

**Collaborative Authorship of Research Articles
Published in the Yemeni Journal of
Agricultural Research and Studies "YJARS" (1994-2013)**

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Abstract:

The study aimed to analyze find out the institutional affiliations of author contributing to the Yemeni Journal of Agricultural Research and Studies (YJARS) and investigate level of collaborative authorship of the journal published articles during 1994-2013 (a total of 27 issues with 381 articles). Simple descriptive statistics were utilized to analyze study data. Most publishesssd articles published in YJARS were contributed by researchers of the Agricultural Research and Extension Authority (AREA) (76%), mainly from its HQ and few Regional Agricultural Research Stations (RARs) and Specialized National Research Centers (SNRCs) of AREA (Hadhramout valley "Sieyun", Southern Coast "Elkod", Central Highlands "Dhamar" and the Food and Post-Harvest Center). The other eight AREA Branches contributed minimally (about one-fifth "25%"). Individual authorship dominated the early YJARS issues, but multiple-authored at later stage has rapidly grown year and discipline wise. The degree of collaborative authorship was generally low with few exceptions (examples: year 2007 and the food and post-harvest discipline). The study concluded with a number of suggestions and recommendations.

Keywords: Yemeni Journal of Agricultural Research and Studies (YJARS), Bibliometric Analysis, Degree of Collaboration, Collaborative Research, Authorship Patterns, Authorship Trend, Agricultural Researches, Yemen.

Introduction:

Beyond verbal communication and correspondence, the scientific periodicals provided a regular and authentic primary channel of communication between scientists. Since the first scientific journal appeared in the world in the year 1665, thousands of similar journals have been proliferated in parallel to the increasing number of scientific fields, research institutions and researchers.

Researchers involved in scientific research are also involved in information exchange activities including discussions that take place between two researchers under informal conditions and formal forms of scientific communication such as periodicals, reviews and books, book chapters and the like.

One of the major aims of scientific journals publishing is the enhancement of information exchange and cooperation among members of the scientific community. This has its root in the unique nature of the process of knowledge generation and utilization which transact with information as an input and output at the same time. Researchers and scientists, thus demand for certain information at early stage, and throughout the process, of their research work and produce their own information. Accordingly, the continuum of knowledge production and utilization necessitates a look at the scientific research work as incomplete unless its results are disseminated.

By virtue of accelerating development of science and knowledge accumulation, many concepts such as the cross-cutting scientific disciplines, compound or multifaceted research approaches and methodologies, and multi-disciplinary investigation teams as well as a diversified knowledge platforms have emerged and grown drastically over the past decades.

As a result, the phenomena of "collaborative authorship" (CA) of scientific research papers and journal articles has come into the forefront and gained an increasing importance in the scientific arena especially with the evolution of some fields of investigation such as bibliometrics, scientometrics, informatics and knowledge management especially with the increasing role of information and **communication technology (ICT) which resulted in a huge and quickly growing expansion of electronic journal publishing.**

A number of studies have tackled the issue of authorship collaboration of research journal articles in different fields such as library and information science (LIS), humanities, education, security, and medical sciences (Atallah & Ahmed, 2009), (Diab, Taftaf & Arabi, 2011), (Alfadhli, 1992), (alhamud, 2010), (Bustagi, 1997). But, it is notable that similar studies relating to bibliometric analysis of journals and scientific periodical articles in the field of agriculture and affiliated disciplines are comparatively rarely available. Example of studies relevant to agricultural journals and scientific articles are those of Farahat (2002) and Anwar (2006).

The Yemeni Journal of Agricultural Research and Studies (YJARS) is issued by the Yemeni national agricultural research agency named "the Agricultural Research and Extension Authority (AREA)" for the first time in 1994, as a refereed specialized journal concerned with agricultural and other related sciences (Alsharjabi, 2003).

