

# A CASE STUDY OF KEY PERFORMANCE INDICATORS IN SCIENTIFIC RESEARCH IN A MIDDLE EASTERN UNIVERSITY

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**Abstract-** *Many Middle Eastern Universities are still struggling to establish themselves to achieve excellence in scientific research and education. The rising awareness in the science and technology, and implication of higher education in shaping future of the younger generation and building societies in the Middle Eastern region became inevitable in order to modify and upgrade educational policies and structure. The foremost step in this direction is governance that comes with hard decisions. The universities and national governments are willing to change strategic plans and institutional guidelines for the development of science and technology. King Abdulaziz University, Jeddah, Saudi Arabia is one of the few universities in the Middle East that rose to acquire the second rank among all the Arab and 351th among the world universities in 2014. King Abdulaziz University has tried to implement KPIs during previous strategic plan in order to achieve international distinction in scientific research and education. Introduction of KPIs helped university to grow but not as much as it was expected. The main reasons were occasional conflicts between KPIs and strategic plan of the university. The university now plans to synchronize KPIs with the current strategic plan that starts from 2016. In this paper, the authors have modified many existing KPIs and proposed others based on the university's ideology, requirements and criteria. With its own KPIs the university will bring transparency, accountability and responsibility among its students, faculty and staff paving way to academic and scientific research development in order to be the role model for other universities in the region.*

**Keywords** - Key performance indicators, scientific research, university, education

## 1. INTRODUCTION

Noble Laureate for Physiology, Albert Szent-Gyorgyi (1893-1986) quoted that "Research is to see what everybody else has seen, but to think what nobody else has thought". The aims and scope of scientific research harmonize the essence in the sense that thinking by the scientists is critical than seeing the results.

The scientific research is of paramount importance, greatly influencing industrial, scientific and operational developments globally. During the last three decades, investment on scientific research was exponential, which has transformed many conventional universities to "Research Universities" e.g. University Malaya and University Kebangsaan (Malaysia). As the influence grew on the world economy and geopolitics, scientific research has established its priorities around the world. The successful scientific research leading to the high-level turnover of economic and financial investments requires long-term strategic planning, functional funding policy, infrastructure, and adequately competent research team.

The quantification of economic, financial and social benefits derived from the advanced and modern scientific research is difficult specially based on input and output of investment and assessment of research. Research, invention and development of new industrial products are the best examples that permit quantification of input and output of investment and characterization. Parameters measuring success of research and turnover of financial and economic investments are somewhat similar to "Knowledge Based

Economy (KBE)". Knowledge Based Economy was coined by [9] while describing differences between a manual and knowledge workers in his book entitled "The Effective Executive". He [9] differentiated manual and knowledgeable workers, as the former works with the hands to produce goods or services, whereas the later does not work with the hands but the head to produce ideas, knowledge, and information. Even, the Organization for Economic Cooperation and Development [25] gives high priority to Knowledge Based Economy.

The outcome of scientific research plays crucial role in decision-making processes, where performance is measured by standard indicators and applicable at different functional levels e.g., ministry, institution, faculty, department etc. The standard indicators determine expenditure, quantity and quality of research published and designs patented. It is an important detrimental factor for successful execution of various national development programs. It is imperative for the national governments to be familiar with quantified values of research input and output, and be aware with the priorities of national plans to achieve successful execution of strategies.

The higher education opens up to new technology, opportunities, and improved ways to acquire and disseminate scientific knowledge. In the light of such developments, think tank of the Organization of Islamic Cooperation (OIC) countries struggled to evolve and improve higher education, research funding, skill-based training to the faculty and staff of universities, and elevating quality and standards of

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scientific teaching and research. It becomes imperative to be more detrimental in promoting higher scientific education and research to bring quality at par with the international standards. The comprehensive and quantitative methodologies must envisage procedures to evaluate performance of institutions for higher education and research.

