ORIGINAL ARTICLE

Influence of Institutional Characteristics on Academic Staff's Research Productivity: The Case of a Vietnamese Research-oriented Higher Education Institution

Phuong Vu Nguyen

University of Economics and Law, Vietnam National University, Ho Chi Minh City, Vietnam
Email: phuongnv@uel.edu.vn

ABSTRACT
As research productivity (RP) can be an indicator of a university's reputation, it is necessary to examine factors within a higher education institution that contribute to promoting RP. This article aims to examine the relationship between a university's institutional characteristics and its academics' RP within a research-oriented university, as regards publications in international and Vietnamese journals. The study was conducted with a survey questionnaire with 96 observations (96 participating academics among approximately 220 academics). The data was analysed through descriptive and inferential statistics including exploratory factor analysis and Poisson regression. The results showed that institutional climate was a significant predictor of both international and domestic journals; for every one unit increase on the predictor institutional climate, the count increased on the number of both international and domestic journals. In addition, the regression coefficients for coordinating goals and research culture were negative, suggesting that academics scoring higher on coordinating goals and research culture were more likely to exhibit a lower count for the number of international and domestic journals respectively than academics scoring lower on the measure. The findings suggested that greater attention should be paid to establishing appropriate research goals, communication, and improving aspects of a research culture within the university so as to enhance academics' research productivity.

1. INTRODUCTION

The function of research in education is to offer information crucial for making relevant judgments on educational issues such as teaching and learning and national policies (Morris, 1967) with a general aim to improve the quality of education (Nguyen et al., 2021). Knowledge created through research can be disseminated through teaching, and research productivity can be an indicator of a university's prestige. Education, research, and service are the three major academic roles of higher education institutions (Edgar & Geare, 2013). When research is integrated into teaching, it can help enhance teaching quality (Brew, 2003). For example, it can help enhance academics' disciplinary knowledge and research competence which in turns improve academics' teaching and supervising students' research projects (Lindsay et al., 2002). Doing research has been considered one of academics' responsibilities in research-oriented universities (Cummings, 2014). Research productivity (especially publications) are considered one of the key criteria for recruitment and promotion to meet the research orientation of the universities (Cummings & Shin, 2014).

Research productivity (RP) is a concept that has many varied meanings in different contexts. In general, it is the overall sum of faculty publications over a given period of time (Print & Hattie, 1997), which can include conference

papers, articles, and books (Toutkoushian et al., 2003). In some cases, scientific research performance can be measured by publications in journals (Dundar & Lewis, 1998; Nguyen et al., 2020). Research publication is the most recognizable sign of an active researcher; and for many academics, it is a mediator of their career development (Mantikayan & Abdulgani, 2018). RP can be measured qualitatively (e.g., measuring the impact of publications) or quantitatively (e.g., academics' publications over a period); yet, journal articles are commonly used in most fields (Nguyen, 2015). It can be argued that different indicators of RP represent different publication practices (Nygaard & Bahgat, 2018).

Among the types of RP measurement, the number of publications (particularly academics' publications in domestic and international journals) has been commonly used as a measure to assess academics' research productivity around the world. There have been studies examining factors of different levels such as individual and institutional characteristics in developed countries, yet there are only few studies such as Huynh (2016), Nguyen (2015), and Nguyen et al. (2021) focusing on institutional factors (including institutional characteristics such as communication policy (Prendergast et al., 2019), resources, teaching loads, leadership, and research environment (Huynh et al., 2019) affecting RP. Therefore, this paper aims to examine institutional characteristics that affect academics' RP in order to provide relevant implications for promoting academics' RP.

2. LITERATURE REVIEW

Research has suggested that the factors influencing academics' RP include academic discipline (Jung, 2012); individual characteristics (Chen et al., 2006), institutional characteristics and leadership characteristics (Bland et al., 2005), social community networks, and national research policies (Moore, 2015, as cited in Huynh (2016)). In the context within a higher education institution, individual characteristics, institutional and leadership characteristics are the factors directly affecting academics' RP, as discussed by Bland et al.(2005) in their model for components of productive organisation. Individual characteristics are the conditions belonging to academics who are well-prepared to carry out research. They will then be facilitated in a supportive environment that is a result of effective leadership. Within Bland et al.'s (2005) model for productive research organisation, the components of institutional characteristics include "resources, rewards, sufficient work time, clear coordinating goals, size/experience/expertise, mentoring, culture, communication, research emphasis, recruitment and selection, positive group climate, communication with professional network, assertive-participative governance, brokered opportunity structure, and decentralised organisation" (p. 227).

