ICT and Financial Inclusion in the Brazilian Amazon

Luiz Antonio Joia[(✉)] and Ricardo Paschoeto dos Santos

Getulio Vargas Foundation, Rua Jornalista Orlando Dantas 30, Room 205,
Rio de Janeiro 22231-010, Brazil
luiz.joia@fgv.br, ricardopas@bol.com.br

Abstract. The challenge of providing the infrastructure of public services in the less developed regions of Brazil has mobilized the Brazilian government in the quest for new and creative approaches that can reduce the major inter-regional disparities in the country. One of the initiatives implemented include access to the financial system, since, by way of example, such access is almost non-existent on Marajó Island in the state of Pará in the Brazilian Amazon. To change this reality, an innovative e-government project is the itinerant bank branch installed in a boat, named *Agência Barco*, to serve the riverine populations of regions with low population density, transportation difficulties and limitations in access to information and communication technology (ICT). Thus, the main objective of this research is to identify how the financial inclusion indicators have been influenced by the work of Agência Barco on Marajó Island from the ICT standpoint. The results obtained led to the conclusion that Agência Barco has been able to attend the needs of access to financial products and services demanded by the population of Marajó Island, as well as identify opportunities for broadening financial education and inclusion through this e-government venture.

Keywords: Financial inclusion · Development · ICT for development · *Agência Barco* · Marajó island

1 Introduction

Studies of the World Bank [1] and the Brazilian Institute of Geography and Statistics [2], among others, point to a continuous improvement of social and economic development indicators in Brazil in the last two decades, with a reduction of inequalities between income classes. However, when analyzing the Brazilian Municipal Human Development Index, regional inequalities are perceived, and it is possible to identify a broad variance in the opportunities available to Brazilians [3].

These inequalities also prevail in access to financial services, which can be seen in the indicators of the Financial Inclusion Reports of 2010 and 2015, which reveal a wide dispersion between the Units of the Federation [4, 5], as in March 2015 when 240 municipalities were without banking services of any kind (branches, service outlets or ATMs). Furthermore, in March 2015 a total of 1922 Brazilian municipalities did not have bank branches, i.e. 34.5% of Brazilian municipalities [5]. Therefore, there is still vast asymmetry in Brazil in access to and use of banking services [6].

Thus, this article seeks to investigate an ICT-equipped itinerant bank in vessels—an e-government project developed by Caixa Econômica Federal (CAIXA[1]) and named Agência Barco[2]—which seeks to attend the populations of riverine regions with access to banking services, in cities where there is not a single local bank branch. In specific terms, the universe of this work includes the Agência Barco that serves Marajó Island[3] in the state of Pará—a region with a low human development index (HDI), including the city of Melgaço, which has the lowest HDI in Brazil [3]—aiming to identify how the Agência Barco, by means of ICT, influences the financial inclusion of the Marajó Island region.

2   Theoretical Background

2.1   ICT and Financial Inclusion

For the Brazilian Central Bank, financial inclusion is the process of effective access and use by the population of financial services suited to their needs, thereby contributing to their quality of life. However, not all individuals and companies have access to the financial system, either due to the lack of availability of services and products for given sectors of society or the lack of a financial culture among the people.

Despite progress in the relationship between citizens and the financial system and the increased presence of financial institutions in almost all Brazilian municipalities due to the success of the Banking Correspondent (BC) model [7, 8], the country still has less than half of the number of bank branches per capita existing in developed countries [9].

Moreover, by adopting a holistic approach, studies on ICT4D—Information and Communication Technology for Development—seek to analyze how ICT can promote development while respecting the complexity of local, national and international conditions [10]. Thus, ICT is the latest enabler of financial inclusion, since its mass diffusion is the most significant technological change in low-income communities in recent years, leading to the emergence of inclusive financial services, especially those related to mobile communication technology [10].

2.2   The Dynamic Info-Inclusion Model (2iD)

In an attempt to overcome the lack of research in the ICT4D field in Brazil, Joia [11, 12] proposed the dynamic info-inclusion model (2iD), which evaluates digital inclusion encompassing both political, technical, educational and social aspects, as well as the dynamics of a virtuous cycle of participation and empowerment, as shown in Fig. 1.

