

# A STUDY TO INVESTIGATE THE IMPACT OF SOCIAL RESEARCH TOWARD RESEARCH PRODUCTIVITY

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## ABSTRACT

The main purpose of this study is to investigate the relationship between demographic diversity and research productivity. The paper attempts to identify the influence of gender diversity, college diversity, and diversity in collaboration on the research productivity of faculty members. The paper is based on data collected from the Deanship of Scientific Research and the Office of Documentation, Al Ain University (AAU). The findings of the study showed significant differences in college diversity. Faculty members of the English instruction colleges dominated the leadership in research productivity. The independent variables appeared to predict 23% of the variation in research productivity. AAU faculty members should increase internal and external collaborations and network in scientific research. Similarly, AAU also should support and promote research collaboration and networking among faculty members through a comprehensive strategic plan and guidance for internal and external collaborations.

**Keywords:** Research productivity, demographic diversity, faculty members, Al Ain University, United Arab Emirates

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## INTRODUCTION

The rate at which scientific output is generated - scientific productivity - is essential for the creation, sharing, and transfer of knowledge. It is employed as a performance metric at both individual and institutional levels. For academic

institutions, it gives them a competitive advantage, while for individual scholars, it enables them to engage in self-marketing, acquire a new job, and obtain a promotion.

Specifically, scientific productivity is measured by the number of scientific publications an

academic has to their name (Abramo & D'Angelo, 2014). Publications in the research field are types of technical and scientific capital generated by researchers that comprise resources and practical skills along with links to professional networks (Bozeman & Corley, 2004). Scientific productivity plays an important role in stimulating both economic and social growth (Szufliita-Zurawska, et al., 2020).

The evaluation of research is a vital activity, the aim of which is to ensure that research continues to improve (Abramo et al., 2019b). As pointed by Krueger and Megits (2021), the quality of research has an impact on the reputation of a faculty member, college, and academic institution. To measure the impact (Abramo & D'Angelo, 2014) or quality of research (Waltman, 2016), citations are widely employed as performance indicators (Aksnes et al., 2019). The diverse nature of research is ensured when scientific research involves collaboration between multi-skilled researchers with diverse demographic, cognitive, and experiential backgrounds. This enables scholars from a broad ambit of disciplines to participate in large scale projects, develop their aptitudes, and enhance both the quantity and quality of research outputs (Abramo et al., 2019a). This serves to promote scientific productivity (Ductor, 2015). Among the many reasons why researchers choose to work with scholars from other countries is to acquire scientific recognition, access research funds, and enhance their status as academics (Kwiek, 2020, El Refae, Belarbi, Abu Rashed, 2017)

This study aims to explore the relationship between research productivity and demographic diversity. To achieve this, we obtained all the research reports available at the AAU office for documentation. AAU has two campuses, the main campus in Al Ain City, and a branch campus in Abu Dhabi. To analyze the data, a descriptive analysis, t-test, and regression analysis was performed.

The structure of this paper is as follows, Section 1 is an introduction; Section 2 reviews the relevant literature; Section 3 outlines the methodology and data that are used, research questions, and research hypotheses; Section 4 presents findings; Section 5 discussion; and Section 6 ties the findings together in an overall conclusion.

## LITERATURE REVIEW

The term diversity may refer to demographic diversity, experiential diversity, and cognitive diversity. Demographic diversity is about the attributes and characteristics that we carry with us, such as gender, age, race, and academic major. Experiential diversity is about personal experiences that shape our emotions and feelings, including hobbies and abilities, while cognitive diversity is about different methods and approaches we use in thinking and problem solving (de Anca & Aragon, 2018). This section presents previous studies that have investigated the issue of demographic diversity with research productivity and research impact.

