzing previous studies from 2019-2024 and the available National Scientific Research Survey for 2022-2023.

6 KEY TERMINOLOGIES

Scientific research: “A precise, organized scientific effort aimed at discovering scientific knowledge. It relies on specific methods to arrive at scientific facts or verify their validity and the possibility of applying them to improve human life and develop societies in all fields” (Al-Damour, 2021, p. 7).

7 STUDY POPULATION AND SAMPLE

The current study population consisted of all educational research related to the challenges of scientific research in higher education institutions in the Sultanate of Oman, and the common recommendations between them, from the period 2019 to 2024 AD, available in the Dar Al Mandhumah University Theses Database and Google Scholar. This was done using the keywords (scientific research - scientific research - Sultanate of Oman). This was the period during which the Ministry of Higher Education was renamed the Ministry of Higher Education, Scientific Research and Innovation, serving as an integrated platform with the former Scientific

Research Council. The purposive sampling technique was used to search for related educational research, and the number of research papers found was 11. Only 10 educational research papers were selected up to April 15, 2025, excluding one paper because it was not peer-reviewed and published in reliable scientific journals. An official document related to the national R&D survey of scientific research was also quantitatively analyzed during the period that witnessed ministerial changes in scientific research affairs in the Sultanate of Oman. Table (1) summarizes the titles of the educational research papers reviewed and analyzed in the current study.

8 STUDY TOOL

Content analysis was used as a study tool to analyze the content and substance of educational research through systematic objective description. This was represented by an electronic form in Excel. The analysis form included information related to the research title, year of preparation, authors' names, research objectives, study methodology, samples, data collection tools, results, and recommendations. The study adopted research as the unit of analysis.

9 TOOL VALIDITY AND RELIABILITY

The validity of the study tool (face validity) was verified by presenting the electronic content analysis form prepared in Excel to four referees specialized in the fields of educational leadership, measurement and evaluation, and scientific research methods. The referees' evaluation focused on the appropriateness of the analysis categories to the study questions, the clarity of the analysis indicators, and the comprehensiveness of the elements included in the previous studies analysis form. All referees confirmed (with a 100% agreement rate) the suitability of the tool for the study without the need for substantial modifications, confirming its suitability for application. As for reliability, it was calculated using the inter-rater reliability coefficient according to According to the Kappa equation proposed by McHugh (2012), two independent researchers analyzed a sample of studies using the same survey questionnaire, and then the degree of agreement between their analyses was measured. The analysis resulted in a very high reliability coefficient of 0.99, indicating a high degree of consistency in data classification and analysis among researchers, enhancing the reliability of the tool and the accuracy of the results obtained.

Table 1

Summary of research related to scientific research challenges (2019-2024)

Researchers (year)	Research methodology	Sample	Data collection instruments	Key recommendations
Krashida *et al.* (2019)	Descriptive - quantitative approach	714 researchers and academics	questionnaire	Increase funding, community awareness, enhance collaboration, improve infrastructure
Krashida *et al.* (2019)	Descriptive-quantitative approach	714 researchers and academics	questionnaire	Improving the research environment, training and development, incentive policies, and establishing research centers
Al-Hadrami *et al.* (2019)	qualitative approach	19 research center directors and 3 heads of research center departments	Semi-structured interviews	Enhancing funding and partnerships, improving communication with decision-makers, and enhancing cooperation between centers.
Al-Musafir (2020)	Descriptive analytical approach (quantitative/qualitative)	Unspecified number of academic institutions	Document analysis, interviews, questionnaires	Enhancing financing, improving infrastructure, and strengthening partnerships with the private sector.
Al-Jaradi (2021)	Descriptive analytical approach (quantitative/qualitative)	11 peer-reviewed scientific journals	Document analysis, interviews, questionnaires	Enhancing financial support, improving infrastructure, building human resources, and adopting excellence strategies.
Al-Sa'iriyah (2022)	Descriptive analytical approach (quantitative/qualitative)	200 faculty members and researchers	questionnaire, document analysis	Increase funding, enhance infrastructure, strengthen partnerships, training and qualification
Al-Dahli & Al-Rashidiya (2022)	Descriptive-quantitative approach	93 faculty members	questionnaire	Providing financial support, strengthening partnerships, and updating educational programs
Al-Habsiyya (2023)	Descriptive-quantitative approach	380 research students	questionnaire	Organizing research competitions, providing incentives, and enhancing research skills
Al-Muzaidi *et al.* (2024)	Qualitative approach (case study)	5 faculty members	Semi-closed interviews	Qualifying students, holding workshops, providing specialized resources
Al-Hadrami *et al.* (2024)	qualitative approach	80 university professors	Interviews	Financial support, establishment of peer-reviewed journals, reduction of teaching burdens, provision of awards

