DEVELOPING THE EDUCATIONAL SCIENTIFIC RESEARCH SYSTEM IN SAUDI UNIVERSITIES TO ENHANCE THEIR GLOBAL COMPETITIVENESS AND SCIENTIFIC POSITION: A STRATEGY

by

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المجلد السابع عشر - العدد الثاني (أبريل) ، لسنة 2025م

Abstract

This study aimed to suggest a strategy for the scientific research system in Saudi universities in the light of global competitiveness, by defining a system for scientific research in Saudi universities and determining the extent to which global competitiveness reflects on the scientific research system at the Saudi universities. The study referred to the reality of scientific research in Saudi universities and discussed the viewpoint of the study sample about the most important requirements needed to develop the scientific research system and the proposed mechanisms for developing the scientific research system in Saudi universities in light of global competitiveness. To achieve these objectives, the researcher used the descriptive survey method. The study achieved various results about defining a system for scientific research, the foundations on which it is based, the requirements that must be met, and the proposed strategy for developing the scientific research system in Saudi universities in light of global competitiveness.

Keywords:

Scientific Research, Global Competitiveness, Saudi Universities, Strategic Planning

تطوير نظام البحث العلمي التعليمي في الجامعات السعودية لتعزيز تنافسيتها العالمية وموقعها العلمي: رؤية استراتيجية

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ملخص الدراسه

هدفت هذه الدراسة إلى اقتراح استراتيجية لمنظومة البحث العلمي في الجامعات السعودية في ظل التنافسية العالمية، من خلال تحديد نظام للبحث العلمي في الجامعات السعودية وتحديد مدى انعكاس التنافسية العالمية على منظومة البحث العلمي في الجامعات السعودية. وأشارت الدراسة إلى واقع البحث العلمي في الجامعات السعودية وناقشت وجهة نظر عينة الدراسة حول أهم المتطلبات اللازمة لتطوير منظومة البحث العلمي والآليات المقترحة لتطوير منظومة البحث العلمي في الجامعات السعودية في ظل التنافسية العالمية. لتحقيق هذه الأهداف ، استخدم الباحث طريقة المسح الوصفي. وحققت الدراسة نتائج متنوعة حول تحديد نظام للبحث العلمي، والأسس التي يقوم عليها، والمتطلبات الواجب توافرها،
والاستراتيجية المقترحة لتطوير منظومة البحث العلمي في الجامعات السعودية في ظل التنافسية العالمية.

الكلمات المفتاحية:

البحث العلمي, التنافسية العالمية, الجامعات السعودية, التخطيط الاستراتيجي

Introduction

Today, the world is witnessing a steady growth in the role of knowledge and information in the economy. Knowledge has become the engine of production and economic development, and it has become clear that the measure of progress for nations and peoples does not depend on the size of their natural wealth, but rather on their balance of human wealth capable of producing knowledge, and the world has moved towards building a knowledge society and knowledge economy in which the percentage of added value increases. The world is already dealing with knowledge industries whose products are ideas, data its raw materials, and the human mind its tool, to the extent that knowledge has become the main component of the contemporary economic and social system.

Futurists expect that knowledge and its technical applications will be the most prominent manifestations of strength and global competition with the transformation it is witnessing at the beginning of the era of knowledge and that development at present is based on the production, circulation, use and reproduction of knowledge. This was confirmed by Toffler (1980) who stated that *"Knowledge is the most effective, effective and positive type of power, and the path to economic progress in the twenty-first century no longer passes through the use of raw materials or human muscles, but passes through the productive human mind." (p. 32)*.

Today, university education plays a major role in the development and progress of societies and has become a global position among societal institutions at the local or international level, and attention is drawn to it as it represents the interface of economic, political and social development, as it is the main source of knowledge and effective management to change societies according to the developments of the twenty-first century (Sachs, 2012). Universities have become the creators of knowledge, incubating innovation and invention in various fields of humanities and sciences. Knowledge is no longer the intended purpose of the university, but rather the growth of knowledge and its use to serve development (Mian, Lamine and Fayolle, 2016).

Several studies confirm that the basis of development in dynamic societies originally stems from the struggle of production forces based on the principle of competitiveness. Competition is originally based on achieving preference through quality, innovation and improving performance efficiency, through the mobilization of intellectual capital, the collective knowledge stock, and the recruitment of capable competencies and expertise. Additionally, societies can excel through pioneering activities in scientific research and development, innovation and creativity in the scientific, cultural and social fields.

Knowledge, as an indispensable information commodity for productive power, has become and will remain one of the most important areas of global competition – if not the most important – to gain power. The world countries will enter the scope of

contemporary globalization in a war for control of information, as it fought in the past for control of colonies (Bhayani, 2015).

Research Problem

Scientific research is one of the pillars of human knowledge in all domains. Indeed, it has become one of the standards of sophistication and civilization in the world. Through scientific research, the decision-makers can discover the unknown and harness it for the benefit of society to achieve development and prosperity in all areas. Thanks to scientific research, technology and knowledge can be possessed as an effective tool to achieve the optimal investment of available resources to achieve development and progress. Strober (2011) confirms that scientific research and innovation are key factors for long-term success, and believes that scientific research is the key to feeding the economy with the right ideas that will establish a sound economic structure in the long run.

