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# Development and Standardization of e-Booklet on Environmental Sound Technologies for Rural Women

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## ABSTRACT

In rural areas, women often have limited access to information and resources on environmental sound technology. Electronic booklets can be an effective tool to bridge this gap and empower rural women to improve their knowledge in this field. Electronic booklets can serve as a valuable resource for rural women, providing them with important information, tips, and best practices on environmental sound technology. By utilizing this digital medium, women can enhance their understanding of sustainable practices, renewable energy sources, and eco-friendly solutions for their communities. This innovative approach can contribute to the empowerment of rural women, enabling them to make informed decisions and take proactive steps towards a more environmentally sustainable future. The prepared e-Booklet was administered to 30 judges from Swami Keshwanand Rajasthan Agricultural University. For standardization a valid and reliable questionnaire was used and judge's feedback regarding the e-booklet was recorded with this. The effectiveness of e-Booklet was assessed using weighted mean score, reliability and perceived feasibility index. Regarding effectiveness of e-booklet results shown that overall mean score for attributes of compatibility 2.97 was followed by content presentation (2.95), writing style (2.94), illustration (2.93), accuracy (2.93), coverage (2.92) and objectivity (2.90), respectively. Overall reliability coefficient of e-Booklet found significant at 1% level of significance with 0.81**"r" value. The perceived feasibility of e-Booklet was high with 2.93 overall means score and perceived feasibility index of e-Booklet was 97.60. Overall content validity ration (CVR) of e-booklet was 0.81* significant at 5% level of significance.

**Keywords:** Environmental Sound Technologies, e-Booklet, Development and standardization

## INTRODUCTION

Environmental Sound Technologies (ESTs) are technologies that have the potential for significantly improved environmental performance relative to other technologies. Environmental sound technologies protect the environment, are less polluting, use resources in a sustainable manner, recycle more of their wastes and products, and handle all residual wastes in a more environmentally acceptable way than the technologies for which they are substitutes. The new technology means producers can work easier and improve cattle welfare, production efficiency, and profitability. Hence, the present study was undertaken for development and standardization of electronic booklet on environmental sound technology for rural women.

**Objectives:**

To develop e-Booklet on environmental sound technology for rural women

## METHODOLOGY

**Development and Standardization of e-Booklet:**

As per objectives, the literature of e-booklet was prepared on the basis of collected information regarding environmental sound technologies for rural women from the respondents and documented by the researcher. At

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initial stage the material was also collected from the books, internet, journals that supported study for developing content on the selected aspects of environmental sound technologies. The standardization of developed e-booklet was measured by assessment, reliability coefficient, content validity ratio and field applicability of e-booklet.

**Statistical tools:**

***Mean scores:***

Mean scores were calculated to evaluate developed e-booklet and also to find out readability and comprehension of e-booklet by respondents.

$$\text{Mean Score} = \frac{\text{Total score}}{N}$$

whereas,

N = Number of members

Mean score was obtained by dividing total score given by panel members for evaluation of e-booklet and total score given to respondents for readability and comprehension of the e-booklet.

***Coefficient of reliability (Split half technique):***

The reliability of an e-booklet was tested with the application of split half technique by administering the e-booklet to 30 judges. The results of judges were marked 3, 2 and 1. The zero order correlation coefficient between even and odd numbered items was calculated as a measure of reliability. Subsequently, the coefficient of reliability was computed with the help of Spearman Brown Prophecy formula, which is as follows;

$$r_{tt} = \frac{2r_{hh}}{1 + r_{hh}}$$

where,

$r_{tt}$ = Reliability of total test estimated

$r_{hh}$ = Correlation between two tests

***Weighted mean score and ranking:***

Weighted mean score was used to access the effectiveness and perceived feasibility index of e-booklet. For each item the frequencies falling under each rating were tabulated. Then the frequencies of each category were multiplied by the score and added. Then resulting sum of each aspect were divided by the total number of respondents. In this way, the weighted mean score in each aspect were calculated.