10 DATA ANALYSIS

Microsoft Excel was used to process quantitative and qualitative data. Data extracted from previous studies (such as the number of studies, sample size, and methods used) were entered into specific tables, and percentages were then calculated using the mathematical formula (subtotal number/total number) × 100, as shown in Table (2), which showed that the

descriptive- quantitative approach represented 40% of the total number of studies. Statistical functions such as COUNT and SUM were used to calculate frequencies and totals, while the analysis of challenges (such as "Inadequate research funding" in Table (5)) relied on counting the studies that referred to each challenge and dividing them by the total number (10 studies) to extract percentages (such as 66.2%). Excel facilitated the organization of tables and the accurate presentation of results, while qualitative aspects (such as recommendations) were addressed through manual content analysis supported by quantitative data.

Table 2

Distribution of studies according to research methodology

Research Methodology	Number	Percentage
Descriptive Approach	4	40%
Qualitative Approach	3	30%
Mixed-Methods Design	3	30%
Total	10	100%

11 STUDY RESULTS AND DISCUSSION

11.1 Results related to the first question

Results related to the first question: What are the methodological characteristics (in terms of research methodology, sample, and data collection tools) of research related to the challenges of scientific research in higher education institutions in the Sultanate of Oman from 2019 to 2024, and the common recommendations among them?

Table (2) shows the distribution of studies related to the challenges of scientific research in higher education institutions in the Sultanate of Oman, and the common recommendations among them for the period from 2019 to 2024. This included research available in the Dar Al Mandhumah database and the scientific researcher. (Google Scholar (, and according to the research method, we note a diversity in research methods. The data show that the descriptive quantitative method is the most used, with (4) studies, while the qualitative method and the descriptive analytical method (quantitative and qualitative) appeared in equal proportion, with (3) studies for each type. This methodological diversity in studying the challenges facing scientific research in higher education institutions shows that the topic has been studied from multiple angles, which enriches the scientific understanding of it. Table (2) shows the percentages according to the research method.

Table (3) summarizes the distribution of studies related to the challenges of scientific research in higher education institutions in the Sultanate of Oman, and the joint recommendations between them in the period from 2019 to 2024 AD according to the nature of the sample, as only one study sample contained more than one sample. In general, the sample that dominated the research was from the academic staff from various private universities and colleges in the Sultanate of Oman at a rate of (43.8%), due to the fact that they are the most in contact with this field, then the sample of researchers in higher education institutions at a rate of (25%) and they are part of the academic community, followed by the sample of documents and literature at a rate of (18.8%), while the rest of the samples were equal in other research that included a sample of leaders of government and private higher education institutions, and heads of research centers in the Sultanate, with the lowest rate of (6.2%).

Table 3

Distribution of studies according to the nature of the sample

Nature of the Sample	Number	Percentage
Academic staff from various private universities and colleges in the Sultanate of Oman	7	43.8%
Researchers in higher education institutions	4	25%
Literature (document review)	3	18.8%
Leaders of public and private higher education institutions	1	6.2%
Heads of research centers in the Sultanate	1	6.2%
Total	16	100%

The following table (4) explains the distribution of research related to the challenges of scientific research in higher education institutions in the Sultanate of Oman, and the common recommendations between them in the period from 2019 to 2024 AD according to the data collection tool for the research. It became clear that the highest tool used was the questionnaire at a rate of (46.7%), which may be attributed to the ease of using the questionnaire, followed by the interview tool at a rate of (33.3%), while documents were less used at a rate of (20%).

Table 4

Distribution of research according to the data collection tool

Search Tool	Number	Percentage
Questionnaire	7	46.7%
The Interview	5	33.3%
Document Analysis	3	20%
Total	15	100%

11.2 Results related to the second question

Results Related to the Second Question: What are the most prominent trends in the results of previous educational research addressing the challenges of scientific research in higher education institutions in the Sultanate of Oman during the period from 2019 to 2024?

By analyzing the content of the results of previous studies, Table (5) shows a statistical breakdown of the frequency of the theme in the challenges of scientific research in higher education institutions in the Sultanate of Oman during the period from 2019 to 2024. (7) main themes were identified, ranked in order of frequency: Inadequate research funding, inadequate research infrastructure, limited collaboration with the private/industrial sector, lack of research skills, teaching and administrative burdens, weak community awareness, and weak coordination between research centers.

Table (5) shows that challenges related to funding were at the forefront of these challenges, as confirmed by the national R&D survey on the percentage of spending on research and development in institutions, which did not exceed 0.37% of the gross domestic product (GDP) for the 2022-2023 statistics (National Center for Statistics and Information, 2024).