The purpose of ranking universities is to provide global comparison of success, competence, and struggle to institutions to become a world-class entity. Besides, the ranking system helps international students, stakeholders, and administrative bodies alike. The former gets the tools to shortlist international universities for their benefits, whereas the later proposes and prepares the road map for excellence in international higher education by implementing distinctive indicators such as academic and employer reputation, student/faculty ratio, research publications, citation index, international faculty, and students etc.

Key Performance Indicators” (KPIs) provide quality assurance to the scientific research and higher education. The KPIs are variable and designed specifically for a particular entity such as education, research, finance, operation, management etc. Nevertheless, each one has its own criteria and goals to achieve the best performance in order to bring international competitiveness. The KPIs are designed to improve and monitor progress as well as success in a particular sector, which have rarely been proposed singularly and exceptionally for an educational and scientific research institute such as the university.

For many years, performance indicators e.g., quality of scientific research, research output, human resources, higher education etc., are proposed and implemented [31]. Countries like Australia, UK, France, Holland, Sweden and New Zealand have implemented performance indicators for more than a decade. Central, Eastern European and Mediterranean countries succeeded in implementing performance indicators [6]. The systems in the United States of America, Germany and Canada are unique, hence standalone [6,32].

In case of Middle Eastern Universities, performance indicators are implemented but with skepticism. Since its inception as a private college in 1967, King Abdulaziz University, Jeddah, Saudi Arabia rose to acquire the second rank among all the Arab and 351th among the world universities in 2014 [34]. King Abdulaziz University needs huge budget to manage its big fleet of faculties, students, departments, centers and institutes of excellence. In order to achieve international distinction, success in scientific research and academic recognition, King Abdulaziz University must assign KPIs based on its own ideology, requirements and criteria. Having its own KPIs, King Abdulaziz University will bring transparency, accountability and responsibility among its students, members of the faculty and staff paving ways for further development of academic and scientific research.

This paper is therefore, aims to develop KPIs and implement them in the King Abdulaziz University in Jeddah, Saudi Arabia to project it as a National Research University and a model for other universities in the region.

## **2. METHODS**

Study is based on the previous and current Five Year Strategic Plans of the King Abdulaziz University. New KPIs are developed and proposed based on the criteria mentioned

on the following pages. The research grants, quality and quantity of research projects, international peer reviewing, number of research proposals accepted and rejected, patents accepted, papers published in Nature, Science and other ISI highly cited journals, and international collaborations with highly cited Researchers are some of the criteria on which KPIs are developed and proposed for the King Abdulaziz University.

## **3. RESULTS**

**3.1 Scientific Research in Saudi Arabia:** Universities, government bodies and private agencies are responsible to promote scientific research and development in Saudi Arabia. Despite ongoing efforts of these organizations to improve scientific research, the ratio of national population to scientific researchers is only 23 per 100,000 in the country, which is meager as compared to the developed nations. The ratio of scientific researchers to national population in developed countries stands at 500 per 100,000 individuals. The spending on scientific research in Saudi Arabia is currently at 1.0% of the Gross Domestic Product [20], as compared to the spending of developed and other countries. In order to improve quality and quantity of scientific research, Ministry of Economics and Planning intends to increase the budget up to 2.1% of GDP [20].

Scientific research in Saudi Arabia needs special attention from governing bodies and those who are already involved in scientific research. Progress in scientific research in King Abdul Aziz University is slow but directly proportional to the rates of development and financing of higher education and to the rates at which research institutes and universities are established and expanded. The relationships as described above are significant signs of improving scientific research in Saudi Arabia. The following points elaborate reasons of investments in terms of funding, infrastructure and resource personnel, which are higher than the outgrowth of scientific research.

1. The rapid increase in the number of universities from 9 (in 2003) to 32 (in 2010) in recent years, which means most universities are still in the phase of research growth.
2. The hiring of specialized work force is slow in relation to the growth in the universities, institutes and infrastructure thus resulting in slower growth rate.
3. With the increase of the international fellowships in techno scientific research, the number of PhD enrollment within the country either decreased or without recruitment of eligible scientists.
4. It is encouraging and important that private sectors recruit significant percentage of university scientific researchers, otherwise such trend drain technology and know-how from main streams of scientific research.