However, the CA of the articles published in YJARS have never been investigated since its first issue appeared in 1994. This matter is intended to be the focus of this study to answer some of the relevant questions like: Did YJARS publish research articles contributed only by AREA researchers or others non-AREA scientific research staff of different institutional affiliations? Which of AREA branches (Regional Agricultural Research Stations "RARSs" and Specialized National Centers "SNRCs") contributed most, or least, to YJARS published articles? What is the proportion of single-authored to multiple-authored articles that have appeared in YJARS over the years and in different scientific fields of specialization? What is the level of CA average level that characterizes materials appearing in the YJARS? Does it vary between years and/or disciplines?

Objectives of the study:

The study aimed at analyzing some properties of the articles published in YJARS) during the period 1994-2013. More specifically, it is guided by the following goals:

1. Finding out the distribution of authors contributing articles appearing in published issues of YJARS according to their institutional affiliations (AREA and non-AREA authored articles).

2. Investigating the variation in YJARS articles contributions among different AREA branches (RARSs and SNRCs).
3. Analyzing the trend of authorship pattern (individual and joint) of the materials published in YJARS.
4. Determining the level of CA of the articles published in the YJARS in terms of publication years and disciplines.
5. Formulating suitable suggestions for YJARS future consideration and possible improvement.

Materials and Methods:

This study is confined to the analysis of the "YJARS" published by AREA for being the Yemeni national agency mandated the responsibility of: "planning, implementing and evaluating agricultural research throughout the country so as to solve the country's agriculture problems (both plants and animals)" (Muharam, Almutwakel, & Alsharjabi, 2005).

The analysis covered all issues of YJARS starting from its issue (no. 1) that appeared in 1994, up to the last issue (no. 27) appeared at the end of 2013. All these issues of the journal totaled (27 issues).

The study used a bibliometric approach to describe and analyze articles published in these issues (381 articles) which form the study sample and population as well.

The classification of published items in the YJARS was executed following the Food and Agriculture Organization (FAO)-Agricultural Research Information System (AGRIS) classification (17 specialized areas/fields). But, it was used with some modification to suit the Yemeni local conditions, where some agricultural fields or disciplines are either still limited or lacking.

The study has used a number of descriptive statistical methods such as frequencies, percentages, means, range etc., to analyze data collected on various bibliometric traits under consideration, and in a suitable and satisfactory manner in accordance to the nature, scope and objectives of the study.

For the purpose of determining Degree of Collaboration (DC) among researchers that is characterizing the study sample of published research articles appearing in the YJARS, the dimensions of time or year of publication and discipline were taken into consideration following Subramanyan (1983):

$$\text{The Degree of Collaboration } DC = \frac{Nm}{Nm + Ns}$$

Where:

Nm = number of multi-authored papers in a discipline

Ns = number of single-authored papers in the discipline

Results and Discussion

The study examined the characteristics of the articles published in the study sample in terms of the frequency of contribution made by authors of various agricultural research institutions (AREA and non-AREA) towards published articles, the trends of individual and joint or multiple authorship of published articles in YJARS and the variation in authorship collaboration across publishing year and disciplines.

A) Institutional Affiliations of authors contributing to YJARS:

With respect to authors' institutional affiliations, study results in table no. (1) show that most of the published articles in YJARS (76%) are contributed by authors from within the national agricultural research agency (AREA), while the remaining percentage (about one-fourth 24%) is contributed by non-AREA authors who are researchers and academicians affiliated with other agencies within country and abroad.

