Digital Usage Dataset of Beninese Farmers

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1 Abstract

A representative sample of 1,500 producers was interviewed through a questionnaire using the tablet-assisted one-on-one interview method to assess the adoption of digital technologies among market gardening producers in Benin. The questionnaire was designed to measure the digital divides within these rural populations. Based on a classic digital divide framework, the questionnaire aims to provide information on socio-economic characteristics and digital uptake by populations typically characterized by low connectivity and low skills. The collected data can be accessed in tabular form from an open repository, allowing the current state to be analyzed and informing the design of future digital rural development projects.

Keywords: on-line questionnaire, representative sample, digital appropriation, rural development, digital agriculture

Specification table

Subject	Social science
Specific domain	Appropriation (motivation, access, capacities and uses) of digital technologies; small-scale producers in Benin
Type of data	Table and data labels in .csv and .txt formats
How the data were acquired	Survey data was collected using the Kobo Toolbox survey tool
Data format	Raw, Processed
Description of data collection	The survey was completed by 1,500 market gardeners from Benin. The sample is methodically selected and representative of these populations. Market gardeners were randomly selected using the most comprehensive and up-to-date database available in the country. Data collection took place in 2022 and 2023 through in-person interviews.
Data source location	Country: Benin City/Region: Dagana and Linguère departments in Senegal, cocoa-producing areas in Côte d'Ivoire and the South Coast and peri-urban areas of major cities (main market gardening areas) in Benin

Value of the data

- The database collects data in regions where the availability of digital data is not very accessible.
- It surveys those most vulnerable to the digital divide.
- It facilitates comparisons between three key value chains in West Africa.
- The database can inform future agricultural or rural development projects and guide the design of public policies.
- It is accessible to researchers, public administrators, funders, experts and development project man- agers.

2 Objective

Improved infrastructure and the proliferation of mobile phones in West Africa are driving changes and challenges. There is growing interest in digital technologies and drives substantial public funding, which fosters the promise of development. However, as digital technologies become more widespread, digital divides are emerging, especially in rural areas. The objective of this survey, based on a digital divide framework, is to collect data on market gardeners in Benin. The resulting database will provide valuable information to local and international researchers and officials, and guide the allocation of funds from public and international agencies, allowing for better targeting of the most excluded groups taking into account their access, capacity and use of digital technologies.

3 Data Collection and Description

The questionnaire was designed to assess socio-economic characteristics and the adoption of digital technolo- gies. Data collection took place during the first semester of 2023. These are original data collected as part of the "Digital Divide" project (https://www.fracture-numerique.org/). Data collection followed the stages of digital adoption: motivation for adopting or not adopting digital technology, access to networks, devices, and mobile plans, capacities, and usage patterns, with a particular focus on professional-related activities. Following a pre-survey, a closed questionnaire was formalized and digitized, and it was administered and centralized using the KoboToolBox software. To enhance the quality and reliability of the primary survey data, data handling and restructuring were performed to create a cohesive database containing descriptions of the variables from the four main sections of the questionnaire. This survey therefore includes both structural data related to farmers and data on digital adoption. For the data cleaning process, missing values are replaced with 0. These correspond to questions for which respondents did not provide an answer. However, we note that some questions legitimately have 0 as a response — particularly binary questions such as yes/no items.

Table 2 : Sections of the Questionnaire used for the survey.

Section	Description of Variables
1. Farmer Characterization	Describes ties, gender, age, ethnicity, level of education, employment status, main occupation, number of persons in the concession.
2. Physical access to digital technology	Indicates access to digital tools, including internet and electricity for the dealership and individuals. Queries include network accessibility and individual internet usage frequency, along with monthly expenditure on plans.
3. Motivations	Individuals' wishes regarding training on digital tools and digital services they would like (climate forecasting, warning services, etc.).
4. Capacities	Individuals' abilities regarding phone applications with focus on mobile money and instant messaging services.
5. Uses	Details on actual use of phone applications.

1,500 individuals were surveyed. These individuals were randomly selected from the largest database of market gardeners available in the country, provided by FéNOMA-Benin, the umbrella organization for market gardening in Benin. Utilizing this database of 13,467 market gardeners, we conducted a two-stage cluster sampling process: communes were selected first, followed by the selection of market gardeners within those communes.

