International Journal of Education & Literacy Studies
ISSN 2202-9478
Vol. 3 No. 4; October 2015
Australian International Academic Centre, Australia

The Relationship between Statistical Analysis Abilities and the Production of Research among Saudi Faculty Members

Abdulghani Ali Dawod Al-Hattami
Bahrain Teachers College, University of Bahrain
E-mail: aalhattami@uob.edu.bh

Arif Ahmed Mohammed Hassan Al-Ahdal (Corresponding Author)
College of Science and Arts, Methnab, Qassim University, Saudi Arabia
E-mail: arif_al_ahdal@yahoo.com

Received: 17-09- 2015 Accepted: 07-10-2015 Published: 31-10-2015
doi:10.7575/aiac.ijels.v.3n.4p.18 URL: http://dx.doi.org/10.7575/aiac.ijels.v.3n.4p.18

Abstract

Scientific research plays an important role in creating growth and progress in developing countries (Greenstone, 2010). Developed countries have realized that importance and focused on conducting scientific researches to help them make valuable decisions. Many Arab countries, including Saudi Arabia, are trying to encourage faculty members at all universities to write as many good quality researches as possible and benefit from the results that can serve the society better. This study examines the relationship between competency of university faculty members to statistically analyse data and their production of research. The sample included 158 faculty members from four universities in the Eastern Province of Saudi Arabia. Participants were asked to respond to a survey that carried 13 questions related to the ability to perform descriptive and inferential statistics. The results showed that more than 70% of faculty members do not have the ability to statistically analyse research data. The results also revealed that there was a significant positive relationship between the ability of faculty members to statistically analyse research data and the number of quantitative researches they produce, $r = 0.69$, $p < .05$. Such results explain why many academicians revert to writing qualitative research. It is recommended that faculty members in Saudi universities should improve their knowledge about the use and implementation of statistical tests appropriately.

Keywords: statistical skills, quantitative research, publication, data collection, statistical software

1. Introduction

It is a universal phenomenon for every one of us to make educated guesses concerning the future events in our lives in order to prepare and plan for new foreseeable and unforeseeable situations. Is it not 'data' that we analyse to do so? After all, our past experiences form the vital database that guides us to propound a theory even if it is for the most inconsequential things in life. This is where we are exercising what is called Descriptive Statistics. However, there will invariably be instances when such a simplistic interpretation of data will not be of much use and we need to arrive at answers that are not obvious from the data: A case of Inferential Statistics being applied.

Thus, statistics can be divided into two streams: Descriptive Statistics and Inferential Statistics. Each of these has a significant role to play, especially in social science research. Whereas inferential statistics functions in a realm beyond simply reaching conclusions based upon the data before us, the latter simply describes what the data speaks. For instance, in a particular study, inferential statistics can tell us what people hypothesized about their study and make inferences to the population, descriptive statistics can specify how many people think what they do out of the total population under consideration. Inferential statistics is used to make judgments on the probability that an observed difference between groups is a dependable one, or one that might have happened by chance in the study. Thus, we use inferential statistics to make inferences from our data to more general conditions; we use descriptive statistics simply to describe what's going on in our data. In other words, descriptive statistics present quantitative data in a manageable form. It enables us to make sense out of a large amount of data, making it comprehensible and hence, usable. It reduces extensive data into a simple summary.

Many of faculty members may believe that statistics is a relatively newer field of study: This is a fallacy. The term 'Statistics' acquired its modern meaning well into the 1830s. In fact, earlier than that, statistics meant to influence debates over social issues. The forerunner of statistics was called "political arithmetic", and these studies were mostly attempts to calculate population size and life expectancy in England and France. Those who conducted such numeric studies were called 'statists'. Over time, the statists' social research led to the new term for quantitative evidence: Statistics.

Galton (1822-1911), a British polymath, evolutionary theorist, introduced the correlation coefficient, the scatter plot, and also regression analysis, the prime tool of modern social-science statistics. Karl Pearson (1857-1936),

mathematician, biometrician and eugenicist, carried on Galton's work, and later on Émile Durkheim (1858-1917), the founder of modern day Social Anthropology, placed statistics in the center, finding covariance between suicide and religion, in addition to other variables. Before Durkheim introduced the use of statistics into the social sciences, researchers relied on a more philosophical procedure, based on reasoning and facts of experience.

