

**RESEARCH PAPER****Exploring the Nexus of Information Literacy and Research Productivity among Agriculture Researchers****¹Ch. Muhammad Nadeem Akhtar* ²Muhammad Shahzad and ³Dr. Fauz Dar Khan**

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***Corresponding Author** m.shahzad@uog.edu.pk**ABSTRACT**

The crucial role of information literacy for agricultural researchers lies in its capacity to augment the effectiveness and influence of academic pursuits within the agricultural field. This study aimed to assess the relationship between the identification, scope, planning, information literacy and research productivity of agricultural researchers. A cross-sectional and quantitative research design was used. A simple random sampling technique was used to collect data from 353 agricultural researchers working in the Punjab agriculture research wing. Data was collected using a questionnaire containing items related to the study variables. SPSS (edition 27) was operated to analyze collected data. The results of correlational analyses reveal a positive, moderate to strong correlation between the study variables and research productivity. The findings suggest to policymakers and organisations the importance of incorporating targeted information literacy training programmes for agricultural researchers' professional development.

Keywords: Agricultural Researchers, Information Literacy, Research Productivity**Introduction**

In today's knowledge-driven culture, information literacy—the capacity to locate, assess, and apply information—has become indispensable (Lupton, 2008). Comprehending the relationship between information literacy and research productivity becomes crucial as the research and institutional setting changes (Babalola & Umar, 2021; Bruce, 2000). A growing amount of research is being conducted with digital resources, large databases, and a variety of information outlets, which emphasises the importance of information literacy (Babalola & Umar, 2021; Bent et al., 2007; Farooq & Maher, 2021; Hussain et al., 2022). Strong information literacy abilities enable researchers to move quickly and wisely through this densely populated information ecosystem. It is anticipated that their research endeavours' efficacy and efficiency will be significantly impacted by this level of proficiency.

Understanding how the digital information ecology and scholarly communication are changing is crucial for placing our inquiry in context. The dynamics of information production and consumption have changed dramatically with the introduction of open-access repositories, collaborative research platforms, and a variety of data sources (Babalola & Umar, 2021). Researchers need to be more information literate because they are now producers as well as consumers of knowledge. Moreover, information literacy has an impact on research output that goes beyond personal aptitude. To improve the overall production and influence of their scholarly community, academic institutions and research organisations are realising more and more how important it is to help their members develop information literacy skills (Bruce, 2000; DeBose et al., 2017; Streatfield et al., 2010).

Information literacy is crucial in professional settings, and several studies have recognised this, highlighting how it influences research practises (Udem & Anaehobi, 2020). There is still a need in the body of literature to conduct a thorough investigation of the precise relationship between information literacy and research output. By using a strong quantitative design and techniques to examine the complex relationship, this study aims to close this gap. Thus, this study aims to examine the correlation between agricultural researchers' information literacy and research productivity. It specifically aims to investigate the identification, scope, planning, and general information literacy abilities of agricultural researchers as well as their influence on research productivity.

Our study on the relationship between information literacy and research productivity will advance scholarly discourse and improve our comprehension of this intricate relationship by significantly adding to the body of literature in several important ways: First, the research will provide detailed insights into the relationship between information literacy and research productivity by carrying out an extensive investigation. While previous research offers a basic insight, an empirical study can provide minute details, context-specific differences enhance our understanding of this relationship. Second, the study can offer actual data to support or improve on current theoretical frameworks that suggest connections between research productivity and information literacy. The academic grounds of study in this field are strengthened by the empirical grounding, which gives the theoretical foundations greater strength. Third, information literacy is a complex idea that can take many forms in various academic fields, organizational settings, and cultural situations. Our study examines how information literacy affects research productivity in an agricultural context. So this contextualization gives already-existing knowledge more substance and relevance.

