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RESEARCH ARTICLE

Construction of A Knowledge Test for Testing the Effectiveness of Participatory Video on Virtual Marketing

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ABSTRACT

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Virtual marketing refers to the marketing activities that take place in a virtual or digital space on various social media platforms. With the increase in the number of internet users around the globe, virtual marketing is a great opportunity for new enterprises to grow and reach new heights. However, to bring the rural entrepreneurs in the flow of modern marketing it is needed to pass on the knowledge about modern marketing strategies. Therefore, in the present study, the detailed procedure as well as the constructed knowledge test has been presented which will serve as a standard test for testing the effectiveness of a participatory video program on 'Virtual Marketing' for women entrepreneurs in SHG. For the construction of the test, 40 items were collected initially through secondary sources of literature and expert opinion surveys covering all the important aspects of virtual marketing. Out of the 40 collected items, 23 items were selected for the item analysis process based on the relevancy test score obtained from 30 experts. Item analysis was carried out in terms of three indices that were item difficulty index, item discrimination index, and point biserial correlation. Then 17 items were selected having: Item's difficulty index ranging from 30 to 70, Item's discrimination index ranging from 0.30 to 0.80, and point biserial correlation of at least 0.15. The final knowledge test contained 17 items that were retained from 40 items and had a reliability coefficient of 0.709 (Cronbach's Alpha), thus indicating an acceptable level of reliability.

Key words: Knowledge test; Virtual marketing; Difficulty index; Discrimination index; Point biserial correlation; Cronbach's Alpha.

Forming Self Help Groups (SHGs) and taking up economic activities is one of the most successful economic upliftment methodologies for livelihood improvement especially among rural women in India. Doss and Devi, 2013 reported that all the Self-Help Groups (SHGs) are willing to create self-employment for improving standard of living but they lack confidence in marketing of their products. Although the Government of India with an active support from State Governments and the National Bank for Agriculture and Rural Development (NABARD) is continuously helping SHGs through assistance in the form of revolving funds, bank credits, and subsidies to boost self-employment, the SHGs cannot always look for help from government or other sources. They need to be empowered and self-sustaining.

Women in SHGs need help to update their knowledge about marketing strategies and need guidance and recommendations for improvement. Kumari, N. et al., (2019) has revealed in a study that the best mode preferred by SHG women to sell their product is through self-mode without involvement of intermediaries. In the era of digitalization, there is a need to provide an alternative solution for women in small-scale enterprises. With the growth of virtual shopping, knowing how to use the internet effectively to gain more customers is becoming increasingly important (Gottlieb and Bianchi, 2017). With time, online media has gain importance in marketing and it can be an ideal medium for SMEs' success in marketing (Kumar et al., 2015). Virtual marketing is simply marketing over the virtual or digital space. It is marketing, without a physical presence. It has been

gaining popularity and is rising in conjunction with the wide use of social media across the world (Singh, G. et al., 2021). Virtual marketing is cost-effective and helps to broaden & manage customer databases for Small Scale Enterprises (SMEs) (Rao and Rajeshwari, 2020). Keeping these in mind, a participatory video was designed in collaboration with SHG women in Uttarakhand State of India on 'Virtual Marketing'. To measure the knowledge gained by the SHG women through the stated video intervention, a valid tool was required. Hence in the absence of any such existing specialized test, an attempt was made to develop a knowledge test to measure the gain in knowledge by SHG women on virtual marketing.

METHODOLOGY

For the present study, relevant items on virtual marketing were collected from secondary sources as well as experts' opinion survey. Initially, 40 items were collected focusing on all relevant aspects of virtual marketing which were sent to 30 judges along with necessary instructions for critical evaluation. The judges were requested to indicate the degree of relevancy of each item on a three-point continuum viz., Most relevant, relevant, and irrelevant with scores 3, 2, and 1, respectively. Relevancy Weightage (RW) and Mean Relevancy Score (MRS) of all the items were computed to isolate the non-relevant indicators. A total 23 items were retained and made subjected to calculation of Item Difficulty Index and Item Discrimination Index to filter out most suitable items by applying the test to 30 non sample women. *Point Biserial Correlation* was also used as an added filter to discard any inconsistent items. Final test constructed of 17 items were administered on another non sample respondents to find out the reliability of the index by using Cronbach's alpha (SPSS 23).