Among other factors, institutional factors are regarded as important factors to enhance academics' RP (Alrahlah, 2016). The research environment within a university is also a mediator to improve the quality of publications (Hanssen et al., 2018). It is obvious that the institutional characteristics in Bland et al.'s model are considerably complicated with a complex set of items covering these 15 features. Different studies selected different areas of institutional characteristics. Within the context of a Vietnamese research-oriented higher education institution, this small-scale study aimed to examine institutional factors that were prioritised for the university's enhancement of academics' RP. These major foci could be named 'coordinating goals, research culture, and institutional climate' (Figure 1), which cover nine institutional characteristics out of 15 from Bland et al.'s (2005) model, including "resources, sufficient work time, clear coordinating goals, mentoring, culture, communication, research emphasis, positive group climate, communication with professional network" (p.227).
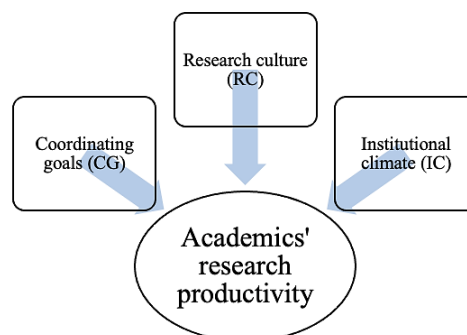

Figure 1. Institutional factors affecting academics' research productivity

Coordinating goals (CG): *Including clear coordinating research goals/objectives and supportive communication to achieve them*

Clear coordinating goals for research is one of the keys for triggering academics' RP. Research results of Bland et al. (2005) indicate that factors such as research objectives of a department and communication have a positive correlation with RP. For instance, clear expectations for research emphasis embedded in departmental mission statements were conducive to academics' RP (Gregorutti, 2008). Thus, communication between academics within a department or more broadly within a university could disseminate research emphasis goals. Vasileiadou and Vliegenthart (2009) claim that communication exchange such as academic meetings is a helpful factor promoting RP. Then, collaboration between academics not only increases RP but also creates a research culture within the department and the university (Bland & Ruffin, 1992).

Research culture (RC): *Including the availability of research resources, culture, sufficient work time for research, mentoring, and research emphasis*

Research culture (including resources for research, time for research, research mentoring, and research emphasis) is an important variable affecting academics' RP. Studies show that academic resources such as highly ranked international books and journals are important in motivating academics to do research (Lertputtarak, 2008). The availability of library resources, research facilities and indoor environmental quality are found to be positively correlated with academics' RP (Bland et al., 2005; Borg & Alshumaimeri, 2012; Kang et al., 2017; Teodorescu, 2000). Research funding is also a determinant of RP (Man et al., 2004). There is also a positive correlation between the research grants received by academics and the amount of their research output (Hottenrott & Lawson, 2017; Sulo et al., 2012) because research funding facilitates academics' research activities such as implementing research projects, purchasing materials, publishing their works, and attending conferences. As regards sufficient work time, Chen et al. (2006) find that when academics have more research time by reducing their teaching load, their research productivity is higher. In addition, time allocation is considered as the basic input in the research process to get a good output (Smeby & Try, 2005). For example, Quimbo and Sulabo (2014) claim that educational attainment and teaching load considerably impact academics' research self-efficacy which then influenced their RP. In other words, research time depends on how academics allocate their work effort between their responsibilities of research, teaching, and service (Blackburn et al., 1991). Furthermore, peer support is important in increasing RP (Raston, 1998). Support could take different forms such as mentoring. Young academics receive support and advice from experienced academics or between academics who collaborate in research (Nguyen, 2015). For example, Hafsteinsdóttir et al. (2017) assert that mentoring makes postdoctoral researchers productive in research. Academics with early interest in research appear to be more productive than those with interest in teaching (Ramsden, 1994). As Creswell (1986) discusses, research culture (including academics' attitudes to research and their shared values) could contribute to academics' RP.

Institutional climate (IC): *Including positive group climate and communication with professional network*

Furthermore, RP may also depend on the extent to which academics socialise with colleagues for collegial support on research activities, which in turns help enhance their research competence. Such an environmental climate could be regarded as a community of practice (Wenger, 1998) whereby academics are participants to achieve their common goals. As regards communication with a professional network, collaborative research among academics should be seen as the socialization of research (Jalloun, 2010). For instance, Nguyen et al. (2017) state that a majority of works from Vietnam are from international collaboration. Besides, there is evidence that the size and quality of researcher networks are conducive to research outputs (Besancenot et al., 2017). As regards positive group climate, Chen et al. (2006) also indicate that a collaborative research climate within a department whereby academics offer collegial support to each other plays an essential role in promoting RP. Such a research environment is claimed to be conducive to academics' RP (Sulo et al., 2012).

The purpose of the paper is to examine the relations between three factors (so-called coordinating goals, research culture, and institutional climate covering institutional characteristics) and academics' RP. There are two hypotheses to examine:

Hypothesis 1: Coordinating goals (CG), research culture (RC), and institutional climate (IC) correlate positively to academics' publications in international journals.

Hypothesis 2: Coordinating goals (CG), research culture (RC), and institutional climate (IC) correlate positively to academics' publications in domestic journals.

3. MATERIALS AND METHODS

The study primarily employed quantitative methods to examine the relationship between factors concerning institutional characteristics and academics' RP regarding the number of publications in international and domestic journals. The participants were purposefully selected from University A. The survey sample included 96 observations: 96 academics, including lecturers (85) across faculties and departments, and research staff at several centres in the university. Purposive sampling allowed selecting people who provided the information the researcher needed to gain insight into the phenomenon under study (Marshall, 1996). Data was collected through a survey questionnaire composed of 15 items from nine institutional characteristics selected from Bland et al.'s (2005) model for components of productive organization. These 15 items were grouped into three components called 'coordinating goals; research culture; and institutional climate', which were to be examined in relation to academics' RP.