***Perceived field applicability index (for each message):***

$$\text{PFAI} = \frac{\text{E (RA + PC + CC + SC + Tr)}}{\text{P (RA + PC + CC + SC + Tr)}} \text{ x } 100$$

where,

PFAI = Perceived field applicability index (for each message)

E = Extent to which message was rated field applicable by the judges as regard to relative advantages (RA), physical compatibility (PC), cultural compatibility (CC), simplicity / complexity (SC) and triability (Tr)

P = Maximum limit to which message was rated field applicable as regard to relative advantage (RA), physical compatibility (PC), cultural compatibility (CC), simplicity / complexity (SC) and Triability (Tr).

***Content Validity:***

Content validity of booklet was measured in terms of accuracy, coverage objectivity, content presentation, illustration writing style and compatibility by providing booklet to the judges with a schedule which was developed to get judges opinion whether the content of booklet is valid or not. The formula given by Lawshe (1975) was used to evaluate content validity ratio (CVR) as under:

$$\text{CVR} = \frac{\text{ne - N/2}}{\text{N/2}}$$

where,

ne = Number of judges indicating on items essentials

N/2 = Total number of judges

## RESULTS AND DISCUSSION

**Messages on Environmental Sound Technologies:**

Five main aspects were included in the e-Booklet on "ग्रामीण महिलाओं के लिए पर्यावरण की दृष्टि से सुदृढ़ प्रौद्योगिकियाँ" which were shown in the Table 1.

**Table 1 : Messages on Environmental Sound Technologies in Messages**

| Sr. No. | Topic |
|---|---|
| Messages 1 | परिचय |
| Messages 2 | पशुपालन और डेयरी |
| Messages 3 | बीज भंडारण |
| Messages 4 | कठिन परिश्रम कम करने वाली प्रौद्योगिकियाँ |
| Messages 5 | घरेलू संबंधित प्रौद्योगिकियां |

**Effectiveness of messages on environmental sound technologies of e-Booklet:**

Total five messages were prepared and the effectiveness of e-Booklet were assessed on criteria *i.e.* accuracy, coverage, objectivity, writing style, content presentation, illustration and compatibility.

Accuracy of messages of e-booklet was evaluated on five attributes. Table 2 shows that weighted mean score of attributes understanding of the title was 3 for $M_1$, $M_3$, $M_4$, $M_5$ and 2.93 for $M_2$ while weighted means score of attributes 'free from grammatical spelling and other typographical errors' was 3 for $M_4$, 2.97 for $M_1$, $M_3$, and 2.93 for $M_2$ and $M_5$. The weighted mean score for attribute repletion of information was 2.97 $M_4$, 2.93 for $M_1$, 2.90 for $M_2$ and $M_5$. The attribute 'Size of font' weighted mean score was 2.97 for $M_1$ and $M_2$ and 2.93 for $M_3$, 2.90 and 2.83 for $M_4$ and $M_5$, respectively. Weighted mean score for attribute appropriateness of language 3 for $M_4$, 2.97 for $M_1$, 2.93 for $M_3$ and $M_5$ and 2.86 for $M_2$ out of maximum score 3.

Findings clearly showed that accuracy in terms of understanding of title, free for, grammatical spelling and other typographical errors, repletion of information, size of font and appropriateness of language was perceived to be high for all messages.

Data of Table 2 depicts that attribute of messages cover all the necessary information was perceived to be high for $M_3$ and $M_4$ followed by $M_1$, $M_5$ and $M_2$ with weighted mean score 2.97, 2.97, 2.93, 2.90 and 2.87, respectively out of maximum score 3. Thus, it clearly indicates that contents related to these messages were covered properly.