Prior studies have used gender (Leahey, 2006; Tower, Plummer, & Ridgewell, 2007; Bell & Fong, 2021), academic major or specialization (Hu & Gill, 2000; Cheng et al., 2003), and research collaboration (Autry & Griffis, 2005; Aldieri, Guida, Kotsemir, & Vinci, 2019; Choi & Oh, 2020) as demographic diversity variables in investigating research productivity and research impact. A study by Kotrlik, Bartlett, Higgins, and Williams (2002) revealed that gender did not explain faculty productivity in research. Similarly, Tower, Plummer, and Ridgewell (2007) reported no significant difference between men and women in research productivity and research impact. On the other hand, research reports by Leahey (2006), Abramo, D'Angelo, and Caprasecca (2009), and also by Hedjazi and Behravan (2011), found gender diversity a significant predictor of research productivity among faculty members.

An international comparison study conducted by Aiston and Jung (2015) explored gender diversity and research productivity using Changing Academic Profession (CAP) data. The authors found that women faculty members in Japan published less as compared to men. They also reported a more noticeable gap between senior male and female academics as compared to junior academics in Germany, Finland, and the USA. A similar study by Koseoglu, King, and Rahimi (2019) reported significant gender diversity of research productivity in the USA, the UK, Canada and France. Recently, Sá, Cowley, Martinez, Kachynska, and Sabzalieva (2020) reported gender diversity in research productivity in the USA, Canada, and South

Africa. The authors found that men published 16% more papers than women and were cited 68% more frequently than women.

Researchers have also explored the impact of the COVID-19 pandemic on faculty research productivity (Cui, Ding, & Zhu, 2020; Bell & Fong, 2021). A research report by Cui, Ding, and Zhu (2020) found that, after 10 weeks of lockdown in the United States, research productivity increased by 35%; female academics' productivity, however, dropped by 13.2% as compared to that of male academics. Similarly, Bell and Fong (2021) investigated gender diversity in submitting research papers to the *American Journal of Public Health* before and during the COVID-19 pandemic. The findings of the study indicated that the submission rates were higher during the pandemic as compared to before the pandemic. However, the number of submissions increased by 23.8% for men but only 7.9% for women. Women authored 29.4% of COVID-19-related articles.

Like gender, academic major or specialization have been explored in light of faculty research productivity (Benbasat & Weber, 1996) and research impact (Long, Barnett, White, & Bowers, 1998). To understand the research productivity of faculty members majoring in information systems (IS), Hu and Gill (2000) used a life-cycle model of academic research and previous studies on data collected through a national survey. Results of the study revealed no significant relationship between academic major and the research productivity of faculty members. For marketing, Cheng et al. (2003) used 20 marketing journals to examine the research productivity of faculty members. Findings of the study showed that the research productivity of top Asia-Pacific marketing faculty members is comparable with that of American counterparts. Similar studies have been conducted on logistics research (Autry & Griffis, 2005; Cantor, Bolumole, Coleman, & Frankel, 2010), sociology and linguistics (Leahey, 2006), operations management (Smith, Fox, Park, & Lee, 2008), agriculture (Hedjazi & Behravan, 2011), and accounting (Wills, Ridley, & Mitev, 2013).

Collaboration in research is another important demographic variable for understanding faculty research productivity (Reich & Reich, 2006; Lewis, Ross, & Holden, 2012) and reach impact

(Abramo, D'Angelo, & Di Costa, 2009). As stated by Bozeman, Fay, and Slade (2013), collaboration has become the norm in scientific research. According to Huang (2014), collaboration is required in research to address complex research issues, to learn and improve research productivity, to reduce research cost, and to improve intellectual companionship. A case study conducted by Ceballos, Jr., Galeano, Juarez and Cantu-Ortiz (2017) at a Mexican university reported the impact of collaboration on research productivity and the research impact of faculty members. The authors believe that knowledge management increases research collaboration and thereby increases research productivity and research impact. An investigation of logistics research collaboration in Asia by Wu, Goh, Yuan, and Huang (2017) found collaboration did not exceed three authors. Besides, the extent of cross-sector collaboration was low at only 10%, while 70% of the research collaboration focused on Northeast Asia. Eduan and Yuanqun (2019) used bibliometric analysis to examine research collaboration between China and African countries. Results of the study indicated that the partnership is growing progressively. However, a few of the African countries were more engaged in the collaboration than the others. Other studies have reported the impact of collaboration on research productivity and research impact in Italy (Aldieri et al., 2019), and other countries (Choi & Oh 2020).