It is inevitable, that the universities and institutes must adopt practices, policies, and strategies to overcome shortcomings in the process of strategic funding to scientific research and development. In the nutshell, guidelines for the best scientific practices (KPI's) based on the following have to be envisaged and implemented.

**3.2 Financial sustainability:** In order to attain financial sustainability, the university has to ensure funding from the following sources.

1. Institutional funding.
2. Scientific chairs in specific subjects.
3. Local and international endowments.
4. Organizational and private sector partnership funding.
5. Return on investment in research.

### **3.3 Improved research processes and procedures:**

The relevant research infrastructure is one of the main objectives of scientific research in the university. This also includes location, laboratory, equipment as well as the information and technology facilities. The policy and executive orders must not circumvent strategic plans of the university and insure that the national development plan and institutional priorities are considered.

### **3.4 Human resources transformation:**

In order to ensure individuals with high quality of techno-scientific skills within the workforce of scientific research, transformation of human resources is must. It ensures induction of individuals with right skills, proficiency, ethicality and standards according to university criteria. The transformed human resources must not be marginalized, doing so it will jeopardize the very essence of transformation. We propose the following to King Abdulaziz University to revamp human resources in scientific research.

Deanship of Scientific Research (DSR) at King Abdulaziz University is doing outstanding job in bringing current scientific knowledge through international scientific collaborations, publications in ISI journals and procuring maximum funding for the development of science and technology. In the light of such developments, Deanship of Scientific Research has to evolve further to embrace highest degree of transparency, accountability and responsibility from participating researchers. Such goals are achievable, if human resources implement techno-scientific programs such as skilled and non-skilled trainings and orientations under established terms and conditions as set forth by various disciplines and regulate compliance by individuals. Following are some advantages of transformation of human resources.

1. Identify challenging issues related to the university, departments and individuals.
2. Help workforce individuals to stay abreast with the latest knowledge in science and technology.
3. Assist individual researchers to compete with international standards.
4. Generate techno-scientific database depending on the knowledge, experience, training, exposure etc., of trained personals.
5. Creating strong database for highly skilled individuals to become national pool for technology employers, thus reducing gaps between input and output of the university.
6. Validate qualification and experience of the employees, and training by accredited agencies.

7. Global connection that connects employees with hiring companies both within and outside of the country.

Last, but not the least, transformation of human resources will bring professional development, self-directed and employer sponsored studies besides accredited and non-accredited courses.

In the light of defined practices, set of established KPIs, Science and Technology Manager will make effective, transparent and productive judgments. Subsequent modifications in the scientific and technical programs, changes in research policies and the introduction of best scientific practices are easily applied on the basis of above criteria.

### **3.5 International examples of KPIs research evaluation:**

The evaluation of scientific research depends upon three parameters namely, the research output (outcome of evaluation); Key Performance Indicators (evaluation tools); and the mechanism of evaluation (governs evaluation methods). The mechanism of research evaluation varies depending upon available data, research output and objectives of evaluation. For example, if the aim of the university classification is on the basis of research then patents and research output must be considered. In contrast, if the classification is based on academics and teaching then the parameters will be different. Authors propose the following evaluation criteria for the King Abdul Aziz University to implement KPIs and evaluate its scientific research programs.

### **3.6 The descriptive or qualitative evaluation**

It evaluates research on the basis of total number of papers published, patents registered, thesis, university website, international funding, outside contracts etc.

### **3.7 The quantitative evaluation**

The quantitative evaluation such as Full Time Equivalent offers real figures and combative tools for correct institutional classification based on achievements [37].

