

FACTORS ASSOCIATED WITH RESEARCH PRODUCTIVITY OF AGRICULTURAL EDUCATION FACULTY

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Abstract

The purpose of this study was to determine the factors that explain the research productivity of agricultural education faculty in colleges and universities. In this study, publications in refereed journals were used as a surrogate for research productivity. The study described the research productivity of agricultural education faculty, their perceptions of the organizational culture that exists in their department to support research productivity, and their self-assessment of their research competency. The population for the study included all full-time, professorial rank faculty employed by colleges and universities in the United States that offered agricultural education. In general, an organizational culture and support for research exists in the departments where the faculty work. The faculty have confidence in their ability to conduct research and reject statements that contain concerns about conducting research. The regression analysis revealed that three variables explained 50% of the variance in research productivity. These variables included number of doctoral students advised to completion in the last five years, faculty members' perceptions of their research confidence, and the number of graduate assistant hours allocated to the faculty member. The variables that did not explain a significant proportion of the variance were percent of the faculty member's time allocated to research, salary, organizational culture and support of research, age, gender, rank, number of master's students advised to completion in the last five years, and number of years they had held a tenure track position.

Introduction

Every profession has a system that is used to evaluate its members. In higher education, past and recent studies have shown that research productivity plays a major role in attaining success in academia as it relates to promotion and tenure, salary, and the fringe benefits of the profession. Studies have also shown that research productivity varies widely from institution to institution depending on the emphasis that is placed on three key aspects of higher education, namely, teaching, research, and service.

Faculty members with longstanding success or integrity in research are often admired by other faculty and students as being on the cutting edge of their field and are regarded as knowledgeable about most issues in their field. These faculty members are seen as more powerful educators and often serve as a frame of reference for junior faculty members or others who are developing their own research agenda (Levine, 1997).

Most agricultural education faculty members believe in the importance of all three parts of the university mission and that all parts of the mission are just as important

in agricultural education as they are in any other academic field (Kelly & Warmbrod, 1986). This study focused on the research function of the universities' teaching/research/service mission.

Theoretical/Conceptual Base

The 1990s was a decade of increased productivity of published research in higher education (Sax, Astin, Korn, & Gilmartin, 1999). Although several studies have been conducted in areas such as research methods and research needs in agricultural education in recent years, a search of the literature reveals that minimal attention has been paid to research productivity of faculty in agricultural education. In a Delphi study using external decision-makers that addressed the mission, initiatives and obstacles to research in agricultural education, Buriak and Shinn (1993) reported that inadequate qualifications, insufficient funds, and a lack of value of research among agricultural educators were among the obstacles to the conduct of research.

Kelly and Warmbrod (1986) studied the research productivity of agricultural education faculty and found that "... faculty members in agricultural education and home economics education are substantially less productive than faculty members in other areas of vocational education" (p. 29). In addition, they reported that agricultural education was under represented among faculty with the highest research productivity.

Several variables have been reported to be related to research productivity. One key variable is the involvement of faculty with graduate student research. Kelly and Warmbrod (1986) found that the number of doctoral committees chaired successfully resulted in higher faculty research productivity. This was supported by Dunder and Lewis (1998) when they reported that high ratios of graduate students to faculty also correlates with productivity, and the percentage of graduate students that were hired as research assistants correlated highly with research production. Gorman and Scruggs (1984) also reported that participation in graduate student research was related to faculty research productivity.

Another factor related to faculty research productivity is the size of the institution in which the faculty member works. Behymer (1974) studied research productivity of faculty in four-year colleges and major research universities and reported that faculty in major research institutions publish more than faculty at four-year colleges. This was similar to the findings by Bailey (1992) in which he found a research productivity increase from Liberal Arts II Colleges through Research I Universities. Dunder and Lewis (1998), Gorman and Scruggs (1984), and Vasil (1992) also reported that institutional size was related to research productivity. However, Blackburn Bieber, Lawrence, and Trautvetter (1991) reported that the characteristics of the employing institution were not related to research productivity.