The review of literature has presented important studies that used demographic variables to investigate research productivity and the research impact of faculty members. As discussed in this section, prior studies have reported conflicting results about the relationship between demographic variables and research productivity or research impact. The current study is attempting to examine the impact of demographic diversity, specifically gender, college, academic specialization, and research collaboration on research productivity and research impact. The findings of the study could contribute to the concept of diversity in scientific research.

## METHODOLOGY

The current study is based on data collected from the annual scientific research reports available at

the Deanship of Scientific Research and the Office of Documentation, Al Ain University (AAU). The study was conducted using the mixed approach method. The mixed approach method is widely used in bibliometric studies (Eduan & Yuanqun, 2019). The study used a qualitative approach for data collection and a quantitative approach in analyzing the data.

The study is based on two concepts, (1) demographic diversity and (2) research

productivity (Table 1). The concept of demographic diversity refers to the personal characteristics of faculty members in this study. The characteristics are gender, college, and level of collaboration. These three characteristics are used as independent variables in this study. On the other hand, the concept of research productivity refers to the number of documents produced by a faculty member during his or her work with AAU.

**Table 1: The study variables and indicators**

Concept	Independent Variable	Indicator
Demographic diversity	Gender	Male Female
	College	English Instruction College Arabic Instruction College
	Collaboration	High (number of coauthored papers above 5) Low (number of coauthored papers below 5)
Concept	Dependent Variable	Indicator
Research productivity	Publications	Number of publications

The collected data were analyzed using Microsoft Excel and the Statistical Package for the Social Sciences (SPSS). The analysis was guided by research questions and hypotheses stated in the study by generating frequency distributions, percentages, correlations, and regression statistics.

### RESEARCH QUESTIONS

1. Is gender diversity-related to research productivity?
2. Is College diversity related to research productivity?
3. Is collaboration related to productivity?

### RESEARCH HYPOTHESES

H1. Diversity in gender is not related to research productivity.

H2. College diversity is not related to research productivity.

H3. Collaboration is not related to research productivity.

### FINDINGS

This section discusses the findings of the study. It focuses on the findings related to research productivity, leaders and drivers of research productivity, demographic diversity differences in research productivity, and identifying relationships among the research variables.

### RESEARCH PRODUCTIVITY

Figure 1 presents the growth of AAU research from 2005 to 2019. Based on the number of documents identified in this study, AAU recorded 1194 documents in 15 years, from 2005 to 2019. This number indicates an average of 79.6 papers per year. However, the highest number of research publications (n=256, 21.44%) were published in 2019, followed by 2017 (n= 217, 18.17%), and 2018 (n= 191, 15.99%).

Meanwhile, by looking at the types of documents, findings of the study (Figure 2) indicate that the top three types of documents published by AAU faculty members are articles

(n= 889, 74.45%), followed by conference papers (n= 283, 23.70%), and books (n= 22, 1.84%).