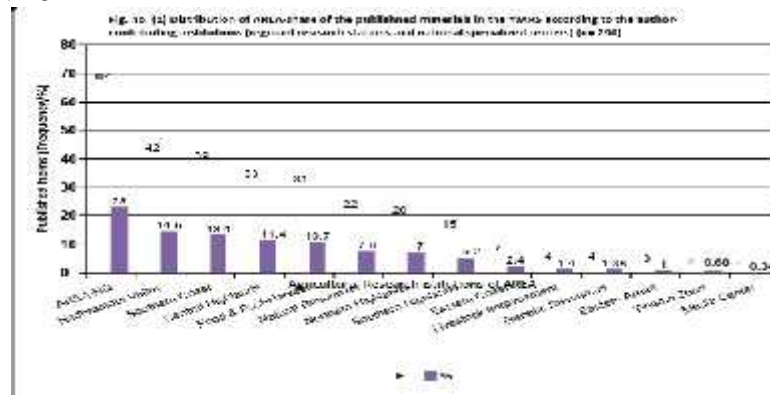
Similarly, results of the study depicted in fig. no. (1) display the distribution of articles published in the YJARS issues by different AREA branches (RARs and SNRCs) with which the contributing authors are affiliated. It indicate that almost all **13 AREAs' branches (the 8 RARs and 5 SNRCs)** have contributed to the authorship of the total share of AREA-authored research articles published in the YJARS, but at a varied percentages.

The overall average number of YJARS published articles is about 14 articles per issue while the average for AREA reached about 11 articles/issue. On the other hand, the average number of articles per year was found to be about 24 articles, but for AREA this average reached only 18 articles.

Table (1) AREA and Non-AREA authored research articles published in YJARS issues under investigation (N= 381)

Authored Articles by	Frequency	%
AREA Researchers	290	76
Non-AREA Researchers	91	24
Total	381	100.0

It is clear from the study data (Figure 1) that the largest AREA-share of published articles (23%) was originated by researcher-authors of AREA-HQ (located at Dhamar province), occupying thus the first rank.



- Total number of authored articles = 381 articles
- Total AREA contribution = 290 articles
- Average no. of articles/issue= 14.1 articles
- Average no. of AREA articles/issue= 10.7 articles
- Average no of articles/AREA branch = 20.7 articles
- Average articles/year = 23.8 articles
- Average AREA articles/year = 18.13 articles

This could be possibly justified and understood as most, if not all, national coordinators of research projects and networks, as well as some other specialized units/departments, are only positioned at AREA HQ with no equivalent at any of its RARSs and NSCs. This perhaps accrues to researchers stationed at AREA HQ the possibility to take the lead in publishing results of their research programs, projects and activities.

The RARSs and NSCs of Hadhramout Valley (Sieyun, Hadhramout Province), Southern Coastal Zone (Elkod, Abyan province), the Central Highlands (Dhamar Province), the Food and Post-Harvest center (Aden Province), and the Natural Resources Research (Dhamar Province), have ranked second, third, fourth and fifth respectively with percentages of 14.5%, 13.4%, 11.4% and 10.7% and 7.6% of the total AREA-authored articles published in YJARS during the whole period under study in that order.

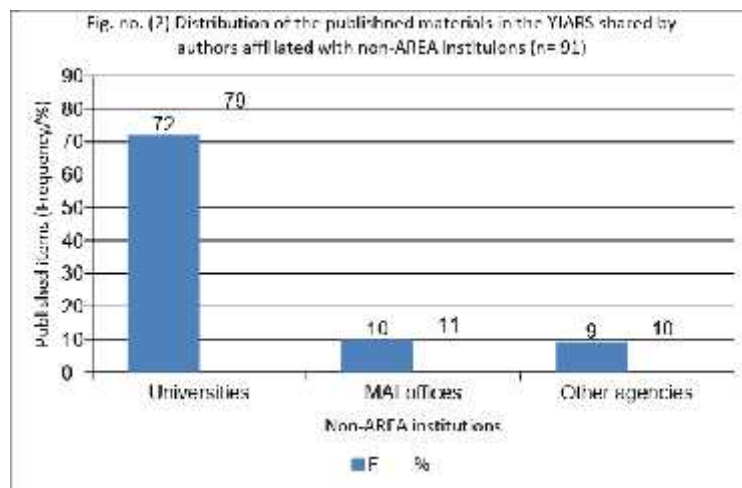
The average number of published articles in the YJARS per AREA branch scored about 21 articles (7.2%). Only 6 AREA branches realized above this average while the remaining 8 branches achieved lower averages than the mentioned overall AREA average.