Literature Review

Scholars have acknowledged that information literacy abilities enable people to successfully navigate the ever-changing and complicated world of information (Perry, 2017; Rader, 2002; Stephenson & Schifter Caravello, 2007). According to Okiki and Mabawonku, (2013), and Safdar and Idrees (2021) these abilities are essential for researchers to effectively interact with a wide range of information sources, evaluate their dependability critically, and incorporate pertinent findings into their work. This level of information literacy proficiency is seen to be a catalyst for improving the effectiveness of research procedures.

Some aspects of information literacy and its effect on research productivity have been the subject of studies (Mr, 2020; Olakunle & Olanrewaju, 2019; Veer et al., 2018). According to Udem & Anaehobi (2020), researchers possessing robust information retrieval abilities are more capable of effectively obtaining pertinent material, which in turn aids in the formulation of well-informed research questions and procedures. In a similar vein, it is suggested that for researchers to generate excellent, evidence-based outputs, they must possess the capacity to critically assess and synthesise material (Perry, 2017).

Institutional initiatives also have a significant effect on the relationship between information literacy and research productivity, in addition to individual competencies (Babalola & Umar, 2021; Malik et al., 2022). Academic and research organisations understand that to provide researchers with the skills they need, they must incorporate information literacy instruction into their curricula (Cunningham & Lanning, 2002; Kousar & Mahmood, 2015; Madukoma & Adekunle, 2022). Increased productivity in research and improved dissemination of research findings are linked to the successful integration of information literacy into academic courses (Carlson & Johnston, 2015a; Freeman & Lynd-Balta, 2010; Makinde et al., 2023; Monroe-Gulick & Petr, 2012; Resnis et al., 2010).

Moreover, the dynamic character of academic communication, which is marked by the swift expansion of digital platforms and resources with free access, underscores the importance of information literacy. Information literacy abilities are crucial for successful collaboration and efficient addition to collective knowledge for researchers working with a variety of data sources, collaborative platforms, and interdisciplinary projects (Olakunle & Olanrewaju, 2019; Safdar & Idrees, 2021).

The literature review highlights the complex relationship between research productivity and information literacy, identifying information literacy as a keystone of the scientific setting. Information literacy plays a vital role in improving researchers' capacity to efficiently navigate complicated information environments, critically evaluate sources, and synthesise ideas, according to scholars such as Babalola & Umar (2021); Bruce (2000); Udem & Anaehobi (2020). Hussain et al. (2022); and Malik et al (2022) add to this conversation by emphasising how information retrieval abilities affect the formulation of methodological and research questions that are well-informed. Furthermore, (D'Angelo, 2017) highlights the significance of information literacy in guaranteeing the generation of superior, empirically-based research results. The debate is expanded to institutional dimensions by Streatfield et al. (2010); Stephenson & Schifter Caravello (2007); and Rader (2002), who show how integrating information literacy into academic workshops has a favourable impact on the quality of research. Information literacy is essential for researchers as well as for creating a vibrant and productive research ecosystem, according to a review of the literature (Klucevsek, 2017). This synthesis offers a strong light on the complex relationship between information literacy and research productivity (D'Angelo, 2017; Ince et al., 2019; Malik et al., 2022).

To summarize, the body of research points to the notion that information literacy is essential for both individual researchers and a thriving, fruitful research ecosystem. Building on this rich body of literature, we investigate the empirical relationship between information literacy and its various components, and research productivity in this paper to provide insights that can guide institutional policies, educational practices, and the professional development of scientists and researchers.

Material and Methods

A simple random sampling approach was employed in the study. The study sample was made up of agricultural researchers working in the Punjab Agriculture Wing. Data were gathered via in-person visits and online questionnaire distribution on social media platforms (Facebook, WhatsApp, etc.). Twenty-seven research organizations working under this wing provided the data. To obtain a representative sample of agricultural researchers, 460 questionnaires were circulated. There were 380 completed surveys (response rate: 76%). Thirty questions had several missing values and were not completed. Therefore, these surveys were not taken into account. In the end, 353 surveys were determined to be valid and comprehensive.

