An Investigation into the Factors Influencing Research Productivity of Business Faculty

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Abstract

The purpose of this paper was to identify factors influencing research productivity of faculty working at higher education institutions. Exploratory Factor Analysis was used to validate the model and also to explore the relationships among variables. Using principal component analysis, 33 independent variables were identified into eight factors which significantly affect the research output of faculty members. These factors, in the order of influence, include Knowledge, Institutional support, Collaboration, Motivation, Recognition, Workload, Research assistance and Exposure. The identified factors may be harnessed to come up with policy interventions to increase research output of higher education institutions and their faculty members.

Introduction

In today's world, research is no longer a choice for faculty but it has become a matter of survival. Therefore, institutions are now focusing on promoting the research productivity of their faculty. Ever increasing number of higher education institutions (HEIs) recruit highly research-oriented faculty and require current faculty to be more productive in research to improve their credibility and popularity in order to gain a competitive advantage. Good quality research not only attracts external funding from government, industry and other private entities that can cover both direct and indirect costs, but also acts as a means of establishing public reputation (Meisinger et al., 1975; Bland et al., 2005).

In recent years, the focus of Indian higher education institutions (HEIs) has shifted towards becoming a hub of knowledge creation and dissemination (Patel, 2009). The Government of India, recognising importance of research and innovation in transforming the nation in to a knowledge-based economy, is encouraging HEIs to conduct world class research (Paliwal & Beukes, 2011). Renowned foreign Universities have been invited to open their education and research centres in India to work with Indian HEIs for joint research (Nanda, 2014). Despite these efforts, HEIs in India have not yet met the expected global standards in

research. For instance, the premier educational and research institutions still do not make to the list of top 200 higher education institutions in research ranking (Scimago, n.d.). The second largest populous country with 17.7% of world population and largest number of higher education institutions (Statista, n.d.) accounted for a mere 5.31% of scientific publications in peer reviewed journals in 2018 (World Bank, n.d.). The number of patent applications filed during 2019 in India were 19454 compared to 285113 applications filed in the United States of America and 1243568 applications filed in the China (World Bank, n.d.). Such comparative poor performance of Indian higher education and research institutions raises a concern regarding the poor research productivity and the factors influencing it, thus, making it a perfect case for investigation.

It is necessary to understand both individual factors (Saini and Chaudhary, 2020) and institutional factors that contribute to productivity in higher education institutions in order to promote research productivity among faculty members (Delello et al., 2018). Therefore, the aim of this research is to study which variables have an impact on the research productivity of HEIs and their faculty members in India. The study aims to contribute to policy and decision-making in HEIs that want to improve the effectiveness of their faculty members in research. The research findings, i.e.; the factors influencing research output, shall be helpful in improving the research productivity.

Literature Review

The effectiveness of HEIs is measured on the basis of research productivity of the institutions specially publications (Ramsden, 1994), as quality research enhances quality of teaching and learning (Chakraborty and Biswas, 2020; Vialle et al., 2006). Since, faculty research is frequently used as an indicator of overall institutional reputation and policymakers are actively seeking ways to enhance and promote the research output of faculty members in HEIs, understanding the variables linked with the productivity of research is critical. Some common measures used to quantify the research productivity are number of publications which includes the number of articles published in well-known referred and reputed

journals and research grants received from both the government and non-government sources.

Research ambience and research productivity

A good research culture builds a good research ambience where creativity and innovations thrive. Research culture which comprises a set of values, ideas and behaviour (Muhajir,2013), enhances image of the HEI, improves the quality of teaching, and also attracts research sponsors for university and individual level research projects (Umeano-Enemuoh et al., 2014). Building research culture requires commitment both at individual level and at institutional level (Hill, 2002). Focus on institutional level such as providing research facilities and institutional support, sharing of expertise and knowledge and commitment at the top level facilitates research. Research productivity, which may be defined as 'research results' (Wills et al., 2011) or publications such as journal articles or patents (Creswell, 1985), citations and peer ratings (Folger et al., 1970; Hedjazi and Behravan, 2011) are influenced by the leadership characteristics of the institution, institutional characteristics and individual characteristics of researchers (Gaus, et al., 2021; Bland et al., 2005). Number of papers published in a reputed peer-reviewed journal is a well-known and widely used indicator for measuring the research productivity and enhancing the image and reputation of an institution. These indicators also play a crucial role in achieving higher rankings (Drnevich et al., 2011) and listings of universities by various national and international agencies.

