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Measuring Quality of the Agricultural Extension Pamphlets: Scale Construction and Standardization

H. S. Kassem[1,2*], M. A. Abdel-Magieed[2], H. M. El-Gamal[2], and F. O. Aldosari[1]

ABSTRACT

In Egypt, pamphlets are often used to disseminate agricultural information to farmers. The aim of this study was to construct and develop a scale of quality standards for agricultural extension pamphlets. The process to construct the scale involved the following steps: (1) The articulation of the construct; (2) Selection of response format; (3) Data collection; and (4) Psychometric analysis. The scale consists of 33 items measuring five domains: content; processing the information; the appearance of text; illustrations; and designing and formatting. Items analysis, reliability, and validity estimates were obtained by a group of experts (N= 78). The reliability of the domains was strong and ranged from (α= 0.81 to α= 0.91). The authors tested validation process by evidence of content validity, criterion-related validity, construct validity, and discriminant validity. Depending on the reliability and validity results, the scale was suggested as a reliable tool for assessing the quality of agricultural extension pamphlets. Implications for practice in planning and evaluation of printed materials for agricultural extension work are discussed.

Keywords: Psychometric analysis, Quality standards, Reliability of the domain, Validation process.

INTRODUCTION

Information has been identified as one of the essential ingredients needed for sustainable development. Information is a resource and every sector of the population engaged in agriculture needs information (Mokwatlo, 2005). According to Familusi and Owoeye (2014) and Snyman (2004), lack of knowledge acts as a barrier to communities communication, capacity building, and empowerment. To maintain their livelihood, farmers need to access information to improve traditional farming methods and to gain a competitive advantage in a rapidly changing environment (Morton and Matthewman, 1996).

Agricultural extension services need to disseminate information through multiple extension methods to adapt with specific needs of farmers (Elias *et al.*, 2015). Print media is still regarded as the primary means of disseminating agricultural information in industrial and developing countries (Ariyo *et al.*, 2013). Agricultural extension agencies have used different forms of print media, i.e., newspapers, magazines/journals, book/booklets, posters and pamphlets (Farooq *et al.*, 2007). The continuing importance of print media is due to many characteristics like portability, low technological complexity and cost, reviewability, credibility, the precision of expression, consistency of message, the ready availability of the required information, choice of contents, and ability

[1] Department of Agricultural Extension and Rural Society, King Saud University, Riyadh 11451, Kingdom of Saudi Arabia.
[2] Department of Agricultural Extension and Rural Society, Mansoura University, Mansoura 35516, Egypt.
[*] Corresponding author; e-mail: hskassem@ksu.edu.sa

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to share information (Hoffmann and McKenna, 2006; Morris, 2001; Paul, 2008). The print media are highly qualified for disseminating information to literate farmers and extension workers at the grassroots level (Flor, 2002). On the other hand, transferring printed media content to the illiterate farmers by their educated children has been found to be useful for solving illiteracy problem (Jennings and Packham, 2001).

The importance of using print media has increased in this era of Information Communication Technologies (ICTs). Flor (2002) stated that people rely more on electronic devices such as mobile and web sites to easily read any content. Printed materials can be tailored to the needs and interest of the audience and uploaded on different medians, offer options and facilitate decision making, and giving information on the economic feasibility of any recommended technology (Farooq *et al.,* 2007; Finnie *et al.,* 2010; Tian *et al.,* 2014].

According to Chiu *et al.* (2015), traditional extension publication are still more effective than digital media and most commonly used for agricultural safety and health information source by farmers. Furthermore, printed media can be an appropriate tool for farmers oriented extension, if they have the the ability to read and understand. In this context, Kassem *et al.* (2017) illustrated the association between readability of farmers' extension pamphlets and both availability of quality standards of information design and knowledge gained.

In the Egyptian agricultural context, the Agricultural Research Centre (ARC) has been disseminating agricultural information through print media in Arabic including the pamphlets, magazines, newspapers, booklets, folders, leaflets, factsheets, etc., to link farmers with agricultural innovations on different crops around the year.

