Construction and Validation of Research Satisfaction Scale (RSS) for Post-Research Analysis of Graduates

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ABSTRACT

A better understanding of the researcher's attitude starts with knowing their satisfaction level, which helps the agricultural universities understand research graduates and make necessary improvement plans. Absence of such a specific scale, forced to draft present piece in 2022 focusing on developing the Research Satisfaction Scale using the scale product method. Initially, 63 items were pooled, scrutinized, and reduced to 57 based on the rules of Edward and Kilpatrick and segregated into three groups as: 'Before, while performing, and after performing research.' Scale and Quartile values were calculated, and the statements with an S-value less than the Q-value were eliminated, bringing the number of statements to 53. For validation – Content Validity Index (CVI), both item and scale were used and Cronbach's alpha for measuring reliability. The score of Item- CVI <0.70 were eliminated, making the total number of statements 36. The Scale – CVI was 0.92, with an internal consistency value of 0.792, making the developed scale with 36 items valid and reliable. Research studies can be formulated by ICAR and SAUs to understand the contentment the graduates attained with their undertaken research activity.

INTRODUCTION

Social Science involves the study of human behaviour, their relationships with each other, and society. A human's psychological and behavioural aspects that affect their activities are qualitative and subjective, making them difficult to measure. A well-constructed scale in social sciences turns out to be the biggest asset for the research process. They are helpful instruments for assigning scores in numerical dimensions to phenomena that cannot be directly measured (Morgado et al., 2017). Clifford Woddy (1927) stated, "Research comprises defining and redefining problems; formulating hypothesis or suggested solutions collecting, organizing, evaluating data, making deductions, and reaching conclusions; to determine whether they fit the formulating hypothesis." In short, research is a continuous process that needs to be done repeatedly. Agriculture education in India is under the purview of the Indian Council of Agricultural Research (ICAR), offering undergraduate, postgraduate, and doctoral studies in 12 streams (Agriculture education portal). Students are exposed to research activity in their master's degree, where the submission of a thesis marks their course completion. Similarly, before taking up any job role (Connor et al., 2023) in a public or private organization as a scientist, doctoral students perform research activities.

Scientific advancements can only happen when these postgraduate students become future scientists, for which educational institutions play a massive role. For the master's students to make their path toward higher studies and for a Ph.D. graduate to obtain a full-time career, it is important to understand their level of satisfaction as an individual's satisfaction at the end of the work motivates them to continue and do better down the line.

The existing studies (Papanastasiou & Zembylas, 2008; Aqil & Upadhyay, 2017) developed scales on students' Attitudes Towards Research (ATR), forming evaluative statements under five sub-dimensions, namely research usefulness, research anxiety, positive attitudes, relevance to life, and difficulty of research. The book Organizational Behaviour states that attitude could influence future behaviour but, in turn, is influenced by job satisfaction, job involvement, and organizational commitment. A better insight could be attained when research satisfaction is studied instead of directly ATR. A thorough review of the literature highlighted the absence of a scale that could measure the satisfaction of researchers; thereby, the need for this study arose. To do a post-research analysis of post-graduate students, understanding their level of satisfaction would be the first step for which this 'Research Satisfaction Scale (RSS)' need to be constructed. Additionally, when agriculture institutions evaluate themselves in the context of their role in building the research acumen of students, RSS stands as a handy tool. It helps the institution to get an understanding of the activities of the student researchers to make improvement plans.

METHODOLOGY

Research satisfaction is operationally defined as a positive feeling about one's research resulting from evaluating its characteristics. A total of 63 items were written based on the researcher's experience and collected by discussing with seniors and faculty of agriculture extension (inductive method of item collection). At the same time, items were added based on the existing review of the literature (deductive method) (Morgado et al., 2017; Rishi et al., 2021). Conveniently the statements were grouped into three categories - 'Before the start of the research,' 'While performing research,' and 'After undergoing research.' Based on the criteria suggested by Edward & Kilpatrick (1948), the items were further edited, and 57 items were in the judge's opinion questionnaire. It was then sent to experts in the field of extension who marked their opinion 'whether the item needs to be included in the scale or not?' in a five-point continuum. A score of 1 for 'Not at all relevant' and 5 for 'Most relevant' was allocated.

It is essential to choose the method of scale development, and for RSS, we used the Scale Product method (Lynn & McMillen, 2004; Kapuriya et al., 2020). It is a combination of Thurstone's equal appearing interval scale and Likert's summated scale techniques, which means it retained the strengths (position anchoring of item and integer item response score, respectively) of both. Along with that, it overcame the limitations such as lack of quality assessment and each item having the same weight in the final score as found in Likert's scale construction procedure. Furthermore, the scale-product method overcame Thurstone's laborious, time-taking constraints and uni-dimensionality (Eysenck & Crown, 1949). In the end, finalized statements of the RSS were mentioned. Microsoft Excel was used for statistical analysis concerned with S- value, Q value, Item-CVI and Scale-CVI, and SPSS for reliability analysis. The formula for obtaining S value and Q Value (Meghwal et al., 2020).

