Social Networking and Gender-Homophily in Article Publications: A Tale of Two Indian Institutes of Management (IIMs)

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ABSTRACT

The social networking in the context of article publications is always fascinating. This study analysed the dimensions of social capital in co-authorships. The aims of this study include: (a) to present an overview of article publications in terms of social networking (bonding and bridging), gender-homophily (b) to study and analyse variance in gender homophily in social networking in article publications at the Indian Institute of Management, Ahmedabad (IIMA) and the Indian Institute of Management, Bangalore (IIMB) spanning 2010-11 to 2019-20. Adopting a longitudinal study, the data set included 1562 productive units from IIMA and 923 productive units from IIMB. In terms of social networking, the overall trend was Bridging (International) > Bridging (National) > Bonding. However, the pattern differed among the IIMs and between genders. Bonding was higher at IIMA (25.02%), compared to IIMB (20.87%). Gender-wise, female faculty bonded more than the male faculty at both the IIM's. In terms of bridging, across genders, collaborations with international partners were higher than with national partners at both IIMA and IIM B. The gender-homophily was higher at IIMA (72.86%) compared to IIMB (68.76%). Gender-wise, while female faculty had higher collaborations with opposite gender at both the IIMs, a reverse trend was seen among male faculty, who collaborated more within the same gender. Overall the gender homophily also differed among Bonding, Bridging (National) and Bridging (International) at the two IIMs. This study puts in focus the bonding and bridging social capital and the need for its nurturing for effective knowledge recombination and for enriching the learning experiences of the researchers.

Keywords: Social Capital, Bonding, Bridging, Business Schools, Social Networking, IIM.

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INTRODUCTION

The communication of research findings in the form of research articles is one of the fundamental social processes of research. The social networking in the context of article publications and the how and why of research collaborations is always fascinating. Previous studies on research productivity of the Indian Institutes of Management (IIMs) are mostly limited to bibliometric studies analysing the research output in terms of article publications and citation patterns in doctoral dissertations. Previous studies on IIMs include paper publications by IIM Ahmedabad during 1999–2010, Citation analysis of doctoral dissertations at IIM Ahmedabad, detailed analysis of research productivity of the IIMs during the period from 1998 to 2012 in terms of articles published.^[1-3] There has also been a study on research productivity in management schools of India by Sahoo *et al.*,^[4] which inter alia



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developed a composite indicator of research productivity using directional benefit-of-doubt model.

REVIEW OF LITERATURE

Social capital as a factor contributing to productivity alongside physical and human capital is being increasingly discussed in economic debates in the recent decades.^[5] The effect of social capital on productivity variance at both the micro and macro levels have also been engaging the attention of the researchers in the recent years.^[6-8] The influence of various dimensions of social capital on productivity was disentangled by Kaasa^[9] in his study. Przybyla^[10] in her study concluded that social capital is indeed a factor in explaining the level of Total Factor productivity in Polish regions. However, Rodrigueez-Pose and Ganau^[11] argued that social capital alone does not drive productivity growth.

While scientometric studies on collaboration in article publications by analysing co-authorship pattern have been attempted frequently, there are limited studies that deal with the dimensions of social capital in terms of bonding, bridging and gender-homophily, while analysing and understanding co-authorships. Further, the previous studies have seldom explored social capital in the context of business schools and in Indian context. The study of co-authorships from social capital perspective in terms of bonding social capital, bridging social capital and gender-homophily can contribute to the existing literature on social networking, besides helping us to understand their influence on individual and institutional research productivity in business schools. Homophily in research collaborations as a unit of analysis has been used less frequently, more so, in social sciences. Nevertheless, homophily is an important driver of research productivity in organisational research output. Hence, this study. This study focusses on two leading business schools viz., the Indian Institute of Management at Ahmedabad (IIMA) and the Indian Institute of Management at Bangalore (IIMB).

The objectives of this study included the following: (a) to present an overview of article publications in terms of social networking (bonding and bridging), gender-homophily at IIMA and IIMB spanning 2010-11 to 2019-20 and, (b) to study the extent of gender homophily and to analyse the variance in gender homophily between the genders with respect to bonding and bridging in article publications at both IIMA and IIMB during the period 2010-11 to 2019-20.