Table 2 also indicate that objectivity of e-booklet was assessed under two attributes *i.e.* write up all of

**Table 2 : Effectiveness of messages on environmental sound technologies presented in e-Booklet**

| Sr. No. | Variables | Weighted mean scores of messages | | | | | Overall weighted mean score |
|---|---|---|---|---|---|---|---|
| | | $M_1$ | $M_2$ | $M_3$ | $M_4$ | $M_5$ | |
| 1. | **Attributes of accuracy** | | | | | | |
| | Understanding of the title | 3.00 | 2.93 | 3.00 | 3.00 | 3.00 | |
| | Free from grammatical spelling and other typographical error | 2.97 | 2.93 | 2.97 | 3.00 | 2.93 | **2.93** |
| | Repletion of information | 2.93 | 2.90 | 2.83 | 2.97 | 2.90 | |
| | Size of font | 2.97 | 2.97 | 2.93 | 2.90 | 2.83 | |
| | Appropriateness of language | 2.97 | 2.86 | 2.93 | 3.00 | 2.93 | |
| 2. | **Attributes of coverage** | | | | | | |
| | Message cover all the necessary information | 2.93 | 2.87 | 2.97 | 2.97 | 2.90 | **2.92** |
| 3. | **Attributes of Objectivity** | | | | | | |
| | Write up all of message stated/self-explanatory | 2.93 | 2.97 | 2.83 | 2.93 | 3.00 | |
| | Information appeared to be valid and well researched | 2.83 | 2.86 | 2.93 | 2.90 | 2.90 | **2.90** |
| 4. | **Attributes of writing style** | | | | | | |
| | The main points were more emphasized | 2.97 | 2.93 | 3.00 | 2.97 | 3.00 | |
| | All the messages/ main headings are differentiated from each other | 3.00 | 2.97 | 2.93 | 2.90 | 2.97 | |
| | Information of messages are complex in nature and having some doubts | 2.93 | 2.93 | 2.90 | 2.97 | 2.90 | **2.94** |
| | Some words repeated again and again which creates boredom | 2.93 | 2.97 | 2.93 | 3.00 | 2.86 | |
| 5. | **Attributes of content presentation** | | | | | | |
| | Material managed in logical sequence and grouping | 2.97 | 2.97 | 2.97 | 3.00 | 3.00 | |
| | Technical terms | 2.97 | 2.93 | 2.97 | 3.00 | 2.97 | |
| | Usefulness of the information | 3.00 | 3.00 | 2.97 | 2.93 | 2.86 | |
| | Completeness of message | 3.00 | 2.97 | 2.93 | 2.90 | 2.97 | **2.95** |
| | Ease to reading | 2.93 | 2.86 | 2.93 | 2.93 | 2.97 | |
| | Length of messages | 2.97 | 2.90 | 2.96 | 3.00 | 3.00 | |
| 6. | **Attributes of Illustration** | | | | | | |
| | Layout of the pictures/ illustration/ graphics is accurate as per content | 2.93 | 3.00 | 2.97 | 2.90 | 2.86 | **2.93** |
| 7. | **Attributes of Compatibility** | | | | | | |
| | Presentation of material of various messages is according to readers background | 2.93 | 2.97 | 3.00 | 2.96 | 3.00 | **2.97** |

**Maximum mean score is 3.00**

message stated/self-explanatory and information appeared to be valid and well researched. The weighted mean score of attributes write up of all messages clearly stated/self explanatory was perceived to be high (3) for $M_5$ followed by 2.97 for $M_2$, 2.93 for $M_1$ and $M_4$ and 2.83 for $M_3$ out of maximum score 3. The weighted mean score for attribute 'information appeared to be valid and well researched was 2.93 for $M_3$ and 2.90 for $M_4$ and $M_5$, 2.86 for $M_2$ and 2.83 for $M_1$ out of maximum score 3.