Scientific research has become a matter of great interest in many contemporary societies, and international organizations have issued several reports that monitor the state of scientific research and publication worldwide. The progress of countries is categorized based on their interest in research and development and terms of the percentage of their spending on scientific research from gross national income, as well as their participation in publishing in scientific journals. Scientific research is one of the main tasks that distinguish universities. The focus of the university's interest has shifted from teaching to scientific research since the mid-nineteenth century when the German higher education model represented in the University of Berlin emerged at the hands of the Minister of Education in the State of Prussia, Homboldt Von Wil Helm, who focused on research and training (Halal, 1998).

Scientific research is one of the most important basic functions that distinguish universities at present. In a study published in 2006 and supported by the Organization for Economic Cooperation and Development (OECD), John Taylor confirmed that interest in scientific research is the most important basic characteristic of advanced universities (Taylor, 2006).

Spending on scientific research is one of the important strategies for developed countries, and the amount of global spending on research and development in 2007 amounted to (107.1) billion dollars; (33%) for the United States of America, which comes in the first place, and Japan in the second place with a percentage (13%), China ranked third with (9%), then Germany (6%), and France came in fifth place with (4%) (OCED, 2012).

The development of the scientific research system in universities in light of global competitiveness represents a new challenge for Saudi universities at the beginning of the twenty-first century. Therefore, the Ministry of Higher Education has prepared strategic plans to develop the higher education system in all fields, especially the field of scientific research. To contribute to building a knowledge society, and economies

based on the production, dissemination and use of knowledge to keep pace with contemporary global trends in higher education. The development initiatives to achieve excellence among Saudi universities were characterized by the creation of a globally competitive environment. However, additional efforts are still needed to formulated new strategies for boosting the universities' efforts in promoting scientific research.

In light of the above, the problem of the current study is represented in the need to develop a strategy for developing the educational scientific research system in Saudi universities to enhance their global competitiveness and scientific position.

Study Questions

The major study question is

What is the developmental strategy of the scientific research system in Saudi universities in light of global competitiveness?

To answer the above question, the following sub-questions will be addressed:

1-What is the reality of the scientific research system in Saudi universities?

2-What are the requirements for the development of the scientific research system in Saudi universities in the light of global competitiveness from the point of view of the study sample?

3-What are the proposed mechanisms for developing the scientific research system in Saudi universities from the point of view of the study sample?

4-Are there statistically significant differences in the degree of approval of the study sample for the domains of requirements to be met, and the domain of the proposed strategy for developing the scientific research system in Saudi universities in light of global competitiveness, according to the study variables (the nature of work at present, and specialization)?

Research objectives

Based on the study problem, the main objective of the study is to develop a strategy for the scientific research system in Saudi universities in the light of global competitiveness, by achieving the following sub-objectives:

1-To explore the reality of the scientific research system in Saudi universities.

2-To determine the most important requirements that should be met to develop the scientific research system in Saudi universities, in light of global competitiveness.

3-To identify the proposed mechanisms for developing the scientific research system in Saudi universities, in light of global competitiveness.

4-To test if there are statistically significant differences about the degree of approval of the study sample for the domains of requirements to be met, and the domain of the proposed strategy for developing the scientific research system in Saudi universities in light of global competitiveness, according to the study variables (the nature of work at present, and specialization)?

Significance of Study

The significance of the study stems from the vitality of its subject, which is scientific research in universities. Scientific research is one of the basic functions that distinguish universities at present. The development of the scientific research function in universities has a major role in raising their local and global competitiveness. Therefore, the study seeks to contribute to the development of the scientific research system in Saudi universities. Theoretically, the study presented a set of basic pillars that, in its entirety, constitute a system for scientific research in universities. It also presented a diagnosis of the reality of the scientific research system in Saudi universities. Practically, the study presented a list of requirements needed to develop the scientific research system in universities, as well as a set of proposed mechanisms for developing the scientific research system to raise the competitiveness of Saudi universities, perhaps benefiting those in charge of scientific research and decision-makers in universities.

Study Terminologies

- **Scientific research**: Keringer (1964) defines scientific research as "the continuous processes and attempts to identify the problem, then impose and verify hypotheses, and follow sound steps to reach and generalize results, and to explain the outcome from these results." Hibberd (2019) defined scientific research as the set of regular efforts undertaken by an individual using the scientific method in the quest to increase control over the environment, discover phenomena, and determine the relationship between those phenomena.
- **Scientific research system**: there is no specific definition for this term, but it has appeared at a time when the world is witnessing a more and more economic trend towards a knowledge economy, which depends mainly on the knowledge industry as an engine of production and economic growth, and a contribution to achieving comprehensive and sustainable development for societies. The concept of the scientific research system depends on the possibility of converting research results into a productive commodity that can be marketed and invested. Therefore, scientific research has become an important knowledge commodity that countries compete in spending on. That is, the biggest challenge for the scientific research system is to bridge the gap between research results and their transformation into products, through the development of technology incubators and business incubators, which transform ideas and innovations into products that are marketed and invested. This study presented a dedicated strategy for the scientific research system in Saudi universities.
- **Global competitiveness:** The Organization for Economic Cooperation and Development (OCDE) defines it as the production of goods and services that face the test of external competition while maintaining an increase in real domestic income. The World Competitiveness Report defines it as Combinations of factors, policies, and institutions that determine the level of productivity in a country, and which

consequently determine its level of prosperity (Dima et al., 2018). It is defined procedurally in this study as a set of factors, policies and indicators that determine the competitiveness of scientific research in Saudi universities.