Age has been included in several studies with conflicting results. Bland and Berquist (1997) observed that the average productivity of faculty seems to drop with age, however, many senior faculty members remain quite active in research activities and their products are comparable to those of younger faculty members. They also reported that there is no significant evidence that age determines a drop in productivity, but increased workloads and shifting emphasis is to blame. Gorman and Scruggs (1984) reported that age was related to research productivity. Blackburn et al. (1991) stated that the relationship between age and research productivity had been addressed in many studies and that little if any, and sometimes contradictory, correlations have been found.

Gorman and Scruggs (1984) and Vasil (1992) found that the number of years of professional employment was related to faculty productivity. Pfeffer and Langton (1993) reported that total years in the profession had a major impact on total research, but an insignificant effect on recent research productivity. Again, Blackburn et al. (1991) stated that the relationship between educational experience and research productivity had been addressed in many studies and that little if any, and sometimes contradictory, correlations have been found.

Gender and research productivity have been studied with mixed results. Bailey (1992) reported a higher level of research productivity by male faculty members. Other researchers have noted that female faculty members are lagging behind experienced male faculty members in research productivity (Gmelch, Lovrich, & Wilke, 1984; Smith, Anderson, Lovrich, & Nicholas, 1995; Sax et al., 1996). Blackburn et al. (1991) stated that the relationship between gender and research productivity had been addressed in many studies and that little if any, and sometimes contradictory, correlations have been found.

Faculty members' confidence in their research abilities is related to faculty research productivity. Bean's (1982) model of faculty research productivity included the perceived level of legitimacy in one's research as an explanatory factor. Increases in ability and self-efficacy were also related to increased research productivity in studies conducted by Vasil (1992, 1996).

Several studies reported the relationship between research productivity and salary (Jacobsen, 1992; Pfeffer & Langton, 1993; Rebne, 1989; Tornquist & Kallsen, 1992). Since salary often reflects research productivity levels, this was expected. Paying attractive salaries in return for performance may serve as an incentive for higher productivity from faculty members. Higher salaries may also attract productive faculty while at the same time minimizing the possibility of losing active faculty to other institutions (Pfeffer & Langton, 1993).

The enhancement of the freedom to collaborate results in increased research productivity (Bland & Berquist, 1997). Landry et al. (1996) found that collaboration of all kinds may increase researchers' productivity. Pfeffer and Langton (1993) found that collaboration was reduced by wage dispersion.

Bailey (1992) found that rank is a significant predictor of research productivity. Dundar and Lewis (1998) found that departments with higher ranked faculty had higher research productivity. Vasil reported that rank is a significant predictor of research productivity (1992).

Kelly and Warmbrod (1986) stated that "Perceived institutional and departmental

support for research are seen as the most important enablers to research productivity" (p. 31). Dundar and Lewis (1998) found that the percentage of graduate students hired as research assistants correlated highly with research production. Only one study could be found (Dundar & Lewis, 1998) that addressed faculty size. They reported that programs with smaller numbers of faculty cannot compete in the area of research productivity with larger universities.

This study uses publication in refereed research journals as a surrogate for research productivity. This approach is supported by the literature. Radhakrishna and Jackson (1993) reported that publishing in refereed journals was ranked as the most important factor when agricultural and extension education department heads were asked to rank the importance of 13 factors in the evaluation of faculty. In a related study, Radhakrishna, Yoder and Scanlon (1994) concluded "Publications (refereed articles in journals and paper presentations in conferences) are considered to be a very important component of faculty productivity" (p. 17). This finding is supported by a comment made by William J. Cooper, former Dean of the Louisiana State University Graduate School. Dean Cooper stated that, "The only magic number is zero; if you haven't published in refereed journals, then publications in research conference proceedings, books and other publications are meaningless." (Personal Communication, August, 1990). In Kelly and Warmbrod's study (1986), most of the variance (84.1%) in their research productivity score was explained by publications in refereed journals, with the remaining variance explained by seven other variables. The decision to use refereed journal articles as a surrogate for research productivity was based on the studies cited here.

