

Original Research Article

<https://doi.org/10.20546/ijcmas.2018.710.102>

Perception of Scientists on Performance Indicators for Monitoring and Evaluation of Agricultural Research System of India

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ABSTRACT

Keywords

Faculties, Agricultural University, Quality

Article Info

Accepted:

10 September 2018

Available Online:

10 October 2018

Continuous Monitoring & Evaluation (M&E) of Agricultural Research System of India (ARSI) is done regularly. However, time to time the performance indicators for M&E of ARSI need to be revalidated and new indicators to be incorporated. Keep this in mind, this research programme was conducted. Based on the result, the indicators are faculty associated with the international collaboration in research, % of staff involved as principal researcher in external funded project, addressing the current research problem of farmers, MoU/ MoA and collaboration with the industries, international joint research publications, patent awarded to university, expenditure on research.

Introduction

The economic performance of the agricultural sector in the most of the countries has been largely determined by the organised research. State Agricultural Universities (SAUs) and Central Agricultural Universities (CAUs) of India have a mandate of doing research along with teaching and extension. The agricultural universities are greatly contributing for development of new technologies for the farming communities. However, the performance of Agricultural Research System largely depends on resource allocation and long-term goal planning, structure and

organization of research system, linkage between National Agricultural Research Systems (NARS) and policy-makers, external sources of knowledge and collaboration, programme formulation and programme budgeting, monitoring and evaluation, information management, development and management of physical resources, and; acquisition and management of financial resources *etc.* (ISNAR, 1987). According Ranjitha (1998) National Agricultural Research Systems (NARS) need changes in relation to human resource development, organization and management reforms, funding, basic and strategic research,

planning, monitoring and evaluation. Indian Council of Agricultural Research (ICAR)-Agricultural Universities (AUs) system comprising of sixty State Agricultural Universities, five Deemed to be Universities, three Central Agricultural University and four Central Universities with Agriculture Faculty. Faculties/scientists of these universities contribute in agricultural research of the NARS. However, the performance of these universities' research needs to be monitor regularly through the set of indicator. These are coined as 'Performance Indicators' for Monitoring and Evaluation of Agricultural Research System of India. Institutional and national quality models and performance indicators are considered vital components in raising the research standard (Marginson and Van der Wende 2007). Under this backdrop, this research work was undertaken with the objectives to identify and validate the Performance Indicators for Monitoring and Evaluation of Agricultural Research System of India.

Materials and Methods

Times Higher Education (THE), Academic Ranking of World Universities (ARWU), U-Multirank, Higher Education Evaluation and Accreditation Council of Taiwan (HEEACT), Australian Universities Ranking; National Institute Ranking Framework in India; ICAR Agricultural University Ranking etc. conduct ranking of universities based on set of performance indicators. For present study, indicators of aforesaid agencies were reviewed and exhaustive lists of performance indicators were made. Finally, through expert judgement the scale was developed. Five point Likert Scale was used for recording the response/perception of the respondents. For the study, data was collected from 250 faculties of twenty two agricultural universities across India. Among these respondents 126, 33 and 91 were Assistant

Professor, Associate Professor and University Professor respectively. The period of data collection was January to February, 2017.

Formula for selection of Indicators

Mean value for Assistant Professor response is symbolised as M_1

Mean value for Associate Professor response is symbolised as M_2

Mean value for Professor response is symbolised as M_3

Mean value for altogether response is symbolised as M_4

Criteria for selection of a specific indicator:

$M_1 = M_2 = M_3 = M_4 = 2$ or more (Criteria 1)

$M_1 = M_2 = M_3 = 2$ or more (Criteria 2)

$M_1 = M_2 = M_4 = 2$ or more (Criteria 3)

$M_2 = M_3 = M_4 = 2$ or more (Criteria 4)

If any of the listed 25 indicators (Table 5) satisfied any one of the aforesaid criteria, it was selected for the monitoring and evaluation of agricultural Education System of India in the study.

Results and Discussion

From the Table 1, it is noted that 50.40%, 36.40% and 13.20 % respondents were Assistant Professor, Professor and Associate Professor. It was also noted that altogether (Assistant Professor, Associate Professor and Professor), the respondents' mean experience is 17.372 years with SD 10.110 (Table 2).

The alpha coefficient for the 25 indicators (Table 3) is 0.925 (Assistant Professor), 0.949 (Associate Professor), 0.946 (Professor) and 0.936 (Altogether) respectively and suggesting that the items have relatively high internal

consistency (A reliability coefficient of 0.70 or higher is considered "acceptable" in most social science research situations).

Taking the experiences of the respondents as dependent variable and remaining 24

indicators as independent variables, regression analysis was conducted and it was noted that R Square was 0.668 which implied that altogether all those indicators explained 66.80 % variation in the model (Table 4).

Table.1 Distribution of respondents (teachers/scientists) as per their designation
n=250

Sl. No.	Designation	f	Per cent
1.	Assistant Professor	126	50.40
2.	Associate Professor	33	13.20
3.	Professor	91	36.40
	Total	250	100.00

Table.2 Distribution of the respondents according to their teaching and research experience
n=250

Sl. No.	Categories	Mean	SD
1.	Assistant Professor	10.992	7.866
2.	Associate Professor	18.121	7.139
3.	Professor	26.34	6.412
4.	Altogether (Asst.Prof + Assoc.Prof. + Prof.)	17.372	10.11

Table.3 Reliability statistics of the Scale

Sl. No.	Categories	Cronbach's alpha
1.	Assistant Professor	0.925
2.	Associate Professor	0.949
3.	Professor	0.946
4.	Altogether	0.936

Table.4 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.668	.447	.078	9.52935