The effectiveness of pamphlets mainly depends on information design that facilitates people to find what they need, understand what they find, and use what they know appropriately (Redish, 2000). By following sound information design principles, it is possible to influence readers' behavior and maximize suitability, and improve readability (Gill *et al.,* 2012; Jahan *et al.,* 2016; McCarthy *et al.,* 2012). A number of guidelines to design effective printed educational materials messages such as content, layout, cultural appropriateness, and illustrations have been emphasized in the literature, especially for print health materials (AMC Cancer Research Centre, 1994; Castro *et al.,* 2007; Centres for Disease Control and Presentation (CDC), 2009; Haute Autorite De Sante (HAS), 2008; Ladd, 2010; McCallum *et al.,* 2012; Pennisi *et al.,* 2011; Wizowski *et al.,* 2014).

A literature review of the role of pamphlets in dissemination of agricultural information among the farmers showed a weak impact on farmers' knowledge and practices. Research by El-Gamal (2015) confirms that many of the pamphlets produced in Egypt appear to have had low levels of readability and technical/educational characteristics. The authors were unable to find any studies conducted to determine the quality standards of written agricultural education materials disseminated in Egypt. This raises the question of what standards can be relied on to plan the production of pamphlets that will be useful, user-friendly, and comprehensible for the target farmer audience. Therefore, the main objective of this study was to develop and evaluate a scale for measuring quality standards of agricultural extension pamphlets.

MATERIALS AND METHODS

The participants of the study were 78 experts from University Staff and Researchers at Agricultural Research Center (ARC) of the Ministry of Agriculture in Egypt. Forty-eight experts from ARC were purposively selected who had previous expertise in writing and reviewing agricultural extension pamphlets and leaflets. These reviewers judged the first draft of the scale, while the rest of reviewers

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tested the final scale on a sample of pamphlets selected. The sample comprised of 54 males and 24 females. Ages of the participants ranged from 37 to 63 years.

The scale was developed and evaluated following the scale construction process identified by Furr (2011): construct articulation, determining a method for measuring response, data collection, and psychometric analysis.

An analysis of the relevant literature on quality standards of writing extension pamphlets was undertaken to determine the domains or key indicators. Based on the content analysis, authors accumulated a list of 50 items that compromised a preliminary draft of the scale to assess the quality of extension pamphlets. In the light that the sample of the study was composed of Arab staff and the majority of literature in this context was written in English language, the statements of the scale were written by the authors in Arabic. A professor of Arabic language checked the suitability of the items for Arabic language grammar. In the end, an independent bilingual professor reviewed the translated Arabic version of the final draft scale to English.

A preliminary draft of the scale was administrated to 48 experts to test the scale on a sample of 15 pamphlets in different agricultural fields issued by ARC in 2015. The experts expressed the degree of approval of each item (OK, to some extent, not OK) with assigned scores of 2, 1, and 0 respectively, with the ability to add amendments or new items for each area studied, as was deemed appropriate for each item, as well as deleting items that seemed inappropriate. As a result, one item was deleted (didn't obtain approval of 80% of the experts) and seven items were added. The final first draft of the scale consisted of 50 items (Table 1).

The authors used mean and standard deviation to arrange the total scores for the 48 experts. Then, for each of the 50 statements, a correlation coefficient was computed between the statement and its domain to clarify the discriminating power of each statement. Based on correlation coefficient value, 17 statements were rejected as they did not discriminate at the 0.05 level of confidence. The correlation coefficient for the statements is presented in Table 1.

The final draft of the scale comprised 33 items divided into five domains: Content (5 items), processing the information (9 items), the appearance of text (5 items), illustrations (5 items), and designing and formatting (9 items) (See Appendix 1).

Slavek and Drnovsek (2012) state that the scale will be useful and psychologically informative by reliability and validity measures.

RESULTS AND DISCUSSION

Cronbach's alpha coefficient for internal consistency was used to assess the reliability of the scale. Findings, as shown in Table 2, showed that Cronbach's alpha coefficient for the scale was 0.85, while alpha values for the five domains ranged from 0.81 to 0.91**.** This result indicated the internal consistency. Average inter-item correlation coefficients ranged for the five subscales from 0.51 to 0.69 (Table 2), while item-total correlation coefficients ranged from 0.38 to 0.88. To determine the possibility of removal of any item, the alpha-if-deleted values were determined and indicated that the scale would not be improved by the removal of any item and, therefore, the 33-item scale was accepted. Based on foregoing findings, the scale clearly demonstrated homogeneity of the items and the high internal consistency.