Literature Review

Scientific research in the Arab world in general, and in the Arab Gulf states in particular, is going through an important stage imposed by successive and rapid developments as a result of scientific and technical revolutions that opened new horizons for development policymakers in the region. Scientific research is no longer an academic luxury practised by a group of researchers ensconced in ivory towers. Many studies emphasize the importance of scientific research and the effective role it plays in the development of contemporary human societies, regardless of their different positions in the ladder of civilized progress (Ahmed and Albuarki, 2017).

The scientific research system is closely linked to the movement of economic growth, and developed countries consider it a basic pillar of the pillars that serve their development plans, which are the basis of their sustainability and development and a source of strength for competition with their counterparts, and a fertile field for investing money to ensure the doubling of national income and raise the standard of living of the individual and society.

Scientific Research System

Referring to the concept of scientific research, the definitions available have varied and varied, and this may be due to the different interests of researchers according to their specializations, and the multiplicity of research methods and methods and the diversity of its fields and activities. Scientific research is defined as the systematic search and endeavour aimed at increasing the scope of existing knowledge or the routine and organized procedures committed to the purpose of gaining knowledge (Žukauskas, Vveinhardt and Andriukaitienė, 2018). Others see that scientific research as the organized application of several means and methods with the intent of finding appropriate solutions to a problem (Cardwell and Hills, 2017).

The scientific research system – as seen by the current study – is based on the following main components:

- Conducting scientific research.
- Publishing scientific research.
- Marketing scientific research.
- Employing and investing the results of scientific research.

Scientific Research System at Universities

The philosophy of the scientific research system in universities is an application of the philosophical view in university education, which is based on the unity of knowledge, and the convergence between theory and application that characterizes this era. Therefore, the function of the university besides being scientific and cognitive is being social and applied. The university represents the place that studies

the conditions of society and its problems and works to find solutions to them. Universities are not isolated from society, they present the concept of the university in the service of society, a trend that is gaining strength and spread in developed and developing countries alike (Cardwell and Hills, 2017).

Today, universities, with their material and human capabilities, are seen as factories of human thought, and the most important institutions that contribute to the progress and advancement of societies. They are the incubator for innovation and invention in various fields of human and scientific sciences. They lead the processes of development and change. They are a symbol of the renaissance of nations. Universities have profound effects on the development of their societies, and accordingly, universities cannot turn into static organizations. Rather, they must be characterized by continuous development, modernization and improvement, to achieve effectiveness in their tool in the face of contemporary challenges of change, and renew their roles and increase the impact of their contributions within the framework of the shift towards a knowledge society.

The university and scientific research face challenges related to the extent of the ability to invest the results of scientific research, and find solutions to the problems of society, in a way that makes the university a centre for research and development in the field of various projects, and a centre for application and production (Ji and Zhang, 2019).

Various studies on some global experiences of the scientific research system in universities indicate that it depends on multiple forms, the most prominent of which were (Unger and Polt, 2017):

- Treat universities as a contractor for scientific research between them and the various institutions of society.
- Scientific research centres.
- Joint research centres.
- Research Postgraduate Programs.

Global Competitiveness and the Scientific Research System in Universities

The concept of competitiveness is characterized by modernity where it emerged at the beginning of the nineties as a result of the new global economic system, the emergence of the phenomenon of globalization, as well as the general orientation of the application of market economies. So far, there is no agreement on a precise definition of competitiveness.

Some define it according to economic institutions as the ability of the institution to provide the consumer with products and services more efficiently and effectively than other competitors in the international market. This indicates a continuous success for such firms at the global level in the absence of support and protection by the government. This could be achieved by maximizing the value of the production factors employed in the production process (labour, capital and technology). (Dima et al., 2018).

It is known to educators that new terms and concepts appear first in the fields of industry, trade and economy, from which they gradually move to the field of education. Accordingly, it can be said that the concept of competitiveness has recently begun to move to the field of education where educational institutions – especially universities – are witnessing new challenges such as the necessity of achieving quality standards and obtaining accreditation and obtaining an advanced rank in the lists of the best universities at international levels, and other challenges, and this puts universities in intense competition at the local and international levels.

Competitiveness in university education can be defined as the university's ability to provide a high-quality educational and research service, which is positively reflected on the level of its graduates and faculty members giving them capabilities and competitive advantages in the labour market at its various levels. At the same time, it reflects the confidence of society in the university. This would increase the demand of students to join university, and thus achieve the desired goal so that the university becomes in the service of society, and society in the service of the university (Kabók et al., 2017). Competitiveness in university education can also be defined as universities racing to achieve the best in their three functions that are education, research, and community service as well as reach global levels.

The reflection of competitiveness on the scientific research function in universities appears in two aspects:

1)Global competitiveness and its reflection on the scientific research system in enhancing the competitiveness of the national economy:

The role of scientific research in universities is to strengthen the national economy through a partnership with other sectors of society. All products whose manufacture requires high technology, need to invest in scientific research to keep pace with development and raise their competitiveness so that industrial companies in developed countries allocate a large part of their revenues to fund scientific research to maintain their competitiveness and the quality of their products.

Because of the importance of scientific research in influencing the competitiveness of companies and countries, the Global Competitiveness Report – which is issued by the World Economic Forum – included the research and development indicator among the twelve indicators specific to the competitiveness of the country, as indicated by the Global Competitiveness Report (Schwab, 2010).