---

[1] CAIXA is a Brazilian federal bank in charge of implementing social programs in the country.

[2] Agência Barco means Riverboat Branch in English.

[3] More information about Marajó Island is available at https://en.wikipedia.org/wiki/Maraj%C3%B3, retrieved on January 19, 2017.
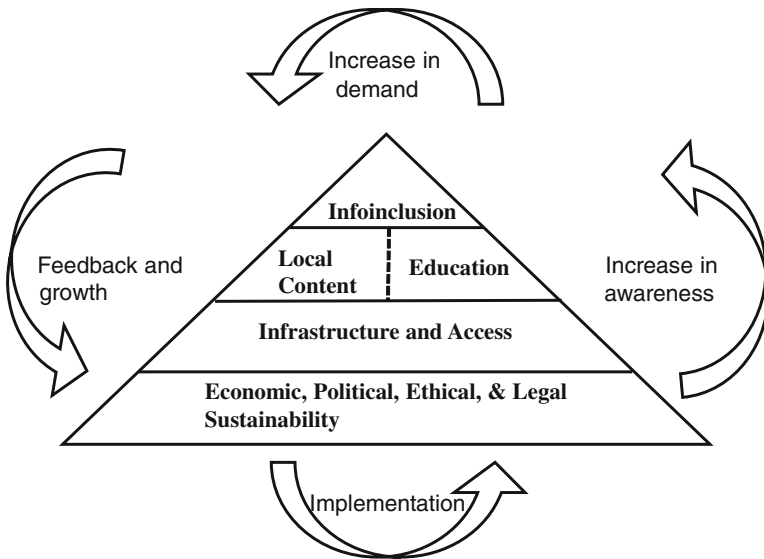
Fig. 1. Dynamic Info-inclusion Model (2iD). *Source*: Adapted from Joia [11, p. 308]

In this context, Joia [11, 12] suggests that the sustainability of digital inclusion should include not only financial and economic factors, but also factors that reflect the government's concern for the continuity of public policies for digital inclusion. Furthermore, according to the author, the "education" component in the model should go beyond the mere training of individuals, incorporating awareness of the opportunities generated by ICTs for socio-economic change. Moreover, the author stresses the need to consider the environment and the context, in order to create specific content that meets the expectations and needs of the location of the individuals in which it develops the info-inclusion project.

On the other hand, in the dynamic process of implementation of actions, there occurs increased awareness of individuals, particularly the awakening of interest in issues relating to the use of ICT. From that moment onwards, these individuals begin to demand content, education, services and access to ICT. The feedback, coupled with the broadening of the empowerment cycle arising from this dynamic, generates the implementation of new initiatives for digital inclusion, as seen in Fig. 1.

2.3   The 2iD Model Adapted to Financial Inclusion (2iDf)

For the development of this research, the 2iD dynamic info-inclusion model created by Joia [11, 12] was adapted to evaluate financial inclusion, as shown in Fig. 2. For this purpose, the theoretical framework that supports the components of the 2iD model adapted to financial inclusion, called 2iDf, is presented in Fig. 3.
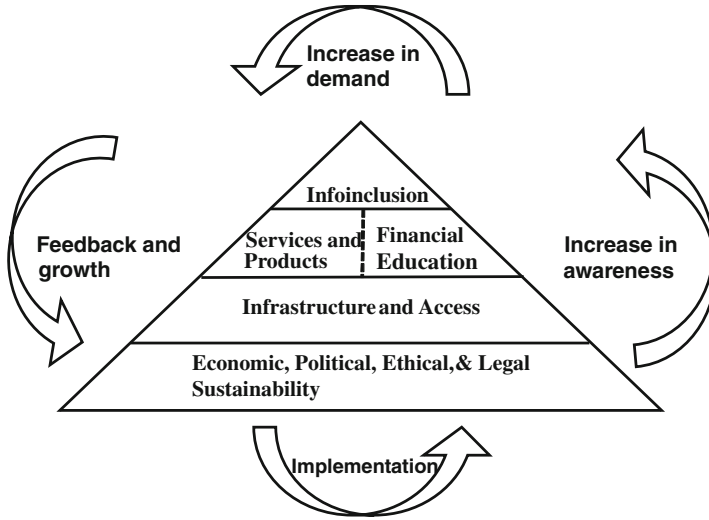
Fig. 2. 2iD Model adapted for financial inclusion (2iDf)