The contribution of all the eight AREA branches (RARSs and NSCs) each constituted a lower percentage (of 7% and below). This portion has totaled about one-fifth (20%) of the overall AREA-share in the published articles that has appeared in the YJARS during the period under investigation (16 years). Among these branches with low published articles are some of the oldest RARSs (Northern and Southern highlands and Tihama research stations).

It is also possible that researchers working in such older AREA branches, could publish some of their research works somewhere else, in other local, Arab and international periodicals within Yemen and abroad as stated by some earlier investigations (ISNAR, 1994 & Mokbel, 2007).

However, this particular finding of low presence of some older AREA branches in their corporate journal (YJARS) indicates also the presence of great variation in scientific production of research personnel among various AREA branches. On the other hand, it should serve as an alarm for the journal editorial board, the researchers themselves and the research management to ascertain the bottlenecks and obstacles resulting in such imbalances and take necessary measures to remedy the situation.

For contributing authors belonging to non-AREA institutions, study results depicted in Figure 2 state that academicians from different Yemeni and Arab universities (Aden, Sana'a, Dhamar, Ibb, Aleppo, and Hadhramout) shared the largest portion of published articles in the YJARS (79%). The provincial offices of the Ministry of Agriculture and Irrigation (MIA) (in Hadhramout Coast and Valley, Sana'a, Dhamar, and Abyan) contributed authors of 11% of the articles published in all issues of YJARS under investigation.



The remaining percentage (10%) represents articles contributed by authors affiliated with a number of other local and regional agencies such as the Yemeni Supreme Council of Export Encouragement, the Syrian Lattakia Research Center, the Yemeni National Authority for Standards and Specifications and the like.

However, it should be mentioned that the YJARS multiple-authored published articles which accounted for about one-quarter of the total sample (23.9%) represented authors affiliated with different scientific, academic and development institutions within Yemen and from other countries such as India, Iraq, Germany, Egypt, and Syria.

This particular finding reveals that the YJARS provides a platform for scientific communication, information and knowledge exchange, and constitutes a joint link and

working cooperation mechanism among scientists, academicians and researchers from different concerned agencies within the country and abroad.

B) Individual and Multiple Authorship:

From the results shown in table no. (2), it is observed that the first stage following the YJARS foundation (1994-2001), the published materials in the journal are characterized by "individual authorship" trend with only limited percentage of multiple-authored articles.

However, in subsequent years the percentages of multiple-authors articles has notably increased as compared to "individually-authored" articles to the extent that it has surpassed the percentages of the "individual-authored" articles such as in the case of the years 2005-2009. Actually, the multiple-authored articles have doubled the number of single-authors items as was the case of the year 2007 (Table no. 2).

Table (2) The distribution of the YJARSs' published articles by year of publication and the nature of authorship (individual and multiple)

Publishing Year	Frequency of Authored articles				Total	
	Single		Joint			
	F	%	F	%	F	%
2004	25	6.6	13	3.4	38	10
2003	21	5.5	12	3.2	33	8.7
2005	15	3.9	16	4.2	31	8.1
2008	14	3.7	17	4.5	31	8.1
2011	11	2.9	19	5	30	7.9
2009	14	3.7	16	4.2	30	7.9
2012	16	4.2	12	3.2	28	7.3
2002	20	5.2	7	1.8	27	7.1
2007	9	2.4	18	4.7	27	7.1
2010	13	3.4	14	3.7	27	7.1
2001	16	4.2	7	1.8	23	6

2006	8	2.1	7	1.8	15	3.9
2013	7	1.8	6	1.6	13	3.4
1994	8	2.1	3	0.8	11	2.9
2000	4	1	5	1.3	9	2.4
1997	6	1.6	2	0.5	8	2.1
Total	207	54.3	174	45.7	381	100

However, despite the increase of multiple-author articles over years showed in this study, but its results are not totally in line with findings reported by Farahat (2002) and Anwar (2006) concerning the predominance of multiple authorship in the samples investigated in their studies (79% and 69% respectively) as compared to only 46% realized in this present study. This difference could be attributed to the relatively longer time span covered in the analysis of both studies which goes back to early and mid-1960s, while the YJARS is a relatively younger in age and a recent experience that could be traced to the issuance of its first issue in 1994 as explained earlier.