Table 2 indicates that writing style of developed e-booklet was assessed under four attributes. The weighted mean score of attributes "main points were more emphasized' was 3 for $M_3$ and $M_5$ followed by 2.97 for $M_1$ and $M_4$, 2.93 for $M_2$ out of maximum score 3. The weighted mean score for 'all the messages/main headings were differentiated for each other' was 3 for $M_1$, 2.97 for $M_2$ and $M_5$, 2.93 and 2.90 for $M_3$ and $M_4$, respectively out of maximum score 3. The weighted mean score for attribute 'information of messages are complex in nature and having some doubts' was 2.97 for $M_4$, 2.93 for $M_1$, $M_2$ and 2.90 $M_3$ and $M_5$. The weighted mean score for attribute 'Some words repeated again and again which creates boredom' was 3 for $M_4$, 2.97 for $M_2$,2.93 for $M_1$ and $M_3$ and 2.86 for $M_5$ out of maximum score 3.

Regarding writing style of all four attributes majority of the judges perceived that overall weighted mean score of all messages is to be high, which clearly that all messages were very clear in writing, main points were emphasized, main and sub-heading differentiate from each other by using of different colour, repetition of word was avoided and information was very simple in nature and had no doubts for all the five messages.

Content presentation of messages of e-booklet was assessed under six attributes. Table 2 depicts that the weighted mean score of attributes 'material managed in logical sequences and grouping' was 3 for $M_4$ and $M_5$ and 2.97 for $M_1$, $M_2$, $M_3$. The weighted mean score for attribute 'Technical terms' was 3 for $M_4$, 2.97 for $M_1$, $M_3$ and $M_5$. Weighted mean score for attribute 'usefulness of the information' was 3 for $M_1$, $M_2$, following by 2.97. 2.93 and 2.86 for $M_3$,$M_4$ and $M_5$, respectively. The weighted mean score of attributes 'completeness of message' was 3 for $M_1$, 2.97 for $M_2$, $M_5$, 2.93 for $M_3$ and 2.90 $M_4$. Weighted means score for attribute 'ease to reading' was 2.97 for $M_5$ followed by 2.93 for $M_1$, $M_3$,$M_4$ and 2.86 for $M_2$. While weighted mean score for attribute 'Length of message' 3 for $M_4$ and $M_5$, 2.97, 2.96 and 2.90 for $M_1$, $M_3$ and $M_2$, respectively. Further, data in table depicts that the content presentation was perceived to be highly appropriate for all messages.

Table 2 depicts that the attributes of illustration of e-booklet in terms of layout of the pictures/ illustrations/ graphics is accurate as per content was perceived to be high for $M_2$ with weighted mean score 3 followed by $M_3$ for 2.97, $M_1$ for 2.93, $M_4$ for 2.90 and $M_5$ for 2.86 weighted mean score out of maximum score 3. Thus, it is clear from that layout of picture/ illustrations was accurate as per content for all the five messages.

Table 2 depicts that the compatibility was found to be high for $M_3$ and $M_5$ with same weighted mean score 3 followed by weighted mean score *i.e.* 2.97, 2.96 and 2.93 for $M_2$, $M_4$ and $M_1$, respectively out of maximum score 3 by judges. This may be due to the reason that presentation of material of all messages was relevant to the readers background, need, interest, customs and value system.

Effectiveness of e-Booklet has been presented in Table 2. It can be clearly seen from the table that overall mean score for attributes of compatibility was 2.97 followed by content presentation (2.95), writing style (2.94), Illustration and accuracy (2.93), coverage (2.92) and objectivity (2.90) for all the messages of e-Booklet.

**Overall effectiveness of e-booklet:**

It is obtained from the Table 3 that the highest effectiveness was perceived for $M_5$ with the weighted mean score 3 followed by $M_1$ and $M_4$ with the same weighted *i.e.,* 2.97 and 2.93 for $M_2$ and 2.86 for $M_3$ out of maximum score 3 by judges.

Further data in Table 3 indicated that the over all weighted means score for developed e-booklet entitled "ग्रामीण महिलाओं के लिए पर्यावरण की दृष्टि से सुदृढ़ प्रौद्योगिकियाँ" was found to be high *i.e.* 2.95 out of maximum score 3 which indicates that the content of developed e-booklet was effective.Thus, the developed e-booklet was found effective by judges.