Component of The Model	Sources
Infrastructure and Access	[4,13-14]
Banking Installations and ICT	[4,14]
Services and Products	[4,14]
Costs	[9,15,16]
Financial Education	[13,16]
Enhancement of the Financial Resources	[8,17]
Generation of Income	[18]
Promote the Use of Electronic Transactions	[8,19,20,21]
Services and Products	[20,22]
Sustainability	[15,16,23,24]
Implementation	[11,12,16,24]
Increase in Demand	[4,11,14,26]
Feedback and Growth	[11,14,22]

Fig. 3. Theoretical framework for the 2iD model adapted for financial inclusion (2iDf)

Thus, in the adapted model of Fig. 2, the following aspects of financial inclusion are addressed:

– Infrastructure and access—This deals with the creation of individual and collective conditions for the population of the locations to access financial services involving:
  – The presence of banking facilities and technological resources;
  – Availability of services and products;
  – Accessible cost for access to the Agência Barco and the products offered.

- Financial Education—This deals with the training of people to use the products offered in all its possibilities, comprising:
  - Presentation of the characteristics of products and services that enhance the financial resources of the citizen;
  - Presentation of the characteristics of products and services to support entrepreneurial activities that can generate more income in the locations;
  - Promotion of the use of electronic transactions, thereby replacing cash.
- Services and Products—This involves offering of a portfolio of financial products and services that takes into consideration the reality of the financial inclusion in each location served.
- Sustainability—This involves the maintenance and updating of financial products and services offered in the locations, including economic aspects—logistic costs, personnel and ICT—as well as aspects related to public policies and legal and ethical issues.

Just as with the 2iD model of Joia [11], the dynamic process of the 2iDf model perceives the government as being responsible for implementing the financial inclusion initiatives. In this dynamic process, through the implementation of financial inclusion actions, there is an increase in the awareness of individuals, particularly the awakening of interest in questions relating to the use of financial products and services. Thereafter, these individuals begin to demand more financial services and products, more educational activities and, consequently, more access to technologies that enable the use of financial services. The feedback coupled with the broadening of the empowerment cycle resulting from this dynamic leads to the implementation of new financial inclusion initiatives.

3   Methodological Procedures

This article used the case study method [27], with data collection by means of interviews and direct observation. For the processing and analysis of data, the content analysis technique [28] and the application of the dynamic info-inclusion model adapted to financial inclusion (2iDf) were used.

Thus, a single case study is investigated with one unit of analysis [27] represented by a service outlet of the Marajó Island Agência Barco of CAIXA, with data obtained from document research, a questionnaire and interviews. A directed sample is used, in which individuals are selected on the basis of certain characteristics regarded as relevant by the researchers and participants [29], and employing techniques of content analysis for data analysis [30].

3.1   Data Collection

To achieve the objectives proposed in this case study a literature review was initially conducted on the subject in question. Documents were also gathered from the financial institution under analysis, IBGE, UNDP and the Central Bank.

Open interviews were conducted [31] with employees of the financial institution to assist in providing an in-depth description of the case in order to identify relevant information not available in documentary sources. However, in order to grasp the perception of the Agência Barco users regarding the services and aspects of financial inclusion, semi-structured interviews were staged [32]. The interviews were conducted during the visit of one of the researchers to the Agência Barco in Marajó. A total of 23 clients and five employees from CAIXA and five servants of organizations involved participated in these interviews, which were recorded and later transcribed verbatim for analysis. Moreover, asystematic non-participant direct observation was also conducted [31].