The Quantitative KPIs are used to classify performance of the institution, researchers and faculty members by feeding necessary formulas and criteria [24]. [7] stated that output should not be the collection of scientific statements but it should be dynamic information system based on standard statistical data. The world ranking of the universities [34] are based on five major indicators of which three are related to research (Table 1) and are considered here to develop KPIs for the King Abduaziz University.

The "Academic Ranking of World Universities" (Shanghai Jiao Tong University) approved certain specific indicators: Nobel Prize Laureates, highly cited scientists, researchers, and publication in *Nature* and *Science*. The *Times Higher Education World University Ranking* also follow the trends (i.e., research-volume, income, reputation, citations and industry income) of the *World University Ranking* and *Thomson-Reuters*. Unlike above, the *Quacquarelli Symonds* ranking system considers reputation and citation as research indicators [28].

Major indicator	Sub-major indicator	Weight %
Citation impact	Average citations per paper	33.0
Research: Income, Quantity, Quality and Excellence	Research of excellence	20.0
	Income through research	5.0
	Publications/academic member	5.0
	Income through public research/gross research income	1.0
Relative value of industry Income and innovation	Per academic member	3.0

Table 1 Research indicators distributed according to sub-indicator weight.

Country	Indicators
PhD Students	Enrolled
	Subject wise enrollment
	National fellowships
	International fellowships
Post- graduate students	Post-graduates enrolled
	Subject wise enrollment
	National fellowships
	International fellowships
Research proposal	Submitted for funding
	Accepted
	Rejected
International research funding	For education
	For research
	For PhD & Post-graduates
	Bibliometric indicators
Research	Research sustainability
	Research quality & performance
	Publications by impact factor
	Participation in Centers of Excellence
Contracted Funding	Amount of contracted funding
	Increase in contracted funding
	Number of Doctorates
Research and academic awards	Research awards
	Academic awards
	Awards for innovative ideas
	Awards for publication in Nature and Science

Table 2 Performance based budget funding for research in King Abdulaziz University.

The OECD has proposed performance-based funding for public research [24], which was adopted by Australia, Austria, Belgium, Czechoslovakia, Denmark, Finland, Germany, New Zealand and Norway after introducing variables according to their policies and research strategies. We adapt OECD parameters but modified as per requirements of the King Abdulaziz University (Table 2).

The "Royal Irish Academy" [27] in association with the Irish Research Council for Humanities and Social Sciences (IRCHSS) organized a session focusing KPIs in the field of humanities in Irish universities. The KPIs were distributed to the universities, department of education, department of skills, higher education authority (HEA) and other agencies. We propose seven indicators classified into two groups based on their importance.

**3.8 Indicators with primary importance:**

- Academic books published by reputed publishers.
- Academic publication in peer reviewed journals.
- Applied work and major research projects.
- Employment of research graduates.
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**3.9 Indicators of the secondary importance:**

- Generation of income through research.

- Facilitation of research through academic meetings.
- Impact of research outcome to create society-based projects.

The Lancaster University has adopted three types of research indicators with KPIs, limited to the number of research postgraduates, equipment facilities and expenditure. The other five indicators measure research output, scientific degrees awarded, publications, research income and percent cost recovery. In order to measure research outcome, the number of citations, number of faculty engaged, international collaboration, economic impact and technology transfer were designated as the indicators [18].

The Research Universities in Malaysia [10] have designated eight KPIs i.e., importance, performance and capacity of researchers (25%), quantity and quality of research (30%), number of postgraduates (10%), performance of postgraduates (5%), innovation (10%), service quality (7%), networking (8%) and equipment & facilities (5%) [15]. Most of the research indicators targeted publications, research grants for science and technology, research expenditure, and post-doctoral appointments. The innovation indicators were the patents, commercialized products, technology know-how, licensing, and copyrights [15]. On the same pattern, Ministry of Higher Education, Saudi Arabia approved certain qualitative and quantitative indicators for evaluating research in higher education institutions ([29]).