In modern times, any social science research, whether in the area of language, sociology, history or political science, can be called worthy only when it applies statistical tools to arrive at conclusions. This is so because information about the society can have the larger implication of helping governments devise policies. With growing population size and ever expanding urban horizons, the need for information that could guide social policy has become greater than ever before. Statistical numbers offer a kind of precision, an authoritative account of social issues and problems.

This paper is looking into this subject in order to encourage more faculty members in higher education in Saudi Arabia to become more able to use statistical methods to analyse data, making Saudi Arabia a leader in the research production in the middle east. Faculty members from four universities in the Eastern Province of Saudi Arabia were surveyed during the academic years 2013/2014 to examine the relationship between their competency to statistically analyse data and their production of research. Results from this study may increase knowledge, growth and development in Saudi Arabia.

2. Literature Review

The use of parametric statistics, especially analysis of variance (ANOVA) and linear regression, has played an essential role in social research in a number of disciplinary areas for decades (Fox, 2010). There has been a significant increase, however, in the use of such analytic techniques in other areas of social science as well. The need for these analytic methods often arises whenever the researcher is analyzing numeric data (whether collected through surveys, in experiments, in field studies, or records).

Statistics is usually not studied for its own sake; it is a widely employed tool, and a highly valuable one, in the analysis of problems in natural, physical and social sciences. Further that statistical methods are nothing but a refinement of everyday thinking (Gupta and Aggarwal, 2012). They are especially appropriate for handling data which are subject to variations that cannot fully be controlled by experimental method.

It was argued by Hudson (2005) that literature research and literary criticism, as currently practised, confine themselves almost exclusively to textual analyses, scarcely ever mentioning or using numbers. Yet those disciplines that are near neighbours of literary studies are amongst the most vigorous and innovative users of quantitative methods and of computer aided research techniques. The scope for using social scientific, statistical and computer applications in literature research, as in so many branches of the Arts and Humanities, is great but its actual use appears to be negligible.

Sociologyguide.com has this to say about the role of statistics in Sociological research: Sociology is one of the social sciences aiming to discover the basic structure of human society, to identify the main forces that hold groups together or weaken them and to learn the conditions that transform social life. Sociologists seek the help of statistical tools to study cultural change in the society, family pattern, prostitution, crime, marriage system etc. They also study statistically the relation between prostitution and poverty, crime and poverty, drunkenness and crime, illiteracy and crime etc. Thus statistics is of immense use in various sociological studies.

In an enlightening account of qualitative methods of analysis, Swanborn (2010) went on to prove the indispensable nature of statistics. He said that almost all academic programs are data driven, and in this sense, inductive. Statements in advertising material, such as, 'relating to text fragments leads you to the discovery of the texture of the data'; 'visual theory building with the semantic network editor allows you to make relationships between emerging concepts visible' describe the authors' intentions. Some of these programs handle text data as well as graphical, geographical, audio and video data.

In an eye opening comment, Swanborn (2010) said that several contemporaneous social science disciplines, such as sociology, show a rather one-sided emphasis on the extensive, large scale strategy. One of the causes of this lack of balance is that an extensive approach easily allows for quantification. Multivariate analysis of data and statistics, together with the advance of computers in data analysis, have facilitated an extremely rapid development in the field. At the same time, however, modern social science is confronted with many problems that cannot be solved by an exclusively extensive approach. In the last decades of the twentieth century the combination of a survey (as a strategy 'in width') with an intensive counterpart (the 'in depth' strategy) gradually developed as the standard approach in applied research projects.

As a tool of the positivist tradition, the statistical method is a way of identifying patterns and regularities in the observable world (Moses and Knutsen, 2007). Statistics involve the systematic collection of data with the aim of achieving knowledge by induction, which is, making inferences from observed regularities to general theories. According to Guthrie (2013), even the most basic social science data can be expressed numerically and tested statistically. A strength of quantitative research is that rules encourage care. The rules get very complicated, but every statistical test has procedures that others can replicate. This provides an intellectual discipline that encourages accuracy. In other words, statistical analysis can add to the reliability of our research.