Item collection: Items for the test were collected from secondary sources such as journals, magazines, reports, etc. Feedback and recommendations from this review were discussed among the experts from various disciplines (i.e., Management, Agriculture Economics, Agri-business Management, Home Science, Psychology, and Agriculture Extension) and the researcher. Necessary modifications and revisions of the items were made accordingly. Initially, 40 items were collected focusing on all relevant aspects of virtual marketing.

Item selection: The 40 items collected previously were then subjected to rating on a three-point continuum by a panel of 30 judges from various fields such as Management, Agriculture Economics, Agri-business Management, Home Science and Agriculture Extension, Psychology etc. Further, the data was computed and undergone for relevancy test for the selection of the items.

Relevancy test and primary selection of items : The judges were asked to indicate the degree of relevancy on a three-point continuum in terms of Highly Relevant (HR), Relevant (R), and Not-relevant (NR). The scores allotted for 'HR'=3, 'R'=2, and 'NR'=1. The Relevancy Weightage (RW) and Mean Relevancy Score (MRS) were calculated for all the items individually as well as the Overall Mean Relevancy Score (OMRS) by using the following formulas:

$$RW = \frac{(MRR \times 3) + (RR \times 2) + (LRR \times 1)}{MPS}$$

Where,

MRR= Most Relevant Response

RR= Relevant Response

LRR = Least Relevant Response

MPS= Maximum Possible Scores

$$MRS = \frac{(MRR \times 3) + (RR \times 2) + (LRR \times 1)}{\text{No. of judges}}$$

Where,

MRR= Most Relevant Response

RR= Relevant Response

$$OMRS = \frac{\text{Sum of weightage of all indicators}}{\text{Total No. of Judges} \times \text{Total No. of indicators}}$$

Criteria for item selection : The items having Relevancy Weightage (RW) greater than 0.80 and Mean Relevancy Score (MRS) greater or equal to Overall Mean Relevancy Score (OMRS) i.e., 2.39 were considered for final selection of indicators or statements. With the help of this process, in the first stage out of 40 items a total 23 items were sorted which were further rewritten and modified as per the suggestions given by experts (Table 1).

Relevancy weightage > 0.8

Mean Relevancy score > OMRS (i.e.,) 2.395

Item difficulty index (P_i) : Item difficulty index indicates the extent to which an item was difficult. The difficulty index of an item is the proportion of respondents giving the correct answer to a particular item. This is calculated as follow:

$$P_i = \frac{n_i}{N_i}$$

Where,

P_i = difficulty in percentage of the i^{th} item,

n_i = number of respondents giving correct answer to i^{th} item.

N_i = total number of respondents to whom the i^{th} item was administered i.e., 30 in the present case.

The items were chosen based on their difficulty index values which ranged from 30 to 70. According to Harper (1974), the difficulty index for a legitimate item should be between 10-50, and discrimination index should be around 0.4-0.5.

Item discrimination index (E 1/3): Each one of the 30 respondents, to whom the test is administered, was given a score of '1' for a right answer and '0' for a wrong answer for each of the 23 items. The total number of correct answers given by the respondents out of 23 items was the knowledge score of the individual. After calculating the scores obtained by the respondents, the scores were arranged from highest to lowest in order of magnitude.