**3.10 Operational key performance indicators for research in King Abdulaziz University:**

The selection of KPIs to evaluate performance is an important task for any scientific research institution. In order to ensure qualitative and continuous assessment of research programs in King Abdulaziz University indigenous and established key performance indicators are proposed (Table 3). To evaluate scientific research in King Abdulaziz University key performance indicators are proposed in three phases. First phase is the preparatory phase, which includes input indicators, research facilities and environment. The second phase, is the ongoing research indicators includes research operational activities leading to output (Table 4). The third phase is output indicators, designated to evaluate research progress and research output (Table 5-8).

**3.11 Standardization of the King Abdulaziz University specific key performance indicators**

The standard and specific KPIs for King Abdulaziz University may be developed on the basis of three important parameters. First, the capacity of the institution and scientific based facilities; second, the targets and objectives of institution's strategic plan; and the third, the international indicators as approved by agencies for the classification of world universities.

King Abdulaziz University has started executive phase of the second strategic plan in 2011. By the end of 2015, it was expected that the key performance indicators will be used to measure the progress of university research, objectives, targets and the strategic plan. The following key performance indicators set forth the basis of research models in King Abdulaziz University (Table 6).

No	Indicator	No	Sub-indicator	Description
3.1	Infrastructure	3.1.1	Laboratories	Specialized and central laboratories matching the needs of programs and researchers
		3.1.2	Equipment	Specialized equipment needed for the research programs
		3.1.3	Research material & supplies	Laboratory material and chemicals
		3.1.4	Centers of excellence in research	Highly specialized research centers
3.2	Human resources	3.2.1	Researchers	PhD holders, faculty members and researchers
		3.2.2	Postgraduates	Master and Doctorate students
		3.2.3	Technicians & assistance staff	Technical, non-technical and administrative personals
3.3	Research funding	3.3.1	Institutional funding	Public funds allocated for research, percent budget allocated to the university by the government
		3.3.2	Contractual funding	Funds obtained from contracts, private sector, national agencies, scientific chairs and endowments
		3.3.3	International funding	Research funds obtained from international agencies and partnership contracts.
3.4	Facilities	3.4.1	Computer and networking facilities	Computers, telecommunication and network system
		3.4.2	Applications & data bases	Electronic applications for research analysis and scientific databases
		3.4.3	Electronic library access	Accessibility to scientific e-library

Table 3 Research Input Indicators for King Abdulaziz University

No	Indicator	No	Sub-indicator	Description
4.1	Research programs	4.1.1	Programs of scientific plan	Research programs corresponding to the strategic plan of the University
		4.1.2	International partnership contracts	International research collaborations and partnership agreements
		4.1.3	Private sector collaborative contracts	Research and development programs and contracts established with private sector
4.2	Ongoing postgraduate thesis	4.2.1	Master's thesis	Research programs attributed to Master thesis.
		4.2.2	PhD thesis	Research programs attributed to PhD thesis
4.3	Conferences & workshops participation	4.3.1	National Conferences & workshops	Participation in national conferences and workshops
		4.3.2	International Conferences & workshops	Participation in international conferences and workshops
4.4	Training programs	4.4.1	Training of researchers	Continuous training programs of researchers in technical methodologies and scientific research management
		4.4.2	Training of technical staff	Continuous training of technical staff in scientific research