3.1 Socio-demographic variables

The variables describing demographics in the database begin with "DEMO" for Demography. These variables characterize individuals in the database based on factors such as region, subregion, age, gender, place of residence, literacy, etc. These factors are typically associated with digital divides

Table 3: County of residence

Answers	Number	Proportion
ALIBORI	108	7.2
ATACORA	96	6.4
ATLANTIQUE	144	9.6
BORGOU	124	8.3
COLLINES	149	9.9
DONGA	70	4.7
LITTORAL	85	5.7
MONO	134	8.9
OUEME	556	37.1
PLATEAU	34	2.3

Table 4: Region of residence

Answers	Number	Proportion
ABOMEY-CALAVI	31	2.1
ADJA-OUERE	34	2.3
ADJOHOUN	133	8.9
AGUEGUES	133	8.9
BEMBEREKE	50	3.3
COME	52	3.5
COTONOU	85	5.7
DANGBO	159	10.6
DASSA ZOUME	88	5.9
DJOUGOU	70	4.7
GLAZOUE	61	4.1
GRAND-POPO	82	5.5
MALANVILLE	108	7.2
NATITINGOU	96	6.4
OUIDAH	44	2.9
PARAKOU	74	4.9
PORTO NOVO	31	2.1
SEME PODJI	100	6.7
ZE	69	4.6

Table 5: Residence

Answers	Number	Proportion
Rural	1113	74.2
Urban	387	25.8

Table 6: Gender

Answers	Number	Proportion
Man	892	59.5
Woman	608	40.5

Table 7: Age

Answers	Number	Proportion
14–40	804	53.6
40–60	609	40.6
60+	87	5.8

Table 8: Education Level

Answers	Number	Proportion
High education or higher	84	5.6
Secondary school	349	23.3
Primary school	385	25.7
Quranic school	30	2.0
Literate	17	1.1
No formal education	635	42.3

Table 9: Marital status

Answers	Number	Proportion
Married	1363	90.9
Not married	109	7.3
Widow	28	1.9

Table 10: Household Size

Answers	Number	Proportion
1–5	627	41.8
5–10	748	49.9
10-15	89	5.9
15+	36	2.4

Table 11: Local speaking languages

Answers	Number
Adja	28
Aizo	64
Bariba	88
Berba	1
Dendi	234
Ditamari	102
Djerma	12
Fon	509
Goun	317
Idaatcha	149
Lokpa	64
Mahi	4
Mina	151
Nago	44
Other	125
Peulh	2
Sahoue	24
Torri	8
Wama	22
Weme	387
Yoruba	36

Table 12: Foreign language comprehension

Answers	Number
English Read	17
English Spoken	32
English Understood	33
English Written	16
French Read	470
French Spoken	612
French Understood	640
French Written	447

Table 13: Distribution on the speaking language

Answers	Number
1 Language	538
2 Languages	215
3 Languages	212
4 Languages	59
5 Languages	223
> 5 Languages	253

This variable provide the distribution of the number of local languages spoken by an individual. It is a summary of the table 11.

3.2 Farming-related characteristics

The variables related to farming activities in the database are prefixed with 'agri' or 'crop', indicating their relevance to agriculture. The distribution of respondents' attitudes and characteristics concerning agricultural activities is presented by question below.

Table 14: What is your main activity in terms of allocated time

Answers	Number
Agriculture	1402
Artisanat	32
Commercialisation de divers articles	19
Commercialisation des produits agricoles	11
Conducteur de moto/ tricycle	1
Conducteur de voiture	1
Entrepreneur	2
Fonctionnaire d'Etat/d'entreprise privée/ONG	20
Pêche	8
Transformation de produits agricoles	1
Élevage	3

Table 15: What is your main activity in terms of income

Answers	Number
Agriculture	1434
Artisanat	20
Commercialisation de divers articles	11
Commercialisation des produits agricoles	15
Conducteur de moto/ tricycle	2
Entrepreneur	3
Fonctionnaire d'Etat/d'entreprise privée/ONG	9
Pêche	3
Transformation de produits agricoles	2
Élevage	1

Table 16: What are your main farming activities?

Answers	Number
Market gardening	1499
Livestock	276
Hydro-amenagement	1
Food crops	724
Fishing	128
Cash crops	89
Agri trade	183
Agri processing	4

Table 17: What crops do you grow?

Answers	Number
Peper	798
Vegetable	557
Tomato	415
Okra	395
Carot	358
Pigweed	307
Crincrin	278
Lettuce	276
Onion	249
Cabbage	149
Basil	124
Other	82
Cucumber	81
Vernonia	53

Access to digital

The names of the variables describing access to digital tools in the database begin with "access". The tables below provide data on access to communication technologies and electricity in Benin as well as on the purchase patterns of communication packages.

Table 18: Do you have acces to these digital tools?

Answers	Number	Proportion
Telephone	1370	91.3
No digital	130	8.7
Laptop	6	0.4
Tablet	3	0.2
Spotlight	1	0.1

Table 19: What type of phone do you have?