These 30 respondents were divided into six equal groups, each having five respondents, and were arranged in the descending order of total scores obtained by them. These groups were named G1, G2, G3, G4, G5, and G6. For item analysis, the middle two groups G3 and G4 were eliminated keeping only four extreme groups with high and low scores (Bloom et al. 1956). the range of scores (out of 23) obtained by the four groups was as follows:

G1=2 to 8	Groups of High Score
G2=9	
G5=13 to 14	Groups of Low Score
G6=14 to 17	

The item discrimination index is indicated by "E 1/3" is calculated by the formula given by Mehta (1958).

$$E1/3 = \frac{(S_1 + S_2) - (S_5 + S_6)}{N/3}$$

Where,

S_1, S_2 , and S_5, S_6 are the frequencies of correct answers in the groups G1, G2, and G5, G6 respectively.

'N' is the total member of respondents of the sample selected for the item analysis that is 30.

Point biserial correlation (r_{pbis}): The point biserial correlation coefficient, r_{pbis} , is a special case of Pearson's correlation coefficient (Khan et.al., 2006). The point-biserial correlation is the correlation

between right and wrong scores that respondents receive on a given item and the total scores that the respondents receive when summing up their scores across the remaining items. It measures the relationship between two variables viz.: one continuous variable (must be ratio scale or interval scale) and one naturally binary variable.

$$r_{pbis} = \frac{M_1 - M_0}{S_n} \sqrt{pq}$$

Where,

M_1 = mean (for the entire test) of the group that received the positive binary variable (i.e., the "1").

M_0 = mean (for the entire test) of the group that received the negative binary variable (i.e., the "0").

S_n = standard deviation for the entire test.

p = Proportion of cases in the "0" group.

q = Proportion of cases in the "1" group.

For determining the reliability of the knowledge test 'Cronbach's Alpha reliability test was conducted with SPSS to measure the internal consistency i.e., reliability of the measuring instrument (test). It is calculated as:

$$\frac{N\bar{c}}{\bar{v} + (N-1)\bar{c}}$$

'N' = number of items,

\bar{c} = average inter-item covariance among the items

and \bar{v} = average variance.

RESULTS AND DISCUSSION

As per the data presented in Table 1. The above-mentioned criteria were considered and 23 items were retained for further analysis.

Item analysis: The 23 selected items were checked and modified based on the suggestions received by the experts and pretesting was conducted with 30 non-sample respondents (SHG women) for item analysis. Item analysis was carried out in terms of three indices that were item difficulty index, item discrimination index, and point biserial correlation.

The item discrimination index indicates how well an item discriminates in agreement, or whether an item distinguishes between a well-informed and a poorly informed respondent (Loukhamv and Bandhyopadhyay, 2014). The point biserial correlation reveals how effectively an item measures or discriminates in comparison to the rest of the test.

The difficulty and discrimination indices and point biserial correlation of all the items were calculated by the procedure mentioned above. The computation of difficulty and discrimination indices