All the above data were obtained over the course of five days in July 2015 during a trip made by one of the researchers in the Agência Barco in the Marajó Island in Brazilian Amazon.

3.2   Data Analysis

Interviews conducted with Agência Barco clients and employees were handled with content analysis techniques, with a priori categorization based on constructs of the 2iDf model, with alphanumeric coding and grouping by frequency of occurrence, i.e. by repeating of contents common to the majority of respondents [28]. The categorization followed the mixed model [33], that is, it made it possible to add new categories as registration units were regrouped.

To assist in the analysis of content, lexical analysis (which applies statistical methods to the description of the vocabulary) was applied before the analysis of content. This was done to ensure that the data analysis therefrom was fully implemented, encompassing several possibilities that might arise or emerge [34].

Registration units for clipping of excerpts were defined by words and expressions that alluded to the static and dynamic components of the 2iDf model. Lexical analysis led to the initial identification of 864 words and phrases which, in turn, were grouped into 235 initial categories. The recurring process of lexical analysis and analysis of content led to a new categorization phase, totaling 97 categories with 821 occurrences (see Fig. 4). From this phase of the review process onwards, the intermediary categories were also coded according to their influence—positive or negative—in relation to the components of the 2iDf model. The data were interpreted by means of comparison with the constructs highlighted in the theoretical framework, which supported the components of the 2iDf model, seeking to identify the impact of the Agência Barco on financial inclusion of locations served, and to identify which of the components of the 2iDf model generated opportunities for actions that could contribute to regional development.

Components of the 2iD Model adapted for Financial incluison	Categories	Frequency of remarks per category	Frequency of remarks per component of the model
Infrastructure and access	ICT	45	430
	Co sts	85	
	Physical Structure	14	
	Promotion	129	
	Complementary services (Lottery and BC)	121	
	Team	19	
	Availability	17	
Financial e ducation	Guidance	85	179
	Ease of use	60	
	Innovation	34	
Products	Supply	112	112
Sustentainability	Politics	46	51
	Economics	5	
	Legal	0	
	Ethics	0	
Awareness	Insertion	9	17
	Community	8	
Increase in demand	New services	18	18
Growth	Initiatives	15	15

Fig. 4. Categories of the content analysis

4   The "Agência Barco" Case

CAIXA is a Brazilian public bank having experience in the operation of social programs of the Federal Government and of banking inclusion to expand attendance to populations still without access to banking services, especially through Banking Correspondents. However, in many areas with difficult access by land, or very far from municipalities with dynamic economic activity, there are difficulties for the business model of the Banking Correspondents to attend the needs of the populations. This situation is especially relevant in the riverine locations of the states of the Amazon region, where river trips between towns and larger cities can take more than one day.

In this scenario in which barriers to the physical presence of banking institutions are well-nigh insuperable, the 'Itinerant Riverine CAIXA Service Units' project, which became known as Agência Barco, was conceived.

The Agência Barco consists of boats designed and built exclusively for operation of a bank agency where bank staff perform their activities like any other bank branch of the institution. In addition, the boats are equipped with infrastructure for support to partnerships with other agencies of the Federal and State Government. These include, among others, the Ministry of Health, Ministry of Culture, Ministry of Labor, Ministry of Education, Secretariat on Policies for Women, as well as Courts of Justice to carry out public and institutional policies in the locations.

The Marajó Island Agência Barco was inaugurated in January 2014 to serve ten cities: Soure, Salvaterra, Ponta de Pedras, Muana, São Sebastião da Boa Vista, Curralinho, Bagre, Breves, Melgaço and Portel. It is a vessel with three decks, with a total area of one thousand and seventy-seven square meters, with capacity for seventy-six people seated in the service area of one hundred and forty square meters, plus a further twenty passengers who remain on the boat throughout the trip, namely five employees of CAIXA, five employees of the organizations involved, four security guards and six crew members.