Quantitative analysis helps to determine the relationship between two or more quantitative variables, measuring the extent of the relation between the independent and dependent variables of the study and interpreting the relation by a number of statistical tests (Creswell, 2009). Several hypothesis tests are performed. Data from the questionnaire was analysed through descriptive statistics and inferential statistics based on SPSS 22.0 software including exploratory factor analysis (EFA), correlation analysis, and Poisson regression analysis.

EFA was used to identify the factors concerning institutional characteristics, including coordinating goals (CG); research culture (RC); and institutional climate (IC). EFA was performed with the absolute value for factor analysis below 0.55, with a total variance explained (greater than 60%) for a number of observations close to 100 (Hair et al., 2014). Regression analyses were performed to examine the predictive role of these three factors (independent variables) on the number of articles published in international and domestic journals (dependent variables). Poisson regression was used to model events where the outcome was observed with count data according to the Poisson distribution. This method allowed analysis of count data by explaining which independent variable has an effect on the dependent variable whose values are non-negative integers and small numbers (Koletsi & Pandis, 2017; Trivedi, 2014). Since each dependent variable (the number of publications) is a non-negative integer (count data), Poisson regression analysis would be appropriate (Coxe et al., 2009).

4. RESULTS AND DISCUSSION

4.1. Results

● *Relation between institutional characteristics and academics' research productivity*

Before performing quantitative analyses, the data was tested and filtered for outliers in the sample using the Little's MCAR test (Table 1). Hypothesis H_0 for Little's MCAR test is completely random missing data (MCAR). The data is MCAR when the sample is missing a value independent of the data value (Little, 1988). Because the Sig-value was greater than 0.05, there was no statistical significance, so the hypothesis H_0 could not be rejected. Thus, it could be concluded that the missing data was completely random and suitable for analysis.

Table 1. EM Estimated Statistics

EM Means

CO1.3	CO1.4	CO1.1	CO1.2	RE1.1	COM1.1	RE1.3	CU1.2	TR1.1	AD	ME1.2	CU1.1	RN1.2	CU1.5	RE1.5	DAR	IAR
3.750	3.687	3.760	3.562	3.696	3.396	3.000	2.677	2.771	2.865	3.240	3.708	3.522	3.393	3.604	2.75	1.24

a. Little's MCAR test: Chi-Square = 72.642, DF = 64, Sig. = 0.215

● *Exploratory factor analysis*

Exploratory Factor Analysis (EFA) was performed to determine the factors of the institutional characteristics that may impact academics' research productivity, providing evidence for the validity of the questionnaire structure. The assumptions of data suitability for factor analysis were met as the Kaiser Meyer Olkin (KMO) measures for sampling adequacy was 0.880, the Bartlett's test was significant ($p < 0.000$) (Field, 2009), which met the condition for EFA when $0.5 < KMO < 1$ and Sig. < 0.05, as shown in Table 2.

Table 2. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.880
	Approx. Chi-Square	1157.819
Bartlett's Test of Sphericity	df	120
	Sig.	0.000

Principal components factoring was used for factor extraction, and varimax was used for simplifying the column of the factor matrix so that the factor extracts were clearly associated. The number of factors to be extracted was determined by considering the eigenvalues together (greater than 1), with the absolute value for factor analysis less than 0.55 for an observed sample close to 100, with explaining cumulative variance (71.47% greater than 60%) (Hair et al., 2014). When performing EFA, the rotated component matrix showed that the variables were clearly distributed in three components, and there was no loading of variables on two factors. Performing EFA produced three factors with a total variance explained of 71.47%, that is, 71.47% of extracted factors were associated with the institutional characteristics that affected academics' research productivity, and 28, 53% was due to other factors. The results of EFA are shown in Table 3.

Table 3. Rotated Component Matrix of the institutional characteristics

		Component		
		1	2	3
CG.3	My department has a commonly held vision for what we want to look like in the next five years.	0.914		
CG.4	I have confidence in the current direction in which my department is heading.	0.876		
CG.1	It is clear to me how my work and goals are or can be related to the department vision.	0.853		
CG.2	My department leadership keeps us on track by clearly emphasizing our core missions of education and research.	0.823		
CG.5	I have excellent opportunities here to pursue my interests in research.	0.780		
CG.6	My department has a communication system that allows me to be adequately informed in a timely fashion about major issues, important events, and upcoming concerns.	0.614		
RC.1	I have space that is well equipped for me to conduct my research.		0.773	
RC.2	A large portion of my academic department's faculty can be considered to be significant external grant "getters."		0.753	
RC.3	I have a system that allows me to protect periods of uninterrupted time to address research activities.		0.750	
RC.4	I have been, or had been, formally assigned an advisor or mentor within my academic department.		0.710	
RC.5	There is a high expectation in my department to conduct research that is externally funded.		0.606	
IC.1	I have strong attachment with colleagues through research activities.			0.855
IC.2	I have a well-developed network of colleagues with whom I discuss research projects.			0.775

Sign	Content					Std. Deviation
IC.3	I feel appreciated and valued by my local colleagues (department/school/university) for my work in research.					0.737
IC.4	A large portion of my academic department's faculty can be considered to be in alignment with my research interests.					0.610

Table 3 shows there were three factors affecting academics' research productivity. The descriptive statistics of these factors are presented in Tables 4-6.