The relevance of statistical methods in social sciences engages with many issues that play a role in everyday life (Flick, 2011). The question whether everyday explanations and theories are correct or not is usually tested pragmatically. Flick discussed the characteristics of social research which are woven around various statistical steps: (1) Social research approaches issues in a systematic and above all, empirical way. (2) For this purpose you will develop research questions. (3) For answering these questions, you will collect data and analyse data. (4) The results are intended to be generalized beyond the examples that were studied. The fact that most research production from faculty members at most Arab colleges and universities are qualitative in nature indicate that there is a genuine lack of quantitative researches that lead to the generalization of findings and its benefit to the Arab nation. This research paper was conducted to find an answer to this phenomenon in general, and answer to the following questions in particular:

1. What is the ability level of faculty members to statistically analyse research data?
2. Is there a significant relationship between faculty members' ability to statistically analyse research data and their production of research papers?
3. Is there a significant relationship between faculty members' ability to statistically analyse research data and their production of research papers based on the major (Science vs. Humanities colleges)
4. Do universities encourage faculty members to produce research papers?
5. What are the reasons preventing faculty members from writing research papers?

3. Methodology

This study was designed to investigate the status of research productivity and its relationship with the knowledge of analyzing data statistically in Saudi Arabia. Data was gathered from a sample of faculty members through an on-line questionnaire using Google Docs. The questionnaire was sent to a random sample of about 400 faculty members from four universities in the Eastern Province of Saudi Arabia.

3.1 Population

The population of this study incorporated a random sample of full-time professors, associate professors, and assistant professors who were actively involved in teaching and/or research during the academic years 2013-2014 at four universities in the Eastern Province of Saudi Arabia.

3.2 Sample

The sample consisted of 158 faculty members (141 males and 17 females) at four universities in Saudi Arabia who have the academic ranks of professors, associate professors, and assistant professors and have spent the academic years of 2013-2014 teaching at the university level. The sample involved 12 professors, 28 associate professor, and 118 assistant professors; 52% of them were majored in Science and 48% in Humanities majors.

3.3 Instrument

A Likert-type rating scale was used to score the responses. The scale expressed a wide range of attitudes from strongly agree (5) to strongly disagree (1). The instrument used was based on the review of literature. It consisted of four parts. The first part was related to the demographic information seeking background data such as, gender, academic rank, and field of study. Part two required information about universities' role in encouraging research production. Part three covered research activities of each faculty member, including their ability to use different statistical tools used to analyse quantitative data. The last part pertained to the participants' reasons for not writing research papers (Appendix). The validity of the questionnaire was checked by three experts; one psychometrician and two in research methodology field.

4. Results and Discussion

This research paper showed that more than 81% of participants agreed that scientific research helps in solving many of the problems of the society. This finding supports many studies in literature like Gupta and Aggarwal (2012) and Fox (2010). The answers to the main research questions are presented below in the order it appeared in the literature review of this paper.

The analysis of the data showed that more than 70% of faculty members participated in the study do not have an adequate ability to analyse research data statistically using statistical software packages like SPSS, SAS, or other software.

Further, it was not surprising to find that there was a significant relationship between the ability of faculty members to statistically analyse data and their production of quantitative research papers, $r = 0.69$, $p < .05$. This seems obvious because many faculty members, about 63%, indicated that they did not have any training on how to analyse numerical data statistically. In addition, about 73% of them did not have information about how to select the appropriate statistical test for different research data analyses.

The results also indicated that there was no significant difference between Science and Humanities majors. However, the results showed that the relationship is stronger for Science majors ($r = 0.42$, $p < .05$) in producing more quantitative researches than the Humanities major ($r = 0.31$, $p < .05$).

When participants were asked about whether their universities encourage them to produce research papers, about 68%

disagreed that universities encourage them to write scientific research. This may be due to the fact that most universities do not have research centers that help faculty members produce research, as was reported by 82% of the participants. Furthermore, 77% of the participants indicated that universities do not provide training workshops about research methodology. In terms of funding research, 75% reported that universities do not fund faculty members to write research papers.

The participants were asked to pinpoint to the reasons that prevent them from writing research papers. The first reason that participants (about 37%) indicated is that they receive no funds to do so. The other reasons that were mentioned are shortage of time due to heavy workload, difficulty to collect and analyse data, some are not interested in writing research, and some need training on how to conduct research. Given the importance of scientific research, whatever obstacles faculty members face that render them from writing useful research in which the findings could be used to solve social and economic problems and therefore benefit the world should be taken seriously by the country. Governments should encourage people and pave the way to help them to write researches.