SCOPE AND METHODOLOGY

The study is limited to the research productivity of two leading business schools in India and has in its scope the research outputs of the Indian Institute of Management, Ahmedabad (IIMA) and the Indian Institute of Management, Bangalore (IIMB). IIMA and IIMB were chosen for the study as they are the top two ranked business schools in the National Institutional Rankings Framework (NIRF) of business schools in India by the Ministry of Education, Government of India, besides being in the list of highly ranked business schools globally.

Data relating to the research outputs during the ten-year period from 2011 to 2020 were extracted from the publicly available resources, viz., the information published in the annual reports and research and publications annual reports available in the website of IIMA and IIMB viz., https://www.iima.ac.in and https://www.iimb.ac.in. (Retrieving Date: 17 April 2022). The Annual Reports of both IIMA and IIMB contain a statement of faculty journal publications having a column listing the authors in sequence as per the journal. MS Excel was used for data extraction. Keeping the faculty as the primary reference, every faculty who had participated in research article publication in a given year at IIMA and IIMB have been considered irrespective of whether they were regular, full-time, part-time or an adjunct faculty. The genders were assigned codes in terms of male and female faculty. The data relating to affiliation of the authors were compiled by going through the author information and

author affiliations mentioned in the articles. As the names of the authors were wide ranging encompassing those of Indian origin, East Asian and Western origin, for assigning the gender, it was opted to look up the web page of the authors and co-authors, linked-in profiles, etc. To analyse the social capital, codes were assigned depending upon whether the co-authors were from within the same organisation (Bonding) or outside the organisations. Co-authorships within the country were classified as Bridging-National and those outside the country classified as Bridging-International. Research outputs, wherever found repeated in the Annual Report were excluded.

For computation of gender-homophily, every pairing of co-authors was considered in two, three and multi-authored article publications. Each pairing of co-author was considered as one social networking unit for purpose of bonding and bridging. Bonding Social Capital and Bridging Social Capital were classified going by the most widely accepted classification of these terms based on group memberships.^[12-15] Accordingly, bonding social capital refers to within-group ties i.e. ties within the same institution (faculty-faculty, faculty-student, faculty-research associate etc., within the same institute) Bridging social capital refers to ties with people outside the institution (faculty of one institution collaborating with a researcher at another institution). Bridging Social capital was further classified as Bridging (National) and Bridging (International) based on the location and affiliation of co-authors. The total number of articles published during the ten-year period represent the Total Productive Units (TPUs).

The study of business schools over a 10-year time-window while measuring research output and impact was adopted by Erkut^[16] in his study of a Canadian Business School, and by Ramkumar^[17] in his study of an Indian management school. This study also followed a 10-year time window. In all, the data set included 1562 productive units from IIMA and 923 productive units from IIMB for the ten-years covering the Annual Reports from 2010-11 to 2019-20. As a ten-year window was chosen, looking into the sheer volume of data of article publications along with the units of analysis, gender, affiliation of authors, homophily, dimensions of social capital, this study has been limited to only two-IIMs.

The data were carefully structured as per the objectives of the study. MS Excel and SPSS 20.0 were used for statistical analysis. Descriptive statistics included calculation of percentage and computation of mean. Test of normality was negative and therefore, Mann-Whitney test was performed to compare social networking between genders, between IIMs and Kruskal Wallis test done to compare the three different forms of social networking.