Table 1. Relevancy test scores of item selection

Item No	Items	RW	MRS
1	*Do you have prior knowledge about virtual marketing?	0.82	2.46
2	**Which is an important element of social networks in virtual marketing?	0.75	2.26
3	*Which social media is considered the most popular platform for virtual marketing?	0.877778	2.633333
4	**How does creating a social network marketing plan differ from a traditional marketing plan?	0.788889	2.366667
5	*Which kind of social media activity is necessary for virtual marketing?	0.844444	2.533333
6	**What are the different forms of virtual marketing?	0.855556	2.566667
7	*Which of the following is a type of Virtual marketing activity?	0.744444	2.233333
8	**Which of the following is not a traditional form of digital marketing?	0.70	2.1
9	*What is not true about virtual marketing?	0.755556	2.266667
10	**Which statement is true about Rural marketing?	0.633333	1.9
11	*Which of the following are the Indian Government initiatives in digital marketing?	0.9	2.7
12	**What are the possible reasons to use a Virtual platform for marketing?	0.911111	2.733333
13	*Which one of the following is the advantage of virtual marketing?	0.833333	2.50
14	**Which of the statement is true about E-retailers in Virtual Marketing?	0.711111	2.133333
15	*The internet penetration in rural India has increased from 9% in 2015 to __ in 2018 which has boosted online rural shopping.	0.60	1.80
16	**Do you know about some Facebook business pages promoting women entrepreneurs in Uttarakhand?	0.833333	2.50
17	*Do you know about social media platforms that can be used for virtual marketing?	0.933333	2.80
18	**What are the advantages of Virtual marketing over traditional marketing?	0.866667	2.60
19	*What are the major drawbacks of traditional marketing?	0.722222	2.166667
20	**Which of the following is true about the disadvantage of social media marketing?	0.644444	1.933333
21	*What is a Facebook Business Page?	0.855556	2.566667
22	**What are the basic requirements for creating a Facebook business page?	0.822222	2.466667
23	*What is the 'page name' in creating a Facebook Business page?	0.80	2.40
24	**How can you identify your page name?	0.822222	2.466667
25	*What is the right sequence to add categories to your shop on Facebook?	0.833333	2.50
26	**Which of the following is the most appropriate way to create a username for your business page?	0.811111	2.433333
27	*How can you invite people to like your Page on Facebook?	0.888889	2.666667
28	**How can you publish your Facebook page?	0.888889	2.666667
29	*Which out of the following statement is the most appropriate way to select a good professional username?	0.777778	2.333333
30	**Select the best alternative that describes the best difference between a page name and username on Facebook?	0.788889	2.366667
31	*Which of the following is not included in Facebook business categories?	0.766667	2.3
32	**Which out of the following you will include in the Facebook business page?	0.788889	2.366667
33	*Which out of the following is true about creating a story on a Facebook business page?	0.677778	2.033333
34	**What is a Facebook business page story?	0.755556	2.266667
35	*How much does a Facebook Business Page Cost?	0.833333	2.5
36	**What methods you will follow to get the best output from the Facebook business page?	0.855556	2.566667
37	*Which of the following is an important aspect of creating blogs and posting content on Facebook business pages?	0.833333	2.5
38	**What is the consideration you will take into account for creating your Facebook business page more attractive?	0.844444	2.533333
39	*Which one out of the following is not true about virtual marketing through Facebook?	0.755556	2.266667
40	**Which out of the following is true about virtual marketing through Facebook?	0.8	2.4
*Total Selected items=23; **Rejected items=17			

of the knowledge items in respect to statements has been presented in Table 2.

The discrimination index varies from 0 to 1. The items with a discrimination index ranging from 0.2 to 0.8 were selected for the final test.

Items with point biserial correlation coefficient of 0.15 or more were accepted (Varma, 2006) though items with coefficient value of 0.20 to 0.25 is generally considered as good for test analysing. Most of the selected items under present study have r_{pbis} value more than 0.25. Data presented in Table 2 shows that out of 23 items, 17 items were selected based on: items with difficulty level indices ranging from 30 to 70; items with discrimination indices ranging from 0.30 to 0.80 and items having a point biserial correlation of at least 0.15. Thus, the finally selected knowledge test items comprised of 17 multiples choice questions to measure the knowledge level of SHG women on virtual marketing.

Standardization of the Test :

Table 2. Item difficulty, discrimination and point biserial correlation scores of items for item analysis.