The Kingdom of Saudi Arabia has taken care of the issue of competitiveness since the cornerstone of the future of the economy in the Kingdom is its ability to compete with other countries. This requires creating an atmosphere in which innovation, excellence and competitiveness are at the forefront of the priorities. In 2006, the Saudi Arabian General Investment Authority (SAGIA) established the National Competitiveness Center (NCC), which acts as a vibrant force driving change. The Center holds meetings for discussion and exchange of views between the public and private sectors that help in enhancing understanding and cooperation between the two sectors (Schwab, 2010).

2)Global competitiveness and its reflection on the scientific research system in universities:

At the end of the first decade of the twenty-first century, universities in developed countries and even in many developing countries shifted from the traditional performance framework to performance based on achieving the data and values of progress and enhancing their competitiveness in light of the new global economy based on knowledge and information technology (Binkley et al., 2012).

The competition between universities has become more intense than it was in the last twenty years, especially the local ones. Competition today exists between public universities and private universities, a competitive race that some private universities are aware of, and seek to win by increasing their market share in the higher education market. Besides, competition between these universities and foreign universities came to invest their money and practice their services locally i.e., establishing joint programs with local private universities, attracting male and female students from within to travel and providing developed electronic services (Schofer and Meyer, 2005).

The challenges of the future necessitate the development of the university's role in scientific research to face social and economic variables. As a university function, it needs a comprehensive review of all its components, taking into account the renewal of the types of knowledge that are most deserving and used for the Saudi society, and how to invest the results of scientific research to achieve society's aspirations for development.

Because of what is characterized by the education industry as the main source of the human capital industry, specialized global institutional devices have emerged to control the quality and excellence of the educational system's inputs, processes and outputs, so that it is possible to rely on the results and classifications of these institutional devices in making decisions aimed at directing investment and capital to the educational sector in particular. In general, and higher education institutions in particular, and therefore the quality level of higher education institutions' products of graduates or research, advisory and training services depends to a large extent on the level that the university obtains in international rankings for quality and excellence at the global level (Nell and Cant, 2014).

The function of scientific research plays a major role in raising the competitiveness of universities. The international rankings of universities have placed scientific research within their criteria for evaluating universities. The evaluation indicators for the production of scientific research include the number of research published in international refereed journals and referred to "Citation Index", research published in English in refereed journals, the ratio of research to the number of faculty members, and the number of research published in (Nature) and (Science) journals. Completed theses in postgraduate studies, their evaluation level, and the number of refereed theses from international arbitration committees are also considered in this regard.

The Reality of Scientific Research System in Saudi Universities

When diagnosing the reality of the scientific research system in Arab universities in general, it is found that it has not reached the desired level, and many studies indicate that the production of scientific research in universities is weak. The number of research published by a faculty member annually is in the range (0.20-0.5), and the time allocated to a faculty member for scientific research in developed countries has reached (33%), while in Arab countries it does not exceed (5%). Elbagory (2018) asserts that Arab universities in the Arab world do not give much attention to basic or applied research with the relative expansion of the number of universities. Since most of these institutions are educational institutions rather than research institutions, the research conducted in universities did not contribute to the Arab development process.

This is confirmed by the study of Mezher et al. (2011) who reported that much of the scientific production in the Arab world is separate from industry and production and that it did not address developmental problems. He reported that research studies are not linked to real problems that have owners looking for solutions, and they are mostly not cumulative, but rather linked to theoretical aspects, mostly for promotion and obtaining a scientific degree. Among what he mentions in this regard is the shortage in the number of faculty research published globally, and the decrease in the number of Arab scientific periodicals. The number did not exceed (514) periodicals in 2008, compared to (13883) periodicals in Japan alone, for example. But it must be taken into account that the global rankings are based mainly on research published in the English language. On the other hand, the report indicates that spending on scientific research in the Arab countries' averages (0.2%) compared to (1.4%) a global average.

The beginning of scientific research in Saudi universities began with the development of higher education, which began in 1958 with the establishment of King Saud University. The beginning of scientific research activity was modest, focused on theoretical research that did not require expertise and technical requirements to be implemented. With the development of universities and their libraries, laboratories, qualified technical and scientific cadres, the activity of scientific research began to develop in quantity and quality.

Several studies confirm that the reality of the scientific research system in Saudi universities can be diagnosed as follows:

- The absence of clear strategies to guide scientific research and scientific research in universities is not linked to comprehensive development plans.
- The lack of budgets allocated to scientific research in universities compared to developed countries, and they do not exceed (0.2%) of the gross domestic product, according to the data of UNESCO for the year 2010.
- Lack of social awareness of the importance of scientific research and its role in improving the development process in society.

- The lack of a clear strategy for marketing research in Saudi universities.
- Weak partnership between universities and various community institutions to support scientific research and establish joint research between them.
- Weak qualification of human cadres working in the research sectors in universities.
- Weak confidence in the possibility of employing research results in various community institutions.

Saudi universities represented by the Ministry of Higher Education have sought to pay attention to scientific research in the last five years. This is to achieve the directions of the Eighth Development Plan of the State, which focused on supporting and encouraging scientific research and technical development to enhance the efficiency of the national economy and keep pace with the trend towards a knowledge economy. In addition, the long-term comprehensive national plan for science and technology in the Kingdom of Saudi Arabia is focused on Saudi Vision 2030.