Table 4 Ongoing Research Indicators for King Abdulaziz University

No	Indicator	No	Sub-indicator	Description
5.1	Publications	5.1.1	Publications in ISI journals	Scientific papers published in ISI journals classified according the journal IF value.
		5.1.2	Citations	The number of scientists citing published paper as reference in their research papers
		5.1.3	Publications in non classified journals	Scientific papers published in ISI and non-ISI journals
		5.1.4	Publications in Nature & Science	Scientific papers published in Nature and Science journals
		5.1.5	Authored books & chapters	Scientific books written, edited and chapters authored by one or more faculty members.
		5.1.6	Translated books & chapters	Scientific books translated by one or more faculty members
5.2	Scientific thesis	5.2.1	Awarded Master thesis	Master of Science (MSc) degrees awarded.
		5.2.2	Awarded PhD thesis	Doctor of Philosophy (PhD) degrees awarded
5.3	Patents	5.3.1	Patents registered in USA, Europe, Japan	Patents achieved and registered in USA, Europe, Japan
		5.3.2	Patents registered in other countries	Patents achieved and registered in any other country
5.4	Technology transfer	5.4.1	Industrial prototypes	Innovative industrial and functional prototype achieved by the research team
		5.4.2	Transferred models	Re-processing of an imported material, apparatus or device.
5.5	Return investment in	5.5.1	Revenue from local research marketing	Value of funds gained from marketing research & development know-how at the local level.
		5.5.2	Revenue from external research marketing	Value of funds gained from marketing research & development know-how at the international level.

Table 5 Research Output Indicators for King Abdulaziz University

No	Indicator	No	Sub-indicator	Measure	Target (100%)
6.1	Infrastructure	6.1.1	Laboratories	Number of labs/department number of central labs/ university	100 %
		6.1.2	Equipment	% of needed equipment	100 %
		6.1.3	Research material & supplies	% of needed material & supplies	100 %
		6.1.4	Centers of excellence in research	Number of centers/ university research areas	20
6.2	Human resources	6.2.1	Researchers	Number of researchers/research program	5
		6.2.2	Postgraduates	Numbers of post-graduates/ researcher	0.5
		6.2.3	Technicians & assistance staff	Number of technicians/researcher	1
6.3	Research funding	6.3.1	Institutional funding	Funding value/researcher	300.00 0 SR

		6.3.2	Contractual funding	Funding value/researcher	20,000 SR
		6.3.3	International funding	Funding value/researcher	30,000 SR
6.4	Facilities	6.4.1	Computer & networking facilities	% of electronic facilities available	100 %
		6.4.2	Applications & databases	% of database availability	100 %
		6.4.3	Electronic library access	Availability of e-library access	100 %

Table 6 Research Input Indicators (measures & targets) for King Abdulaziz University

No	Indicator	No	Sub-indicator	Measure	Target (100%)
7.1	Research programs	7.1.1	Programs of scientific plan	Number of ongoing programs/ number of scientific plan programs	1
		7.1.2	International partnership contracts	Number of partnership contracts/ department	2
		7.1.3	Private sector collaborative contracts	Number of contracts/ department	2
7.2	Ongoing postgraduate thesis	7.2.1	Master's thesis	Number of ongoing MSc/researcher/year	0.3
		7.2.2	PhD thesis	Number of ongoing PhD/researcher/ year	0.2
7.3	Conferences & workshops participation	7.3.1	National Conferences & workshops	Percentage of participants/total university staff	50 %
		7.3.2	International Conferences & workshops	Percentage of participants/total university researchers	40 %
7.4	Training programs	7.4.1	Training of researchers	Percentage of in house training, researchers/total university staff	20 %
		7.4.2	Training of technical staff	Number of in house training, technicians/total university technicians	60 %

Table 7 Ongoing Research Indicators (measures & targets) for King Abdulaziz University

### 3.12 Evaluation process:

We propose, King Abdulaziz University to constitute a Specialized Follow-up Evaluation Committee (FEC), which should be responsible for research evaluation processes across the faculty & research centers. The task of FEC will be to supervise evaluation and reporting of research performance of the centers twice a yearly. In order to collect and facilitate data on research evaluation and performance, FEC-subcommittees will be constituted in each faculty and research center, which is a norm in many high standard research universities and institutes. Data provided by the sub-committees will be transformed into numerical values as per strategic plan of the university.

The research evaluation process is divided in two major factions. The first, related to the input and ongoing research indicators, where percentages of these indicators will permit university authorities to ensure quality in research and follow-up actions for infrastructural.