With regards to discipline-wise authorship collaboration, the analysis of individual and joint authorship materials (Table no. 3) revealed that there exists a significant variation between different disciplines few of which have surpassed individual authoring such as: "plant protection" and "food sciences and post-harvest". For other disciplines, individual authorship has clearly dominated over joint authorship. While still in some other disciplines, such as "horticultural crops" and "agricultural mechanization", co-authoring has equaled, or realized a close frequency to that achieved by joint authoring.

From the study results (Table no. 3), it is clear that individual authorship of articles published in YJARS has prevailed in some disciplines such as "socio-economics" and "soil and water", while the percentage of multiple authored articles was dominating in some fields such as "plant protection", "field crops", and "food sciences and post-harvest technologies". However, the percentage of multiple authoring was too low, particularly in some fields

which have initially realized limited shares of the overall published articles of the study YJARS sample such as: "plant physiology" and "climate and meteorology".

With respect to the prevailing single-authored articles in the field of socio-economics that has appeared in this study, such a particular finding does not get support from the study of Farahat (2002) who contrarily found co-authorship most common in the field of social sciences related to agricultural disciplines in his study. This could be attributed to the fact that socio-economic research, though more productive, are less in number among AREA research staff and are thinly dispersed in different AREA branches all over the country.

Table no. (3) Distribution of published articles by discipline and authorship (individual and multiple)

No.	Discipline(s)	Related articles authored				Total	
		Individual		Joint		F	%
		F	%	F	%		
1	Socio-Economics	53	13.9	22	5.8	75	19.7
2	Plant Protection	21	5.5	31	8.1	52	13.6
3	Field Crops	22	5.8	26	6.8	48	12.6
4	Horticultural crops	21	5.5	20	5.2	41	10.7
5	Livestock	22	5.8	18	4.7	40	10.5
6	Food Science and post-harvest	6	1.6	25	6.5	31	8.1
7	Soil and water	19	5	10	2.6	29	7.6
8	Unclassified/Unrated	10	2.6	4	1.1	14	3.7
9	Rangelands and forests	7	1.8	5	1.3	12	3.1
10	Natural resources	7	1.8	3	0.8	10	2.6
11	Agricultural mechanization	5	1.3	4	1.1	9	2.4
12	Plant Breeding	5	1.3	4	1.1	9	2.4
13	Plant Physiology & Bio-technologies	5	1.3	1	0.3	6	1.6
14	Climate and meteorological	4	1.1	1	0.3	5	1.3
	Total	207	54.3	174	45.7	381	100

The study results also reveal that authors of disciplines which showed both prevailing authorship (individual and multiple) are more actively involved in publishing research articles in YJARSs as these fields are the traditionally common ones for larger number of Yemeni research personnel as compared to other authors belonging to disciplines that are of rare nature and relatively recent ones at least under the Yemeni conditions and AREA in particular (like plant physiology, bio-technology, meteorology, mechanization and forestry).

C) Level of Collaborative Authorship by Years & Disciplines:

Although the study results presented in tables no. (2 & 3) provide a clear picture of the occurrence of individual vs. multiple authorship of the articles published in the YJARS, a further analysis was made on the study data, displayed in both tables, to measure the degree of collaborative authorship at both dimensions (years and disciplines), using the equation stated by Subramanyan (1983).

The results shown in table no. (4) indicate that the average value of the degree of "collaborative authorship" (DC) for the whole study duration (16 years) is 0.44 which is lower than the middle value of the DC scale being (1).