From this point of view, universities have sought to launch some initiatives, projects and activities that support their orientation towards building a system for scientific research, such as:

- Establishing an infrastructure for conducting various scientific research, and currently includes more than (101) research centres, as well as (14) centres of research excellence in various scientific and humanitarian fields. As for research chairs, the number of research chairs has exceeded (150) research chairs in some Saudi universities.
- The Ministry of Higher Education focused on developing creativity and excellence among faculty members; It allocated approximately (60) million riyals to implement (439) specialized courses held within universities, and (35) programs implemented with distinguished centres in international universities. The Ministry encourages universities to communicate with international institutions and houses of expertise to enable faculty members to benefit from global expertise and experience, and transfer them to Saudi universities, to help transform the knowledge society, and contribute to the development of scientific research skills and components.
- The Ministry has established in some universities' institutes for research and advisory services, and it links universities with society by providing distinguished scientific and research services according to the highest scientific specifications for the benefit of government and private agencies in return for a fee, which contributes to the development of scientific research in universities, and in providing reliable scientific research and survey studies to the authorities.
- Some universities have incubators for scientific research, and the importance of these scientific incubators lies in providing the appropriate economic and technical environment that contributes to helping researchers to innovate, intellectual creativity, and industrial development, in line with the shift towards a knowledge economy.
- The Ministry, in coordination with universities, supports about (100) scientific societies, and the support includes all scientific purposes, such as: developing

scientific activities in societies, holding conferences, issuing periodicals, and encouraging competition among them.

- The Ministry has implemented many twinning projects that include linking departments, colleges, and programs in Saudi universities, and laboratories specialized in medical, engineering, scientific, and other fields, with their counterparts in prominent international universities known for international excellence.

Based on the foregoing, the strategy for the development of higher education in the Kingdom of Saudi Arabia emphasized making Saudi universities achieve leadership and global competition among international universities. It supported many projects to raise the level of university performance to reach advanced positions in international rankings, and as a result of this blessed effort, some Saudi universities have achieved advanced positions in (Shanghai), (Times) and (Web Matrix) rankings, led by King Saud University, King Fahd University of Petroleum and Minerals, and King Saud University, Abdul Aziz and Imam Muhammad bin Saud Islamic University.

Method and Procedures

Research Design

In light of the objectives of the study and the questions it is designed to answer, the researcher used the descriptive survey method, which expresses the social phenomenon that has been studied quantitatively and qualitatively, and seeks to reveal the relationships between its dimensions to explain them and reach general conclusions that contribute to improving and developing reality.

Sampling Process

The study sample consisted of 80 faculty members who work in research sectors, and who participated in the Scientific Research Chairs Forums (King Saud University, King Faisal University, and Princess Noura bint Abdul Rahman University) along with a sample of faculty members in those universities.

Research Instrument

After reviewing the literature and previous studies related to the subject of the study, the researcher prepared a special questionnaire, which consisted of two domains as follows:

- The proposed mechanisms for developing the scientific research system in Saudi universities in the light of global competitiveness.
- The requirements that need to be met to develop the scientific research system in Saudi universities in the light of global competitiveness.

Reliability and Validity of Research Instrument

1.Validity

- Face validity

The face validity way was used to ensure the questionnaire validity and its suitability to the research goals, the questionnaire was evaluated by a group of experts,

academics and specialists, and they were asked for their opinion about every paragraph in the questionnaire, and they were asked to add, delete or reformulate. The researcher followed the instructions and modified the questionnaire.

-Internal Consistency

Internal consistent Means consistency of each paragraph of the questionnaire with the domain that belongs to that specific paragraph, so correlation coefficients have been calculated between the degree of each paragraph and the total score of the domain to which it belongs, to verify the validity of the questionnaire, the results indicate validity consistency of internal data in the study where values of correlation coefficient ranged for all phrases in all study domains between 0.185 to 0.571, and these values were significant at 5% level, and table (1) illustrate that.

Table (1): Internal consistency for questionnaire items.

The first Domain			The second Domain		
No.	**r**	**P-value**	**No.**	**r**	**P-value**
1	.742**	.000	1	.787**	.000
2	.644**	.000	2	.653**	.000
3	.692**	.000	3	.732**	.000
4	.563**	.001	4	.656**	.000
5	.471**	.009	5	.537**	.002
6	.651**	.000	6	.545**	.002
7	.425*	.019	7	.630**	.000
8	.649**	.000	8	.697**	.000
9	.729**	.000	9	.755**	.000
10	.459*	.011	10	.583**	.001
11	.532**	.003	11	.554**	.001
12	.628**	.000	12	.710**	.000
13	.653**	.000	13	.619**	.000
14	.580**	.001	14	.572**	.001
15	.445*	.014	15	.565**	.001
16	.581**	.001	16	.572**	.001
17	.645**	.000	17	.621**	.000
18	.541**	.002	18	.589**	.001
19	.632**	.000	19	.624**	.000
20	.683**	.000	20	.612**	.000

Hint: r= Pearson Correlation Coefficient, *Significant at the 0.05 level, **Significant at the 0.01 level.

