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Information and Communication Technology Training Needs for Agricultural Extension Workers in Delta State, Nigeria

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Abstract

The study investigated the training needs of agricultural extension workers on the use of information and communication technology (ICT). Some specific objectives were to ascertain the level of awareness on channels of information on ICT available to extension workers and to identify the constraints facing agricultural extension workers on the use of ICT in Delta State. A sample size of 80 was obtained; first, purposive and second, random sampling techniques. Information was gathered with a semi-structured questionnaire. Major results obtained revealed that the respondents' awareness of information channels on ICT were mostly telephone (96.3%), photo camera (95.0%) and radio (93.9%). In the competence of ICT utilization, telephone with on-line forum (group chat) (mean = 3.6), and laptop (mean = 3.3) were most applicable. However, low competence in usage was recorded in video conferencing (mean = 2.0), and GPS (mean = 1.7). The most serious constraints were frequent power failure (mean = 3.7), high cost of ICT infrastructure coupled with poor communication network (mean = 3.6) in the rural areas of Delta State. Result of tested hypothesis showed that there was a significant relationship between social economic profile of respondents and ICT competence of extension workers ($p<0.05$). The benefits of the study is typical in the exposure of necessary training needs made available for development interventions. It was recommended that there ought to be regular electricity power supply, subsidized the high cost of ICT and availability of good communication network in rural areas.

Keywords: Information communication technology, Agricultural Extension; Training Needs

1. Introduction

Farming is a significant supporter of the economy of Delta State. Other than the oil business, individuals are engaged with cultivating exercises. Such cultivating exercises incorporate creation of some significant yields like sweet potato, maize, cassava, groundnut among others, handling and promoting of these homestead produce and advertising of livestock like poultry, pigs and fish.

Agricultural extension serves as an informal education process which helps farmers to advance their farming techniques and methods, increase their production efficiency and to lift their education and social standards. Agricultural extension also plays the important role of supportive measures between farming communities and agricultural researches to encourage the adoption of improved technologies and innovations (Egbunonu, Igwe and Anunibe, 2017).

Agricultural extension worker is mandated to create change in knowledge, attitude, skills and aspirations (KASA) farming stakeholders to enable them increase their agricultural production by the adoption of new technologies. For any extension body to expand its performance, a continuous and systematic training of its staff is necessary (Beever, 2017).

The term training refers to education, instructions sharing and learning or personal development in any skill and knowledge acquisition that is related to a specific useful competency. Effective training of extension staff is required to improve the output of farmers as well as to introduce new technologies through the use of advance communication. Need from a perspective is what exists and what is required to accomplish a purpose (Obinna and Maduka, 2017). According to Agbamu (2017) 'need' is an imbalance, lack of adjustment, or a gap between the present situation and a new state of conditions assumed to be desirable.

The rate at which technology is increasing is overwhelming. However, the use of some technologies has not yet been maximized in Delta State and as such makes it difficult for extensionists to get necessary information to solve agricultural problems. Whereas, the ultimate goal of any extension agent is to create change, raise incomes, improve yields and help farmers to get new opportunities and a better life through the operative adoption of Information Communication Technology (ICT) (Obinna and Maduka, 2017).

ICT comprises of several electronic communication scheme, device or application encompassing telephones, computer, television, radio and communication gadgets. The ICT usage by extensionists offers enormous potential to enhance farmer's agricultural productivity. Umar *et al.* (2015) observed that interactions and knowledge exchange system is paramount in agricultural extension among the stakeholders or actors in the usual agricultural knowledge and information management system (AKIS). The effective use of ICT depends on how they are used frequently and for what purpose. It is a vital fact that every extension worker need to build its capacity in training and continuous learning to acquire new technologies and how they can convey information to farmers through the proper use of Information and Communication Technology for their own benefit in Delta State.