	Gender	Total Productive Units	Solo		Socia	Gender-Homophily							
IIM A				Bonding	Bridging	Bridging	Social	Same	Hetero				
					(National)	(International)	Networking Units	Gender	Gender				
	Male	1323	205	255	405	458	1118	893	225				
				(22.80%)	(36.23%)	(40.97%)	(100%)	(79.87%)	(20.13%)				
	Female	239	38	75	65	61	201	68	133				
				(37.31%)	(32.34%)	(30.35%)	(100%)	(33.83%)	(66.17%)				
Total		1562	243	330	470	519	1319	961	358				
				(25.02%)	(35.63%)	(39.35%)	(100%)	(72.86%)	(27.14%)				
IIM B	Male	705	94	112	182	317	611	470	141				
				(18.33%)	(29.78%)	(51.89%)	(100%)	(76.92%)	(23.08%)				
	Female	218	48	51	24	95	170	67	103				
				(30.00%)	(14.12%)	(55.88%)	(100%)	(39.41%)	(60.59%)				
Total		923	142	163	206	412	781	537	244				
				(20.87%)	(26.38%)	(52.75%)	(100%)	(68.76%)	(31.24%)				

Table 1: Overview of Article Publications in IIMA and IIMB (2010-11 to 2019-20).

RESULTS

Overview of Article Publications: An overview of article publications in terms of TPUs at IIMA and IIMB from 2010-11 to 2019-20 is presented in Table 1. In terms of the quantum, IIMA (1562) was higher as against IIMB, which had 923 TPUs during the period 2010-11 to 2019-20. Interestingly, the pattern of solo authorships at both IIMA and IIMB were similar at 15.56% and 15.38% respectively. Social Networking, in the form of bonding and bridging: nationally or internationally was prevalent largely at both IIMA (84.44%) and IIMB (84.62%).

Bonding and Bridging: The year-wise data in terms of social networking (bonding and bridging), and gender-homophily at IIMA and IIMB are given in Tables 2A and 2B. In terms of the mean, the following pattern was observed: *Bridging (International)* > *Bridging (National)* > *Bonding.* Similar trend was seen among male faculty. However, a different social networking pattern prevailed among female faculty and the pattern also differed between the two IIMs. While the female faculty at IIMA revealed a pattern of *Bonding* > *Bridging (National* > *Bridging (International)*, the social networking pattern at IIMB was *Bridging (International)* > *Bonding* > *Bridging (National*). Non-parametric Kruskal-Wallis tests also revealed significant difference among the three social networking forms between the IIMs. (χ 2(2) =85.331; p=0.000).

Bonding: Overall, collaborations in the form of co-authorships within the Institute (Bonding) was higher at IIMA (25.02%), compared to IIMB (20.87%). Gender-wise, the bonding trend revealed that female faculty bonded more than the male faculty at both the IIMs. (See Table 1).

Bridging: The overall picture depicted that collaborations with international partners were higher than with national partners at both IIMA and IIM B. The international collaborations at IIMB (52.75%) were greater than IIMA (39.35%). While female faculty at IIMB had far greater international collaborations, a reverse trend was witnessed at IIMA. The male faculties were consistent with the overall trend and had higher international collaborations at both the IIMs.

Gender Homophily: Overall, the gender-homophily in terms of collaborations between the same gender in article publications were higher at IIMA (72.86%) compared to IIMB (68.76%). Gender-wise, the male and female faculty collaborated differently (Table 1). Non-parametric Mann-Whitney test also revealed significant difference between the genders. (U=184600.500; lzl=16.400; p=0.000). While female faculty had higher collaborations with opposite gender at both the IIMs, a reverse trend was seen among male faculty, who collaborated more within the same gender.

Gender Homophily with respect to Bonding and Bridging: The pattern of collaborations with respect to Bonding, Bridging (National) and Bridging (International) revealed that same gender collaborations far exceeded hetero (opposite) gender collaborations (Table 3). The pattern of incidence of gender homophily, however differed in the social networking pattern in the form of Bonding, Bridging (National) and Bridging (International) between the two IIMs. Non-parametric Kruskal-Wallis tests also revealed significant difference between the two institutions in social networking pattern. ($\chi 2(2) = 20.818$; p=0.000). While at IIMA, the incidence of same gender collaborations was highest in Bridging (International) followed by Bridging (National) and