- Factor 1: coordinating goals

Table 4. Descriptive statistics of coordinating goals (CG)

Sign	Content	N	Min	Max	Mean	Std. Deviation
CG.1	My department has a commonly held vision for what we want to look like in the next five years.	96	1.0	5.0	3.760	1.0234
CG.2	I have confidence in the current direction in which my department is heading.	96	1.0	5.0	3.562	1.0241
CG.3	It is clear to me how my work and goals are or can be related to the department vision.	96	1.0	5.0	3.750	1.0463
CG.4	My department leadership keeps us on track by clearly emphasizing our core missions of education and research.	96	1.0	5.0	3.688	1.0494
CG.5	I have excellent opportunities here to pursue my interests in research.	96	1.0	5.0	3.687	1.0292
CG.6	My department has a communication system that allows me to be adequately informed in a timely fashion about major issues, important events, and upcoming concerns.	96	1.0	5.0	3.396	1.0807

- Factor 2: research culture

Table 5. Descriptive statistics of research culture (RC)

Sign	Content	N	Min	Max	Mean	Std. Deviation
RC.1	I have space that is well equipped for me to conduct my research.	96	1.0	5.0	3.000	1.1425
RC.2	A large portion of my academic department's faculty can be considered to be significant external grant "getters."	96	1.0	5.0	2.677	1.0809
RC.3	I have a system that allows me to protect periods of uninterrupted time to address research activities.	96	1.0	5.0	2.771	1.2007
RC.4	I have been, or had been, formally assigned an advisor or mentor within my academic department.	96	1.0	5.0	2.865	1.2865
RC.5	There is a high expectation in my department to conduct research that is externally funded.	95	1.0	5.0	3.232	0.9615

- Factor 3: institutional climate

Table 6. Descriptive statistics of institutional climate (IC)

Sign	Content	N	Min	Max	Mean	Std. Deviation
IC.1	I have strong attachment with colleagues through research activities.	96	1.0	5.0	3.708	0.9615
IC.2	I have a well-developed network of colleagues with whom I discuss research projects.	96	1.0	5.0	3.510	0.9733
IC.3	I feel appreciated and valued by my local colleagues (department/school/university) for my work in research.	96	1.0	5.0	3.385	0.9880
IC.4	A large portion of my academic department's faculty can be considered to be in alignment with my research interests.	96	1.0	5.0	3.604	0.9785

● *Reliability Test*

The reliability of the internal construct of items was expressed by the Cronbach's Alpha value. For the reliability test, it was required to remove the variable when Cronbach's Alpha < 0.6. The results of Cronbach's Alpha of these three groups of items were all > 0.8 (Table 7). Therefore, the observed variables in these three factors were accepted and have high reliability.

Table 7. Cronbach's Alpha

Factors	Number of items	Cronbach's Alpha
Factor 1: Coordinating goals	6	0.933
Factor 2: Research culture	4	0.865
Factor 3: Institutional climate	4	0.812

The descriptive statistics of CG, RC and IC are presented in Table 8.

Table 8. Descriptive Statistics of CG, RC and IC

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
CG	96	1.00	5.00	3.6431	0.90474	- 0.882	0.246	1.268	0.488
RC	96	1.00	4.60	2.9104	0.91898	- 0.261	0.246	- 0.693	0.488
IC	96	1.00	5.00	3.5573	0.78177	- 0.694	0.246	1.355	0.488
Valid N (listwise)	96								

The multicollinearity test was performed in two steps: examining the correlation between the independent variables and testing the tolerance and Variance Inflation Factor (VIF) values. Table 9 shows that the correlation coefficient between these two independent variables was low (< 0.5), which was the first sign that there was no multicollinearity. Table 10 shows the test results for multicollinearity, showing that the VIF values were in the range [1,2] (1 < VIF < 2), that is, no multicollinearity occurred. There are different views on considering tolerance and VIF values, such as [0.1 and 10], [0.2 and 5], and [0.5 and 2]. Thus, the explanatory variables satisfied the conditions for the regression analysis step.

Table 9. Correlations of the independent variables

		CG	RC	IC
CG	*Pearson Correlation*	*1*	*0.620*****	*0.486***
	Sig. (2-tailed)		*0.000*	*0.000*
	N	*96*	*96*	*96*
RC	*Pearson Correlation*	*0.620***	*1*	*0.560***
	Sig. (2-tailed)	*0.000*		*0.000*
	N	*96*	*96*	*96*
IC	*Pearson Correlation*	*0.486***	*0.560***	*1*
	Sig. (2-tailed)	*0.000*	*0.000*	
	N	*96*	*96*	*96*

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

Table 10. Tolerance and VIF

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.509	2.232		0.676	0.501		
	CG	- 0.402	0.630	-0,086	-0.637	0.526	0.587	1.702
	RC	- 0.116	0.655	-0,025	-0.178	0.859	0.528	1.895
	IC	0.431	0.691	.080	0.623	0.535	0.655	1.527

a. Dependent Variable: IAR

● *Poisson regression analysis*

Based on EFA and the conditions applied to the dependent variable, Poisson regression model was applied to find the relationship between the three factors (CG, RC, IC) of the institutional characteristics and two dependent variables of RP, respectively: articles in international journals (IAR), articles in domestic journals (DAR). Table 11 describes parameter estimates in the relationship between institutional characteristics and international publications.