Purpose and Objectives

The purpose of this study was to determine the factors that explain the research productivity of agricultural education faculty in colleges and universities. In this study, publications in refereed journals were used as a surrogate

for research productivity. This study addressed the following objectives:

1. Describe selected demographic characteristics of the agricultural education faculty in the study.
2. Describe the research productivity of agricultural education faculty members in the study (using publications in refereed journals as surrogate or estimate of research productivity).
3. Describe agricultural education faculty members' perceptions of the organizational culture that exists in their department to support research productivity.
4. Describe agricultural education faculty members' self-assessment of their research confidence.
5. Determine if selected variables explain a significant proportion of the variance in the research productivity of agricultural education faculty.

Research Methods and Procedures

Population and Sample

The population for this study included all full-time, professorial rank faculty employed by colleges and universities in the United States that offered agricultural education. The frame for the study was drawn from the membership files of the American Association for Agricultural Education. Using Cochran's (1977) sample size formula, a random sample of 228 faculty was selected.

Instrumentation

The scales and items used in the instrument were selected after a review of the literature and grounded in the theoretical base of the study. The face and content validity of the instrument was evaluated by an expert panel of university faculty and doctoral level graduate students in agricultural education and in human resource education. The instrument was

pilot tested with 20 university faculty members. Changes recommended by the validation panel, when appropriate, and those identified as needed during the pilot test were incorporated into the instrument. These changes occurred in the wording of items, the design of scales, and in the instructions for completing the instrument. Internal consistency coefficients for the scales in the instrument were calculated using Cronbach's alpha and were as follows: organizational culture/support for research scale = .88, and faculty self-assessment of research confidence = .80.

Data Collection

The responses were collected using two mailings and a systematic follow-up of a random sample of non-respondents. Each mailing consisted of a questionnaire, cover letter, and stamped addressed return envelope. A response rate of 50% (114 of 228) was attained after the completion of the two mailings and the telephone follow-up.

Data Analyses

The data were analyzed using descriptive statistics for objectives one thru four. Stepwise multiple regression analysis was used for objective five. The alpha level was set a priori at .05. To determine if the sample was representative of the population and to control for non-response error, the scale means for the two primary scales were considered to be the primary variables in the study and the scale means were compared by response mode (mail versus phone follow-up) as recommended by Borg (1987) and Miller and Smith (1983). There were no statistically significant differences between the means by response mode for the two primary scales in the instrument: Organizational Culture/Support for Research Scale - $t = .02$, $p = .28$, and Faculty Self-Assessment of Research Confidence Scale - $t = 1.21$, $p = .23$. It was concluded that no differences existed by response mode, and the data were representative of the population. The mail and phone follow-up responses were combined for further analyses.

Findings

Objective One: Demographic Characteristics of Faculty

This objective sought to describe selected demographic characteristics of the faculty in the study. Most of the agricultural education faculty were male (88 or 83.0%) and their mean age was 46.5 years ($sd=9.80$). The mean salary of those who responded to this question ($n = 89$), without adjusting for length of contract, was \$64,302 ($SD= \$16,525$), with over half holding a 12-month contract (60 or 56.6%). Of those responding, 38.7% ($f=41$) were full professors, 22.6% ($f=24$) were associate professors, and 38.7% ($f=41$) were assistant professors.

The participants reported their universities allocated an average of 67.4% of their time for teaching, 13.2% of their time for conducting research, 10.7% of their time for service duties, and 7.6% of their time for administrative duties. Almost all (105 or 99.1%) had earned the doctorate. The number of doctoral students advised to completion in the past five years ranged from zero to 11 and the respondents averaged .8 completions ($SD=1.77$), while the number of masters students advised to completion in the last five years ranged from zero to 50 with an average of 10.5 students advised to completion ($SD=12.25$).

Objective Two: Faculty Research Productivity

In this study, articles published in refereed journals in the past five years were used as a surrogate for research productivity. Those surveyed reported that, in the past five years, they had published an average of 1.97 refereed journal articles for which they were the sole author ($SD=4.20$), an average of 3.14 co-authored refereed journal articles for which they were the lead author, and 2.64 co-authored refereed journal articles for which they were not the lead author ($SD=3.20$).