For the DC between researchers over the publishing years of YJARS articles, values have ranged between 0.21 – 0.66. It is notable that the value of this indicator was uneven and varied from one year to another. But, it is generally low though it has increased in some years and reached its peak in 2007 (0.66) scoring a little above the mean value (two-thirds).

However, it should be noted also that starting the years 2005 up to 2013, the whole period has witnessed higher DC value than that of the overall average except the year of 2012 which realized a lower AC value of 0.43 alongside with other six earlier years of the YJARS life span under study all of which have achieved lower than the overall DC average (1994, 1997, 2001, 2002, 2003 and 2004) (Table no. 4).

Table (4) The level of authorship cooperation (AC) between researchers in the articles published in YJARS studied sample according to year of publication

Publication's Year	AC	Rank	Publication's Year	AC
1994	0.27	1	2007	0.66
1997	0.25	2	2011	0.63
2000	0.55	3	2000	0.55
2001	0.21	4	2008	0.55
2002	0.25	5	2009	0.53
2003	0.36	6	2005	0.52
2004	0.34	7	2010	0.52
2005	0.52	8	2006	0.47
2006	0.47	9	2013	0.46
2007	0.66	10	2012	0.43
2008	0.55	11	2003	0.36
2009	0.53	12	2004	0.34
2010	0.52	13	1994	0.27
2011	0.63	14	1997	0.25
2012	0.43	15	2002	0.25
2013	0.46	16	2001	0.21
Total	0.44			0.44

In this respect, actually these above-mentioned years were considered the foundation years of the YJARS from which only the year of 2000 escaped with greater DC value.

Although it fluctuated from one year to another afterwards (starting 2005 onwards), DC values have never went back to a value lower than that of the overall DC mean value of 0.44.

However, the generally fluctuating DC values between about the average and below, and in spite of the clear increase of multiple-authorship realized over the years, such values do not reflect a good or satisfactory degree of scientific cooperation between agricultural researchers. This requires a certain interventions to foster this essential dimension of collaborative scientific publishing so as to raise its degree to the maximum extent possible for the benefit of researchers themselves, the scientific community and institutions for greater advancement of scientific research, technology development and the national development as a whole.

Joint research work and scientific collaboration leads naturally to better achievement of harmony, complementarity, channeling, and integration between the various disciplines of agricultural and relating scientific fields. It enhances the exchange of experiences, knowledge and skills among researchers within the research institution and across relevant institutions and the whole scientific and academic community within and outside the country as well.

To find out the level of DC between agricultural researchers working in different disciplines, the DC values were calculated using the same equation (Subramanyan, 1983). The study findings shown in table no. (5) state that the overall average DC value of various disciplines investigated was 0.41 and it ranged between two extreme values of 0.16 - 0.80.

The results shown in table (5) indicate that the highest DC index value (0.80) was achieved by the field of "Food Sciences and Post-Harvest Technology", while the lowest value (0.16) was realized by the disciplines of "plant physiology" with a bit higher value scored by the field of "climate and meteorology" (0.20).

The DC values of eight other disciplines were above the average value of 0.41 such as: "Range and Forests", "Farm mechanization", and "plant breeding". But, it was below that average value in other discipline such as: "soil and Water", "natural resources", "socio-economics" and some other disciplines covered by the YJARS study sample. Nonetheless,

several disciplines scored higher than the middle value of the DC scale of "0.5" such as: "Plant protection" and "field crops" (Table no. 5).

Table (5) The level of collaborative authorship between researchers in the articles published in the YJARS study sample according to disciplines

Agricultural Disciplines	Level of AC
Food & Postharvest	0.80
Plant Protection	0.59
Field crops	0.54
Horticultural Crops	0.49
Livestock	0.45
Plant Breeding	0.44
Farm mechanization	0.44
Range & Forestry	0.42
Soil and Water	0.34
Natural Resources	0.30
Socio-Economics	0.29
Unclassified	0.28
Metrology	0.20
Plant physiology	0.16
Total Discipline(s)	0.41

These results reflect the existence of good and satisfactory cooperative authorship between researchers working mainly in the field of "Food Science and post-harvest technologies", and a relatively above average DC among researchers working in the fields of

"plant protection" and "field crops". However, the actually realized DC values relating to all other disciplines were below average and represent a modest to weak DC.

