Characterisation of the digital divide and impact of the use of digital tools for Ivoirian cocoa farmers

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Introduction

#1 ICT concept

- ICT definition (Dieuzeide, 1994): **Instruments carrying immaterial messages**
- Digitalization of the Agricultural Sector in Africa: **Opportunities and Risks** (Zscheischler, 2022).

#2 Notion of digital divide

- Origine of the concept (UIT, 1985)
- Typology of the digital divide:
  - North vs. South (Papadopoulos & Cleveland, 2023)
  - Urban vs. Rural (Malecki, 2013)
  - Socio-professional categories (Granjon, 2009)
Objectives

1) Characterization of the digital divide within the population of cocoa farmers and study of the determinants of agricultural uses.

2) Assessment of the impact of digital usage on producers' income.

Study areas and sampling

- 9 regions belonging to historical cocoa loops (Ruf et al., 2020)
- 903 cocoa farmers surveyed
- Random sampling of support cooperatives
- Stratified sampling (age and gender) of farmers according to Assiri et al. (2009):
  - 30% [18-40]; 50% [40 – 60] and 20% ]60 +[
  - 1/20 woman
Methodology

Characterization of the Digital Divide following the theoretical framework of Van Dijk (2013)
Basic descriptive statistics (histograms, pie charts)

Study of the determinants of each step:
1) Binary Logit models (motivation and access (Yes or No))
2) Poisson models (usage capabilities and agricultural uses (cumulative number))

Analysis of the effect of digital technology on cocoa income using the nearest neighbor matching method (Rosenbaum & Rubin, 1983)

The four successive access steps in the appropriation of digital technology according to van Dijk (2013)
Results

Motivation

<table>
<thead>
<tr>
<th>Variable</th>
<th>To be motivated</th>
<th>Modality or unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td>Woman, Man</td>
</tr>
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<td>Age</td>
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<tr>
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<td></td>
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<tr>
<td>Farming activities</td>
<td></td>
<td>Number</td>
</tr>
<tr>
<td>Cooperative membership time</td>
<td></td>
<td>Years</td>
</tr>
<tr>
<td>Experiences other organizations</td>
<td></td>
<td>Number</td>
</tr>
<tr>
<td>Mean cocoa sales for the last 5 years</td>
<td></td>
<td>US$</td>
</tr>
<tr>
<td>Owning a phone</td>
<td></td>
<td>No, Yes</td>
</tr>
<tr>
<td>Time passed since the acquisition 1st phone</td>
<td></td>
<td>Years</td>
</tr>
</tbody>
</table>

To be motivated

- Yes: 79%
- No: 21%
### Results

#### Physical access

<table>
<thead>
<tr>
<th>Area coverage by operator</th>
<th>MTN</th>
<th>Orange</th>
<th>Moov</th>
<th>No network</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>99.6%</td>
<td>98.2%</td>
<td>90.8%</td>
<td>0.3%</td>
</tr>
</tbody>
</table>

Not homogeneously present but network available in one or more places in the locality

<table>
<thead>
<tr>
<th>Access to the network from the field</th>
<th>No; 14%</th>
<th>Yes; 86%</th>
</tr>
</thead>
</table>

Even available in the field

<table>
<thead>
<tr>
<th>Access to electricity</th>
</tr>
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<tbody>
<tr>
<td>Little problem of access to electricity</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Individual housing connection</th>
<th>Domestic collective connection</th>
<th>No electricity</th>
</tr>
</thead>
<tbody>
<tr>
<td>6%</td>
<td>19%</td>
<td>75%</td>
</tr>
</tbody>
</table>
**Motivation**

**Material access**

**Type of phones**
- Smartphone
- GSM

**Multimedia**
- Yes: 95%
- No: 5%

**Owning a phone**
- Yes: 95%
- No: 5%

**Results**

**To have a smartphone**

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Motivation

Physical and material access

Usage capabilities

Results

General digital capabilities of producers

- Sell online
- Buy online
- Ability to create a group
- None
- Use a search engine
- Ability to integrate a group
- Use mobile money
- Write/read a written message
- Take and send a picture
- Send/listen to a voice...
- Make a call

Results

To have digital capabilities

Variable

- Gender
- Age
- Location
- Educational level
- Main activity
- Farming activities
- Cooperative membership time
- Experiences other organizations
- Mean cocoa sales
- Time since 1st phone

Modality or unit

- Woman
- Man
- 18 to 40
- 40 to 60
- +60
- Camp
- Village
- City
- None
- Primary
- Secondary
- University
- Farmer
- Other
- Number
- Years
- Number
- US$
### Results

#### Agricultural uses (Diversity and frequency)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Never</th>
<th>Once or twice a month</th>
<th>Once a week</th>
<th>One or three times a week</th>
<th>Every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sell online</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to create a group</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use mobile money</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Ability to integrate a group</td>
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<td></td>
</tr>
<tr>
<td>Buy online</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Use a search engine</td>
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<td></td>
</tr>
<tr>
<td>Take and send a picture</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Make a call</td>
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#### To use digital skills for agricultural activities

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#### Motivation

- Physical and material access
- Usages capabilities
- Make a call
- None
- Send/listen to a voice...
- Write/read a written...
- Take and send a picture
- Use a search engine
- Buy online
- Ability to integrate a group
- Ability to create a group
- Use mobile money
- Sell online

#### Usages capabilities

- Never
- Every day
- One or three times a week
- Once a week
- Once or twice a month
Key results

- 38% of farmers have no use of their phone in connection with their farming activity
- only 3% of banking digitalization

- 22% have no capacity to use their phone
- only useful for making calls

- 6% with no access to electricity
- 99.7% of the studied areas covered by at least one operator
- 86% field coverage
- 95% have a phone, only 28% a smartphone

- 79% motivated

Agricultural uses (diversity and frequencies)
- No agricultural use divide, because no use of software

Usage capabilities
- Divide in usage capabilities

Physical and material access

Motivation
- Hardware divide
Conclusion, recommendations and perspectives

Digital divide in terms of (i) equipment and (ii) farmers' skills in using digital technology

| Income variation between digital users and non-users | Pr(>|t|) |
|-----------------------------------------------------|---------|
| 20 US$ ha\(^{-1}\)                                 | 0.587   |

→ No significant effect of digital use on income

Recommendations at this stage

- **Reduce hardware, telephone and internet costs:** Facilitate access to smartphones, which are still extremely expensive for farmers, and reduce operating costs (5 US$ for 1 Gbit in Ivory Coast while 3 US$ in France (Alliance for affordable internet, a4ai.org), minimum wage in CI of 100 US$).

- **More education:** To increase the capacity of use of the stakeholders, it is necessary to provide an adequate education (42% illiteracy in our sample).

- **Develop useful and suitable software for farmers**

• Interviews with other members of the farming households
• Interviews with other actors in the cocoa sector

To understand the positive and negative interferences induced by digital technology that could affect the farmer.
Thank you for your attention
References