RESULTS

A panel of 60 judges from agricultural universities in India, representing research scholars, specialists, extension educators, and social scientists, evaluated the statements. Once the judge's opinion was received, they were coded for the data processing, and scale and quartile values were calculated. By the end of this step, four statements were rejected.
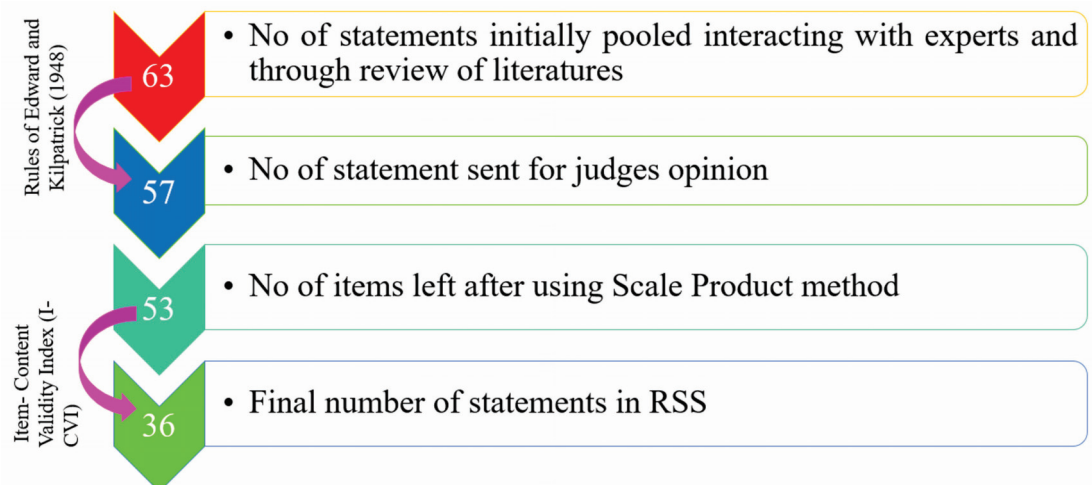
Validation of scale-reliability and validity

The Content Validity Index (CVI) will be calculated separately for items and scale. The statements issued for judges' opinions asking the relevance were used where the response of 'most relevant' and 'relevant' was coded as 1, and the other three responses (not at all and somewhat relevant, neutral) were coded for 0, conveying maximum favourability and un-favourability, respectively.

Procedure to calculate CVI- Item (I-CVI)

I-CVI can be obtained by dividing no of judges who gave relevant scores for a given statement to the total no of judges. It was calculated for all the items, and the score ranged from 0.30 to 1. The ideal I-CVI value should be >0.79 (Rodrigues et al., 2017); therefore, all items with a score below 0.79 were eliminated. By the end of this process, we were left with 36 statements (17 items lost), using which we computed Scale- CVI. Figure 1 depicts a detailed description of the item reduction.

Figure 1. A detailed flowchart of the item reduction procedure

Rules of Edward and Kilpatrick (1948)

63 • No of statements initially pooled interacting with experts and through review of literatures

57 • No of statement sent for judges opinion

Item- Content Validity Index (I-CVI)

53 • No of items left after using Scale Product method

36 • Final number of statements in RSS

Procedure to calculate CVI- scale (S-CVI)

The average method was used to calculate S- CVI. A summation of all I –CVI values (mentioned in Table 1) divided by the total number of items gives the S-CVI (average). The obtained total of all I-CVI values was 33.36 and was divided by 36 (no of items), giving the value of 0.92, proving the scale's content validity.

Reliability

For this, a final scale of 36 statements was administered to a sample of 70 agriculture students who had finished their master's degree through Google Forms. Proceeding to calculations based on the responses received, the internal consistency score of 0.792 was obtained, which is not only an acceptable level but closer to a good level of reliability.

The final scale to measure the research satisfaction of agriculture graduates

To know the extent of research satisfaction attained by the agriculture graduates, the developed research satisfaction scale consisting of 36 statements could be used (Table 1). The responses can be collected on a 5-point continuum, scoring 5 for 'Strongly agree' and 1 for 'Strongly disagree' for positive statements and vice-versa for negative statements. The individual score needs to be multiplied with the corresponding scale/median value (Butcher, 1956). The sum total of an individual's items becomes his research satisfaction score. The higher the score, the more will be the individual's research satisfaction. Obtaining responses from RSS will be economical and efficient for the questionnaire and interview schedule, ensuring its practicability.