Table 5

The most prominent trends in the results of previous educational research related to the topics of scientific research challenges in higher education institutions in the Sultanate of Oman in the period from 2019 to 2024

Main Challenges	Studies that Have Indicated It	Main Results
Inadequate research funding	Karashida *et al.* (2019), Al-Musafir (2020), Al-Jaradi (2021), Al-Sa'iriyah (2022), Al-Hadrami *et al.* (2024)	66.2% affected by Inadequate research funding, 90% of journals suffer from Inadequate research funding, 85% of participants confirmed Inadequate research funding
Poor infrastructure	Karashida *et al.* (2019), Al-Hadrami *et al.* (2019), Al-Musafir (2020), Al-Sa'iriyah (2022)	70% confirmed the weakness of the technical infrastructure and the limited availability of advanced laboratories.
limited collaboration with the private/industrial sector	Al-Hadrami *et al.* (2019), Al-Musafir (2020), Al-Sa'iriyah (2022)	60% cited limited collaboration with industry, a disconnect between academic research and private sector needs.
Lack of research skills	Al-Muzaidi *et al.* (2024), Al-Hadrami *et al.* (2024)	Students' reluctance to engage in qualitative research, lack of necessary skills, and poor language skills among some researchers.
Teaching & Administrative burdens	Al-Hadrami and others (2024), Karashida et al (2019)	Heavy teaching loads, lack of sufficient time for scientific research
Lack of community awareness	Karashida *et al.* (2019)	Low community awareness is the most prominent obstacle (66.2%)
Poor coordination between research centers	Al-Hadrami *et al.* (2019)	90% indicated limited collaboration between research centers and decision-makers

11.3 Results related to the third question

Results related to the third question: What is the common theme in the research recommendations related to addressing scientific research challenges in higher education institutions in the Sultanate of Oman during the period from 2019 to 2024?

Results from a content analysis of previous educational recommendations and studies revealed that most of the recommendations focused on enhancing funding, followed by improving infrastructure, strengthening partnerships, training and qualification, reducing administrative burdens, and finally, community awareness. Table (6) shows the common and detailed recommendations.

Table 6

Common themes in research recommendations (2019-2024) related to scientific research challenges in higher education institutions in the Sultanate of Oman

CommonTheme	Detailed Recommendations	The Studies It Mentioned
Enhancing financing	- Allocating larger budgets for scientific research - Private sector participation in funding - Providing financial incentives to researchers	Karashida *et al.* (2019), Al-Hadrami *et al.* (2019), Al-Musafir (2020), Al-Jaradi (2021), Al-Sa'iriyah (2022), Al-Hadrami *et al.* (2024)
Improving infrastructure	- Developing laboratories and research centers - Providing modern technologies - Developing electronic publishing platforms	Karashida *et al.* (2019), Al-Musafir (2020), Al-Jaradi (2021), Al-Sa’iriyah (2022)
Strengthening partnerships	- Cooperation between universities and the private sector - Establishing national networks of research centers - Joint research programs	-Al-Hadrami *et al.* (2019), Al-Musafir (2020), Al-Sa'iriyah (2022), Al-Dahli & Al-Rashidiya (2022)
Training and qualification	- Workshops to develop research skills - Training courses in modern methodologies - Preparing students for qualitative research	Karashida *et al.* (2019), Al-Muzaidi *et al.* (2024), Al-Hadrami *et al.* (2024)
Reducing administrative burdens	- Reducing administrative burdens on researchers - Easing teaching burdens - Providing sufficient time for research	Karashida *et al.* (2019), Al-Hadrami *et al.* (2024)
Community awareness	- Educational campaigns on the importance of scientific research - Promoting a research culture - Engaging the community in supporting research	Karashida *et al.* (2019), Al-Musafir (2020), Al-Habsiyya *et al.* (2023)

11.4 Results related to the fourth question

Results related to the fourth question: What are the results of linking the results and recommendations of previous studies with the results of the 2022-2023 national R&D survey?

To answer this question, the results of previous studies were linked with the results of the analysis of the 2022-2023 National Scientific Research Survey, and then aspects of analysis and integration were identified. (7) Themes emerged, ranked according to human resources, financing, infrastructure, and cooperation with the private sector, sectoral distribution, and research intensity. Table (7) represents an analysis of the link between the results of previous studies and the results of the 2022-2023 national R&D survey.

Table 7

Analytical: Linking the results of previous studies and the results of the 2022-2023 national R&D survey.