The questionnaire had two parts. In the first part, demographic information was asked including area of specialization, work experience, nature of job, gender, designation and qualification. In the second part, items for measuring identification of information, the scope of information, the planning of information and information literacy were included. Likert scales with five points, 1 denoting strongly disagree and 5 denoting strongly agree, were used to measure the items. The identification of information was measured using 6 items. The scope of information was measured using 5 items. The planning of information was measured with 5 items. Finally, research productivity was gauged by taking the aggregate of the number of publications, book chapters, conference papers, and the number of students supervised in the last five years. Table 1 on following page presents the items in each variable. The Society of College, National, and University Libraries (SCONUL) developed the SCONUL Model in 1999, and it was updated in 2011. This model has seven

dimensions but in this study, only three were taken that are Identify, Scope, Plan, and considering the scope of the study. Reliability of Identification of information, the Scope of information, the planning of information, and information literacy were assessed through Cronbach's alpha. It was above the conventional cut-off value of .7. It was .78, .80, .72 and .73 respectively.

Table 1.
Scale Items

Identify (ID)	
ID1	Acknowledge a lack of comprehension in a certain area of study
ID2	Using simple words, formulate and explain a search topic or inquiry
ID3	Recognise that certain data and information are required to achieve a given goal, and be able to define the parameters for the information needed
ID4	Make use of the basic data to aid in the search process.
ID5	Take personal responsibility for searching for information
ID6	Manage your time well to finish the search
Scope (SC)	
SCI	Assess the amount of information that is required
SC2	Determine if there are any informational gaps
SC3	Determine which information resource categories best meet the needs
SC4	Determine the format of a source that could provide the necessary data
SC5	Formulate a precise search query utilising suitable terminology
Plan (PL)	
PL1	Determine the format of a source that might have the necessary information
PL2	Create a search strategy by using pertinent concepts and keywords, as well as by defining and setting boundaries.
PL3	Determine taxonomies and controlled vocabularies to make searching easier if necessary.
PL4	Use the proper search strategies as required.
PL5	Determine which specific search tools are appropriate for each distinct information requirement.
Information literacy (IP)	
Aggregate of ID, SC, and PL	

We used a cross-sectional survey to assess the study's research hypotheses. The study applied the Correlation Analysis technique using SPSS (27 edition). In the social sciences, correlation analysis is a well-respected statistical method for estimating the link between complicated variables.

Before the correlation analysis, the normality of the dependent variable was verified. Based on a preliminary investigation of the dependent variable's skewness and kurtosis values (skewness < 3.0; kurtosis < 10.0), the distribution of the variable seemed to be nearing normalcy. Specifically, the White (1980) test statistic was assessed to determine the homoscedasticity of the residuals generated as the null hypothesis. Bivariate correlations and variance inflation factors (VIF) were examined to further establish that collinearity was not an issue in the current study; the highest VIF was found to be much below the conventional cut threshold.

Results and Discussions

This section presents the results of the data analysis. It also elaborates on the results concerning previous studies conducted in relevant fields.

Respondents of the study are summarized in this table for their gender, qualification, designation, nature of job, specialization, and job experience. As we can see from Table 1, 72% of respondents were male. So the majority of agricultural researchers are male in Punjab. Only two 2% respondents were chief scientists. That means there is a severe paucity of senior researchers in the agriculture wing of Punjab. 24.5% of respondents have a specialization in soil science. Social science researchers are the largest section of researchers who are working in the agriculture wing of Punjab, Pakistan