Table 1. Final statements included in RSS

Statements	S-value	Q-value	I-CVI
Before the start of the research			
I find difficulty in the selection of research areas (-)	3.36	2.06	0.83
The pressure of publication disappoints me to pursue research (-)	2.93	1.90	1.00
Research allows me to work on my terms (+)	4.00	1.42	0.86
I feel research is a treasure that I can pass to the next generations (+)	4.33	1.29	0.90
Research allows me to make mistakes and learn from them (+)	3.00	1.18	0.86
I take time to analyze the situation, understand it and act accordingly (+)	4.06	0.96	0.86
I have good knowledge in areas of my research work (+)	4.22	1.14	1.00
I prefer academics over research (because of the tedious process of research work) (-)	3.09	2.43	0.93
I am confident that my research work has practical utility (+)	4.56	1.00	1.00
I had to work on the research topic as it was allotted to me but not chosen by me (-)	3.79	2.50	0.83
While performing the research			
It is very difficult for me to sit in front of a computer for a long time to do analysis. (-)	3.00	2.17	1.00
I have the ability to interpret the results in a better way (+)	4.13	1.02	1.00
The academic time allotted for the research activity is not sufficient (-)	3.00	2.56	1.00
Infrastructure availability plays a crucial role in research (+)	4.42	1.17	1.00
Working in the lab for long hours (/ preparing interview schedules for social science) makes me lethargic (-)	2.87	2.11	0.90
Personnel conflicts between faculties affect my quality of research work (-)	3.66	2.73	0.86
I cannot give proper attention to my diet and physique because of research activity. (-)	2.92	2.26	0.83
Overlapping of academic curriculum and research work often happens (-)	4.03	2.08	0.90
Lack of infrastructure (/Improper responses for social science) was a hindrance to my research work (-)	3.58	1.96	0.90
Fieldwork (/ Survey for social science) as a part of research is too tiring (-)	4.18	2.18	0.83
After performance the research			
I feel that research should be given more importance than academic performance (+)	4.40	1.31	1.00
If I had known the process of research, I would've chosen another option for my career (-)	3.18	1.99	0.93
I needed the guidance of the chairperson throughout the research process (-)	3.00	1.9	0.93
I want to pursue my career purely in research only (+)	4.08	1.33	1.00
I am satisfied with my current research work (+)	4.28	1.51	1.00
I found difficulty in searching for articles that support research findings (-)	3.68	2.2	0.83
Thesis writing is tedious work than actual research work (-)	3.85	1.29	1.00
Research taught me about teamwork and collaborations (+)	4.41	1.24	0.96
I have improved my English vocabulary after writing a thesis (+)	4.23	1.21	1.00
Unexpected environment (excess rainfall, temperature fluctuations, Covid-19 pandemic) affected my research work	3.95	1.81	0.83
I am inspired to pursue further research work because of my previous research work (+)	4.14	0.44	1.00
It discourages me that results of my research work are for the theoretical purpose (as review of literature) (-).	3.58	1.52	0.93
I can guide my juniors well with my experience in research (+)	4.43	1.07	1.00
If given chance, I would undo my previous research work and redo it differently (-)	3.00	1.90	0.93
I have good academic contacts due to my research work (+)	4.1	1.07	0.83
I am confident to conduct new research work effectively on my own (+)	4.27	1.00	0.90

DISCUSSION

Likert and Edward's (1969) criteria have 14 rules that help correct the statements for easy understanding, avoid ambiguity, and provide a holistic overview of the content. S and Q values will help in the further selection of statements. The statements with an S value greater than Q values shall be included and when having the same S value for both statements, the one with a lower Q value will be included. Validity, reliability, and practicability become the three major dimensions to check for a measurement tool (Sahu, 2013). Various methods were used for estimating validity and reliability by researchers (Kumar et al., 2015; Kumar et al., 2016; Shitu et al., 2018; Gupta et al., 2022; Vijayan et al., 2023). However, in this article, focused on testing the content validity, characterized as the extent to which components of an assessment tool are relevant to and indicative of the intended construct, using CVI. Higher CVI depicts that judges agree that the specific statement (item) has content validity. After confirming individual items with content validity, whether the entire scale concurs with content validity or not was measured by S-CVI. A higher value (>0.80) conveys content validity of the scale. Not only should the scale should measure what it intends to measure, but it should also be done consistently when used among different samples. Reliability is a measure that depicts the consistency of the scale and is calculated most commonly by Cronbach's alpha coefficient. A reliability score 0.792 shows a correlation between the statements, confirming the internal consistency.

CONCLUSION

Measuring research satisfaction is a significant part of understanding the researcher's attitude. A future that depends on young scientists currently under development in universities should have a higher inclination towards a research career. Agriculture as a subject will always be dynamic, and the students pursuing it must have a research orientation to contribute to technology development and dissemination. As part of their master's and doctoral degrees, the research performed forms the basis for their future career. Moreover, it lies in the hands of agricultural universities to make this experience holistic, which encourages them to generate creative, applicable problem-solving solutions. The extent to which the universities are fulfilling their duty in developing efficient researchers and the level of satisfaction students achieve after completion of research need to be measured for which RSS was constructed.