Content validity was assessed by 48 experts in ARC, who were expert in agricultural extension. They were asked to give their response on the clarity of items and their relevance with the corresponding domain. Moreover, the experts judged the extent to which the items adequately represented the quality standards and made amendments to the wording of statements, where necessary.

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Table 1. Distribution of the items of the first draft of the scale according to mean, standard deviations, variance, and correlation coefficient with the domain.

No	Items	Mean	SD	Variance	Correlation coefficient with domain
Domain 1: Content					
1	Information used should be important to the audience.	1.87	0.34	0.11	0.006
2	The accuracy of information.	1.87	0.34	0.11	0.51**
3	The newness of information.	1.82	0.38	0.15	0.15
4	Provide specific steps about the behavior desired.	1.71	0.51	0.26	0.41**
5	Formulate information as recommendations to avoid problems.	1.73	0.68	0.46	0.86**
6	The content should reflect the priorities of the audience needs.	1.79	0.62	0.38	0.88**
7	Write the most relevant information and eliminate all unnecessary words.	1.84	0.54	0.29	0.77**
Domain 2: Processing the information					
8	Use the conversational language.	1.71	0.51	0.26	0.38*
9	Use motivate in a sentence.	1.74	0.5	0.25	0.21
10	Imperatives used should be limited to advising or warning.	1.68	0.66	0.43	0.65**
11	Do not use concepts that underestimate the audience.	1.95	0.22	0.05	0.07
12	Use the simple language.	1.84	0.43	0.19	0.45**
13	Offer examples of possible behavior to convince the learner to adopt.	1.71	0.51	0.26	0.44**
14	Do not use words with double meanings.	1.92	0.27	0.07	0.15
15	Distribute the important information into different sections.	1.92	0.27	0.07	0.27
16	Stick to one idea at a time before moving to the next one to avoid confusion.	1.79	0.47	0.22	0.61**
17	Maintain average sentence length of 10-15 words.	1.84	0.43	0.19	0.53**
18	Explain and interpret non-common concepts.	1.71	0.56	0.31	0.57**
19	Use realistic and familiar language to your audience.	1.84	0.43	0.19	0.21
20	Write in an active voice.	1.82	0.56	0.31	0.38*
21	Do not use abbreviations and acronyms (when necessary give them first and spell the word in parentheses).	1.95	0.32	0.1	0.21
22	Use the logical order in presenting the information (general to specific).	1.89	0.31	0.09	0.48**
Domain 3: Text appearance					
23	Use a font size between 12-14 points in the body text.	1.95	0.22	0.05	0.48**
24	Use a clear font type that easy to read.	1.95	0.22	0.05	0.2
25	The font of headings should be colored and bigger than the rest of text (2 points at least).	1.63	0.78	0.61	0.62**
26	Make the headings and subheadings or the important information bold to the readers.	1.89	0.31	0.97	0.49**
27	Use a black font in a body text on white background to make a contrast.	1.82	0.45	0.2	0.62**
28	Avoid use glossy paper.	1.84	0.43	0.19	0.45**
Domain 4: Illustrations					
29	Present one idea for each visible.	1.95	0.22	0.05	0.46**
30	Avoid cluttering the image.	1.89	0.31	0.09	0.55**
31	Write a brief comment for each visual. [a]	2	-	-	-
32	Present pictures that help to emphasize or explain the text.	1.84	0.37	0.13	0.11
33	Present the images that show both positive and negative impact and behavior.	1.97	0.16	0.02	0.2
34	Avoid graphs/Charts unless they really help readers to understand the material.	1.87	0.41	0.17	0.28
35	Use arrows and circles to refer to the basic idea	1.87	0.41	0.17	0.28
36	Include natural pictures with realistic colors.	1.92	0.27	0.07	0.19
37	Keep each image consistent with audience culture. [a]	2	-	-	-
38	Make sure your images are of high quality and up to date.	1.95	0.22	0.05	0.49**

Continued…

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Continued of Table 1.