Table.5 Indicators for monitoring and evaluation of Agricultural Research System of India

n=250

Sl. No.	Indicators (1)	Respondents categories with their Mean & SD								Remark on validation of Indicator (Selected/ Rejected) (10)
		Asst. Professor (A) (n ₁ =126)		Assoc. Professor (B) (n ₂ =33)		Professor (C) (n ₃ =91)		Altogether (A+B+C) (n ₄ =250)		
		Mean (M ₁) (2)	SD (3)	Mean(M ₂) (4)	SD (5)	Mean(M ₃) (6)	SD (7)	Mean(M ₄) (8)	SD (9)	
1	No. of faculty associated with the international collaboration in research	2.031	0.902	2.181	0.882	2.120	0.892	2.084	0.894	Selected
2	% of staff involved as principal researcher in external funded project	2.039	0.741	2.333	0.816	2.109	0.721	2.104	0.747	Selected
3	Speed of university departments' response to current research problem of farmers	2.333	0.715	2.531	0.717	2.450	0.719	2.401	0.717	Selected
4	No. of multi-departmental external funded Project running	2.127	0.779	2.281	0.851	2.153	0.815	2.156	.800	Selected
5	Recognition in the scientific community of the work produced by university departments	2.232	0.773	2.354	0.797	2.263	0.800	2.259	0.784	Selected
6	Number of active national/ international MoU/ MoA and collaboration with the industries	2.056	0.826	2.156	0.846	2.076	0.833	2.076	0.828	Selected
7	Number of international joint research publications	1.896	0.901	2.000	0.915	2.111	0.953	2.085	0.924	Selected
8	Number of international research project received	1.824	0.942	2.069	0.918	2.011	0.965	2.011	0.948	Selected
9	Number of postdoctoral positions	1.722	0.926	1.939	0.933	1.681	0.880	1.736	0.910	Rejected
10	Research Excellence (No. of research articles in high impact journals (NAAS rating of over 7.0 in 5 years)	2.112	0.881	2.242	0.791	2.285	0.792	2.192	0.833	Selected
11	Research Impact (No. of papers cited 20 times or more each in last 5 years)	2.121	0.822	2.093	0.683	2.269	0.779	2.171	0.791	Selected
12	Research Journal Published by institute	1.888	0.863	1.969	0.809	1.835	0.859	1.879	0.852	Rejected
13	Research database in university website	2.016	0.775	2.181	0.768	2.000	0.930	2.032	0.833	Selected
14	Availability of PME (Prioritization, Monitoring & Evaluation) cell in the university	1.991	0.811	2.093	0.928	2.022	0.820	2.016	0.827	Selected
15	Number of edited or co-authored books published by the faculty of the institute	2.032	0.717	2.090	0.630	2.088	0.713	2.060	0.703	Selected
16	Number of articles published in peer-reviewed journals	2.280	0.616	2.303	0.769	2.362	0.691	2.313	0.664	Selected
17	Number of monographs published by well-regarded publishing houses	1.774	0.872	1.937	0.715	2.000	0.738	1.877	0.810	Rejected
18	Number of international awards and prizes won for research work	2.137	0.875	2.000	0.901	2.175	0.914	2.133	0.854	Selected
19	Research Excellence (Varieties released, Breeder Seed demand thereof, Area Covered, products developed, traits identified and its economic impact, breed developed, technologies developed)	2.371	0.770	2.437	0.800	2.670	0.558	2.489	0.714	Selected
20	Patent awarded to university	2.161	0.849	2.125	1.039	2.263	0.814	2.194	0.861	Selected
21	Total number of patents pending	1.758	0.925	1.781	1.069	1.988	0.915	1.837	0.925	Rejected
22	Research fund received from national and international institution	2.219	0.741	2.312	0.780	2.230	0.731	2.235	0.740	Selected
23	Proportion of funds (for example, royalties) received by university departments through licence fees for intellectual property	1.788	0.831	1.806	0.980	1.955	0.923	1.852	0.885	Rejected
24	Proportion of university department funds derived from research contracts with companies	1.804	0.846	1.727	0.910	1.934	0.840	1.842	0.852	Rejected
25	Expenditure on research	2.264	0.716	2.354	0.797	2.297	0.740	2.288	0.733	Selected

On the basis of aforesaid formula as stated in methodology (i.e. $M_1 = M_2 = M_3 = M_4 = 2$ or more; $M_1 = M_2 = M_3 = 2$ or more; $M_1 = M_2 = M_4 = 2$ or more and $M_2 = M_3 = M_4 = 2$ or more) nineteen performance indicators were validated out of twenty five as mentioned in column number 10 of Table 5 as per the response received from the scientists/faculties. In brief the indicators were faculty associated with the international collaboration in research, per cent of staff involved as principal researcher in external funded project, addressing the current research problem of farmers, recognition in the scientific community of the work produced by university departments, MoU/MoA and collaboration with the industries, international joint research publications, international research project received, research articles in high impact journals, research impact, research database in university website, number of international awards and prizes won for research work, patent awarded to university, expenditure on research and others as shown in Table 5.

Agricultural Research System of India should be considered under global perspective and its

quality should be maintained. For this quality maintaining, a set of performance indicator is identified. These performance indicators will help universities, government or other independent agencies to continuous monitoring of agricultural research of agricultural universities, institutions of ICAR and other agricultural research institutions and organisations.

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How to cite this article:

Chandan Kumar Panda, Arun Kumar, Vishal Tripathi and Siya Ram Singh. 2018. Perception of Scientists on Performance Indicators for Monitoring and Evaluation of Agricultural Research System of India. *Int.J.Curr.Microbiol.App.Sci*. 7(10): 925-929.
doi: <https://doi.org/10.20546/ijcmas.2018.710.102>