One of the prerequisites for opening the Agência Barco imposed by the regulatory bodies was that no cash would be stored or transacted on the boat for security reasons. Thus, the business strategy has the support of a lottery office in each city served by the boat, such that the amounts in cash can be handled by these service outlets, also operated locally by CAIXA.

The Agência Barco makes a monthly trip, referred to as a cycle, remaining two days on average in each location, working during normal banking hours and offering all the services of a normal branch, except for cash transactions. The displacement between cities is usually at the end of the day in the early evening and night, depending on the sailing conditions and the weather (wind, rain, etc.). The main services offered are: opening accounts, microcredit operations, financing of building materials, security bonds, life insurance, direct consumer credit, registration and resetting passwords on federal government citizen cards, registration and regularization of the social integration program, release of length of service pension funds, release of unemployment benefits, registration and regularization of social security cards, family allowance benefits, among others.

The technological solution for the Agência Barco includes satellite communication to connect to the CAIXA Datacenter located in Brasilia, which is structured to support real time data and voice applications with autopointing and autotracking mechanisms. These functions enable execution and transmission of back-end processes of the Agência Barco, even with the vessel in transit, and reduce the occurrence of communication failures due to movement of the boat on its moorings. The satellite connection is concentrated in the teleport of the telecommunications services operator and forwarded by terrestrial circuits to the CAIXA Datacenter located in Brasilia. In addition to this, the vessel is equipped with direct access to the Internet via cell phone networks.

5   Results

Of the ten municipalities served by the Agência Barco on Marajó Island, eight are classified as having low or very low human development and only two are classified as having medium human development, which is well below the Brazilian global HDI [3]. Moreover, only four of the ten municipalities served by the Agência Barco have bank branches, and only the municipality of Breves has a CAIXA branch, which is the financial institution responsible for putting the public policies of the federal government into operation.

The Financial Inclusion Index of the State of Pará was analyzed in the second Financial Inclusion Report of the Brazilian Central Bank [4], with Marajó Island featuring the lowest indicators of the state, which confirms the lack of the availability of banking services in the Agência Barco operating region.

It was revealed that the majority of the customers interviewed (47.8%) had little schooling (incomplete primary education) and a little over half of the sample received social benefits from the federal government—with only one respondent stating that this is the main source of family income.

Of the twenty-three customers interviewed, approximately 50% knew of the existence of the Agência Barco through third parties, i.e. a neighbor or relative saw the boat in the harbor and passed on the information, and six customers interviewed came to the branch by boat, coming from tributaries or creeks in the regions surrounding the cities.

In addition to this, there has been a marked increase in cell phone penetration, with all of the customers confirming that they owned cell phones, although around half of them did not have any form of Internet access.

Of the twenty-three respondents, 40.9% reported having no formal relationship with financial institutions through checking or savings accounts, though only three said they had never had a bank account. In addition, more than half of the respondents reported their preference for full withdrawal of money deposited in a bank account.

With respect to financial education, there was little experience or awareness regarding other products such as, for example, loans and investments among those interviewed.

The content analysis conducted resulted in tables that summarize the opinions of respondents regarding the presence of each of the components of the 2iDf model. They identified the intermediate categories and their frequency of occurrence, as well as the influence of each intermediate category in the final category, namely a positive influence or presence of aspects related to a given component of the model or a negative influence or no aspects related to a given component of the model.

The perception of the existence of the static elements of the 2iDf model proves to be more accentuated than the dynamic components, as evidenced by a higher frequency of comments—attaining more than 93% of all remarks made by respondents. Thus, the low frequency of remarks related to the dynamic aspects of the model suggests that the financial education process failed to generate awareness of the potential opportunities offered by financial inclusion in the daily lives of individuals [12].

To assess the relative impact of the presence of each static component of the 2iDf model, a scale was created with three levels to represent the perception of the presence of a given component of the model and its positive aspects—Fig. 5 and Table 1.