Factors influencing research productivity

Individual factors

Individual characteristics influencing research productivity include (i)demographic factors such as age, gender, salary, academic rank, marital status, years of experience, educational background etc. and (ii) psychological factors such as self-efficacy, socioeconomic status, achievement and recognition needs etc. (Alghanim and Alhamali, 2011). In the literature one of the most important individual factors influencing the research productivity is academic rank of the faculty (Long, 1978; Dundar and Lewis, 1991; Lee and Bozeman, 2005; White et al., 2012). Productive researchers

have been found to be of higher rank who are promoted due to their research performance (White et al., 2012). Various researchers such as Dundar and Lewis (1998), Bland et al. (2005) and Hedjazi and Behravan (2011) in their studies reported that the rank of faculty member is positively and significantly associated with their research productivity. Self-efficacy also influences research productivity of faculty members (Blackburn et al., 1991; Bailey, 1999; Quimbo and Sulabo, 2014) as individuals with high self-efficacy perceive obstacles and problems as challenges and are highly committed to the activities and think strategically to solve a problem.

Previous researchers have found mixed results on gender and its association with the research productivity of the faculty. Few researchers reported that men publish twice as much compared to women (Kessler et al., 2014) may be due to greater parenting and marital responsibilities of the latter (Kyvik and Teigen, 1996; Xie and Shauman, 1998; Prpic, 2002). While, Garg and Kumar (2014) found that women researchers prefer to publish more in domestic journals authors such as Bland et al. (2005), Burke and James (2005); Hedjazi and Behravan (2011) found that gender have no significant impact on the research productivity of faculty members. Age is also regarded as a factor which significantly influences the research productivity of faculty (Singh, 2020; Hedjazi and Behravan, 2011). Horner (1986) found that the productivity is lower in the 20s and is at peak during 40s then it declines. On the other hand researchers such as Levin and Stephan (1989) and Bland et al. (2005) found that age have no impact on the research productivity of faculty member. Bland et al. (2005) reported that the type of appointment has a significant impact on the research productivity, as tenure track faculty are more productive. Whereas, Hedjazi and Behravan (2011) argue that the type of appointment was not significant predictor of the research productivity of faculty members. Experience has been considered as one of the most important factors which greatly influences the productivity of faculty member (Hedjazi and Behravan, 2011, Jung, 2012).

Institutional factors

Institutional factors such as size of the institution /department, availability /allocation of funds for research,

administrative support, availability of database and computing facilities, clarity of research direction, reward and counselling system, networking opportunities etc. significantly influence the research performance of the faculty members in an HEI (Alghanim and Alhamali, 2011; Hedjazi and Behravan, 2011; Delello et al., 2018). Favourable working environment and availability of necessary resources are found to have a positive impact on the research performance of faculty (Crewe, 1988; Dundar and Lewis, 1998). Impact of Department size has been examined with research performance by various researchers, however, the results are contradicting as some studies found a positive correlation between department size and research performance (Dundar and Lewis, 1998; Kyvik, 1995; Jordan et al., 1988) while others found it to be negative (Cohen, 1991; Blackburn et al., 1978). Large department size facilitates intra department collaboration and intellectual synergies to a large extent as there may be faculty with similar research interest as compared to a smaller department. Also, large department attract faculty with high reputation who may elevate the research standard to which their colleagues must relate.

Similarly, the link between work load and research productivity is found to have mixed relationship. Some researchers documented a negatively relationship with the research performance (Fox, 1992; Toutkoushian and Bellas, 1999; Porter and Umbach, 2001), while, others found no relationship between research and teaching time (Braxton, 1996, Hattie and Marsh, 1996). Collaboration is also identified as one of the significant factors which influences the research productivity of faculty members (Rey-Rocha et al., 2002; Katz and Martin, 1997) as consolidated teams of researchers with openness and good collegial traits are more productive. Availability of doctoral student also has an impact on the research productivity indirectly (White et al., 2012) as these students usually help in literature review or preparing the first draft of the research papers under their guidance which frees up the time for engaging in research. Appointment of research assistants and administrative support was also found to be positively influencing the research productivity (Dundar and Lewis, 1998).