The findings are in conformity with findings of Kaur (2011) and Arya (2016) who indicated that as the

**Table 3 : Overall effectiveness of e-booklet**

| Weighted mean scores of messages | | | | | Overall Weighted mean score of e-booklet |
|---|---|---|---|---|---|
| $M_1$ | $M_2$ | $M_3$ | $M_4$ | $M_5$ | |
| 2.97 | 2.93 | 2.86 | 2.97 | 3.00 | 2.95 |

developed e-booklets were perceived effective with high overall weighted mean score by the judges.

**Reliability of e-booklet:**

Reliability refers to the consistency of the score obtained. Inter consistency reliability was estimated and reported for the prepared e-booklet. Split half techniques were used to measure the inter consistency reliability.

Table 4 shows that the reliability (r) value was found high for all the messages covered under e-booklet *i.e.* introduction ($M_1$), animal husbandry and dairy ($M_2$), grain storage ($M_3$), drudgery reduction technologies ($M_4$) and household technologies ($M_5$) with reliability coefficient 0.87, 0.80, 0.67, 0.93 and 0.80, respectively.

Further data in table indicated that the overall inter consistency reliability coefficient value of e-booklet was 0.81. All the values of reliability coefficient were found to be statistically significant at the 0.01 level of significance which indicated that all the attributes of content were found to be reliable.

Two major characteristics *i.e.* reliability and validity of its content were assessed for standardized e-booklet. Field applicability of various messages incorporated in e-booklet was also tested. A number of studies *i.e.* Dudi (2010) and Kaur (2011) have indicated that standardization may be done in terms of reliability, validity as well as field applicability.

**Validity of e-booklet:**

Validity indicates the accuracy with which an e-booklet measure what it intends to measure. Evidence of content validity which were used to determine the validity of the developed e-booklet was presented under.

Table 5 depicts that the overall content validity ratio (CVR) for e-booklet in terms of all attribute *i.e.* accuracy, coverage, objectivity, writing style, content presentation, illustrations and compatibility for all the messages introduction ($M_1$), animal husbandry and dairy ($M_2$), grain storage ($M_3$), drudgery reduction technologies ($M_4$) and household technologies ($M_5$) was found to be 0.81 with significant at 5 per cent level of significance.

The result shows in Table 5 further presented that the overall content validity ration (CVR) of $M_1$, $M_2$, $M_3$, $M_4$ and $M_5$ was 0.83, 0.79, 0.82, 0.80 and 0.82, respectively. All calculated CVR values exceeded the tabulated values ranging from 0.67 to 0.93 so that these were significant at 5 per cent level of significance (As per Lawshe, 1975).

Thus, it may be concluded that all the attributes of content and format for all the messages were valid to be included in e-booklet and the judges approved the content and format for the entire message.

**Perceived field applicability of e-booklet:**

Field applicability perceived by judges of various messages of and e-booklet have been presented in Table

**Table 4 : Reliability coefficients of e-booklet as perceived by judges**

| Attributes of content and format | Reliability coefficients | | | | | Overall Reliability coefficients |
|---|---|---|---|---|---|---|
| | $M_1$ | $M_2$ | $M_3$ | $M_4$ | $M_5$ | |
| Accuracy, coverage, objectivity, writing style, content presentation, illustration and compatibility | 0.87** | 0.80** | 0.67** | 0.93** | 0.80** | 0.81** |