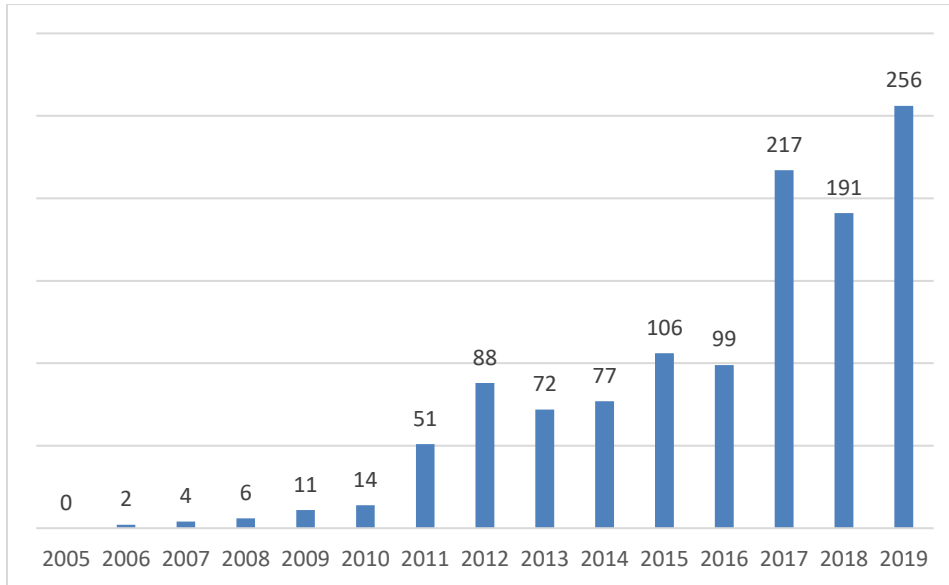


Figure 1: Research productivity per year

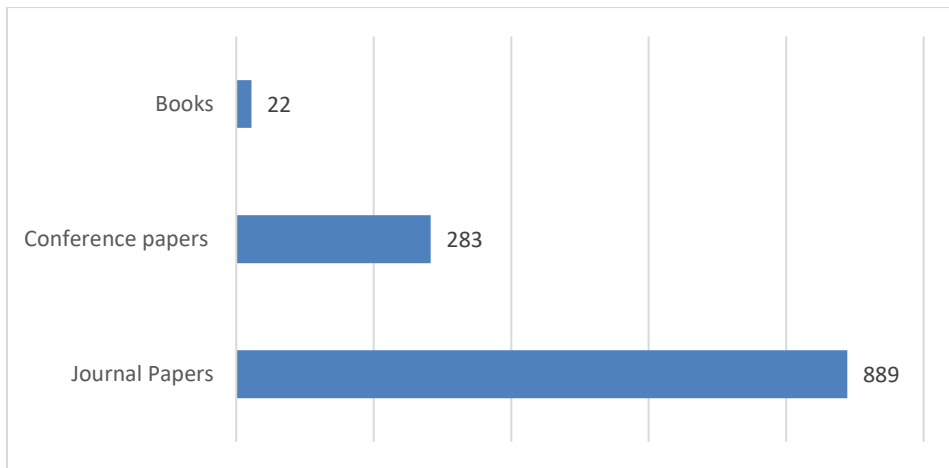


Figure 2: Document types

**LEADERS AND DRIVERS OF RESEARCH PRODUCTIVITY**

In this section, we discuss leaders and drivers of research productivity and research impact at AAU by identifying the top ten authors and contributors and the top ten collaborators. The study identified 138 faculty members who contributed to the research productivity at AAU.

Of the 138 contributors identified, 38 names are considered top productive faculty members, 35 men and only 3 women. The top ten authors contributed 306 out of 1194 documents, indicating a 25.62% contribution to the total documents under the study (Table 2).

Regarding leaders and drivers in collaboration and co-authorship, the analysis of data indicated that the faculty members produced 210

collaborated papers with other authors. Moreover, male faculty members collaborated on 178 papers compared to 32 for female faculty members (Table 3).

Table 2: Top ten contributors, 2005-2016

Rank	Member of Rank	M	F	Single Contribution
1	1	1	0	15
2	2	2	0	14
3	2	2	0	12
4	1	1	0	11
5	1	1	0	10
6	4	4	0	9
7	5	4	1	8
8	6	5	1	7
9	8	7	1	6
10	8	8	0	5

#### DEMOGRAPHIC DIVERSITY DIFFERENCES IN RESEARCH PRODUCTIVITY

In this study, demographic diversity variables are gender, college, and collaboration. For gender diversity, the findings indicate that male faculty members published more papers ( $n= 978$ , 81.90%) than female faculty members ( $n= 216$ , 18.09%). For college diversity, faculty members affiliated with English instruction colleges published more research papers ( $n= 934$ , 78.22%) than faculty members of Arabic instruction colleges ( $n= 260$ , 21.77%). Likewise, faculty members with a high level of collaboration published more research papers ( $n= 898$ , 75.20%)

Table 3: Top ten collaborators, 2005-2016

Rank	Member of Rank	M	F	Collaboration
1	2	2	0	13
2	2	1	1	12
3	3	2	1	10
4	3	3	0	9
5	1	1	0	7
6	2	1	1	6
7	4	4	0	5
8	7	6	1	4
9	6	6	0	3
10	9	9	0	2

as compared to faculty members with a low level of collaboration ( $n= 296$ , 24.79%).