Table 11. Parameter Estimates of institutional characteristics and IAR

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)
			Lower	Upper	Wald Chi-Square	df	Sig.	
(Intercept)	0.284	0.4816	- 0.660	1.228	0.349	1	0.555	1.329
CG	- 0.255	0.1227	- 0.496	-0,015	4.321	1	0.038	0.775
RC	-0,053	0.1371	- 0.321	0.216	0.148	1	0.701	0.949
IC	0.276	0.1308	0.019	0.532	4.440	1	0.035	1.317
(Scale)	1[a]							

Table 11 shows that the variable IC (institutional climate) had an influence on the international publication performance at 0.05, Sig values. = 0.035. Omnibus Test gave p = 0.024 < 0.05, which means the model was predictive at 0.05. The positive coefficient (the beta value B) indicates that as scores increased on the predictor IC, the count increased on the number of IAR. IC was a good predictor of IAR (B = 0.276; S.E = 0.1308; p = 0.035 < 0.05): for each unit increase in the variable IC the predicted number of IAR increased by 31.7%. It is necessary to mention that the incidence rate ratio (IRR) is found in the Exp(B) column. The Exp(B) value for this variable is greater than one, which means that with an increasing score on the predictor IC, the count for the number of IAR changed by a factor of 1.317 (IRR).

The negative coefficients for CG and RC indicate that as scores increased on the predictors CG and RC, the count decreased on the number of IAR. In the model, CG was a negative and significant predictor of the count for the number of IAR (B = -0.255; S.E = 0.1227; p = 0.038). The IRR suggests that for every one unit increase on the predictor CG, the count for the number of IAR changed by a factor of 0.774 (meaning that the count was decreasing).

The regression coefficient for RC was negative, suggesting that academics scoring higher on RC were more likely to exhibit a lower count for the number of IAR than academics scoring lower on the measure. Nevertheless, RC was not a significant predictor in the model (B = -0.053; S.E = 0.1371; p = 0.701); the IRR indicates that for every one unit increase in RC, the count for the number if IAR changed by a factor of 0.949 (meaning that the count was decreasing).

Table 12 describes Poisson regression of three predictors, parameter estimates in the relationship between institutional characteristics and DAR.

Table 12. Parameter Estimates of institutional characteristics and DAR

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)
			Lower	Upper	Wald Chi-Square	df	Sig.	
(Intercept)	0.513	0.3373	- 0.148	1.174	2.313	1	0 0.128	1.670
CG	-0,054	0.0776	- 0.206	0.098	0.483	1	0.487	0.948
RC	-0,317	0.0855	- 0.485	- 0.150	13.768	1	0.000	0.728
IC	0.440	0.0871	0.269	0.611	25.497	1	0.000	1.553
(Scale)	1[a]							

Table 12 shows that the variable IC had an influence on DAR at 0.05, Sig values. = 0.000. Omnibus Test gave p = 0.000 < 0.01, which means the model was predictive at 0.01.

The positive coefficient for IC indicates that as scores increased on the predictor IC, the count increased on the number of DAR. IC was a good predictor of DAR (B = 0.440; S.E = 0.0871; p = 0.000 < 0.01): for each unit increase in the variable IC, the predicted number of DAR increased by 55.3%. The Exp(B) value for this variable was greater than one, which means that with an increasing score on the predictor IC, the count for the number of DAR changed by a factor of 1.553.

The negative coefficients for CG and RC indicate that as scores increased on the predictors CG and RC, the count decreased on the number of DAR. In the model, RC was a negative and significant predictor of the count for the number of DAR (B = -0.317; S.E = 0.0855; p = 0.000 < 0.01). The IRR suggests that for every one unit increase on the predictor RC, the count for the number of DAR changed by a factor of 0.728 (meaning that the count was decreasing).

The regression coefficient for CG was negative, suggesting that academics scoring higher on CG were more likely to exhibit a lower count for the number of DAR than academics scoring lower on the measure. Nevertheless, CG was not a significant predictor in the model (B = -0.054; S.E = 0.0776; p = 0.487); the IRR indicates that for every one unit increase in CG, the count for the number if DAR changed by a factor of 0.948 (meaning that the count was decreasing).