Item number	No. correct answers				No. of correct answers (N=20)	% of correct answer (Difficulty Index)	Discrimination Index ($E^{1/3}$)	Point Biserial correlation (r_{pbis})
	G1	G2	G3	G4				
1	1	1	2	3	7	35	0.3	0.280003*
3	2	2	4	3	11	55	0.3	0.21555*
5	2	4	3	2	11	55	-0.1	-0.08896
6	1	2	5	5	13	65	0.7	0.692618*
11	0	1	3	5	9	45	0.7	0.670441*
12	2	3	3	3	11	55	0.1	0.04
13	1	1	4	4	9	50	0.6	0.460726*
16	2	2	3	1	8	40	0	-0.10024
17	1	1	4	4	10	50	0.6	0.460726*
18	0	1	5	5	11	55	0.9	0.812056*
21	1	4	4	4	13	65	0.3	0.282789*
22	1	3	3	5	12	60	0.4	0.438848*
23	1	1	4	4	9	50	0.6	0.460726*
24	1	3	2	5	11	55	0.3	0.322425*
25	2	1	4	3	10	50	0.4	0.190947*
26	2	2	3	2	9	45	0.1	-0.13031
27	2	2	2	5	3	55	0.3	0.295436*
28	1	0	4	2	7	35	0.5	0.224679*
35	1	2	2	4	9	45	0.3	0.303513*
36	2	2	5	5	14	70	0.6	0.600469*
37	2	2	2	5	11	55	0.3	0.295436*
38	2	1	3	5	11	55	0.5	0.432259*
40	0	2	0	0	2	10	-0.2	-0.24696

*Selected items

Table 3. Reliability Statistics

Cronbach's Alpha	No. of Items
0.709	17

Table 4. The standard knowledge test for measuring knowledge gain through participatory video on virtual marketing

Questions/Options of answer
<i>Do you have any knowledge about virtual marketing?</i> a) Yes b) No
<i>Do you know any social media platforms which can be used for virtual marketing?</i> a) Yes b) No
<i>Which kind of social media activity is necessary for virtual marketing?</i> a) Promoting and sharing product information with a customer b) Identifying trends in marketing for better output c) Both A and B d) None of the above
<i>Which of the following are the Indian Government initiatives in digital marketing?</i> a) Digital India b) Startup India c) BharatNet d) All the above
<i>Which one of the following are the advantages of virtual marketing?</i> a) Accesses by few people per day b) Slowest way of reaching the customer c) Saves on advertising costs within companies d) Always gives the company a good reputation
<i>What are the advantages of virtual marketing over traditional marketing?</i> a) Marketers have access to millions of consumers online, nationally, and internationally. b) It is also much easier to reach these customers, and for much less money, than through offline marketing. c) Online marketers can reach vast numbers of people by placing ads in various search engines, including Google, Yahoo, and Lycos. d) All the above
<i>What is a Facebook Business Page?</i> a) A Facebook Business Page is where you manage your brand's presence on the largest social network in the world. b) Your page allows you to connect with your customers c) It helps in collaborating with customers and other brands d) All the above
<i>What are the basic requirements for creating a Facebook business page?</i> a) Facebook log in Id b) Page name c) Email-id d) All the above
<i>How can you identify your page name for creating a Facebook Business Page?</i> a) Use acronyms (Hint: First letter of the group of words) b) Get inspiration from mythology and literature c) Use your own name d) All the above
<i>What is the right sequence to add categories to your shop on a Facebook page?</i> (i) On a computer, click the Shop tab on your Facebook Page. (ii) Click Add Collection. (iii) From Publishing Tools, click +Add Collection. (iv) Name the collection, choose if you want it to be publicly visible and decide if you want this collection to be featured first in your Facebook Page shop. (v) Click Save Changes when you're done.
<i>Options:</i> a) (i), (ii), (iii), (iv), (v) b) (i), (ii), (iii), (v), (iv) c) (i), (iii), (ii), (iv), (v) d) (ii), (i), (iii), (iv), (v)

What is the correct sequence to publish your Facebook page?

- (i) Login to Facebook.
- (ii) Switch over to your Facebook business page.
- (iii) Click Settings at the top of your Page.
- (iv) From General, click Page Visibility.
- (v) Click to check the box next to Publish Page.
- (vi) Click Save Change.

Options:

- a) (i), (iii), (ii), (iv), (v), (vi) b) (ii), (i), (iii), (iv), (v), (vi)
- c) (v), (i), (ii), (iii), (iv), (vi) d) (i), (ii), (iii), (iv), (v), (vi)

Which of the following is the most appropriate way to create username for your business page?