5. Conclusion

The developed countries realized the importance of research and allocated a good amount of fund to producing scientific findings which boost the economic, social and educational prosperity. Therefore, it is now the role of universities to contact with societies and investigate the problems they face and their needs and provide solutions to them (Fox, 2010). The production of research will definitely lead to advanced inventions and better technology. The problem that drove the researchers to conduct this study was that many faculty members have a strong interest to write research papers but they face a lot of obstacles; their ability to analyse data statistically using statistical tool is one such a problem. Furthermore, their ability to interpret statistical results is limited.

The relevance of statistical analyses in the social science was explained well by Flick (1998). Therefore, the lack of potential knowledge of statistics slows academicians from getting involved in a number of research writings. The findings of this study showed that there is a significant positive relationship between faculty members' ability to statistically analyse data and their production of research. Thorough and not just workable knowledge of statistical tools in social science research will enable the scholars to:

1. explore issues, fields and phenomena and provide first descriptions;
2. discover new relations between variables by collecting and analysing data;
3. provide empirical data and analyses as a basis for developing theories;
4. empirically document the effects of interventions, treatments, programmes, etc.;
5. provide knowledge (i.e. data, analyses and results) as an empirically grounded basis for political, administrative and practical decision making; and
6. test existing theories and stocks of knowledge empirically.

5. Recommendations

We expect that examination of the relationship between competency of university faculty members to statistically analyse data and their production of research will serve to encourage greater participation of faculty in data-driven research projects in their respective disciplines as well as in cooperation with faculty across different disciplines. Furthermore, we believe that universities play crucial roles in solving the problems related to research production faced by many faculty members. They ought to:

- provide annual competitive funds to encourage interested faculty to have the chance to get involved in writing research papers;
- provide continuous training workshops related to research methodology; specifically, how to write literature review, collect and analyse data, interpret results, use statistical software, use endnote and other reference organizing tools, and anything that is intended to improve faculty members write research papers; and
- establish research centres inside every university to help respond to faculty members' concerns and needs. The centre will also keep record of articles and subscribe in well-known journals for the different fields.

The university is part of the society and it has to cooperate with the industrial sector to move the industry ahead and drive the country to a prosperous future. The university and the society both need each other and no flourish will happen if they do not work hand in hand.

References

Denscombe, M. (2007). *The good Research Guide; for small scale social research, projects*, 3rd ed. Maidenhead: McGraw Hill.

Flick, U. (1998). The Social Construction of Individual and Public Health: Contributions of Social Representations Theory to a Social Science of Health, *Social Science Information, 37*, 639-62.

Flick, U. (2011). *Introducing Research Methods*. New Delhi: Sage.

Fox, R. A. (2010). Review of "Statistics in Language Research: Analysis of Variance" (by T. Rietveld and R. van Hout). *Language, 86*(3), 741-744.

Greenstone, M., (2010). *The importance of research and development (R&D) for U.S. competitiveness and a clean energy future*. Testimony before the U.S. Senate Joint Economic Committee, July 27th, 2010.

Gupta, G. and Aggarwal, H. (2012). Improving customer relationship management using data mining. *International Journal of Machine Learning and Computing, 2*(6), 874–877.

Guthrie, G. (2013). *Basic Research Methods*. New Delhi: Sage.

Hudson, P. (2005). Identifying Mentoring Practices for Developing Effective Primary Science Teaching. *International Journal of Science Education, 27*(14), 1723-1739.

Kennedy, M. M. (1979). Generalising From Single Case Studies. *Evaluation Quarterly, 3*, 661-678.

Lewins, C. & Silver, C. (2007). Using Software in Qualitative Research: A step by step guide. London: Sage.

Lijphart, A. (1971). Comparative Politics and the Comparative Method. *The American Political Sciences Review, 65*, 682-693.

Maxwell, J. A. (2005). *Qualitative Research Design: An Interactive Approach*, 2nd ed. Thousand Oaks, CA: Sage.

Moses, J. W. & Knutsen, T. L. (2007). *Ways of Knowing: Comparing Methodologies in Social and Political Research*. London: Palgrave.