Method, Data, and Analysis

This research was conducted among faculty members working at Indian higher education institutions, especially business school to identify factors which influence their research productivity. The sample for this study consisted of faculty members of the top 50 business schools ranked by the National Institutional Ranking Framework (NIRF). The primary data is collected through a questionnaire administered through e-mail. Prior to the variable selection process, a comprehensive literature review was done for framing constructs, through which a comprehensive list of 33 items were identified as shown in Table 1. First phase of the survey was a pilot study followed by the second phase of data collection.

The survey participants were asked to share data about their publication and research projects during last five years i.e. from 2014 to 2019 and identify factors or contributors influencing their research productivity. The questions were based on the variables identified with the help of literature review. Responses regarding influences and significance of variables on research productivity were recorded on a seven-point Likert type scale. To understand the key elements of all independent variables which influences the research productivity of the respondents, Exploratory factor analysis (EFA) was conducted using SPSS statistical software. EFA was conducted as per guidelines given by Hair et al. (2009). This approach allowed us to explore several variables with latent variables to validate the model and also to explore the relationships between variables. Using principal component analysis, 33 independent variables (possible influences) were studied to identify the variables that significantly affect the research output of business faculty.

Research Objective

Majority of the existing research on this topic has been in developed nations; hence, little is known about the factors influencing research productivity of business school faculty in developing countries such as India. Thus, the objective of this study is to identify factors affecting research productivity of business school faculty members in India.

Result and Discussion

Demographic profile of respondents

Out of 164 respondents, 29.3 per cent were female, 70.1 per cent were male and 0.6 per cent were other gender. Maximum respondents (37.2%) were between the age group of 40 to 49 years, followed by 30 to 39 years (26.8%), and 50 to 59 years (26.2%). While the rest were either below 30 years of age (2.4%) or above 60 years of age (7.3%). In our sample most of the respondents were of Assistant professor rank (42.7 per cent) followed by Professor (32.9 per cent), Associate professor (22 per cent), and only 2.4 per cent of the respondents were of Lecturer and Senior Lecturer Rank who responded as Rank "Others". 88.4 per cent of respondents were Regular/Tenured faculty members and 11.6 per cent were employed as contractual faculty members. Interestingly most of respondents (36%) were having up to 10 years of experience followed 32.3 percent having experience of 11 to 20 years and 31.7 per cent with experience of more than 20 years. 93.9 per cent respondents hold doctorate degree. Descriptive statistics such as mean and standard deviations of all the 33 variables used in the study are presented in Table 1.

Table 1: Descriptive Statistics of variables

Variables influencing research productivity (n=164)	Mean	Std. Deviation
Obtaining various awards	3.19	1.949
Change in tenure/Professional status/Promotion	4.39	2.089
Peer recognition	4.61	1.914
Improving social status and social recognition	4.23	1.999
National or International Conference	4.13	1.713

Variables influencing research productivity (n=164)	Mean	Std. Deviation
Personal satisfaction/enjoyment	5.86	1.679
Process of enquiry and curiosity	5.50	1.739
Development and improvement of research skill and knowledge	5.66	1.595
Enhancement of teaching quality	5.41	1.510
Stay updated in the field	5.74	1.456
Contribution to the society	5.49	1.599
Heavy teaching load	3.63	2.297
More admin responsibilities	3.63	2.450
Adequate library resources	5.33	1.636
Competitive salary	4.79	1.778
Funding for research/conferences	5.43	1.734
Access to research databases	5.74	1.589
Computing and data analysis facilities	5.57	1.654
Work-Life balance	5.26	1.619
Ranking of Institute/University	4.93	1.835
Interaction with colleagues to find research ideas	4.99	1.734
Advice and support from research active experienced colleagues	5.02	1.757
Peer review of research work by colleagues	4.84	1.676
Collaboration with colleagues to do research	5.32	1.705
Interaction with academics from Foreign Universities	5.12	1.855
Supervising Doctoral students	5.11	2.015
Supervising Master's students	4.34	1.811
Time management skill	5.22	1.559
Majority of colleagues are committed to research	4.20	1.873
Faculty are supportive in helping others to do research	4.07	1.841
Recognition regardless of faculty's age, rank, and title	4.44	1.841
The Institute/Department Head acts as a research facilitator	4.34	2.111
Collaborative programmes are to improve research productivity	5.23	1.557