Why ICT in agricultural extension? The use of ICT has always been a concerned in the agricultural system of Delta State. The extension system is concern with the following: where, when, why, what, how and who to use ICT agricultural activities such as growing of crops and raising livestock, record keeping, farm visits, documentation, information management from one extension worker to the other and from extension worker to clientele. Other concerns are seeking for channels of improved traits in crop and animal production; contemporary value addition in agriculture, participation in government activities and linkage to farm land in form of lease or freehold. These concerns are not easily manageable by farmers and extension worker. To a great extent, knowledge of the functionality and operationalization of ICT will provide interventions. Besides, how does ICT come into play in a manner of problem solving approaches in agricultural extension management? These are perceived gaps that the study is poised to address.

Umar *et al.* (2015) opined that lack of information or communication scheme is a basic factor responsible for low agricultural production. Extension personnel serve as a chief source of knowledge and information for the communities they serve. These extension workers would not be serviceable in their responsibilities if they are deficient in the utilization of ICT to disseminate information to the communities. It is on this basis that this research is carried out to investigate the training needs of agricultural extension workers on the usage of ICT in Delta State.

ICT plays a vital role in enhancing food security and supporting farming. It includes the use of computers, internet, mobile phones, radio and television (Egbunonu *et al*., 2017). However, past research has proven that the major cause of ICT failures and gaps were found in its user's knowledge level and attitude. Therefore, for a successful application of ICT in the agricultural system in Delta State, the skills and knowledge of agricultural extension workers on ICT need to be investigated. Hence, this study is poised to bridge any identifiable gaps with the following objectives that guided the study.

The specific objectives were to:

i. describe the socio-economic characteristics of the agricultural extension workers in Delta State,
ii. ascertain the level of awareness on channels of information on ICT available to extension workers in Delta State,
iii. identify the level of competence possessed by agricultural extension workers based upon skills utilization,
iv. assess the agricultural extension worker's perception on the importance they place on ICT skills in order to establish training needs, and
v. identify the constraints facing agricultural extension workers on the use of ICT in Delta State.

On the basis of the study, two null hypotheses were formulated

Ho_1: There is no significant difference between socio-economic characteristics of extension workers and perception of extension workers on the competence ICT.

Ho_2: There is no significant difference between constraints faced by extension and the perceived importance of ICT skills on performance of extension officer.

2. Materials and Methods

The study was carried out in Delta State. The state covers a landmass of 18,050km and more than 60% is land. Delta State lies approximately between longitude 5.00 and 6.45' east and Latitude 5.00 and 6.30 north. The State is divided into three agricultural zones which are Delta Central, North, and South.

Sample technique and sample size: A two-stage sampling procedure was employed to draw a sample from a population of extension officers from the three agricultural zones in the study area. First, a random selection of state two local government areas (LGAs) from Delta North, two LGAs from Delta South and three LGAs from Delta Central. This resulted in selection of 7 LGAs. Extension agents formed the population for which sample for this study which was drawn. Owing to the scarcity of extension workers both in government and corporate organizations, a purposive sampling skill was engaged to involve all extension field workers comprising of Delta Agriculture and Rural Development Agency (DARDA) and also from a pool of Fadama project local facilitators in the study area. A sum of 80 extension agents were randomly selected from the three agricultural zones (Table 1).

Table 1. Sample composition of extension workers

Agricultural Zones	Blocks (LGA)	Cells (Villages)	Extension Workers
Delta North	Ika North East	4	11
	Ndokwa East	5	13
Delta South	Warri North	2	11
	Isoko South	4	13
Delta Central	Ughelli North	3	12
	Uvwie	2	8
	Udu	4	12
Total	7	24	80

Source: DARDA and Fadama project

Method of data collection: Data collected for this study was obtained using a set of semi-structured questionnaire in line with the objectives of the study which was administered to the agricultural extension workers.

Measurement of variables: socio-economic, for instance, age and working experience were measured in years; household size in numbers. Respondents' level of awareness of the selected ICT skills were measured using a dichotomous scale of 'yes' or 'no'. Respondents' level of competence in selected ICT skills, attitude to the importance ICT skills and perceived constraints facing the use of ICT were measured using a Likert type scale of four categories with a cut-off mean of 2.5 respectively.

Data Analysis: The data collected were be subjected to descriptive and inferential statistical computation using statistical packages for social science (SPSS) analysis.