** significant at 1% level of significance

**Table 5 : Content validity ration (CVR) of e-booklet as perceived by judges (N = 30)**

| Sr. No. | Attributes | CVR of messages | | | | |
|---|---|---|---|---|---|---|
| | | $M_1$ | $M_2$ | $M_3$ | $M_4$ | $M_5$ |
| 1. | Accuracy | 0.93* | 0.87* | 0.80* | 0.93* | 0.67* |
| 2. | Coverage | 0.87* | 0.73* | 0.67* | 0.87* | 0.80* |
| 3. | Objectivity | 0.80* | 0.67* | 0.93* | 0.67* | 0.73* |
| 4. | Writing style | 0.73* | 0.93* | 0.80* | 0.73* | 0.93* |
| 5. | Content presentation | 0.67* | 0.80* | 0.93* | 0.80* | 0.87* |
| 6. | Illustrations | 0.87* | 0.87* | 0.87* | 0.67* | 0.93* |
| 7. | Compatibility | 0.93* | 0.67* | 0.73* | 0.93* | 0.80* |
| | Overall CVR | 0.83* | 0.79* | 0.82* | 0.80* | 0.82* |

Overall content validity ration (CVR) of e-booklet = 0.81*
*Significant at 5% level of significance

**Table 6 : Perceived field applicability of e-booklet**

| Sr. No. | Attributes of accuracy | Weighted mean scores of messages | | | | |
|---|---|---|---|---|---|---|
| | | $M_1$ | $M_2$ | $M_3$ | $M_4$ | $M_5$ |
| 1. | Relative advantage | 2.90 | 2.97 | 2.97 | 3.00 | 3.00 |
| 2. | Physical compatibility | 2.86 | 2.83 | 3.00 | 2.97 | 2.97 |
| 3. | Cultural compatibility | 2.93 | 3.00 | 2.86 | 2.86 | 2.93 |
| 4. | Simplicity complexity | 3.00 | 2.86 | 2.90 | 2.90 | 2.80 |
| 5. | Triability | 2.97 | 2.93 | 2.93 | 2.97 | 2.86 |
| Overall Weighted mean scores | | 2.93 | 2.92 | 2.93 | 2.94 | 2.91 |
| Perceived field applicability index (PFAI) | | 97.78 | 97.33 | 97.78 | 98.00 | 97.11 |

Overall weighted mean score of e-booklet = 2.93
Overall perceived field applicability index (PFAI) of e-booklet = 97.60
Maximum score = 3.0

5 shows that the relative advantages was found to be high for $M_4$ and $M_5$ with similar weighted mean score 3 followed by $M_2$ and $M_3$ with same weighted mean score 2.97 and $M_1$ with weighted mean score 2.90, respectively. Physical compatibility was perceived to be high for $M_3$ with weighted mean score 3 followed by $M_4$ and $M_5$ with same weighted mean score 2.97, for $M_1$ and $M_2$ weighted men score was 2.86 and 2.83, respectively. The weighted mean score of cultural compatibility was 3 for $M_2$, 2.93 for $M_1$ and $M_5$, and for $M_3$ and $M_4$ weighted mean score was 2.86. The weighted mean score for simplicity complexity was perceived to be high 3 for $M_1$ followed by 2.90 for $M_3$ and $M_4$, 2.86 and 2.80 for $M_2$ and $M_5$, respectively while the weighted mean score of triability was 2.97 for $M_1$ and $M_4$, 2.93 for $M_2$ and $M_3$ and 2.86 for $M_5$ out of maximum score 3.

The field applicability was perceived be highest for $M_4$ with overall weighted mean score 2.94 followed by 2.93 for $M_1$ and $M_3$, 2.92 for $M_2$ and 2.91 overall weighted mean score for $M_5$ out of maximum score 3.

Further data in Table 6 shows that the $M_4$ (98.00) was perceived highly applicable followed by $M_1$ and $M_3$, $M_2$ and last $M_5$ with perceived field applicability index (PFAI), 97.78, 97.78, 97.33 and 97.11, respectively. The overall perceived applicability (PFAI) of developed e-booklet was 97.60. Thus, it may be concluded that the judges were convinced about all the messages as well as e-booklet was highly applicable for rural women.

**Conclusion:**

An e-booklet was developed on the selected messages related to environmental sound technologies. In terms of the standardization of the developed e-booklet the quality parameters of e-booklet were perceived quite high by a large majority of judges, e-booklet was found valid in terms of content and format, which were found reliable and field applicable.

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