No	Items	Mean	*SD*	Variance	Correlation coefficient with domain
Domain 5: Designing and formatting					
39	The cover of the pamphlet should be colored and attractive.	1.95	0.22	0.05	0.41**
40	The cover should reflect the core idea of the pamphlet.	1.82	0.51	0.26	0.21
41	Use headings, subheadings, and bullets to arrange the content.	1.74	0.68	0.46	0.09
42	Leave white space above the heading bigger than space under it.	1.74	0.68	0.46	0.69**
43	Leave enough amounts of white spaces without print.	1.89	0.38	0.15	0.69**
44	Include 60 words maximum in each paragraph (7-8 lines per paragraph).	1.66	0.7	0.5	0.27
45	Include page numbers.	1.82	0.45	0.2	0.46**
46					
47	Include index at the beginning of the pamphlet.	1.92	0.27	0.07	0.57**
48	Include bibliography to the end of the pamphlet.	1.92	0.35	0.12	0.46**
49	Use a justified left and right margin.	1.84	0.49	0.24	0.32*
50	Keep page size limited to 3-4 paragraphs (maximum 20 lines).	1.68	0.73	0.54	0.65**

* Significant at 0.05 level, ** Significant at 0.01 level. [a] Correlation coefficient was not estimated since all experts agreed that the item was Ok.

Table 2. Inter-correlation coefficients between the five domains of the scale.

Domain	Cronbach's Alpha	Correlation coefficient between domain and overall scale
Content	0.87	0.51**
Processing the Information	0.91	0.69**
Text appearance	0.88	0.61*
Illustrations	0.81	0.53**
Designing and formatting	0.82	0.62**
Overall scale	0.85	

** Significant at 0.01 level.

Table 3. Inter-correlation coefficients between the five domains of the scale.

Domain	Total scale	Content	Processing the information	Text appearance	Illustrations	Designing and formatting
Overall scale	-					
Content	0.97**	-				
Processing the information	0.71**	0.4*	-			
Text Appearance	0.77**	0.61*	0.38*	-		
Illustrations	0.72**	0.65**	0.41*	0.46*	-	
Designing and formatting	0.84**	0.69**	0.36*	0.6**	0.67**	-

* Significant at 0.05 level, ** Significant at 0.01 level.

Each item obtained approval of, at least, 80% of referees. The authors considered this result sufficient to achieve the content validity. A high level of experts' familiarity and integrity in responding and reviewing the statements in a positive manner to the items reflects a high level of content validity.

Construct validity was achieved by measuring the relationships among scale's items and scale's domains with the total score of the scale. Table 3 shows that all values of correlation coefficients were significant at, at least, 0.05 level. Also, all values of standard deviations were estimated in a low range from 0.22 to 0.78 (Table 1). As for evidence based on the internal

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structure of the scale, the domains of the scale implied five subscales of standards that proved to be homogeneous, but also distinct from each other. This was a significant contribution to the reliability estimates of the domains and the high values of correlation coefficients between each subscale and the overall score on of the scale (Table 2).

Thirty faculty member from the Faculty of Agriculture, Mansoura University, were asked to use the scale for judging three pamphlets to evaluate the criterion-related validity of the scale. The pamphlets were titled poultry production, cultivating rice, and irrigation management in greenhouses. These pamphlets were different based on all domains. The scores obtained were used as the predictor. At the same time, twenty-four students, who took the course of extension methods, were asked to judge the same pamphlets by using the scale developed. The students' scores were used as the criterion. The high correlation coefficient value (r= 0.87, P= 0.000) was found between the two scores. Comparison of the scale's scores between students and experts related to their assessment of the extension pamphlets was

Appendix1. Items of the scale of quality standards for the agricultural extension pamphlets**.**