Table 2
Sociodemographic Characteristics

Area of Specialization	f	%	Research Experience	f	%
Agri. Engineering	4	1.1	1 – 5	26	7.4
Agronomy	40	11.3	6 – 10	89	25.2
Biotechnology	1	0.3	11 – 15	138	39.1
Entomology	34	9.6	16 – 20	35	9.9
Food Technology	10	2.8	21 – 25	10	2.8
Horticultural Sciences	30	8.5	26 – 31	23	6.5
Plant Breeding & Genetics	120	34.0	32 and above	32	9.1
Plant Pathology	22	6.2	Total	353	100
Soil Science	88	24.9			
Any Other	4	1.1			
Total	353	100			
Qualifications:			Designation		
PhD	99	28	Chief Scientist	9	2.5
M.Phil/ MSc. (Hons.)	248	70.3	Principal Scientist	17	4.8
Master	05	1.4	Senior Scientist	139	39.4
BSc. (Hons.)	01	0.3	Scientific Officer	185	52.4
Total	353	100	Any Other	3	0.8
			Total	353	100
Gender			Job Nature		
Male	256	72.5	Full-Time	348	98.6
Female	97	27.5	Contract	5	1.4
Total	353	100	Total	353	100

Table 2. briefly presents the minimum, maximum, range, mean, standard deviation and variance of the key study variables.

Table 3
Descriptive Analysis

Var_	Range_	Min_	Max_	Mean_	Std. Devi_	Variance_
ID	24.00	6.00	30.00	24.3569	4.10412	16.844
SC	20.00	5.00	25.00	20.1785	2.90266	8.425
PL	20.00	5.00	25.00	19.9660	3.21378	10.328
IL	64.00	16.00	80.00	64.50	8.93	9.79
RP	98.00	1.00	99.00	22.0368	14.70646	216.280

There is a correlation between the identification of information and the research productivity of agricultural researchers.

H1 evaluates whether there is a correlation between the identification of information and the research productivity of agricultural researchers. The results of the study underscore that there is a positive, moderate, and statistically significant correlation ($r=32^{**}$, $p<.01$). Hence H1 is supported. See table 4 for the results of correlation analysis.

Additionally, this relationship's strength is classified as moderate, meaning that it is neither very strong nor very weak. This implies that information identification has a significant, if not entirely dominating, impact on agricultural researchers' research productivity.

This result confirms the association between the identification of information and the research productivity. Similarly, this result matches those observed in earlier studies (Ince et al., 2019; Udem & Anaehobi, 2020; Veer et al., 2018). Additionally, the correlation between the identification of information through online databases and the research output of researchers found in this study is in line with those of previous studies conducted on information literacy and research output (Exner, 2014; Farooq & Maher, 2021; Olakunle & Olanrewaju, 2019). Identification of information is crucial in finding relevant information. So researchers who are adept at identifying relevant information in information online platforms are more likely to produce quality research. This line of argument is corroborated by the ideas of Lloyd & Williamson (2008); and Udem & Anaehobi (2020) who suggested that efficiency in the identification of information is strongly correlated with research productivity.

There is a correlation between the scope of information and the research productivity of agricultural researchers.

H2 assess whether there is a correlation between the scope of information and the research productivity of agricultural researchers. The findings show that there is a positive, moderate, and statistically significant correlation ($r=39^{**}$, $p<.01$). Thus, H2 is supported.

This finding corroborates the findings of Veer et al. (2018). The amount or range of information that falls inside a specific context or domain also affects research productivity. This result is in line with earlier studies examining the association between the boundaries or limits of what is deemed relevant, to a certain investigation, research project, or information system to establish the scope of the information (Ince et al., 2019; Malik et al., 2022; Okiki, 2013). This finding supports previous research into this information literacy area which links the scope of information and research productivity (Babalola & Umar, 2021, 2021). This finding highlights how crucial it is to take information comprehensiveness into account to improve the efficacy of agricultural researchers. This line of reasoning is in accord with recent studies indicating that the ability to find comprehensive information is connected with research productivity (D'Angelo, 2017; Exner, 2014; Lloyd & Williamson, 2008). Previous studies conducted by Oyedokun et al (2019); and Perry (2017) on the importance of the scope of information in research productivity also seem to be consistent with this result. Therefore, the scope of information and research productivity are correlated.

Table 4
Correlation among the Study Variables

Vari-	ID	SC	PL	IL	RP
ID	1				
SC	.661**	1			
PL	.567**	.71**	1		
IL	.61**	.69**	.58**	1	
RP	.32**	.39**	.20**	.66**	1

**Correlation is significant at the .01 level

There is a correlation between the planning of information and the research productivity of agricultural researchers.