Recall, hypothesis one (1) which states that: There is no significant difference between socio-economic characteristics of extension workers and perception of extension workers on the competence ICT, and hypothesis two (2), that there is no significant difference between constraints faced by extension and the perceived importance of ICT skills on performance of extension officer. These hypotheses were tested using a regression analysis as follows:

Linear, semi-log and double log forms of regression were used in the analysis. A lead equation was chosen to make conclusion based on (a) the relative magnitude of the R^2, (b) relative F_{cal} value of the models, (c) the function that showed more statistical significance.

Linear Regression equation

$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 \ldots + b_7 X_7 + e$

Where,

Y = extension worker's perception score.

b_0 = A constant

b_1 to b_7 = regression coefficient of seven variables.

X_1 = Age of extension agents

X_2 = Gender of extension agents

X_3 = Level of education of extension agents

X_4 = Working experience.

X_5 = Income level.

X_6 = Household size.

X_7 = Frequency of contact with extension workers

e = random error.

Semi–log functional form of regression

$Y = \log b_o + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 \ldots + b_7 \log X_7 + e$

Double log functional form of regression

$\text{Log}Y = \log b_o + b_1 \log x1 + b_2 \log X_2 + b_3 \log X_3 \ldots + b_7 \log X_7 + e$

3. Results and Discussion

Entries in Table 2 shows respondents mean age was 47 years and mostly male (72.5%) extension workers in the field. This means that skills acquired through re-training and training programmes can still be utilized in the organization for at least 18years before retirement age of 65 years. This result corresponded with that of Imo State Extension workers age average and male dominance (Egbunonu *et al.*, 2017). Respondents (90%) were married with HND/Degree (55%) as highest educational attainment. This is at variance with the report of Ogebe and Adanu (2018) that in Nigeria extension job is a low status job fit only for job applicants possessing low academic qualifications

Respondents mean age of working practice was 12 years with mean household number of five persons. Ovharhe (2019) reported that most extension worker had over ten years of job experience and mean household sizes of persons.

Table 2. Demographic profile of respondents (n=80)

Profile	Frequency	Percentage (%)	Mean/Mode
Age			
27 – 34	16	20	
35 – 42	24	30	
43 – 50	30	37.5	47
51 – 58	10	12.5	
Gender			
Male	58	72.5	Male
Female	22	27.5	
Marital status			
Single	6	7.5	
Married	72	90	Married
Widowed	2	2.5	
Educational level			
OND/NCE	27	33.8	
HND/Degree	44	55	HND/Degree
Postgraduate	9	11.5	
Working experience			
3-8	17	21.3	
9-14	27	33.8	12
15-20	18	22.5	
21-27	18	22.5	
Household size			
1-3	16	20	
4-6	56	70	5
7-9	8	10	

Source: Field Responses

Awareness on channels of information on ICT available to extension workers

An attempt was made to identify the awareness on channels of information**.** According to Table 3 displays majority (above 50%) of the extension workers were aware of telephone (96.3%), photo camera (95.0%), (radio 93.8%), television (91.3%), video camera (86.3%), email (83.8%), lap top (82.5%), desk top and accessories (78.8%), internet/email (72.5%), projector (in-focus, 72.5%), on-line forum (group chat, 65.0%) and cable TV (55.0%). By this record, it implies that their level of awareness of ICT channels was high and commendable. Thus training exercises will be advisable channeled to areas where awareness of ICT is below 50% such as video conferencing (32.5%) and global positioning system (GPS) (26.3%). Afsar and Idrees (2019) reported low ICT awareness level of extension workers in the use of global positioning system for climate change which invariably affected extension activities delivery.

Utilization Competence in Selected ICT Skills

Utilization competence in selected ICT skills is an important finding of the study. Entries in Table 4 below show the level of competence which the extension workers use various ICT gadgets/software. The result obtained from the field survey therefore implies that the extension workers possess a high level of competence in the use of items ranked

first to eight such as On-line forum (group chat) and laptop (mean =3.6). This infers that extension advisers go online for meeting and group chats, a commendable attempt. Egbunonu et al. (2017) carried out a similar study in Imo State. They reported that Extension workers make use of Telephone and radio as part of their ICT package but are lacking in computer and internet operations. However, the extension workers possess a low level of competence in the use of video conferencing (mean = 2.0) and GPS (mean = 1.7) which lowest as 14th and 15th rank respectively. It is suggested that where competences are low (≤ 2.5), there are needs for training. Okwuokenye and Ovharhe (2017) reported that extension staff ought to be given adequate capacity building to bridge up identifiable gaps for effectiveness and competence in extension package delivery. With the overall mean = 2.8, suggested that level of competence is high in utilization.