IIM Ahmedabad													
Male Faculty													
						Social Netv	vorking		Gender Homophily				
Year	Total Prod. Units	No. of Faculty	Per Capita Productivity	Solo	Social Networking Units	Bonding	Bridging (N)	Bridging (I)	Same Gender	Hetero Gender			
2010-11	65	29	2.24	13	52	14	22	16	44	8			
2011-12	73	30	2.43	16	57	21	17	19	46	11			
2012-13	96	27	3.56	17	79	24	17	38	65	14			
2013-14	148	43	3.44	30	118	20	43	55	89	29			
2014-15	183	49	3.73	30	153	37	62	54	119	34			
2015-16	161	48	3.35	28	133	32	51	50	109	24			
2016-17	133	44	3.02	24	109	24	32	53	94	15			
2017-18	146	38	3.84	15	131	24	49	58	107	24			
2018-19	160	42	3.81	20	140	29	53	58	106	34			
2019-20	158	55	2.87	12	146	33	59	54	114	32			
Total	1323			205	1118	258	405	455	893	225			
Mean	132.3					25.8	40.5	45.5	89.3	22.5			

Female Faculty												
Year	Total Prod. Units	No. of Faculty	Per Capita Productivity	Solo	Social Networking Units	Bonding	Bridging (N)	Bridging (I)	Same Gender	Hetero Gender		
2010-11	12	4	3.00	0	12	4	5	3	6	6		
2011-12	26	8	3.25	3	23	13	3	7	11	12		
2012-13	16	9	1.78	2	14	4	5	5	2	12		
2013-14	20	8	2.50	4	16	6	6	4	3	13		
2014-15	26	9	2.89	6	20	7	8	5	4	16		
2015-16	17	8	2.13	3	14	7	5	2	6	8		
2016-17	23	9	2.56	9	14	5	4	5	7	7		
2017-18	24	13	1.85	4	20	8	4	8	6	14		
2018-19	29	6	4.83	3	26	6	15	5	10	16		
2019-20	46	13	3.54	4	42	15	10	17	13	29		
Total	239			38	201	75	65	61	68	133		
Mean	23.9				20.1	7.5	6.5	6.1	6.8	13.3		

IIM Bangalore												
Male Faculty												
						Social Net	vorking		Gender H	lomophily		
Year	Total Prod. Units	No. of Faculty	Per Capita Productivity	Solo	Social Networking Units	Bonding	Bridging (N)	Bridging (I)	Same Gender	Hetero Gender		
2010-11	91	30	3.03	13	78	11	22	45	65	13		
2011-12	56	26	2.15	11	45	11	12	22	35	10		
2012-13	66	33	2.00	16	50	9	12	29	38	12		
2013-14	78	31	2.52	7	69	13	24	32	53	11		
2014-15	70	24	2.92	10	60	11	15	34	44	16		
2015-16	68	24	2.83	8	60	11	19	30	47	13		
2016-17	59	23	2.57	11	48	18	6	24	33	15		
2017-18	79	32	2.47	5	72	7	31	34	58	16		
2018-19	64	25	2.56	3	61	10	20	31	45	16		
2019-20	74	28	2.64	3	71	13	24	34	52	19		
Total	705			87	614	114	185	315	470	141		
Mean	70.5			8.7	61.4	11.4	18.5	31.5	47	14.1		

Female Faculty												
Year	Total Prod. Units	No. of Faculty	Per Capita Productivity	Solo	Social Networking Units	Bonding	Bridging (N)	Bridging (I)	Same Gender	Hetero Gender		
2010-11	25	10	2.50	13	12	4	1	7	5	7		
2011-12	16	8	2.00	5	11	3	0	8	5	6		
2012-13	31	11	2.82	11	20	9	1	10	9	11		
2013-14	19	8	2.38	1	18	8	3	7	8	9		
2014-15	21	6	3.50	3	18	7	3	8	5	13		
2015-16	19	11	1.73	4	15	6	4	5	5	10		
2016-17	27	13	2.08	4	23	4	6	13	6	17		
2017-18	25	8	3.13	2	23	5	4	14	11	12		
2018-19	23	10	2.30	3	20	4	1	15	8	12		
2019-20	12	6	2.00	1	11	2	1	8	5	6		
Total	218			47	171	52	24	95	67	103		
Mean	21.8			4.7	17.1	5.2	2.4	9.5	6.7	10.3		