Analysis Axis	Results of Previous Studies (2019-2024)	National R&D Survey Results (2023)	Analysis & Integration
Human Resources	-Lack of qualified personnel (Al-Muzaidi *et al.* 2024) -Weak research skills (Al-Hadrami *et al.* 2024)	-7,480 researchers (65% male) -16,423 research workers (63% male) -35.5% of the total workforce are researchers	The survey shows that there is a good human base (7,480 researchers), but studies indicate problems in the quality of qualifications and skills, especially in qualitative research.
Financing	-Inadequate research funding (8 studies) -Reliance on government funding (Al-Hadrami 2019)	- Spending: 0.37% of GDP (RO 152.79 million) - 51.8% of spending from the government sector - 14.1% from higher education	The survey confirms the weakness of spending (less than 0.5% of GDP) and the dominance of government financing, which supports the results of previous studies.
Infrastructure	- inadequate research infrastructure (6 studies) - Limited laboratories (Al-Sa'iriyah 2022)	-19.8% of spending on support staff - No direct data on infrastructure	Limited spending on support (19.8%) indicates a possible inadequate research infrastructure supporting research.
Cooperation with the private sector	- limited collaboration with the private sector (5 studies) - 60% indicated limited collaboration (Al-Sa'iriyah 2022)	- 34.1% of financing from the private sector (2023) - An increase from 28% in 2022	There is an improvement in private sector participation (34.1%) but it is still below the optimal level according to studies.
Sectoral distribution	Centralization of Research in Public Universities (Al-Musafir 2020)	- 45.5% of researchers are in higher education - 31.9% are in the government sector	It confirms the dominance of higher education and the government sector in research, with the weakness of the private sector.
Research density	Weak research productivity (Al-Hadrami 2024)	- 382 researchers per million populations (2023) - Down from 349 in 2022	The decline in research intensity points to challenges in attracting talent.

As for the common recommendations reached by comparing the analysis of the study results with the national R&D survey document for the year 2022-2023, (5) common recommendations were found, represented in order: increasing funding, followed by strengthening companies, then improving infrastructure, then developing cadres, and finally enhancing scientific publishing. Table (8) shows the common recommendations and proposed steps.

Table 8

Common recommendations between the analysis of study results and the national R&D survey document for the year 2022-2023

Recommendations From Studies	The Reality of The Indicators in The Survey	Suggested Implementation Steps
Increased funding (8 studies)	- Spending 0.37% of GDP (less than the global level of 1-3% - 51.8% government funding	- Achieving the goal of increasing spending to 1% of GDP - Diversifying funding sources
Strengthening Partnerships (5 Studies)	34.1% private sector financing (improved from 28%)	- Developing tax incentives for supporting companies - Creating communication platforms between universities and industry
Improving infrastructure (6 studies)	19.8% spending on support (insufficient)	- Allocating a greater proportion of spending to infrastructure - Establishing research centers of excellence
Human Resources Development (4 Studies)	- 7,480 researchers (65% male) - Low research density	- Training programs in modern methodologies - Motivating young researchers
Promoting scientific publishing (3 studies)	- There is no direct data in the survey.	- Supporting peer-reviewed journals - Encouraging publication in international databases

12 SUMMARY OF RESULTS

- The diversity of research methods used in the analyzed studies. The data show that the descriptive quantitative method was the most widely used, with (4) studies, while the qualitative and descriptive-analytical methods (quantitative and qualitative) appeared equally, with (3) studies of each type. This methodological diversity in studying the challenges facing scientific research in higher education institutions demonstrates that the topic has been studied from multiple perspectives, enriching scientific understanding.
- The majority of the research sample consisted of academic staff from various private universities and colleges in the Sultanate of Oman (43.8%). This is due to their greater exposure to this field. This is followed by researchers in higher education institutions

(25%), who are part of the academic community. This is followed by a sample of documents and literature (18.8%). The remaining samples were similar in other research, including a sample of leaders of public and private higher education institutions and heads of research centers in the Sultanate, with the lowest percentage being (6.2%). - Seven (7) main themes were identified for the challenges facing scientific research in higher education institutions, ranked in order of frequency: Inadequate research funding, inadequate research infrastructure, limited collaboration with the private/industrial sector, lack of research skills, teaching and administrative burdens, weak community awareness, and weak coordination between research centers.

- Most of the recommendations focused on enhancing funding, followed by improving infrastructure, then strengthening partnerships, then training and qualification, then reducing administrative burdens, and finally, community awareness.
- The 2023 national R&D survey confirmed most of the challenges highlighted in previous studies, particularly the weak spending on research, which amounts to only 0.37% of GDP, with government funding representing 51.8%, nearly double the contribution of the private sector, despite its improved contribution to 34.1%.
- The survey shows the presence of 7,480 researchers. However, studies indicate a lack of skills, particularly in qualitative and applied research. There has been an improvement in private sector participation from 28% to 34.1%, but it remains below the recommended levels. The results of the national R&D survey confirm the need to increase research spending to a minimum of 1% of GDP, strengthen partnerships between groups and industry, develop training programs for researchers, and improve the R&D infrastructure.

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