- (i) From your News Feed, click Pages in the left menu.
- (ii) Go to your Page.
- (iii) Click Create Page @Username on the left side of your Page.
- (iv) Enter a username.
- (v) If the username is not available, click Create Username.

Options:

- a) (i), (iii), (ii), (iv), (v) b) (i), (ii), (iii), (iv), (v)
- c) (i), (iv), (ii), (iii), (v) d) (v), (i), (ii), (iii), (iv)

Which out of following statement is the most appropriate way to select a good professional username?

- a. Use your real name. Pick a username that matches what you go by professionally.
- b. Consistency. When it comes to finding professional usernames, consistency is key.
- c. No swears/explicit language.
- d. All the above

Select the best alternative that describe the best difference between a page name and username on Facebook?

- a. Page name is the title of business page while Username is the link address of Facebook page.
- b. Username is the title of the page while page name is the link address
- c. Both page name and Username are the same thing
- d. None of the above

What methods you will follow to get best output from the Facebook business page?

- a. Post regularly
- b. Give clear information.
- c. Post quality pictures with good product description.
- d. All the above

Which of the following is an important aspect of creating blogs and posting content on your Facebook business page?

- a. Using a witty user name
- b. Posting at least once a month to the blog
- c. Social Media Optimization
- d. All of the above

What is the consideration you will take into account for creating your Facebook business page more attractive?

- a. Create a Big, Beautiful Cover Photo.
- b. Post Lots of Photos, Images, & Videos.
- c. Use Great Thumbnail Photos & Descriptions with Links.
- d. All the above

Reliability : Reliability statistics has been presented in Table 3 which shows the value for Cronbach's alpha was 0.709 and it reflects the acceptable level of reliability of the measuring instrument. The similar procedure is followed by *Priyadarshini et.al., (2021)* in her study found the value of Cronbach's alpha 0.904 for knowledge test on *Alder based Jhum cultivation*. However, reliability more than 0.6 also indicates an acceptable level of internal consistency for the specific sample.

Validity : The content validity of the knowledge test was derived from a long list of test items representing the whole universe of virtual marketing collected from various sources as discussed earlier. It was assumed that the score obtained by administering the knowledge test of this study measures what was intended to measure. Thus, a fair degree of content validity was ensured. Therefore, the knowledge test developed in the present study measures the knowledge of SHG women on virtual Marketing as it showed a greater degree of reliability and validity.

Final Knowledge Test : The final knowledge test was comprised of a total of 17 items which has been presented in Table 4. Although various knowledge tools on a range of topics have been developed. However, no comparable instrument has been developed for virtual marketing. Rural women and individuals are still unfamiliar with the concept of virtual marketing. As a result, the developed knowledge test is crucially significant for development practitioners to assess their understanding of virtual marketing and to investigate hitherto unexplored areas of the field.

CONCLUSION

Over the past two decades, India's SHG movement has evolved from small savings and credit groups that sought to empower poor rural women, into one of the world's largest institutional platforms of the poor. Virtual marketing has been emerging as a marketing tool which is inevitable for developing a sound marketing strategy in the digital era. Linking SHGs and small firms with the market using virtual marketing can expand their horizons beyond physical markets. To make this possible, it is necessary to determine the existing gaps in knowledge of SHGs regarding virtual marketing in order to understand the knowledge of individuals as it fosters the learning process to a great extent. Therefore, in this study, a knowledge test on virtual marketing was created and standardized with the primary goal of determining the

success of a participatory video that had been prepared. The knowledge test covered the important aspects of virtual marketing. It is confirmed to be valid and dependable within the acceptable limits, as evidenced by the significant value of reliability coefficient. This test can be used by the researchers to assess the expertise of SHG women and men alike in virtual marketing. It can also assist the extension personnel to formulate a sound strategy to exploit the strengths and overcome the weaknesses in knowledge of the rural women regarding virtual marketing.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

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