			5.000	5 5,				
IIMA			IIMB			IIM(A+B)		
Gender H	omophily		Gender H	omophily		Gender Homophily		
Same	Hetero	Total	Same	Hetero	Total	Same	Hetero	Total
Gender	Gender	PN	Gender	Gender	PN	Gender	Gender	PN
217	113	330	96	69	165	313	182	495
(65.76%)	(34.24%)	(100%)	(58.18%)	(41.82%)	(100%)	(63.23%)	(36.77%)	(100%)
336	134	470	160	47	207	496	181	677
(71.49%)	(28.51%)	(100%)	(77.29%)	(22.71%)	(100%)	(73.26%)	(26.74%)	(100%)
408	111	519	281	128	409	689	239	928
(78.61%)	(21.39%)	(100%)	(68.70%)	(31.30%)	(100%)	(74.25%)	(25.75%)	(100%)
	Gender H Same Gender 217 (65.76%) 336 (71.49%) 408 (78.61%)	IIMA Gender Homophily Same Hetero Gender Gender 217 113 (65.76%) (34.24%) 336 134 (71.49%) (28.51%) 408 111 (78.61%) (21.39%)	IIMA Gender Homophily Image: Colspan="2">Colspan="2" Same Hetero Total Gender Gender PN 217 113 330 (65.76%) (34.24%) (100%) 336 134 470 (71.49%) (28.51%) (100%) 408 111 519 (78.61%) (21.39%) (100%)	IIMA Gender Homophily Gender H Same Hetero Total Same Gender Gender PN Gender 217 113 330 96 (65.76%) (34.24%) (100%) (58.18%) 336 134 470 160 (71.49%) (28.51%) (100%) (77.29%) 408 111 519 281 (78.61%) (21.39%) (100%) (68.70%)	IIMA IIMB Gender Homophily Gender Hetero Gender Hetero Total Same Hetero Gender Gender PN Gender Gender Hetero 217 113 330 96 69 (65.76%) (34.24%) (100%) (58.18%) (41.82%) 336 134 470 160 47 (71.49%) (28.51%) (100%) (77.29%) (22.71%) 408 111 519 281 128 (78.61%) (21.39%) (100%) (68.70%) (31.30%)	IIMA IIMB Gender Homophily Gender Homophily Gender Homophily Same Gender Hetero Gender Total PN Same Gender Hetero Gender Total PN 217 113 330 96 69 165 (65.76%) (34.24%) (100%) (58.18%) (41.82%) (100%) 336 134 470 160 47 207 (71.49%) (28.51%) (100%) (77.29%) (22.71%) (100%) 408 111 519 281 128 409 (78.61%) (21.39%) (100%) (68.70%) (31.30%) (100%)	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	IIMA IIMB IIMB IIMB IIM(A+B) Gender Homophily Gender Total Same Hetero Gender PN Gender Gender PN Gender Gender PN Gender Gender PN Gender Gender IIM(A+B) 217 113 330 96 69 165 313 182 (65.76%) (34.24%) (100%) (58.18%) (41.82%) (100%) (63.23%) (36.77%) 336 134 470 160 47 207 496 181 (71.49%) (28.51%) (100%) (77.29%) (22.71%) (100%) (73.26%) (26.74%) 408 111 519 281 128 409 689 239 (78.61%) (21.39%) (100%) (68.70%) (31.30%) (

Table 3: Gender Homophily w.r.t. Social Networking (Bonding and Bridging) in IIMA and IIMB (2010-11 to 2019-20).

then in Bonding (*Bridging (International*) > *Bridging (National*) > *Bonding*), the incidence of same gender collaborations at IIMB were highest in Bridging (National) followed by Bridging (International) and then Bonding (*Bridging (National*) > *Bridging (International*) > *Bonding*).