Source: Authors calculation

KMO and Bartlett's Test and Communalities

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO measure) is 0.842, which proves that sample is adequate for further factor analysis. Bartlett's Test of Sphericity yields a value for chi squared statistic of 3384.750 with p value of 0.00, which justifies suitability of data for factor analysis. The values of communality for all the items are more than 50 per cent indicating that each variable fits with factor solution.

Total Variance Explained

For extracting factors, varimax rotation method was used to compute Eigenvalues for selecting the number of factors (Hair et al., 2009). As given in Table 2, eight (8) factors, consisting of 33 variables, were extracted having Eigenvalue of more than 1. Total variance explained by these eight factors is 70.594 per cent.

Table 2: Total Variance Explained

Item	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.498	28.781	28.781	9.498	28.781	28.781	4.668	14.147	14.147
2	3.534	10.710	39.490	3.534	10.710	39.490	4.334	13.134	27.280
3	2.822	8.550	48.040	2.822	8.550	48.040	3.243	9.826	37.106
4	2.079	6.301	54.342	2.079	6.301	54.342	3.044	9.223	46.329
5	1.893	5.737	60.078	1.893	5.737	60.078	2.897	8.779	55.108
6	1.300	3.938	64.017	1.300	3.938	64.017	2.011	6.093	61.201
7	1.124	3.407	67.423	1.124	3.407	67.423	1.626	4.926	66.127
8	1.046	3.171	70.594	1.046	3.171	70.594	1.474	4.467	70.594
9	.911	2.759	73.353						
10	.855	2.592	75.945						
11	.715	2.166	78.111						
12	.701	2.125	80.236						
13	.651	1.972	82.209						
14	.580	1.757	83.965						
15	.565	1.711	85.676						
16	.487	1.477	87.153						
17	.467	1.416	88.569						
18	.404	1.223	89.792						
19	.377	1.142	90.934						
20	.352	1.066	92.000						
21	.340	1.031	93.031						
22	.323	.979	94.009						
23	.312	.946	94.955						
24	.257	.780	95.735						
25	.237	.719	96.454						
26	.207	.628	97.082						
27	.188	.571	97.654						
28	.161	.489	98.143						
29	.155	.471	98.614						
30	.145	.439	99.053						
31	.120	.365	99.418						
32	.106	.322	99.740						
33	.086	.260	100.000						

Source: Authors' calculation

Rotated Component Matrix

Table 3 presents the rotated component matrix which is also referred as the factor loading table. From rotated component matrix, it is evident that the first factor has 6 variables with a factor loading of more than 0.5, second factor has 7 variables with a factor loading of more than 0.5, third factor has 4 variables with a factor loading of more than 0.5, fourth factor has 4 variables with a factor loading of more than 0.5, fifth factor has 5 variables with a factor

loading of more than 0.5, sixth factor has 2 variables with a factor loading of more than 0.5, seventh factor has 2 variables with a factor loading of more than 0.5 and eighth factor has 2 variables with a factor loading of more than 0.5 and 1 with more than 0.4. A collection of total thirty-three variables have been clubbed into eight factors on the basis of their inter-item correlation. Among the eight factors two of them i.e. factor 1 and factor 4 include a set of individual variables and other six factor include a set of institutional variables.