4.2. Discussion

The first major finding is that IC was a significant predictor of both IAR and DAR with positive regression coefficients and Exp(B) values greater than one, meaning that for every one unit increase on the predictor IC, the count increased on the number of both IAR and DAR. The institutional climate where research collaboration was fostered among academics as experiences of research socialisation (Jalloun, 2010) facilitates sharing ideas and learning new knowledge. Within this community of practice (Wenger, 1998), positive group climate whereby academics were offered collegial support appeared to be conducive to academics' RP (Chen et al., 2006; Sulo et al., 2012). It should be noted that the university had a policy to offer financial incentives for publications in international journals and formal funding for strong research groups. Table 6 indicates that academics had strong attachment with colleagues within a well-developed research network and shared research interests. Such quality of researcher networks could make academics productive with research outcomes (Besancenot et al., 2017).

As the second major finding, the regression coefficients for CG and RC were negative, suggesting that academics scoring higher on CG and RC were more likely to exhibit a lower count for the number of IAR and DAR respectively than academics scoring lower on the measure. First of all, it should be noted that clear coordinating research goals and communication which were established at the university forced academics to do research within their discipline and published their works in prestigious international journals. This planning somehow hindered multidisciplinary research outputs. Then, data on Table 4 also showed that academics were not well-informed with the present communication system within the department. This study's results are consistent with Nguyen et al.'s (2021) study in that communication policies were negatively correlated with academics' research outcomes.

In addition, research culture was negatively correlated with academics' RP. The descriptive statistics of research culture in Table 5 also showed low ratings for items related to the availability of research resources, culture, sufficient work time for research, mentoring, and research emphasis (with means ranging from 2.6 to 3.2 on a 5-point Likert scale). Previous studies argue that research infrastructure considerably influences university academics' research productivity (Kang et al., 2017) because a lack of adequate research facilities would restrain their research activities (Alrahlah, 2016). It should be noted that internal funding was limited at the university, and data on Table 5 shows that academics had difficulty to receive external funding to do research, without which they could not enhance the amount of their research outputs (Hottenrott & Lawson, 2017; Sulo et al., 2012). In some cases, they had to spend more time to locate and secure research funding (Rawls, 2018). The academics in this study expressed low ratings for uninterrupted time for research because of their heavy teaching load. Consequently, teaching load significantly influenced their RP (Quimbo & Sulabo, 2014) because academics' RP depended on the time they spent on research-related activities with balancing the time they spent on their other responsibilities (Smeltzer et al., 2016). Mentoring was also an issue to academics in this study because their research outputs depended on experience and competence in research without which their RP could not be enhanced. In mentoring, for example, young lecturers received support and advice from lecturers with research experience (e.g., mentoring junior academics to do research) or between lecturers who collaborated in research (e.g., reviewing a manuscript for a colleague) (Nguyen, 2015). Another explanation for this finding could be issues with research interest and commitment. Only when academics have high commitment to undertake research because academics have research interest and are aware of their research responsibility, they are willing to be involved in research activities to achieve research goals (Nguyen, 2015).

5. CONCLUSION

The study results show that institutional climate was a significant predictor of both IAR and DAR; for every one unit increase on the predictor IC the count increased on the number of both IAR and DAR. In another finding, the regression coefficients for coordinating goals and research culture were negative, suggesting that academics scoring higher on CG and RC were more likely to exhibit a lower count for the number of IAR and DAR respectively than academics scoring lower on the measure. The findings suggest that greater attention should be paid to establishing appropriate research goals and communication. For example, research goals should focus on multidisciplinary research so that academics can collaborate with colleagues from different disciplines and they need to be well-informed with research activities within the institution. There are also implications that the aspects of a research culture (such as the availability of research resources such as library resources and well-equipped research space, external research funding, sufficient work time for research, research training and mentoring, and research emphasis such as shared interest and commitment) within the university should be improved so as to enhance academics' RP.

The study has some limitations. First of all, it used the number of IAR and DAR as a simple measure of RP, which may not reflect all areas of RP. Besides, the study could not examine academics' disciplines which might affect RP in this university. It lacks qualitative data such as in-depth interviews on the extent to which institutional characteristics impacted their RP. Therefore, future research should address these limitations to provide a holistic view of factors affecting research productivity.

Conflict of Interest: No potential conflict of interest relevant to this article was reported.

REFERENCES

Alrahlah, A. A. (2016). The impact of motivational factors on research productivity of dental faculty members: A qualitative study. *Journal of Taibah University Medical Sciences*, *11*(5), 448-455. https://doi.org/10.1016/j.jtumed.2016.06.006

Besancenot, D., Huynh, K., & Serranito, F. (2017). Co-authorship and research productivity in economics: Assessing the assortative matching hypothesis. *Economic Modelling*, *66*(C), 61-80. https://doi.org/10.1016/j.econmod.2017.05.018

Blackburn, R. T., Bieber, J. P., Lawrence, J. H., & Trautvetter, L. (1991). Faculty at work: Focus on research, scholarship, and service. *Research in Higher Education*, *32*, 385-413. https://doi.org/10.1007/bf00992183

Bland, C. J., & Ruffin, M. T. (1992). Characteristics of a productive research environment: Literature review. *Academic Medicine*, *67*, 385-397.