Reliability

In general, reliability means the degree to which an instrument measures the same way each time it is used under the same condition with the same subjects, there are many methods in which it can be measured to ascertain the extent of the Reliability to measure what it was designed for, but in this study, Cronbach's Alpha method has been used to calculate the reliability in the data collected through the study tool (questionnaire) and the results were shown in table (2).

Table (2): The value of Cronbach's Alpha for every domain

Domains	No. of Questions	Cronbach's Alpha
The requirements that need to be met to develop the scientific research system in Saudi universities in the light of global competitiveness.	20	0.905
The proposed mechanisms for developing the scientific research system in Saudi universities in the light of global competitiveness.	20	0.920
All domains	**40**	**0.943**

Table (2) shows that the reliability variables ranged from 0.905 to the first domain, and 0.920 to the second, these results indicate the presence of high reliability in the data of study domains, in addition, the total reliability coefficient reached 0.943, which is considered the very high value of the Cronbach's Alpha.

Through the above tests of the validity and reliability of data in the study, results indicated a high presence of validity and reliability of data in the study and, accordingly, the data collected from the study sample is suitable for the analysis. The results of the analysis are dependable to be disseminated in the study population.

Results and Discussion

The results of the first domain "The requirements that need to be met to develop the scientific research system in Saudi universities in the light of global competitiveness"

Table (3) shows the descriptive measurements of items of the "The requirements that need to be met to develop the scientific research system in Saudi universities in the light of global competitiveness" whereas the table has (20) items, the item which comes first based on a level of approval is "The existence of a comprehensive database and information for the scientific research activities of the faculties and departments in their research centres" with (M = 4.34 out of 5, RII = 86.8%, SD = 0.5), This result indicates a v. high degree of approval, the item which comes last based on approval level is "Applying the scientific research pricing policy in a manner that ensures the survival and continuity of its production" with (M = 4.09 out of 5, RII = 81.8%, SD = 0.6) This result indicates a high degree of approval.

The total degree of the "The requirements that need to be met to develop the scientific research system in Saudi universities in the light of global competitiveness" was with (M = 4.19 out of 5, RII = 83.8%, SD = 0.36) This result indicates a high degree of approval.

Table (3): Descriptive measurements of items of "The requirements that need to be met to develop the scientific research system in Saudi universities in the light of global competitiveness".

Items		M	SD	RII	L A	R
1	Investing in research and graduate studies programs in employing knowledge and transforming them into a productive and developmental wealth.	4.26	0.72	85.2%	V. High	2
2	Holding conferences, symposia and periodic	4.16	0.72	83.2%	High	13

	meetings with community institutions to market scientific research					
3	Building mutual trust between research centres in universities and community institutions.	4.18	0.69	83.6%	High	11
4	Encouraging faculty members to attend and actively participate in international conferences.	4.15	0.62	83.0%	High	17
5	Encouraging publication in trustworthy international scientific journals.	4.16	0.60	83.2%	High	13
6	Applying the scientific research pricing policy in a manner that ensures the survival and continuity of its production.	4.09	0.60	81.8%	High	20
7	Cooperation between local and international research centres to benefit from their expertise in investing and employing scientific research.	4.10	0.56	82.0%	High	19
8	Evaluating the research of faculty members according to the benefit of its results and developmental applications.	4.24	0.53	84.8%	V. High	3
9	Developing the human capabilities of workers in scientific research centres to keep pace with the requirements of global competitiveness.	4.23	0.59	84.6%	V. High	4
10	Localizing knowledge by directing the government and various community institutions to benefit from local research centres instead of importing them.	4.19	0.55	83.8%	High	9
11	Providing the appropriate research environment (libraries, laboratories, equipment, laboratories, refereed scientific journals...).	4.21	0.50	84.2%	V. High	7
12	Providing sufficient time for faculty members to complete scientific research.	4.18	0.61	83.6%	High	11
13	Supporting the production of joint scientific research of an integrative nature for disciplines in the manner of research teams.	4.20	0.54	84.0%	V. High	8
14	Increasing financial allocations to finance research projects in universities.	4.16	0.63	83.2%	High	13
15	The existence of an effective administration to lead the scientific research system in universities and raise their competitiveness.	4.23	0.57	84.6%	V. High	4
16	There is a clear strategy for marketing scientific research in Saudi universities.	4.16	0.66	83.2%	High	13
17	The existence of a legislative framework that preserves rights, grants freedom and facilitates the work of researchers.	4.23	0.53	84.6%	V. High	4
18	Having a clear vision to guide the scientific research system in universities, in line with the development plan in the country.	4.14	0.52	82.8%	High	18
19	Having a clear vision to support an effective partnership between research centres in universities and community institutions.	4.19	0.53	83.8%	High	9
20	The existence of a comprehensive database and information for the scientific research activities of the faculties and departments in their research centres.	4.34	0.50	86.8%	V. High	1
The requirements that need to be met to develop the scientific research system in Saudi universities in the light of global competitiveness.		**4.19**	**0.36**	**83.8%**	**High**	

Hint: M=Mean of answers, RII=Relative Importance Index ((Mean/5) *100%), SD=Standard Deviation, LA= Level of agreement, R=Rank.

It is clear from the table (3) that there is great agreement among the study community about the domain of the requirements needed to develop the scientific research system in Saudi universities in the light of global competitiveness; Where the arithmetic averages range between (4.58 - 3.34). Also, the general arithmetic means of the domain (4.43) out of (5) means that the approval is of a very high degree, and this confirms the importance of those requirements for developing the scientific research function in Saudi universities in light of global competitiveness. This study agrees with the findings of many studies, including the study of Amaya Molinar et al. (2021) and the study of Bileviciute et al. (2019).