Table 3: Rotated Component Matrix

Variables influencing research productivity	Factor loading							
	Factors							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Stay updated in the field	.859							
Development and improvement of research skill and knowledge	.835							
Personal satisfaction/enjoyment	.828							
Enjoy the process of enquiry and curiosity	.815							
Contribute to the society	.774							
Enhancement of teaching quality	.773							
Access to research databases		.834						
Adequate library resources		.831						
Computing and data analysis facilities		.821						
Funding for research/conferences		.690						
Competitive salary		.642						
Work-Life balance		.610						
Time Management skill		.503						
Advice and support from research active experienced colleagues			.813					
Interaction with colleagues to find research ideas.			.796					
Peer review of research work by colleagues			.783					
Collaboration with colleagues to do research			.711					
Faculty are supportive in helping others to do research				.849				
Recognition regardless of faculty's age, rank, and title				.840				
Majority of colleagues are committed to research				.806				
The Institute/Department Head acts as a research facilitator				.783				
Peer recognition					.746			
Improving social status and social recognition					.726			
Change in tenure/Professional status/Promotion					.710			
Obtaining various awards					.650			
National or International Conference					.604			
Heavy teaching load						.932		
More admin responsibilities						.924		
Supervising Doctoral students							.682	
Supervising Master's students							.679	
collaborative programmes by institute improve research productivity								.785
Ranking of Institute/University								.540
Interaction with academics from Foreign Universities								.419

Source: Authors' calculation

The exploratory factor analysis identified eight factors (Table 4) to be influential. These factors, emerging from the rotated component matrix, were suitably named based on the items belonging to the identified factors. Factor 1 (Knowledge) comprised six items having factor loadings between 0.859 to 0.773. Factor 2 (Institutional support) comprised seven items having factor loadings between 0.834 to 0.503. Factor 3 (Collaboration) consisted of three items having factor loadings between 0.813 to 0.711. Factor 4 (Motivation) comprised four items with factor loadings ranging from 0.843 to 0.783. Factor 5 (Recognition) consisted of two items having factor loadings between 0.746 to 0.604. Factor 6 (Workload) comprised two items having factor loadings ranging from 0.932 to 0.924. Factor 7 (Research assistance) comprised two items having factor loadings between 0.682 to 0.679. Factor 8 (Exposure) comprised two items with factor loadings ranging from 0.785 to 0.419.

Table 4. Summary of findings (Factors with corresponding variables)

Factor1: Knowledge (14.147%)*	Factor 2: Institutional support (13.134%)*	Factor 3: Collaboration (9.826%)*	Factor 4: Motivation (9.223%)*	Factor 5: Recognition (8.779%)*	Factor 6: Workload (6.093%)*	Factor 7: Research assistance (4.926%)*	Factor 8: Exposure (4.467%)*
Stay updated in the field	Access to research databases	Advice and support from research active experienced colleagues	Faculty are supportive in helping others to do research	Peer recognition	Heavy teaching load	Supervising Doctoral students	collaborative programmes by institute
Development and improvement of research skill and knowledge	Adequate library resources	Interaction with colleagues to find research ideas	Recognition regardless of faculty's age, rank, and title	Improving social status and social recognition	More admin responsibilities	Supervising Master's students	Ranking of Institute/University
Personal satisfaction and enjoyment	Computing and data analysis facilities	Peer review of research work by colleagues	Majority of colleagues' are committed to research	Change in tenure/Professional status/Promotion			Interaction with academics from Foreign Universities
Process of enquiry and curiosity	Funding for research/conferences	Collaboration with colleagues to do research	The Institute/Department Head acts as a research facilitator	Obtaining various awards			
Contribution to the society	Competitive salary			National or International Conference			
Enhancement of teaching quality	Work-Life balance						
	Time Management skill						

* *Variance Explained*
Source: Authors' calculation

The factor 'Knowledge' has a variance explained of 14.147%. Past studies have reported that research enhances teaching by introducing new subjects and methodologies, by developing the findings of one's own study, teaching topics can be clarified, revised and improved (Lertputtarak, 2008). The objective of any research is to improve the old or produce new knowledge in the field. The faculty members are motivated to conduct research if they themselves want to be updated on new developments in the field as the knowledge gained through research is based on experience. Hence the knowledge of faculty and their quest for new knowledge, will certainly contribute in improving the research productivity.