DISCUSSION AND CONCLUSION

The principal findings of the study throw interesting insight into the collaborative pattern of the male and female faculty at the IIMs in terms of bonding, bridging and gender-homophily. Firstly, the study revealed that there existed overall, largescale collaborations in article publications of over 84% at both IIMA and IIMB, with solo authorships seen in just over 15%. This trend is consistent with the principles of sociology of scientific knowledge, where, collaboration is considered endogenous to knowledge production and driven by knowledge interests.^[18]

Secondly, in terms of the dimensions of social capital, overall, Bridging (International) > Bridging (National) >Bonding at both IIMA and IIM B. However, the overall trend was not reflected in female faculty and the pattern also differed between the two IIMs. While female faculty at IIMB had far greater international collaborations than the male faculty, a reverse trend was witnessed at IIMA. The variance in the pattern gender-wise and between IIMs in both the identified dimensions (i.e., bonding and bridging), show that the incidence of bonding and bridging is deeply embedded in social structures and practices among researchers in an organization.^[19]

Thirdly, when it came to bonding, female faculty bonded more than the male faculty at both the Institutes of Management (IIM A and IIMB). This trend is consistent with the findings of Gorska *et al.*^[20] who concluded that women mainly focus on bonding capital, which allows them to sustain relationships within their inner circle. The higher prevalence of local collaboration in the form of bonding correlates with the knowledge management literature, where co-location is often highlighted as the most

important factor in effective transfer of knowledge, especially tacit knowledge which is the focus of the learning perspective of research collaboration.^[21] Local collaboration also allows a scientist to be embedded in a densely interconnected local network that is characterized by high levels of social capital such as trust, shared beliefs, mutual obligations and expectations, and cooperative norms which, in turn, enhance their productivity in future research.^[22]

Fourthly, in terms of gender-homophily, the male and female faculty collaborated differently While female faculty had higher collaborations with opposite gender at both the IIMs, a reverse trend was seen among male faculty, who collaborated more within the same gender. The pattern of gender homophily also differed among Bonding, Bridging (National) and Bridging (International) and between the two IIMs. While at IIMA, the incidence of same gender collaborations was highest in Bridging (International) followed by Bridging (National) and then in Bonding (*Bridging (International) > Bridging (National) > Bonding*), the incidence of same gender collaborations at IIMB was highest in Bridging (National) followed by Bridging (International) and then Bonding (*Bridging (National) > Bridging (International) > Bridging (Internatio*

Collaborations outside the Institute (Bridging), be it national or international are also highly beneficial from the learning perspective, as partners from afar, domestic or international, are more likely to possess ideas and techniques that are novel and non-overlapping for a researcher to learn.^[23] International Collaborations can also "plug' a scientist into a much wider network of global science and greatly expand their network advantage for future research.^[18] Although many of these ideas and techniques are tacit, distance per se is not a barrier to acquiring tacit knowledge from research partners, because tacit-ness is not an intrinsic property of knowledge stock, but a property of knowledge flow.^[24] It was also observed that the frequency of repeat partnering existed in all the three social networking patterns: bonding, bridging(national) and bridging(international), lending strength to the findings of McFadyen and Cannella^[25] that a scientist's future research output increases with social capital.

The findings of this study on gender-homophily that female faculty had higher collaborations with opposite gender compared to male faculty is consistent with the findings of the large-scale study of man-woman collaboration examined by Kwiek and Roszka.^[26] The trend in male faculty of higher same-gender collaborations at both the IIMs further confirmed the homophily principle that similarity breeds connection. However, the findings of this study that gender-homophily varied between the different dimensions of social capital viz., bonding and bridging is in departure from the findings of Yuan and Gay.^[27]

The limitations of this study include that this is limited to only the top two IIMs. While the study gives a preliminary insight, a largescale study dealing with the dimensions of social capital encompassing other IIMs and more business schools is recommended to better understand the dimensions of social capital and their impact on research productivity. Nevertheless, this study adds to the existing literature on social networking and gender-homophily in the context of organisational research productivity, especially in social sciences. This study also puts in focus the influence of bonding and bridging social capital and the importance and need for local, domestic and international collaborations, which needs to be nurtured for effective knowledge recombination and to enrich the learning experiences of the researchers.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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