Perception of presence of the component	Caption
High> 75%	███████
25% <= Average <= 75%	░░░░░░
Low < 25%	∶∶∶∶∶∶∶∶

Fig. 5. Classification of the components of the 2iDf model

Table 1. Scale of the presence of the static components of the 2iDf model

Static component of the model	Total Frequency	Positive Frequency	Positive Frequency (%)
Infrastructure/access	430	212	49.30%
Education	179	179	46.93%
Services/Products	112	97	86.61%
Sustainability	51	41	80.39%

Based on the above scale, a graphical representation of the results analyzed is shown in Fig. 6, associated with the perceptions of the presence of positive aspects of the static components of the 2iDf model.
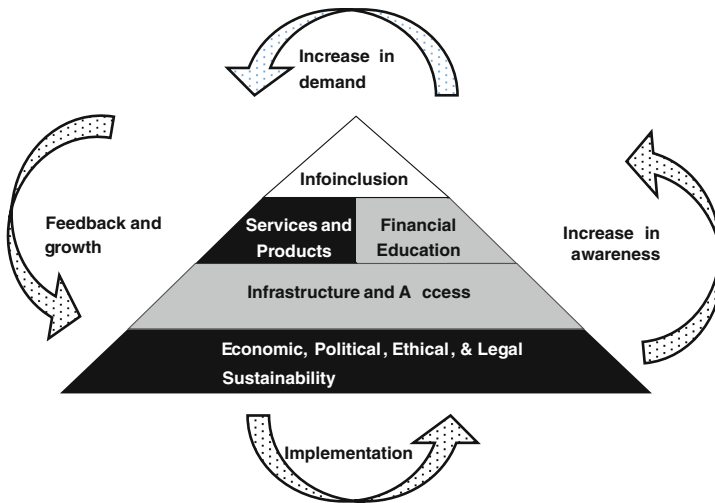
Fig. 6. Final representation of the 2iDf model

6   Conclusions

This research identified the need for investment in ICT infrastructure to meet the commercial agreements in order to provide a wider range of services, as well as enable partnerships with other state and federal agencies for services related to issuance of documents and processing retirement benefits, for example. In addition, the need to create incentives for dissemination of ICT infrastructure in regions with lower population density was identified, such as for example, the creation of basic cell phone packages with access to transaction services (cell phone banking, credit and debit transactions, cell phone payment).

It is also clear that without minimum financial education of the customers, it will be difficult for Agência Barco to offer more than the most basic and simple financial services to the population served.

Lastly, it was perceived that the riverine population in Marajó Island is still not even aware of the potential benefits accrued from being financially included as the dynamic components of the 2iDf model were not considered important by the local population.

In sum, financial inclusion is still a challenge in Brazil and tackling this situation depends on technological innovations, business models and public policies that can provide faster inclusion of the population currently excluded from financial system in the country.

References

1. World Bank: World development indicators (2015). http://data.worldbank.org/country/brazil#cp_wdi. Accessed 10 May 2015
2. IBGE: Informações Sociais, Demográficas e Econômicas (2015). http://www.ibge.gov.br/home/disseminacao/eventos/missao/informacoessociais.shtm. Accessed 5 Mar 2015
3. UNDP: Índice de desenvolvimento humano municipal brasileiro (2013). http://www.br.undp.org/content/brazil/pt/home/library/idh/o-idhm-do-brasil.html. Accessed 19 Jan 2017
4. BCB: Relatório de Inclusão Financeira N. 2. Brasília (2011). www.bcb.gov.br/?INCFINANC. Accessed 2 May 2016
5. BCB: Atendimento bancário no país—Distribuição do quantitativo de municípios por Região e UF. Brasília (2015). http://www.bcb.gov.br/htms/deorf/d201503/Quadro04-Atendimentobanc?rionoPa?s-Distribui??odoQuantitativodeMunic?piosporRegi?oeUF.pdf. Accessed 2 May 2016
6. Crocco, M.A., Santos, F., Figueiredo, A.: Exclusão financeira no Brasil: uma análise regional exploratória. Revista de Economia Política **33**, 505–526 (2013)
7. Jayo, M., Diniz, E.: Um mapeamento descritivo dos modelos de gestão de redes de correspondentes bancários no Brasil. Revista de Administração da USP **48**, 621–634 (2013)
8. Leonardi, P.M., Bailey, D.E., Diniz, E.H., Sholler, D., Nardi, B.: Multiplex appropriation in complex systems implementation: the case of Brazil's correspondent banking system. MIS Q. **40**, 461–473 (2016)
9. Bader, M., Savoia, J.R.F.: Logística da distribuição bancária: tendências, oportunidades e fatores para inclusão financeira. Revista de Administração de Empresas **53**, 208–215 (2013)