Second factor 'Institutional Support' has a variance explained of 13.134%. This factor includes items like access to databases, library resources, computing and data analysis facilities, funding competitive salary, work-life balance and time management skills. Our findings are similar to that of Rafi et al. (2019), who reported that availability of resources is significantly associated with improved research productivity. In order to carry out any research, substantial financial and technological resources are needed and the availability of these resources with the institution plays a critical role in increasing the research productivity. Thus, the research productivity of faculty member is directly related with the level of support they get from the institution.

Another factor identified through EFA is 'Collaboration' which has a variance explained of 9.826%. This factor includes items like advice and support from research active experienced colleagues, interaction with colleagues to find research ideas, peer review of research work by colleagues and collaboration with colleagues to do research. In literature, it has been argued that colleagues can act as a source of idea generation for research and also criticism, which act as a form of motivation in enhancing the research productivity (Blackburn and Lawrence, 1995). Collaboration helps in overcoming the gaps in the competencies among the researchers and helps perceiving the research problem from the multiple angles which results into an effective solution to the problem at hand and ultimately leads to quality publications. Fourth factor 'Motivation' which has a variance explained of 9.223%, includes items like collegial support, recognition, number of research active staff and role of academic leaders as a research facilitator. Our conclusion is similar to the findings of Jones and Preusz (1993) that motivation from within and from peers and superiors also influences the research productivity.

Fifth factor 'Recognition' (variance explained of 8.779%), includes items like peer recognition, improving social status and social recognition, change in tenure/professional status/promotion, obtaining various awards and national or international conference. This findings similar to Im and Hartman (1997) who also reported rewards such as pay rise, tenure and promotion to enhance the research productivity of the faculty members. Sixth factor 'Workload' which has a variance explained of 6.093%, includes variables like heavy teaching load and more admin responsibilities. Butler and Cantrell (1989) also documented that the faculty members emphasise on reduction of teaching load as a reward for enhanced research productivity. A researcher has to strike a fine balance between work and life and also among the work time spent in research, teaching, administrative and other responsibilities. Seventh factor 'Research Assistance' (variance explained of 4.926%) includes items like supervising doctoral and master's students. Dundar and Lewis (1998) also identified that supervising PhD and master's students is correlated with research productivity as it leads to reduction of work load by sharing the responsibilities with them. The eighth factor 'Exposure' has a variance explained of 4.467%. This factor includes items like collaborative programmes by institute, Ranking of Institute/University and Interaction with academics from Foreign Universities. All these variables are found to have some predictive powers regarding research productivity. Lee and Bozeman (2005) in their study identified that the collaboration and interaction influences the research productivity significantly. The degree of exposure that a faculty member receives from other countries and institutions in the form of collaboration and interaction also affects the research productivity as such interactions lead to the creation of a global research network and the generation of new ideas.

Conclusion and Suggestion

Using Exploratory Factor Analysis (EFA) eight major factors which influence the research productivity were identified. These factors, in the order of influence, include Knowledge, Institutional support,Collaboration, Motivation, Recognition, Workload, Research assistance and Exposure. The HEIs aiming to improve research productivity of their faculty members and thus improve institutional ranking and image shall focus on proving support to their faculty members in respect of the eight identified factors. Factors such as institutional support especially computing and data analysis facilities; increased opportunities for collaborative research; motivation including collegial support and research facilitation by academic leaders; peer recognition; research assistance especially that by doctoral students and exposure are perceived by the survey respondents to be of significance in improving research productivity. Hence, the onus is on the academic leadership and regulators to ensure that the identified factors are strategically used to improve the research productivity. One of the limitations of the present study is that it covers respondents from business schools from India only. Future researchers can conduct a study by including respondents from other disciplines and jurisdictions to contrast the results across disciplines and nations.

This study identified factors that have an impact on the research productivity of faculty members, which may be used to come up with appropriate strategies to enhance research productivity. A framework putting these factors in perspective shall be useful in creating an enabling environment for fostering research among Indian HEIs and their faculty members. Institutional requirement to use more research-based pedagogy in teaching, providing support in terms of computational facilities and research assistance by doctoral students, continuous motivation and recognition by peers and supervisors and appropriate collaborative opportunities shall definitely prove effective in improving research productivity. Though the findings are based on respondents from Indian business schools, the finding shall be equally important for other developing countries which struggle with low research productivity of their HEIs.

Acknowledgement

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