Answers	Number
Smartphone	472
None	296
Basic	732

Table 20: Why don't you have phone?

Answers	Number	Proportion
Friend	68	21.9
Illiterate	52	16.7
Money	47	15.1
Child	32	10.3
Electricity	29	9.3
Can't use	25	8.0
Time consuming	24	7.7
Don't need	12	3.9
Husband autorisation	7	2.3
Not desire	4	1.3
Internet	3	1.0
Network	3	1.0
Satisfaction	3	1.0
Perception	1	0.3
Dangerous	1	0.3
Interdiction	0	0.0

Table 21: Cost of your current phone

Answers	number	proportion
1K–10K	433	28.9
10K–20K	313	20.9
20K-30K	39	2.6
30K-50K	205	13.7
50K+	213	14.2
NA	297	19.8

Table 22: Number of phone purchased

Answers	Number	Proportion
0	298	19.9
1	26	1.7
2	90	6.0
3	175	11.7
4	227	15.1
5	230	15.3
6	155	10.3
7	78	5.2
8	86	5.7
9	45	3.0
10	90	6.0

The question related to access to electricity is conditional on whether the respondent already owns a phone.

Table 23: Electiricity source

Answers	Number
Community charging station	35
Domestic individual	821
None	3
Shared utility connection	345
0: No answer	296

Table 24: Electricity production

Answers	Number
None	3
Power generator	9
SBEE	578
Solar panels	614
0: No answer	296

Table 25: Do you have access to network?

Answers	Number	Proportion
MTN	1185	79.0
Moov	756	50.4
SBIN	76	5.1
None	3	0.2
Isocel	2	0.1

Table 26: Do you have access to internet?

Answers	number	Proportion
0	528	35.2
1	972	64.8

Table 27: Quality of internet

Answers	Number
Very weak network	22
Weak network	87
Average network	222
Good network	486
Very good network	155
0: No answer	528

Table 28: Moov internet quality

Answers	Number
Very weak network	13
Weak network	97
Average network	155
Good network	385
Very good network	106
0: No answer	744

Table 29: MTN internet quality

Answers	Number
Very weak network	19
Weak network	133
Average network	187
Good network	626
Very good network	220
0: No answer	315

Table 30: Frequence of the internet recharge

Answers	Number
Daily	372
Weekly	90
Monthly	7
More rarely	2
0: No answer	1029

Table 31: Weekly budget for internet recharge

Answers	Number	Proportion
0–500	75	5.0
500–2000	205	13.7
2000-3000	162	10.8
3000-5000	21	1.4
5000+	7	0.5
NA	1030	68.7

Table 32: Frequence of communication recharge

Answers	Number
Daily	818
Weekly	327
Monthly	8
More rarely	51
0: No answer	296

Table 33: Weekly budget for communication

Answers	Number	Proportion
0–500	342	22.8
500–2000	522	34.8
2000-3000	233	15.5
3000-5000	18	1.2
5000+	3	0.2
NA	382	25.5

Table 34: Do you have access to credit top-up or communication package services in your village or locality?

Answers	Number	Proportion
0	387	25.8
1	1113	74.2

Capacities

Table 35: Capacity

Answers	Number	Proportion
Call/Sms	1280	85.3
Sell product online	805	53.7
Buy product online	660	44.0
Recruit/Rent online	554	36.9
Vocal	505	33.7
Photos	453	30.2
Messages	407	27.1
Videos	371	24.7
Install app	300	20.0
Join group	284	18.9
Transfer files	231	15.4
Search/Share info	141	9.4
Write mail	111	7.4

Usage

Table 36: What applications do you use with your phone?

Answers	Number	Proportion_total	Proportion_smartphone
Mobile Money	1173	78.2	248.5
Whatsapp	281	18.7	59.5
Facebook	213	14.2	45.1
Google	132	8.8	28.0
Youtube	116	7.7	24.6
Instagram	20	1.3	4.2
Other no agri	19	1.3	4.0
Tiktok	13	0.9	2.8
Other agri	9	0.6	1.9
Snapchat	6	0.4	1.3
Linkedin	2	0.1	0.4

Table 37: To how many whatsapp do you group belong ?