On the other hand, an independent t-test analysis illustrated in Table 4, indicates that the differences in gender diversity among faculty members are statistically significant ( $t\text{-value}= 2.053$ ,  $p\text{-value}=0.042$ ). Similarly, the analysis reveals significant differences in collaboration with other researchers ( $t\text{-value}= 5.910$ ,  $p\text{-value}= 0.000$ ). Interestingly, the findings of the study showed statistically no significant difference in college diversity (with respect to research productivity  $t\text{-value}= 0.061$ ,  $p\text{-value}= 0.952$ ).

Table 4: Demographic Diversity Differences in research productivity

Variable	Indicator	Productivity (%)	Mean	SD	t-value	p-value
Gender	Male	978 (81.90)	3.68	3.434	2.053	0.042
	Female	216 (18.09)	2.21	2.378		
College	English	934 (78.22)	3.36	3.549	0.061	0.952
	Arabic	260 (21.77)	3.32	3.051		
Collaboration	High	898 (75.20)	7.17	3.839	5.910	0.000
	Low	296 (24.79)	2.77	2.795		

### IDENTIFYING THE RELATIONSHIP

The current study investigates the relationship of demographic diversity to research productivity. The concept of demographic diversity is measured using three independent demographic diversity variables. These independent variables are gender, colleges, and collaboration or co-authorship. On the other hand, the number of publications is a dependent variable used to measure the concept of research productivity.

Table 5 illustrates the results of Spearman's rho correlation analysis. This non-parametric test was preferred because an early normality test indicated that the data are not normally

distributed, particularly in research productivity. The correlation analysis shows a statistically positive significant relationship between college diversity or collaboration diversity and research productivity ( $r_s = 0.179, 0.521$ ), respectively. The findings provide answers to the second and third research questions, and at the same time, reject the second and third stated hypotheses in this study.

On the other hand, gender diversity indicates a statistically negative significant relationship with research productivity ( $r_s = -0.181$ ), respectively. The result provides an answer to the first research question but rejects the first hypothesis (H1) of the study.

**Table 5:** Spearman's rho correlation analysis

Variable	1	2	3	4
1. Gender diversity	1			
2. College diversity	-0.006	1		
3. Collaboration	-0.065	-0.176*	1	
4. Research productivity	-0.181*	0.179*	0.521**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed). \* . Correlation is significant at the 0.05 level (2-tailed).

Based on the above results, we performed a linear regression analysis to find out the effect of gender diversity, college diversity, and collaboration diversity on research productivity. The regression tests are based on the partial least squares' structural equation modelling (PLS-SEM) as follows:

$$Y1 = \beta_0 + \beta_1 \text{Gender} + \beta_2 \text{College} + \beta_3 \text{Collaboration} + \varepsilon$$

**Table 6:** Definitions of variables

Variable	Definition
Y1	= Research productivity (number of documents reported for faculty members)
Gender	= 1 if respondent is male, 0 if female
College	= 1 if faculty member is from English instruction college, 0 if Arabic
Collaboration	= number of coauthors or contributors
$\varepsilon$	= errors

As illustrated in Table 6, the results of the regression analysis support the suggested model of the study by demonstrating statistically the significant effect of gender diversity, college diversity, and collaboration on the research productivity ( $R^2 = 0.235, F = 13.687, p\text{-value} < .05$ ).

**Table 7:** Coefficient of variable

Variable	Research Productivity	
	Coefficient	p-value
(Constant)		
Gender	-0.164	0.032
College	0.074	0.334
Collaboration	-0.457	0.000

Note:  $R^2 = 0.235, F = 13.687, p\text{-value} = 0.000$

The results demonstrate that the three independent variables together (gender, college, and collaboration) explain at least 23% of the variance in research productivity among faculty members.