For the purposes of this study, total research productivity was calculated as

follows: the respondent was given a credit of 1.0 for each article published for which they were the sole author, a credit of .50 for each co-authored article published for which they were the lead author, and a credit of .33 for each co-authored article published for which they were not the lead author. The mean faculty research productivity score was 4.42 ($SD=5.95$).

Objective 3: Organizational Culture

The Organizational Culture/Support for Research (OCSR) Scale contained 20 items that assessed the faculty members' perceptions of the organizational culture and support for research that existed in their department. Responses were recorded on a five point Likert scale that ranged from 1=Strongly Disagree to 5=Strongly Agree. The responses are presented in Table 1. The respondents agreed with the two highest rated ($M=3.68$) statements, "My department supports my efforts to publish in refereed research journals", and "My peers recognize my efforts to publish in refereed research journals." The respondents strongly disagreed with the lowest rated ($M=1.39$) statement, "My department offers more or improved office space or facilities for those who publish in refereed research journals." The scale grand mean was 2.94 ($SD=.63$). The Cronbach's alpha for this scale was $\alpha=.88$.

Objective Four: Self-Assessment of Research Confidence

The fourth objective sought to describe the faculty members' self-assessment of their research confidence as measured by the Faculty Self-Assessment of Research Confidence. The respondents agreed with all items on the scale, with the highest rated item ($M=3.91$) being, "I am confident when writing the conclusions and recommendations of a study to be published in a refereed research journal." The overall mean for the scale was 3.80 ($SD=.67$). These data are presented in Table 2.

Table 1
Organization Culture/Support for Research (n=106)

Item	<i>M</i>	<i>SD</i>
My department offers merit pay for publishing in refereed research journals.	2.32	1.49
My department offers a reduction in teaching load for publishing in refereed research journals.	1.49	.99
My department offers desirable teaching assignments as a reward for publishing in refereed research journals.	1.41	.91
My department offers travel money as an incentive for publishing in refereed research journals.	2.35	1.44
My department offers more or improved office space or facilities for those who publish in refereed research journals.	1.39	.80
My department offers increased student support for individuals who publish in refereed research journals.	1.70	1.10
My department recognizes my efforts to publish in refereed research journals.	3.65	1.20
My department supports my efforts to publish in refereed research journals.	3.68	1.19
My peers recognize my efforts to publish in refereed research journals.	3.68	1.10
My peers support my efforts to publish in refereed research journals.	3.58	1.10
My university administration recognizes my efforts to publish in refereed research journals.	3.55	1.15
My university administration supports my efforts to publish in refereed research journals.	3.44	1.16
My department values collaboration in publishing refereed research articles.	3.63	1.10
Collaborative publishing of refereed journal manuscripts with other faculty in my department is encouraged.	3.51	1.16
Collaborative publishing of refereed journal manuscripts within my institution, but outside my department, is encouraged.	3.39	1.12
Collaborative publishing of refereed journal manuscripts with individuals from other institutions is encouraged.	3.42	1.10
I am encouraged by my department to involve students as co-researchers in my efforts to publish in refereed research journals.	3.30	1.15
My family supports my efforts to publish in refereed research journals.	3.60	1.12
My parenting responsibilities inhibit my efforts to publish in refereed research journals.	2.47	1.13
Faculty in my university view teaching as an impediment to publishing in refereed research journals.	3.28	1.20
Scale Grand Mean/Standard Deviation	2.94	.63

Note. 1=Strongly Disagree, 2=Disagree, 3=Undecided, 4=Agree, 5=Strongly Agree. Negatively stated items were reverse coded prior to calculating the grand mean.