Table 3. Respondents' awareness level on of selected ICT channels (n=80)

Selected ICT Channels	Respondents (yes)	Percentage (%)
Telephone	77	96.3
Photo Camera	76	95.0
Radio	75	93.8
Television	73	91.3
Video Camera	69	86.3
Lap top	66	82.5
Desk top and accessories	63	78.8
Internet/Email	58	72.5
Projector (In-focus)	58	72.5
On-line forum (group chat)	52	65.0
Video conferencing	26	32.5
Global Positioning System (GPS)	21	26.3

Source: Field Responses

Table 4. Respondents' competence in utilization of selected ICT gadgets (n =80)

ICT gadgets/software	Very competent (4)	Competent (3)	Little competence (2)	Not competent (1)	Mean score	Rank
On-line forum (group chat)	57 (228)	15 (45)	4 (8)	4 (4)	3.6	1st
Telephone	40 (160)	29 (87)	9 (18)	2 (2)	3.6	1st
Internet/Email	49 (196)	25 (75)	4 (8)	2 (2)	3.5	2nd
Lap top	49 (196)	16 (48)	7 (14)	8 (8)	3.3	4th
Desk top and accessories	38 (152)	24 (72)	11 (22)	7 (7)	3.2	4th
Photo Camera	29 (116)	29 (87)	18 (36)	4 (4)	3.0	5th
Video Camera	22 (88)	24 (72)	21 (42)	13 (13)	2.7	6th
Television	13 (52)	32 (96)	23 (46)	12 (12)	2.6	7th
Radio	18 (72)	22 (66)	24 (48)	16 (16)	2.5	8th
Projector	10 (40)	22 (66)	27 (54)	21 (21)	2.3	9th
Video conferencing	6 (24)	22 (66)	21 (42)	31 (31)	2.0	10th
GPS	4 (16)	13 (39)	17 (34)	46 (46)	1.7	11th
Pooled mean= 2.8						

Note: Figures in parentheses are scores from Likert-type scale. Cut-off mean=2.5(≥2.5= high competence; ≤2.5= low competence) **Source:** Field Survey Responses

Importance of Selected ICT Items

Findings in Table 5 shows the degree of importance of the selected ICT items to the extension personnel. The results from the field survey therefore implies that computer (laptop) and telephone which were ranked 1st are the most important ICT skills to the extension personnel in agricultural communications. However, video conferencing (mean = 2.4) and global positioning system (mean = 2.1) which had the lowest rank (7th and 8th respectively) were considered not important by the extension workers in agricultural communications. Since the overall ICT mean = 2.9, it indicates that the selected ICT items are important components of contemporary agricultural extension. Thus efforts should be made to ensure the affordability and availability of these ICT items for effective and efficient extension delivery system in Delta State extension services. Ebewore *et al.,* (2015) was to establish the fact that reliable channels

of information of importance of animal protein was gotten from internet amongst others. Extension workers should be abreast with latest information on agricultural innovations.

Table 5. Respondents' rating of importance in selected ICT items (n =80)

Selected ICT Items	Very important (4)	Important (3)	Slightly important (2)	Not important (1)	Mean score	Rank
Computer (Lap top)	31 (124)	44 (132)	5 (10)	0 (0)	3.3	1st
Telephone	40 (160)	28 (84)	9 (18)	3 (3)	3.3	1st
Desk top and accessories	35 (140)	29 (87)	11 (22)	5 (5)	3.2	2nd
Internet/ Email	32 (128)	29 (87)	14 (28)	5 (5)	3.1	3rd
Radio	34 (136)	31 (93)	6 (12)	9 (9)	3.1	3rd
On-line forum (group chat)	25 (100)	32 (96)	18 (36)	5 (5)	3.0	4th
Television	35 (140)	22 (66)	11 (22)	12 (12)	3.0	4th
Photo Camera	17 (68)	39 (117)	22 (44)	2 (2)	2.9	5th
Video Camera	21 (84)	28 (84)	26 (52)	5 (5)	2.8	6th
Projector	22 (88)	29 (87)	20 (40)	9 (9)	2.8	6th
Video conferencing	17 (68)	16 (48)	25 (50)	22 (22)	2.4	7th
GPS	5 (20)	24 (72)	30 (60)	16 (16)	2.1	8th
Pooled mean = 2.9						