No	Indicator	No	Sub-indicator	Measure	Target (100%)	Weight %
8.1	Publications	8.1.1	Publications in ISI journals	Peer reviewed publications / FTE academic staff / year	1	15
		8.1.2	Citations	Mean number of citations / FTE academic staff / 5 years	20	15
		8.1.3	Publications in non classified journals	Number of publications / FTE academic staff/ year	2	3
		8.1.4	Publications in Nature & Science	Number of publications/ 100 FTE academic staff/ 5 years	2	7
		8.1.5	Authored books & chapters	Number of authored publications / 100 FTE academic staff/year	20	5
		8.1.6	Translated books & chapters	Number of translated documents / 100 FTE academic staff / year	5	3
8.2	Scientific thesis	8.2.1	Awarded Master thesis	Number of awards MSc / staff/ year	0.5	2
		8.2.2	Awarded PhD thesis	Number of awarded PhD/staff/year	0.3	5
8.3	Patents	8.3.1	Patents registered in USA, Europe, Japan	Registered patents / S&T staff / 5 years	1	10
		8.3.2	Patents registered in other countries	Registered patents / S&T staff / 5 years	1	3
8.4	Technology transfer	8.4.1	Industrial prototypes	Number of prototypes/ S & T department/ 5 years	1	10
		8.4.2	Transferred models	Number of models / S & T department / 5 years	1	7
8.5	Return in investment	8.5.1	Revenue from local research marketing	Total amount of revenue / staff / year	6,000 \$	5
		8.5.2	Revenue from external research marketing	Total amount of revenue / staff/ year	2,000 \$	10

Table 8 Output Indicators (measures & targets) for King Abdulaziz University

requirements. Such evaluation of ongoing research is necessary to ensure progressive research achievements and timely intervention to correct mistakes. The second faction of research evaluation targets output research indicators. The output percentage of each indicator will be weighed against standard weighting factors in order to evaluate each faculty and research center. The final aggregated and mean percentages of each indicator will set faculties and research centers in their ranks and values. Upon evaluation of ranks and values the university can compare its achievements and research standard based on its strategic plan objectives.

Finally, the university can be compared with local, regional, and international universities based on its own research evaluation criteria and indicators as calculated by KPIs. Some research indicators cited in this paper may not hold good for human sciences and mathematics, hence their weights should be removed before evaluation.

#### 4.0 DISCUSSION & CONCLUSION

During recent times, scientific research in the universities is under pressure. The expectations are significantly high to bring quality, excellence, innovation and financial outcome. The expectations from scientific research in the universities enforced performance indicators as the criteria to measure university progress towards national goals [17,22] and specific contributions made for the benefit of university and nation ([2,23].

Earlier attempts to implement performance indicators in King Abdulaziz University partially succeeded. The reason was disparity between performance indicators and institutional strategic planning [1,21]. Such disparities are removed and modifications presented in this paper to implement KPIs in King Abdulaziz University in order to make it a model research university in the Middle East. The present proposal is different from earlier propositions mainly because our new approach is on the lines of current institutional strategic plan that emphasizes excellence in scientific research and education, innovation, “K” selected scientists and criteria of good governance. Although, it is a cumbersome process to implement KPIs but such evaluation models initiate and improve good scientific governance and best scientific practices. Implementation of the proposed KPIs model in the King Abdulaziz University will inspire the process of strategic planning and role of evaluators, thus bringing coherent relationship between KPIs and institutional strategic planning.

The performance indicators are reliable quantitative measures that define performance of research institutions [3]. The author’s proposal for the evaluation of scientific research chose KPIs on similar lines, which are logistical and relative. The authors have set benchmarks to help scientific research institution to compare itself with other institutions. The benchmarking is a continuous and ever evolving process [13] leading scientific research standards to elevate and KPIs to improve [4,12,26].

The institutional peer reviewing is highly expensive as indicated by *British Research Assessment Exercise* [29]. Therefore, the present authors proposed plan commends significant role of quantitative KPIs which are advantageous due to their wider limits and cost effectiveness [2,5,11,14,19,36,37].

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