Table 2
Faculty Self-Assessment of Research Competency

Item	<i>M</i>	<i>SD</i>	<i>N</i>
I am confident when writing the conclusions and recommendations of a study to be published in a refereed research journal.	3.91	.87	106
I am confident when writing the findings of a research study to be published in a refereed research journal.	3.90	.89	106
I am confident when determining a research methodology of a study to be published in a refereed research journal.	3.86	.81	106
I am confident when determining the purpose and objectives of a study to be published in a refereed research journal.	3.78	.80	106
The research I produce is respected by my peers.	3.75	.78	105
I am confident when conducting the data analysis of a study to be published in a refereed research journal.	3.74	.93	106
I am confident when determining a research/theoretical base of a study to be published in a refereed research journal.	3.70	.84	106
Scale Grand Mean/Standard Deviation	3.80	.67	106

Note. 1=Strongly Disagree, 2=Disagree, 3=Undecided, 4=Agree, 5=Strongly Agree. Negatively stated items were reverse coded prior to calculating the grand mean.

Objective 5: Explanation of Variance in Research Productivity by Selected Variables

The last objective sought to determine if selected variables explain a significant proportion of the variance in research productivity. A step-wise multiple regression procedure ($n=94$) was used to examine the amount of variance in research productivity explained by selected variables. The procedure revealed that three variables entered the model to explain 50% of the variance found in research productivity ($R^2=.50$). These variables included number of doctoral students advised to completion in the last five years ($R^2=.37$), faculty members' research confidence scale mean (additional $R^2=.09$), and the number of graduate assistant hours allocated to the faculty member (additional $R^2=.04$). The variables that did not explain a significant proportion of the variance were percent of the faculty member's time allocated to research, whether they were employed in a land grant university, age, gender, rank, number of master's students advised to completion in the last five years, and

number of years they had held a tenure track position. It should be noted that, even though salary has been shown to be related to research productivity, faculty salary was not included in the regression analysis because of the high non-response rate on this variable.

Conclusions

In general, an organizational culture and support for research exists in departments where agricultural education faculty work. The faculty have confidence in their ability to conduct research and do not have major concerns about conducting research. The number of doctoral students advised, number of graduate student hours allocated to the faculty member, and research confidence explain a major proportion of the variance in faculty research productivity.

The number of doctoral students advised is a very powerful explanatory variable for faculty research productivity. This conclusion supports the research by Kelly and Warmbrod (1986) in which they found

that the number of doctoral committees chaired successfully resulted in higher research productivity. This conclusion also supports the research by Dundar and Lewis (1998) in which they reported that high ratios of graduate students to faculty correlates with productivity. Gorman and Scruggs' (1984) conclusion that participation in graduate student research was related to faculty productivity is also supported.

The number of graduate assistant hours allocated to the faculty member explains a substantial proportion of faculty research productivity. This conclusion directly supports Kelly and Warmbrod's (1986) conclusion that "Perceived institutional and departmental support for research are seen as the most important enablers to research productivity" (p. 31) and Dundar and Lewis' (1998) conclusion that the percentage of graduate students hired as research assistants correlated highly with research production.

Research confidence explains a modest proportion of the variance in faculty research productivity. This conclusion is supported by Bean's (1982) model of faculty research productivity, which included the perceived level of legitimacy in one's research as an explanatory factor. Vasil's (1992, 1996) research is also supported; he found that increases in ability and self-efficacy were related to increased research productivity.

Although all variables included in this study were selected based on the theoretical and research foundation for the study, several variables do not explain faculty research productivity levels, namely, percent of the faculty member's time allocated to research, number of master's students advised to completion, age, gender, rank, size of the institution, and number of years in a tenure track position.

Implications

Research productivity has been and continues to be one of the most highly valued aspects of a faculty member's career, especially when university promotion and tenure, faculty evaluation, and university goals are considered. There are some in our

profession who want university administrators to place a higher value on other forms of scholarly productivity. However, until that occurs, agricultural education faculty and administrators would do well to heed the results of this and similar studies.

For the immediate future, research productivity in the form of publication in refereed research journals will continue to be strongly encouraged. Faculty should attempt to find ways to chair more doctoral committees, work to secure more research assistance in the form of graduate assistants, and work to improve their confidence in their research abilities. Faculty may want to pay some attention to the other variables addressed in this study since they were related to faculty productivity in other studies.

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