REFERENCES

Aqil, Z., & Upadhyay, A.K. (2017). Attitude towards Research Scale (ATRS): A factor analytic study. *International Journal of Indian Psychology*, *4*(4).

Attitudes & job satisfaction. (n.d.). In *Organizational Behaviour*. Pearson Education. https://wps.pearsoned.co.uk/ema_uk_he_robbins_orgbeuro_1/151/38820/9937929.cw/-/9937949/index.html#:~:text=Job%20satisfaction%20can%20be%20defined

Butcher, H. J. (1956). A note on scale product and related methods of scoring attitude scales. *British Journal of Psychology*, *47*(2), 133–139.

Edwards, A. L., & Kilpatrick, F. P. (1948). A technique for the construction of attitude scales. *Journal of Applied Psychology*, *32*(4), 374–384.

Eysenck, H. J., & Crown, S. (1949). An experimental study in opinion-attitude methodology. *International Journal of Opinion & Attitude Research*, *3*, 47–56.

Gupta, S. K., Nain, M. S., Singh, R., & Mishra, J. R. (2022). Development of scale to measure agripreneurs attitude towards entrepreneurial climate, *Indian Journal of Extension Education, 58*(2),153-57.

ICAR. (n.d.). *Under-Graduate, Post-graduate and Doctoral Programmes available for admission*. Agricultural Education Portal. Retrieved July 26, 2022, from https://education.icar.gov.in/graduate_course.aspx

Kapuriya, T., Jadav, N., Zala, P., & Chovatia, J. (2020). Standardized scale to measure factors related for avoidance of agriculture as a profession. *Indian Journal of Extension Education*, *56*(3), 198–200.

Kumar, R., Slathia, P. S., Peshin, R., & Nain, M. S. (2015). Development of scale to measure attitude of farmers towards rapeseed mustard crop. *Journal of Community Mobilization and Sustainable Development, 10*(2), 221-224.

Kumar, R., Slathia, P. S., Peshin, R., Gupta, S. K., & Nain, M. S. (2016). A test to measure the knowledge of farmers about rapeseed mustard cultivation. *Indian Journal of Extension Education, 52*(3&4), 157-159.

Lynn, M. R., & McMillen, B. J. (2004). The scale product technique as a means of enhancing the measurement of patient satisfaction. *Canadian Journal of Nursing Research Archive*, *36*(3), 66–81.

Meghwal, P. K., & Jadav, N. (2020). A Scale to measure perception of the farmers about role of mobile in decision making process in agriculture. *Indian Journal of Extension Education*, *56*(3), 173–176.

Morgado, F. F. R., Meireles, J. F. F., Neves, C. M., Amaral, A. C. S., & Ferreira, M. E. C. (2017). Erratum to: Scale development: ten main limitations and recommendations to improve future research practices. *Psicologia: Reflexão E Crítica*, *30*(1).

Papanastasiou, E. C., & Zembylas, M. (2008). Anxiety in undergraduate research methods courses: its nature and implications. *International Journal of Research & Method in Education*, *31*(2), 155–167.

Rishi, S., Dhaka, B. L., Kirti, Meena, L. K., & Meena, S. N. (2021). Developing an instrument to measure adaptive capacity of farmers to climate change. *Indian Journal of Extension Education*, *57*(4), 17–22.

Rodrigues, I. B., Adachi, J. D., Beattie, K. A., & MacDermid, J. C. (2017). Development and validation of a new tool to measure the facilitators, barriers and preferences to exercise in people with osteoporosis. *BMC Musculoskeletal Disorders*, *18*(1).

Sahu, P. K. (2013). Research methodology: a guide for researchers in agricultural science, social science and other related fields. Springer India. https://doi.org/10.1007/978-81-322-1020-7

Shitu, G. A., Nain, M. S., & Kobba F. (2018). Development of Scale for assessing farmers' attitude towards Precision Conservation Agricultural Practices. *Indian Journal of Agricultural Sciences*, *88*(3), 499-504.

Vijayan, B., Nain, M. S., Singh, R., Kumbhare, N. V., & Kademani, S. B. (2023). Knowledge test for extension personnel on *Rashtriya Krishi Vikas Yojana*, *Indian Journal of Extension Education*, *59*(1), 131-134.

Woody, C. (1927). The values of educational research to the classroom teacher. *The Journal of Educational Research*, *16*(3), 172–178.

Yusoff, M. S. B. (2019). ABC of content validation and content validity index calculation. *Education in Medicine Journal*, *11*(2), 49–54.