The results of the first domain "The proposed mechanisms for developing the scientific research system in Saudi universities in the light of global competitiveness"

Table (4) shows the descriptive measurements of items of the "The proposed mechanisms for developing the scientific research system in Saudi universities in the light of global competitiveness" whereas the table has (20) items, the item which comes first based on a level of approval is "Participation of some specialists and senior workers in various community institutions as members of scientific research councils in universities" with (M = 4.21 out of 5, RII = 84.2%, SD = 0.54), This result indicates a v. high degree of approval, the item which comes last based on approval level is "Establishing a coordinating council for representatives of universities and various community institutions in the Chambers of Commerce and Industry" with (M = 4.14 out of 5, RII = 82.8%, SD = 0.55) This result indicates a high degree of approval. The total degree of the "The proposed mechanisms for developing the scientific research system in Saudi universities in the light of global competitiveness" was with (M = 4.20 out of 5, RII = 84%, SD = 0.36) This result indicates a high degree of approval.

Table (4): Descriptive measurements of items of "The proposed mechanisms for developing the scientific research system in Saudi universities in the light of global competitiveness".

Items		M	SD	RII	L A	R
1	Using the method of comparison and imitating an external competitor (BENCHMARKING) to raise the competitiveness of the scientific research industry in universities.	4.14	0.69	82.8%	High	2
2	Take advantage of the scientific sabbatical of faculty members to visit scientific centres in developed countries and conduct joint research.	4.19	0.60	83.8%	High	13
3	Establishing advanced training courses for workers in research centres to raise their research and production capabilities.	4.21	0.69	84.2%	V. High	11
4	Regularly attaching some faculty members in universities to work sites in various community institutions.	4.14	0.72	82.8%	High	17
5	Establishing a special fund to finance scientific research in universities, to which the government and various community institutions contribute.	4.19	0.58	83.8%	High	13

6	Establishing a coordinating council for representatives of universities and various community institutions in the Chambers of Commerce and Industry.	4.14	0.55	82.8%	High	20
7	Establishing a national information observatory for scientific research to provide data and information to researchers.	4.20	0.54	84.0%	V. High	19
8	Establishing offices for marketing the results of scientific research, affiliated to each research centre, and responsible for marketing the production and service sectors.	4.26	0.50	85.2%	V. High	3
9	Creating Infer faces between research centres and converting research results into new products (such as knowledge incubators, scientific parks, technology valleys...).	4.26	0.52	85.2%	V. High	4
10	Building a roadmap for research topics in universities in coordination with officials in various community institutions.	4.23	0.48	84.6%	V. High	9
11	Exchange of visits between universities and various community institutions to raise awareness of the importance of the role of scientific research in development.	4.16	0.58	83.2%	High	7
12	Encouraging the productive sector in equipping laboratories and laboratories in universities.	4.20	0.58	84.0%	V. High	11
13	Forming committees in the Ministry of Higher Education to make plans and community awareness programs for the significance of scientific research in community development.	4.25	0.52	85.0%	V. High	8
14	Forming committees to develop the regulations and laws regulating the scientific research industry in universities.	4.18	0.52	83.6%	High	13
15	Forming an advisory board in each university of faculty members, senior workers and specialists in the various community institutions.	4.18	0.55	83.6%	High	4
16	Apply the (research contracts) system in planning and implementing research projects.	4.24	0.58	84.8%	V. High	13
17	Evaluation of research projects according to clear and specific international competitive standards to ensure quality.	4.25	0.54	85.0%	V. High	4
18	Expanding the idea of research chairs and centres of excellence in universities for businessmen and various community institutions.	4.16	0.60	83.2%	High	18
19	Increasing the number of workers in research centres and appointing research assistants.	4.24	0.58	84.8%	V. High	9
20	Participation of some specialists and senior workers in various community institutions as members of scientific research councils in universities.	4.21	0.54	84.2%	V. High	1
The proposed mechanisms for developing the scientific research system in Saudi universities in the light of global competitiveness.		**4.20**	**0.36**	**84.0%**	**V. High**	

Hint: M=Mean of answers, RII=Relative Importance Index ((Mean/5) *100%), SD=Standard Deviation, LA= Level of agreement, R=Rank.

It is clear from the table (4) that there is great agreement among the study community about the domain of the proposed mechanisms for developing the scientific research system in Saudi universities in the light of global competitiveness, where the arithmetic averages range between (6.64 - 4.30). The general arithmetic means of the domain (4.44) out of (5) means that the approval is very high, and this confirms the importance of those proposed mechanisms for developing the scientific research system in Saudi universities in light of global competitiveness, and this study agrees with the findings of Krstić, Filipe and Chavaglia (2020).

The differences about the degree of approval of the study sample for the domains of requirements to be met, and the domain of the proposed strategy for developing the scientific research system in Saudi universities in light of global competitiveness, according to the nature of work at present.

The t-test was used to test the differences in the degree of approval of the study sample for the domains of requirements to be met, and the domain of the proposed strategy for developing the scientific research system in Saudi universities in light of global competitiveness, according to the nature of work at present.