## DISCUSSION

This research was conducted to explore research diversity at AAU. The paper investigated the relationship between the research productivity and demographic diversity of faculty member. The findings of the study identified 1194 documents produced by AAU faculty members from 2005-2019, with an average of 79.60 papers per year, approximately an average of 8.65 documents per faculty member.

**Table 8:** Summary

Item	Number
Total documents	1194
Average documents per year (2005-2019)	79.60
Average documents per faculty member	8.65

The last three years, 2019, 2018, and 2017, appear to be the most productive period, which reflects the commitment of AAU management to improve research productivity and the research output of faculty members. Before 2017, AAU faculty members could achieve hardly more than 100 documents per year. This scenario changed in 2017 with the production of 217 documents, followed by 191 documents in 2018, and 256 documents in 2019.

The findings of the study reveal that, despite efforts and time needed to publish an article in

scholarly journals, faculty members are more likely to publish journal articles than the other types of publications. This finding supports the recent study reported by Liyanagunawardena, Adams, and Williams (2021). The motive for publishing more journal articles than other types of publications could be related to academic promotion, research impact, academic reputation, and research funds, as well as research incentives.

The results of the study show that faculty members of the English instruction colleges, namely the College of Engineering, Pharmacy, and Business, dominated the leadership in productivity and collaboration. The differences are statically significant at the college level. This indicates that the faculty members of the three colleges are more active in research than the faculty members of the Arabic instruction colleges. At the same time, it indicates challenges faced by the faculty members from the Arabic instruction colleges. The challenges include the time needed to publish a paper in an Arabic journal and publishing research papers in English. These challenges could be essential factors contributing negatively to the research productivity of faculty members from Arabic instruction colleges.

Results of the study have provided answers to research questions and determined the status of the stated hypotheses (Table 8). Interestingly, gender demonstrated a negative relationship with research productivity.

**Table 9:** Status of the tested hypotheses

Code	Hypothesis	Test result	Status
H1	Diversity in gender is not related to research productivity.	Not related	Not supported
H2	College diversity is not related to research productivity.	Negative relation	Not supported
H3	Diversity in collaboration is not related to research productivity.	Positive relation	Not supported

Our finding contradicts the studies reported by Williams (2002), Plummer, and Ridgewell (2007). However, it supports research reports that found gender diversity a significant predictor of research productivity among faculty

members (Leahey, 2006; Abramo, D'Angelo, & Caprasecca, 2009; Hedjazi & Behravan, 2011).

The most striking results are identified in research collaboration. The findings of the study indicate a statistically positive significant relationship between collaboration and research



productivity. The regression analysis revealed that the study model explains 23% of the variance in research productivity. This indicates that the three variables can predict the level of research productivity among faculty members. These findings support the previous studies (Aldieri et al., 2019; Choi & Oh 2020) that reported the impact of collaboration on faculty research productivity.

### CONCLUSION

Diversity in research is highly demonstrated by AAU faculty members. They are aware of the importance of research diversity in research productivity. Diversity in research collaboration, particularly, has a significant impact on research productivity and research impact. Therefore, AAU faculty members should increase internal and external collaborations and networks in scientific research. Similarly, AAU also should support faculty members in research collaboration and networking through a comprehensive strategic plan and guidance for internal and external collaborations. Perhaps a special research fund and incentive could be essential factors to implement and realize the strategic plan.

This is a case study that targeted faculty research productivity at AAU with gender, college, and collaboration as demographic diversity variables. The annual scientific reports available at the Deanship of Scientific Research and the Office of Documentation were used to identify and collect the needed data and information. Therefore, the findings of the study may not be generalized to similar situations. Besides, the results of the study could be different if bibliographic data are collected from multiple sources such as the Scopus database, Web of Science, Google Scholar, and ResearchGate. Therefore, future studies may extend this topic to include more bibliographic sources and more diverse variables research and science research.

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