Answers	Number
10 group	3
1 group	306
2 group	203
3 group	115
4 group	45
5 group	24
6 group	13
7 group	8
8 group	7
9 group	3
> 10 grop	1

Table 38: Difference in digital usage across communication types

Usage	Usage agri call sms	Usage agri messages	Usage agri photos	Usage agri videos	Usage agri vocal
Advisor agri	69 (1.3%)	33 (2.2%)	38 (2.6%)	26 (2.4%)	49 (2.2%)
Agent atda	113 (2.1%)	50 (3.3%)	40 (2.8%)	35 (3.2%)	68 (3.1%)
Agent ddaep	4 (0.1%)	3 (0.2%)	2 (0.1%)	3 (0.3%)	4 (0.2%)
Carrier	103 (1.9%)	23 (1.5%)	11 (0.8%)	11 (1%)	34 (1.5%)
Colleague	352 (6.6%)	114 (7.6%)	102 (7%)	66 (6.1%)	149 (6.8%)
Collector	229 (4.3%)	26 (1.7%)	56 (3.9%)	31 (2.9%)	62 (2.8%)
Consumer	570 (10.8%)	136 (9.1%)	190 (13.1%)	142 (13.1%)	249 (11.3%)
Employee	192 (3.6%)	33 (2.2%)	16 (1.1%)	13 (1.2%)	68 (3.1%)
Friend	1196 (22.6%)	378 (25.3%)	370 (25.5%)	304 (28%)	486 (22%)
Gardener	854 (16.1%)	259 (17.3%)	252 (17.4%)	164 (15.1%)	377 (17.1%)
Parent	1114 (21%)	304 (20.3%)	286 (19.7%)	232 (21.4%)	433 (19.6%)
Supplier	499 (9.4%)	137 (9.2%)	87 (6%)	57 (5.3%)	226 (10.2%)

Table 39: Digital usage summary

Answers	Number
Call/Sms	1280
Vocal	505
Messages	407
Photos	453
Videos	371

Table 40: Financial usage of digital

Answers	Number	Proportion
Receive	1158	77.2
Payment	751	50.1
Saving	229	15.3
Refund	212	14.1
Tontine	27	1.8
Credit	6	0.4
Secure payment	4	0.3

Table 41: Usage for information

Answers	Number	Proportion
Crop protection	106	7.1
Agri technique	101	6.7
Price of product	60	4.0
Technique	42	2.8
Market access	33	2.2
Other	16	1.1
Financial management	13	0.9
Climate data	7	0.5
Land law	1	0.1

Table 42: Usage for buying product

Answers	Number	Proportion
Seed	638	42.5
Plant proctection	618	41.2
Fertilizer	479	31.9
Dropping	413	27.5
Labour	189	12.6
Agri material	173	11.5
Compost	151	10.1
Other	11	0.7

Table 43: Usage for knowledge

Answers	Number	Proportion
Social media	283	18.9
Agri question	252	16.8
Whatsapp question	231	15.4
Internet research	131	8.7
Agri videos	117	7.8
Read research	105	7.0
Research on youtube	99	6.6
Bluetooth file transfer	36	2.4
Specific platform	26	1.7
Pre-filled SD cards	1	0.1

Table 44: Usage for belonging to group

Answers	Number	Proportion
Vegetable producers	68	4.5
Cooperative members	63	4.2
Agri advisory	60	4.0
Knowledge exchange	48	3.2
Other	31	2.1

Table 45: Summary of usage

Answers	Number
Momo	1173
Market	820
Buy	660
Knowledge	309
Information	141
Group	117

Table 46: Usage for recruitment

Answers	Number	Proportion
Rent machine	8	0.5
Temporal recruitment	552	36.8

4. Theoretical Design

The survey was designed to follow the widely used Digital Divide framework proposed by van Dijk (2020). This framework highlights the steps of the appropriation process of digital devices.

The appropriation process starts with a person's motivation (does a potential user want to use the technology?), followed by their need for physical and material access (can the potential user access the digital technology itself and the additional material resources that are needed to use that technology over time?), and the skills to effectively use the technology (how able is the user to understand and use the technology?), and finally the actual usage of the technology (how often, for what purpose, with what result?). These four stages influence each other to unleash potential or, on the contrary, increase inequalities.

The data was collected as part of the Digital Divide project, launched in November 2021 to explore and understand the inequalities that technologies can create or exacerbate. The project's objective was to characterize the uses and non-uses of digital technology in agriculture by studying the socio-economic dimensions of digital development at the level of value chains and farms in West Africa. It intervenes in three value chains in three countries: market gardening in Benin, cocoa farming in Côte d'Ivoire, and the dairy sector in Senegal.

To our knowledge, data on the realities of digital adoption by producers in these areas are rare or non-existent. The collection of this data was intended to provide a better understanding of this adoption process. The survey results will be used to design a digital strategy for agriculture led by producer organizations, technical services, development operators, and research. The collected data could be used by others in related or complementary frameworks.