Note: Figures in parentheses are scores from Likert-type scale. Cut-off mean=2.5 (≥2.5= important skills; ≤2.5= unimportant skills), Source: Field Responses

Constraints Facing Agricultural Extension Workers on the Usage of ICT

Values in Table 6 shows various constraints faced by the extension employees on ICT which categorize by their level of seriousness. Among the most serious constraints were frequent power failure (mean = 3.7), high cost of ICT infrastructure coupled with poor network in rural areas (mean = 3.6) and ranked second in pairs However, the constraints considered not serious by the extension workers were Difficulty in extension usage (mean = 2.2) and high rate of inferiority complex (mean = 1.8) which had the lowest ranks of 7th and 8th respectively. Ovharhe *et al.*, (2020) expressed dissatisfaction that similar constraints affect poultry farming on backyard household farming basis in Delta State. The constraints pooled mean = 3.1. This predicted that most constraints were serious and should be addressed to ensure proper extension delivery system.

Table 6. Constraints Facing Agricultural Extension Workers on the Use of ICT *(n=80)*

Constraints	Very serious (4)	Serious (3)	Slightly serious (2)	Not serious (1)	Mean score	Rank
Frequent power failure	57 (228)	20 (60)	2 (4)	1 (1)	3.7	1st
High cost of ICT infrastructure	52 (208)	25 (75)	2 (4)	1 (1)	3.6	2nd
Poor network in rural areas	53 (212)	23 (69)	4 (8)	0 (0)	3.6	2nd
High cost of maintenance	46 (184)	26 (78)	8 (16)	0 (0)	3.5	3rd
Low literacy level	43 (172)	24 (72)	7 (14)	6 (6)	3.3	4th
Poor access to ICT infrastructure	33 (132)	37 (111)	9 (18)	1 (1)	3.3	4th
Insufficient trainers	32 (128)	35 (105)	11 (22)	2 (2)	3.2	5th
Absence of governmental wireless internet access	36 (144)	29 (87)	9 (18)	6 (7.5)	3.2	5th
Absence of official telephone facilities	33 (132)	27 (81)	15 (30)	5 (5)	3.1	6th
low interest in ICT	9 (36)	14 (42)	35 (70)	30 (30)	2.2	7th
High rate of inferiority complex	2 (8)	12 (36)	30 (60)	36 (36)	1.8	8th
Pooled mean = 3.1						

Note: Figures in parentheses are scores from Likert-type scale. Cut-off mean=2.5 (≥2.5= Serious constraints; ≤2.5= Unserious constraints), Source*:* Field Responses

Results of tested hypothesis

The first hypothesis of the study sought to find out that there is no significant difference between socio-economic characteristics of extension workers and perception of extension workers on the competence ICT.

The result of the ordinary least square (OLS) shows that there is a significant relationship between social economic profile of respondents and ICT competence of extension workers in the study area. The result showed value as 0.714, R^2 = 0.578 and adjusted R^2 0.520 with p=value 0.000. This implies that level of competent in ICT is 0.57.8% explain

by the social economic characteristic of the extension workers. Among the social economic characteristic of the extension workers analyzed, age, marital status, education level, working experience are significant in determining importance in ICT whereas, gender and household size are found insignificant @ $p<0.05$).