H3 examines There is a correlation between the planning of information and the research productivity of agricultural researchers. The findings show that there is there is a positive, small, and statistically significant correlation ($r=20^{**}$, $p<.01$). Consequently, H3 is endorsed. This result shows a minor but positive correlation, indicating that there is a noticeable boost in research output as agricultural researchers arrange their information-related tasks more carefully.

A potential explanation for this result is that planning carefully can help agricultural researchers find the information they need more quickly and efficiently. This gives them access to the books, articles, and other materials they need (Bruce, 2000). Planning may result in better time management, enhanced study design, and more informed decision-making. All of these could raise the calibre and production of research. This result matches those observed in earlier studies conducted on the correlation between the planning of information and research productivity (Farooq & Maher, 2021; Klucsevsek, 2017; Olakunle & Olanrewaju, 2019).

This result emphasises the role that deliberate information preparation plays in helping agricultural researchers become more productive researchers. The relationship between the planning of information and the research productivity is subtle, as indicated by the moderate but statistically significant association. This suggests that planning techniques should be further optimised to improve research outcomes. This finding is in agreement with those obtained by Ince et al. (2019); Lloyd & Williamson (2008) (DeBose et al., 2017; MacMillan, 2015; Monroe-Gulick & Petr, 2012; Vezzosi, 2006).

There is a correlation between information literacy and the research productivity of agricultural researchers.

H4 investigates whether there is a correlation between information literacy and the research productivity of agricultural researchers. The findings show that there is there is a positive, strong, and statistically significant correlation ($r=.66^{**}$, $p<.01$). Resultantly, H4 is endorsed.

This is a convincing finding that underpins the importance of the relationship between information literacy and research output among agricultural researchers. The strong positive connection highlights the critical role that information literacy plays in affecting people's research productivity in the field of agricultural research. This result is consistent with the larger body of studies emphasising the value of information literacy as a prerequisite for efficient research methods (Carlson et al., 2013; Carlson & Johnston, 2015b; Cowan & Eva, 2016; Makinde et al., 2023; Rader, 2002; Stephenson & Schifter Caravello, 2007). The significant strength of the association points to a strong and significant relationship. This implies that research output among agricultural researchers rises in tandem with information literacy competency.

Moreover, this finding further supports the idea that information literacy is crucial in boosting the research process. This can result in greater research productivity among other research related outcomes. For example, the study carried out by Cowan & and Eva (2016) stressed information literacy and its impact on research outcomes. Therefore, information literacy and research productivity are correlated resulting in greater research productivity among agricultural researchers.

Conclusion

To conclude, this study has shed important light on the relationship between information literacy and agricultural researchers' productivity in their research. The importance of information literacy abilities in influencing study outcomes is highlighted by the positive and frequently substantial correlations that have been seen across a range of factors. The strong relationship between research productivity and information literacy emphasises how important efficient information processing is to academic pursuits. These results add to the continuing conversation on information literacy's significance in professional and academic contexts. This conclusion provides a basis for further investigation and improvement of information literacy-promoting strategies, which will ultimately enhance agricultural research.

Recommendations

The study's findings point to possible directions for further studies and policymakers. Firstly, subsequent studies may examine the complex relationships between information literacy and research output in particular agricultural subdisciplines. Secondly, important insights could be gained from longitudinal studies that follow the development of information literacy abilities and how they relate to research productivity over time. Thirdly, the findings highlight the significance of including focused information literacy training programmes in academic and professional development frameworks for agricultural researchers for policymakers and institutions. The goal of these programmes ought to be to improve researchers' capacity to find, assess, and apply information sources. Moreover, given the dynamic character of information environments, policymakers might find it advantageous to adopt flexible approaches that include new technology and information sources into the training programme. This strategy would not only help to create a research community that is more information literate, but it would also help to improve research results in the agricultural field over time.

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