Bland, C. J., Center, B. A., Finstad, D. A., Risbey, K. R., & Staples, J. G. (2005). A theoretical, practical, predictive model of faculty and department research productivity. *Academic Medicine*, *30*(3), 225-237. https://doi.org/10.1097/00001888- 200503000- 00006

Borg, S., & Alshumaimeri, Y. (2012). University teacher educators' research engagement: Perspectives from Saudi Arabia. *Teaching and Teacher Education,*, *28*(3), 347-356. https://doi.org/10.1016/j.tate.2011.10.011

Brew, A. (2003). Teaching and Research: New relationships and their implications for inquiry-based teaching and learning in higher education. *Higher Education Research & Development*, *22*(1), 3-18. https://doi.org/10.1080/0729436032000056571

Chen, Y., Gupta, A., & Hoshower, L. (2006). Factors that motivate business faculty to conduct research: An expectancy theory analysis. *Journal of Education for Business*, *81*(4), 179-189. https://doi.org/10.3200/JOEB.81.4.179-189

Coxe, S., West, S. G., & Aiken, L. S. (2009). The Analysis of Count Data: A Gentle Introduction to Poisson Regression and Its Alternatives. *Journal of Personality Assessment*, *91*(2), 121-136. https://doi.org/10.1080/00223890802634175

Creswell, J. W. (1986). *Measuring faculty research performance*. Jossey-Bass.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). SAGE.

Cummings, W. K. (2014). The research role in comparative perspective. In J. C. Shin, A. Arimoto, W. K. Cummings, & U. Teichler (Eds.), *Teaching and research in contemporary higher education* (pp. 35-44). Springer.

Cummings, W. K., & Shin, J. C. (2014). Teaching and research in contemporary higher education: An overview. In J. C. Shin, A. Arimoto, W. K. Cummings, & U. Teichler (Eds.), *Teaching and research in contemporary higher education* (pp. 1-12). Springer.

Dundar, H., & Lewis, D. R. (1998). Determinants of research productivity in higher education. *Research in Higher Education*, *39*(6), 607-631.

Edgar, F., & Geare, A. (2013). Factors influencing university research performance. *Studies in Higher Education*, *38*(5), 774-792. https://doi.org/10.1080/03075079.2011.601811

Field, A. (2009). *Discovering statistics using SPSS (3rd ed.). London, England: Sage.* (3rd ed.). Sage.

Gregorutti, G. (2008). *A mixed-method study of the environmental and personal factors that influence faculty research productivity at small-medium, private, doctorate-granting universities. (PhD Dissertation).* Retrieved

from Proquest Digital Dissertation (3276618), Andrews University. https://digitalcommons.andrews.edu/cgi/viewcontent.cgi?article=1407&context=dissertations

Hafsteinsdóttir, T. B., van der Zwaag, A. M., & Schuurmans, M. J. (2017). Leadership mentoring in nursing research, career development and scholarly productivity: A systematic review. *International Journal of Nursing Studies*, *75*, 21-34. https://doi.org/10.1016/j.ijnurstu.2017.07.004

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate data analysis* (7th ed.). Pearson.

Hanssen, T.-E. S., Jørgensen, F., & Larsen, B. (2018). The relation between the quality of research, researchers' experience, and their academic environment. *Scientometrics*, *114*(3), 933-950.

Hottenrott, H., & Lawson, C. (2017). Fishing for complementarities: Research grants and research productivity. *International Journal of Industrial Organization*, *51*, 1-38. https://doi.org/10.1016/j.ijindorg.2016.12.004

Huynh, T. T. (2016). *Vietnamese academics' research capacity in tertiary contexts*. Doctoral thesis, Victoria University of Wellington.

Huynh, T. T., Nguyen, T. H., & Huynh, T. V. (2019). *A case study: Institutional Factors Affecting Lecturers' Research Engagement in A University in Mekong Delta region, Vietnam*. ASEAN/Asian Academic Society International Conference.

Jalloun, O. (2010). *Faculty research socialization: A study of faculty perceptions of research socialization experiences at a large research university*. ProQuest Dissertations Publishing.

Jung, J. (2012). Faculty research productivity in Hong Kong across academic disciplines. *Higher Education Studies*, *2*(4), 13. https://doi.org/10.5539/hes.v2n4p1

Kang, S., Ou, D., & Mak, C. M. (2017). The impact of indoor environmental quality on work productivity in university open-plan research offices. *Building and Environment*, *124*, 78-89. https://doi.org/10.1016/j.buildenv.2017.07.003

Koletsi, D., & Pandis, N. (2017). Poisson regression. *American Journal of Orthodontics and Dentofacial Orthopedics*, *152*(2), 284-285. https://doi.org/10.1016/j.ajodo.2017.05.009

Lertputtarak, S. (2008). *An investigation of factors related to research productivity in a public university in Thailand: a case study*. Victoria University, Melbourne, Australia.