No	Item statement
A- Content	
1	Information used should be accurate and consistent with best practice.
2	Focus on applicable information or recommendations to clarify behavior desired.
3	Choose 2-3 main subtopics to focus on.
4	The content should reflect the priorities of the audience needs.
5	Write the most relevant information and eliminate all unnecessary words.
B- Processing the information	
6	Use the conversational language.
7	Imperatives used should be limited to advising or warning.
8	Use the simple language with familiar words to clarify information.
9	Offer examples of possible behavior to convince the learner to adopt.
10	Stick to one idea at a time before moving to the next one to avoid confusion.
11	Maintain average sentence length of 10-15 words.
12	Explain and interpret non-common concepts.
13	Do not use abbreviations and acronyms (when necessary give them first and spell the word in parentheses).
14	Use the logical order in presenting the information (general to specific).
C- Text appearance	
15	Use a font size between 12-14 points in the body text.
16	The font of headings should be colored and bigger than the rest of text (2 points at least).
17	Make the headings and subheadings or the necessary information bold to the readers.
18	Use a black font in body text on white background to make a contrast.
19	Avoid using glossy paper.
D- Illustrations	
20	Present one idea for each visual.
21	Avoid cluttering the image.
22	Write a brief comment for each visual.
23	Make sure your images are of high quality and up to date.
24	Keep each image consistent with audience culture.
D- Designing and formatting	
25	The cover of the pamphlet should be colored and attractive.
26	Leave white space above the heading bigger than space under it.
27	Leave enough amounts of white spaces without print.
28	Include 60 words maximum in each paragraph (7-8 lines per paragraph).
29	Include page numbers.
30	Provide contact information for feedback. (Telephone, e-mail, fax, publisher, etc.)
31	Include index at the beginning of the pamphlet.
32	Include bibliography to the end of the pamphlet.
33	Keep the page size limited to 3-4 paragraphs (25 lines maximum).

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an indicator for a high level of predictive validity of the scale and indication of the evidence on relations to other variables. This result obviously showed the high predictive validity of the developed scale.

Discriminant validity was achieved by conducting a t-test for comparing the statistical differences between the lowest and the highest means of 25% of the 30 experts' responses who judged the three pamphlets. As a result, significant differences were found between the two means. Thus, the significant differences highly contribute to the evidence of the discriminant validity of the measure.

CONCLUSIONS

The quality standards scale for agricultural extension pamphlets was found to be a standardized and an objective one, as indicated by the validity, reliability, and norms of distribution of scores. Since there is no sufficient number of valid and reliable measures for quality standards of agricultural extension pamphlets, we recommend this scale to be used in agricultural extension**.** University staff and agricultural researchers can easily use the scale as a guide in the planning process of writing extension pamphlets and for the evaluation process to assess the quality of pamphlets. Accordingly, the accountability purposes for the Central Administration of Agricultural Extension Services (CAEES) in Egypt, which is responsible for all processes of pamphlets' production, is to genuinely understand and monitor the application of these standards to ensure the effectiveness and readability of pamphlets, especially those targeting farmers.

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ساخت و استاندارد کردن مقیاس سنجش کیفیت جزوه های ترویج کشاورزی

ه. س. قاسم، م. ع. عبدالمجید، ه. م. الجمال، ف. ا. الدوساری

چکیده

در مصر، برای پخش اطلاعات کشاورزی غالبا از جزوه استفاده می شود.هدف پژوهش حاضر ساخت و برپاسازی مقیاسی کیفیتی برای جزوه های ترویج کشاورزی بود. فرایند ساخت این مقیاس شامل گام های زیر بود:۱) وضوح مقیاس ساخته شده، ۲)انتخاب آرایه و قالب بندی پاسخ، ۳)گردآوری داده ها، و ۴) تجزیه تحلیل روانشناسی. مقیاس مزبور دارای ۳۳ آیتم بود برای اندازه گیری ۵ دامنه(domain): مطالب محتوایی، فرآوری اطلاعات، ظاهر متن، نمودارها، طراحی و آرایه بندی. تحلیل آیتم ها، برآورد اطمینان سنجی و اعتبار سنجی با استفاده از یک گروه از متخصصین(N=78) انجام شد. درجه اطمینان دامنه ها قوی بود و مقدار آن در محدوده α=0.81 تا α=0.91 تغییر میکرد. نویسندگان مقاله فرایند اعتبار سنجی را با شواهد اعتبارمحتوا، اعتبار مربوط به ضوابط، اعتبار ساختار، و اعتبار تشخیصی(تمایزی) (discriminant validity) سنجیدند. بسته به نتایج مربوط به اطمینان و اعتبار، یک مقیاس به عنوان ابزاری مطمئن برای ارزیابی کیفیت جزوه های ترویج کشاورزی پیشنهاد شد. همچنین، پیآمدهای عملی برای برنامه ریزی و ارزیابی مطالب چاپی برای کارهای ترویج کشاورزی در این مقاله بحث شده است.

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