Table (5) The T-test result

variable	Categorie	N	Mean	Std. Deviation	T-value	P-value
The requirements that need to be met to develop the scientific research system in Saudi universities in the light of global competitiveness.	A faculty member working in the research sectors at the university.	40	4.24	.383	1.298	.198
	Faculty member	40	4.14	.340		
The proposed mechanisms for developing the scientific research system in Saudi universities in the light of global competitiveness.	A faculty member working in the research sectors at the university.	40	4.25	.367	1.166	.247
	Faculty member	40	4.15	.353		
Developing the Educational Scientific Research System in Saudi Universities to Enhance their Global Competitiveness and Scientific Position	A faculty member working in the research sectors at the university.	40	4.24	.334	1.324	.189
	Faculty member	40	4.15	.337		

Through table (5), it is clear that the value of (T) is significant at the level of (0.01) in the domain (The requirements that need to be met to develop the scientific research system in Saudi universities in the light of global competitiveness); this indicates that there are statistically significant differences in the answers of the study sample about the requirements for developing the scientific research system in Saudi universities in the light of global competitiveness, according to the nature of their work.

It is also evident from table (5) that the value of (T) is significant at the level of (0.01) in the domain (The proposed mechanisms for developing the scientific research system in Saudi universities in the light of global competitiveness); this indicates that there are statistically significant differences in the answers of the study sample about their approval of the proposed mechanisms for developing the scientific research system in universities in the light of global competitiveness according to the nature of their work, and these differences were in favour of faculty members who are not working in the research sectors at the university.

The researcher believes that the presence of differences is normal since those working in research sectors have experience and field practice, which makes the proposed requirements and mechanisms differ from faculty members who are not working in research sectors.

All in all, the results showed there are no statistical differences at level $\alpha \leq 0.05$ about the degree of approval of the study sample for the requirements to be met, according to the nature of work at present. ($T=1.298$, $p>0.05$). Additionally, the results showed that there are no statistical differences at level $\alpha \leq 0.05$ about the degree of approval of the proposed strategy for developing the scientific research system in Saudi

universities in light of global competitiveness, according to the nature of work at present. (T=1.166, p>0.05). Finally, the results showed that there are no statistical differences at level $\alpha \leq 0.05$ about the degree of approval of the study sample for the Developing the Educational Scientific Research System in Saudi Universities to Enhance their Global Competitiveness and Scientific Position, according to the nature of work at present. (T=1.324, p>0.05).

Suggestion for Developing the Educational Scientific Research System in Saudi Universities – proposed strategy

In the light of the research results, the following suggestions should be considered to further develop the educational scientific research system in Saudi Universities:

Requirements:

•Encouraging faculty members to attend and actively participate in international conferences.

•Having a clear vision to guide the scientific research system in universities, in line with the development plan in the country.

•Cooperation between local and international research centres to benefit from their expertise in investing and employing scientific research.

•Investing in research and graduate studies programs in employing knowledge and transforming it into a productive and developmental wealth.

•Providing the appropriate research environment (libraries, laboratories, equipment, laboratories, refereed scientific journals...).

•Increasing financial allocations to finance research projects in universities.

•The existence of an effective administration to lead the scientific research system in universities, and raise their competitiveness.

•Developing the human capabilities of workers in scientific research centres to keep pace with the requirements of global competitiveness.

•Having a clear vision to support an effective partnership between research centres in universities and community institutions.

•Localizing knowledge by directing the government and various community institutions to benefit from local research centres instead of importing them.

•Supporting the production of joint scientific research of an integrative nature in the manner of the research teams' work.

•Provide sufficient time for faculty members to complete scientific research.

Mechanisms:

•Forming an advisory board in each university of faculty members, senior workers and specialists in various community institutions.

•Finding interfaces between research centres, and between converting research results into new products, such as: (knowledge incubators, science parks, technology valleys...).

•Establishing a national information observatory for scientific research to provide data and information to researchers.

•Participation of some specialists and senior workers in various community institutions, members of the scientific research councils in universities.
•Forming committees in the Ministry of Higher Education to make plans and community awareness programs for the importance of scientific research in the development of society.
•Expanding the idea of research chairs and centres of excellence in universities for businessmen and various community institutions.
•Establishing a special fund to finance scientific research in universities, to which the government and various community institutions contribute.
•Using the method of comparison and imitating an external competitor (Bench Marking) to raise the competitiveness of the scientific research system in universities.
•Take advantage of the scientific sabbatical of faculty members to visit scientific centres in developed countries and conduct joint research.

Conclusion and Recommendations

Scientific research has been a focal point of attention in some contemporary countries, and international organizations have published some studies on the state of scientific research and publication globally. In light of results, the study recommends the following:
•Directing the Ministry of Higher Education to make strategic plans to build the scientific research system in Saudi universities.
•Saudi universities provide the requirements to develop the scientific research system in light of global competitiveness.
•Saudi universities adopt several mechanisms proposed in this study to develop the scientific research system.
•Establishing a special fund to support research centres at the state level, and urging government and private institutions and companies to allocate a percentage of profits equivalent to (3%) at least to support the fund.
•The government should seek to localize knowledge by urging governmental and private institutions and companies with the help of national research expertise.
•The government's work to establish a national information observatory for scientific research to provide data and information to researchers.

Acknowledgements

The author would like to thank Professor ….. for giving his advice and time to support this project. The author would also like to thank Dr. ….. for allowing doing this project.

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