Table 7. Model Summary and coefficients of first hypothesis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.714[a]	.578	.526	14.826

a. Predictors: (Constant), Household size, Gender, Marital Status, Level of education, Working experience, Age

F-stat =7.378, p-value 0.000

Estimated coefficient of parameters

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.245	22.093		.373	.710
	Age	1.295	.500	.605	2.590	.012
	Gender	-9.438	4.089	-.235	-2.308	.064
	Marital Status	10.719	4.587	.249	2.337	.022
	Level of education	15.034	3.241	.529	4.638	.000
	Working experience	-1.274	.611	-.440	-2.087	.040
	Household size	-.514	1.357	-.048	-.378	.706

a. Dependent Variable: Competence

The second hypothesis: Regression analysis was used to achieve this. From the result of OLS analysis above, there is a significant relationship between constraints faced by extension and the perceived importance of ICT skills on performance of extension officer.

The result revealed R = 0.546 R^2 =0.499 and adjusted R^2 =0.415 with F-stat =2.62 and P-value 0.007. This result implies that 49.9% variation of extension workers perception of importance in ICT skills is accounted for by changes in the level of constraints faced. Among the 10 constraints test low level of literacy, low interest in ICT, frequent power failure, poor network in rural area, insufficient trainers are significant while there rest are insignificant in determining important of ICT skill. In line with this result we reject the null hypothesis and accept the alternative that there is a significant relationship between the constraints faced by extension workers and their perceived important of ICT skills.

Table 8. Model Summary and coefficients of second hypothesis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.546a	.499	.415	10.247

a. Predictors: (Constant), Absence of internet access , Frequent power failure , Poor network in rural areas, High cost of maintenance , Low interest in ICT, Insufficient trainers , Poor access to ICT infrastructure , Absence of official telephone facilities , Low literacy level, High cost of ICT, High inferiority complex

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	48.648	17.452		2.788	.007
	Low literacy level	-3.204	1.423	-.260	-2.251	.028
	Low interest in ICT	.140	1.555	.011	.090	.023
	High inferiority complex	.589	1.380	.057	.427	.671
	High cost of ICT	2.130	2.194	.114	.971	.335
	Frequent power failure	3.097	2.137	.162	1.449	.052
	Poor access to ICT infrastructure	-.763	1.836	-.048	-.415	.679
	Absence of official telephone facilities	-.139	1.686	-.010	-.082	.935

Poor network in rural areas	4.841	2.047	.249	2.365	.021
Insufficient trainers	-5.804	1.556	-.396	-3.731	.000
High cost of maintenance	1.067	1.869	.063	.571	.570
Absence of internet access	-.092	1.391	-.007	-.066	.948

a. Dependent Variable: Importance of ICT

4. Conclusion and Recommendations

The study was aimed at determining the training needs of Delta State agricultural extension workers on the use of information and communication technology (ICT). The study discovered that the mean age of extension workers was 47 years with more of male. Extension workers attained educational qualification of HND/First Degree and were more married in number. The mean working experience of extension workers was 12 years; while the mean household number was five persons. On awareness of information channels on ICT available to extension workers, telephone, photo camera, radio and television were rated among the highest; while, video conferencing and GPS were rated lowest. In the utilization competence of ICT, on-line forum (group chat) and laptop were most applicable. However, competence in usage was reduced in video conferencing and GPS. The top most important ICT skills were regarded to be computer (laptop) and telephone in hierarchy. Again, at the bottom of importance were video conferencing and GPS respectively. The most serious constraints were frequent power failure, high cost of ICT infrastructure coupled with poor communication network in the rural areas of Delta State.

Finally, Information and Communication Technologies have great potentials in improving agricultural extension delivery and the Delta State extension workers are moderately aware, resourceful, and competent in the use of relevant ICT skills in extension delivery mechanism. Based on the findings and conclusion reached in this study, the following recommendations were made:

i. Training needs analysis should be carried out for new recruit more graduate youths and also periodically to determine the training needs of agricultural extension workers.

ii. On-the-job training programs should extend to video conferencing and GPS skill acquisition of ICTs for extension service delivery system.

iii. Improvement in rural infrastructures particularly electricity power supply, subsidizing the high cost of ICT and availability of good communication network in rural areas should be treated as top priority to enable the extension workers stay committed to their duties. Suggestions for Further Research

Usage of ICT in contemporary agriculture in Africa.

Gender analysis in the involvement of e-agriculture for crop production.

Agricultural productivity by implication of ICT in Nigeria.

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