Perecman, E. & Curran, S. (2006). *A Handbook for Social Science Field Research: Essays and Bibliographic Sources on Research Design and Methods*. Thousand Oaks: Sage.

Swanborn, P. (2010). *Case Study Research*. New Delhi: Sage.

Appendix

الزملاء الكرام

السلام عليكم ورحمة الله، وبعد:

أرجو المشاركة في الإستبانة التالية المتعلقة **بمدى إدراك أعضاء هيئة التدريس في الجامعات السعودية بأساليب التحليل الإحصائي للبحوث العلمية**، علماً بأنها لن تأخذ من وقتكم أكثر من 5 دقائق. مشاركتكم مهمة جداً لتحقيق أقصى إستفادة ممكنة من هذا البحث، وإذا أردت الحصول عل نسخة من نتائج هذا البحث بعدالنشر، فضلاً ضع بريدك الإلكتروني في آخر الاستبيان، وتقبل خالص التحية والتقدير.

- **المعلومات العامة:**

1- الجنس: ذكر/أنثي
2- الدرجة العلمية:معيد/مدرس/مساعد/ استاذ مساعد/استاذ مشارك/استاذ
3- سنين الخبرة في مجال التدريس:
4- التخصص:مجال علمي/مجال أدبي

- **دور الجامعة:**

1- يساهم البحث العلمي بالجامعة في معالجة مشكلات المجتمع.
2- تساهم الجامعة في تشجيع أعضاء هيئة التدريس على إنتاج الابحاث العلمية.
3- يوجد مركز متخصص في الجامعة يساعد أعضاء هيئة التدريس على إنتاج الأبحاث العلمية.
4- تقدم الجامعة برامج تنمي قدرات أعضاء هيئة التدريس في مجال البحث العلمي.
5- تساعد الجامعة في تمويل الأبحاث العلمية لأعضاء هيئة التدريس.

- **التحليل الإحصائي:**

1- سبق و إن حصلت على دورة في طريقة إعداد البحوث العلمية.
2- لدي المعرفة الكافية بأخلاقيات البحث العلمي (إشعار أفراد العينة بمخاطر البحث، أخذ موافقتهم قبل المشاركة، تجنب التحيز عند إختيار العينة، لا أستغل موقعي و أجبر الأخرين على المشاركة في البحث، الخ).
3- لدي المعرفة الكافية و القدرة على إعداد و تصميم الاستبانات و تحليلها إحصائياً.
4- لدي المعرفة الكافية و القدرة على إستخدام الوسئل العلمية المختلفة في جمع المعلومات.
5- لدي المعرفة الكافية و القدرة على إختيار الإختبارات الإحصائية الصحيحة لتحليل البيانات.
6- لدي المعرفة الكافية و القدرة على تحليل البيانات إحصائياً بإستخدام برنامج إحصائي (Minitab – SPSS – SAS – STATA – R – Excel)
7- لدي المعرفة الكافية و القدرة على إستنتاج مقاييس النزعة المركزية و مقاييس التشتت.
8- لدي المعرفة الكافية و القدرة على إستنتاج الرسوم البيانية.
9- لدي المعرفة الكافية و القدرة على إستنتاج العلاقات و الإنحدار الخطي و t-test و ANOVA و غيرة للمتغيرات.
10- لدي المعرفة الكافية و القدرة على ترجمة نتائج التحليل الإحصائي للبيانات.
11- أستخدم المركز التجارية لتحليل البيانات إحصائياً.

12- هل لديك بحوث علمية منشورة؟ نعم/لا

- إذا كانت الإجابة بـ *نعم*:

a. كم عدد الابحاث الكمية ..... النوعية .....

13- إذا لم يسبق لك عمل بحث علمي... فما هو سبب ذلك؟

- ضيق الوقت لدي
- لا أرى أن له أهمية
- عدم وجود حوافز
- صعوبة الحصول على المعلومة التي تساعدني لإعداد البحث.
- صعوبة تحليل البيانات إحصائياً
- أخرى:.....

شكراً جزيلاً على مشاركتك ووقتك الثمين!

- **إذا أردت الحصول على نسخة من نتائج هذا البحث بعد النشر، فضلاً ضع بريدك الإلكتروني.**