Lindsay, R., Breen, R., & Jenkins, A. (2002). Academic Research and Teaching Quality: The views of undergraduate and postgraduate students. *Studies in Higher Education*, *27*(3), 309-327. https://doi.org/10.1080/03075070220000699

Little, R. J. A. (1988). A Test of Missing Completely at Random for Multivariate Data with Missing Values. *Journal of the American Statistical Association*, *83*(404), 1198-1202. https://doi.org/10.1080/01621459.1988.10478722

Man, J., Weinkauf, J., Tsang, M., & Sin, J. (2004). Why do Some Countries Publish More Than Others? An International Comparison of Research Funding, English Proficiency and Publication Output in Highly Ranked General Medical Journals. *European Journal of Epidemiology*, *19*(8), 811-817. https://doi.org/10.1023/B:EJEP.0000036571.00320.b8

Mantikayan, J. M., & Abdulgani, M. A. (2018). Factors affecting faculty research productivity: Conclusions from a critical review of the literature. *JPAIR Multidisciplinary Research*, *31*, 1-21.

Marshall, M. N. (1996). Sampling for qualitative research. *Family Practice*, *13*(6), 522-525.

Morris, B. (1967). The role of research in education. *The Irish Journal of Education*, *1*, 5-14.

Nguyen, D. N., Nguyen, D. T., & Dao, T. K. (2021). Effects of institutional policies and characteristics on research productivity at Vietnam science and technology universities. *Heliyon*, *7*, e06024.

Nguyen, P. V., Nguyen, T. A., Hoang, H. N., Tran, D. T. K., & Hoang, H. T. Q. (2020). Relationships between academics' research motivation and productivity. *Science and Technology Development Journal - Economics - Laws and Management*, *4*(3), 821-832. https://doi.org/10.32508/stdjelm.v4i3.652

Nguyen, Q. H. (2015). *Factors Influencing the Research Productivity of Academics at the Research-Oriented University in Vietnam*. Griffith University.

Nguyen, T. V., Ho-Le, T. P., & Le, U. V. (2017). International collaboration in scientific research in Vietnam: an analysis of patterns and impact. *Scientometrics*, *110*(2), 1035-1051. https://doi.org/10.1007/s11192-016-2201-1

Nygaard, L. P., & Bahgat, K. (2018). What's in a number? How (and why) measuring research productivity in different ways changes the gender gap. *Journal of English for Academic Purposes*, *32*, 67-79.

Prendergast, H. M., Heinert, S. W., Erickson, T. B., Thompson, T. M., & Vanden Hoek, T. L. (2019). Evaluation of an Enhanced Peer Mentoring Program on Scholarly Productivity and Promotion in Academic Emergency Medicine: A Five-Year Review. *Journal of the National Medical Association*, *111*(6), 600-605. https://doi.org/10.1016/j.jnma.2019.07.001

Print, M., & Hattie, J. (1997). Measuring quality in universities: An approach to weighting research productivity. *Higher Education*, *33*, 453-469. https://doi.org/10.1023/A: 1002956407943

Quimbo, M. A. T., & Sulabo, E. C. (2014). Research productivity and its policy implications in higher education institutions. *Studies in Higher Education*, *39*(10), 1955-1971. https://doi.org/10.1080/03075079.2013.818639

Ramsden, P. (1994). Describing and explaining research productivity. *Higher Education*(28), 207-226. https://doi.org/10.2307/3447753

Raston, C. (1998). Enhancing research productivity by using peer support. In L. Conrad & O. Zuber-Skerritt (Eds.), *Developing as researchers*. Griffith University.

Rawls, M. M. (2018). *Assessing research productivity from an institutional effectiveness perspective: How universities influence faculty research productivity* Virginia Commonwealth University. https://scholarscompass.vcu.edu/cgi/viewcontent.cgi?article=6556&context=etd

Smeby, J.-C., & Try, S. (2005). Departmental Contexts and Faculty Research Activity in Norway. *Research in Higher Education*, *46*(6), 593-619. https://doi.org/10.1007/s11162-004-4136-2

Smeltzer, S. C., Cantrell, M. A., Sharts-Hopko, N. C., Heverly, M. A., Jenkinson, A., & Nthenge, S. (2016). Assessment of the Impact of Teaching Demands on Research Productivity Among Doctoral Nursing Program Faculty. *Journal of Professional Nursing*, *32*(3), 180-192. https://doi.org/10.1016/j.profnurs.2015.06.011

Sulo, T., Kendagor, R., Kosgei, R., Tuitoek, D., & Chelangat, S. (2012). Factors affecting research productivity in public universities of Kenya: The case of Moi university, Eldoret. *Journal of Emerging Trends in Economics and Management Sciences*, *3*, 475-484.

Teodorescu, D. (2000). Correlates of faculty publication productivity: A cross-national analysis. *Higher Education*, *39*(2), 201-222. https://doi.org/10.1023/A:1003901018634

Toutkoushian, R. K., Porter, S. R., Danielson, C., & Hollis, P. R. (2003). Using publications counts to measure an institution's research productivity. *Research in Higher Education*, *44*(2), 121-148. https://doi.org/10.1023/A:1022070227966

Trivedi, P. K. (2014). Models for Count Data. In A. J. Culyer (Ed.), *Encyclopedia of Health Economics* (pp. 306-311). Elsevier. https://doi.org/10.1016/B978-0-12-375678-7.00716-1

Vasileiadou, E., & Vliegenthart, R. (2009). Research productivity in the era of the internet revisited. *Research Policy*, *38*(8), 1260-1268. https://doi.org/10.1016/j.respol.2009.06.005

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge University Press.