Although, DC measures particularly the collaborative scientific authorship, but it also reflects the extent of general atmosphere, suitability and working relationship conducive to team work and working coordination mechanism prevailing among researchers within the specific specialized research unit, station or center as well as a certain multi-disciplinary research teams and programs.

Therefore, it is recommended to take advantage of these results in the context of any efforts aiming at improving or enhancing the performance of the institutional environment of scientific and technical administration of the various research stations and centers of AREA and other concerned partner-agencies.

Conclusions:

The YJARS published by AREA is dominated by materials largely authored by AREA research who variedly contribute according to the research stations and centers with which they are affiliated. Most of AREA contributions come from its staff authors of AREA-HQ, Hadhramout valley-Seiyun, Southern Coast-Elkod, the Central highlands stations and Food and Post-harvest, with only about one-fifth of AREA share contributed by the other eight AREA branches (RARSs and SNCs) or subsidiaries some of which have only realized a minimal percentage each.

The articles contributed by authors from Yemeni and Arab universities and other local and foreign agencies totaled about one-fourth (24%) of the total YJARS articles. It is a positive point that needs to be further enhanced for greater knowledge and experience exchange and higher level of cooperation and joint endeavors between scientists and affiliated agencies.

At beginning of its publication, the YJARS relied heavily on individual- authored articles with little multiple authored articles. But, in spite variation from one year to another, the frequency of joint-authored materials has increased at later years (2005-2013) and in some disciplines (Food and Post-harvest) as compared to others.

The DC values proved that most of multiple-authored articles have appeared in 2007 onward but with a generally low overall average at annual level as well as for the discipline-wise DC. The apparent exception was that of the "food and post-harvest" discipline which realized a comparatively high and outstanding DC index value (0.80) with only few other disciplines scoring values higher than the average. This reveals the importance of, and the needs for, focusing efforts in this respect to raise the value of this essential index for better future institutional, researchers and journal performance in this respect.

Recommendations and Suggestions:

Based on results of the study, a number of proposed recommendations and suggestions could be advanced as follows:

1. Developing and implementing a clear editorial policy for the publication of the YJARS to be adopted by its editorial board so as to cope with policies and strategies of agricultural scientific communication, research and the overall national agricultural and development strategy, including environmental, rural and economic development.
2. Undertaking necessary measures to encourage researchers to publish their scientific research findings in YJARS and other Yemeni, Arab and World recognized scientific journals alongside with scientific intellectual collaborative mechanisms in the context of agricultural research at the national, regional and international levels.
3. Plan and conduct in-depth studies to explore the causes and factors affecting the level of effectiveness and scientific and intellectual productivity of agricultural researchers/scientists as well as the major causes of the papers production disparity between research agencies, and the reasons for the high or low level of cooperation between researchers belonging to various agencies and disciplines towards developing visions of future direction.
4. Planning and undertaking a comprehensive study to determine the training needs of researchers in areas related to research report writing and preparation for publication, information processing, scientific publication guidelines, varied publishing styles, knowledge management and exchange through various media forms in Yemen and abroad, taking into

account the issue of foreign language. It is also of equal importance to develop appropriate programs to improve capabilities of researchers in English and other living languages, and to utilize the advantage of some available but unexploited opportunities and resources for the development of research and academic human capacity in this aspect .

5. Reviewing and improving YJARS publishing rules and regulations based on the experiences gained and lessons learned from the past period of journal issuance and the results of this study. It is possible a suitable time for reformulating its editorial policy and keeping up with the varied relevant circumstances and changing contexts.

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