10. Heeks, R.: Do Information and comunication technologies (ICTs) contribute to development? J. Int. Dev. **22**, 625–640 (2010)
11. Joia, L.A.: Bridging the digital divide: some initiatives in Brazil. Electr. Gov. Int. J. **1**, 300–315 (2004)
12. Joia, L.A.: Inclusão digital no Brasil: um modelo heurístico de natureza dinâmica. In: Martins, P.E.M., Pieranti, O.P. (eds.) Estado e gestão pública: visões do Brasil contemporâneo, 1st edn, p. 340. FGV Editora, Rio de Janeiro (2006)
13. Beck, T., De La Torre, A.: The basic analytics of access to financial services. Financ. Markets Inst. Instr. **16**, 79–117 (2007)
14. Heeks. R., Molla, A.: Impact assessment of ICT-for-development projects: a compendium of approaches. In: Working Paper on Development Informatics, Manchester (2009)
15. Kleine, D., Unwin, T.: Technological revolution, evolution and new dependencies: what's new about ICT4D? Third World Q. **30**, 1045–1067 (2009)
16. Gloukoviezoff, G.: The link between financial exclusion and over-indebtedness (2006). https://gloukoviezoff.files.wordpress.com/2009/01/wp-link-fe-oi.pdf. Accessed 10 Jan 2015
17. Diniz, E.H.: Correspondentes Bancários e Microcrédito no Brasil: Tecnologia Bancária e Ampliação dos Serviços Financeiros para a População de Baixa Renda. FGV/EAESP/GVPesquisa, pp. 1–102 (2007)
18. Dymski, G.A.: Financial globalization, social exclusion and financial crisis. Int. Rev. Appl. Econ. **19**, 439–457 (2005)
19. Brandão, J.L.: Perspectivas para os celulares dos pobres servirem a políticas de inclusão financeira e de governo eletrônico: a proposição do Ministério do Desenvolvimento Social no Governo Lula. In: Proceedings of the XXXV Encontro Nacional dos Programas de Pós-Graduação em Administração (EnANPAD, Rio de Janeiro) (2011)
20. Heeks, R., Amalia, M., Kintu, R., Shah, N.: Inclusive Innovation: Definition, Conceptualisation and Future Research Priorities. Working Paper on Development Informatics. Manchester (2013)
21. Diniz, E.H., Bailey, D.E., Sholler, D.: Achieving ICT4D project success by altering context, not technology. Inf. Technol. Int. Dev. **10**, 15–29 (2014)
22. Heeks, R.: The IC T4D 2.0 Manifesto: Where Next for ICTs and International Development? Working Paper on Development Informatics. Manchester (2009)
23. Kempson, E., Atkinson, A., Pilley, O.: Policy level response to financial exclusion in developed economies: lessons for developing countries. Bristol (2004)
24. Sarma, M.: Index of Financial Inclusion. Discussion Papers in Economics. Nova Delhi (2008)
25. Unwin, T.: The technologies: identifying appropriate solutions for development needs. In: Unwin, T. (ed.) ICT4D: Information and Communication Technology for Development. Cambridge University Press, Cambridge (2009)
26. Sanford, C., Cojocaru, L.: Do Correspondents Improve Financial Inclusion? Evidence from a National Survey in Brazil. Bankable Frontier Associates, Somerville (2013)
27. Yin, R.K.: Estudo de Caso: Planejamento e Métodos, 4th edn. Bookman, Porto Alegre (2010)
28. Bardin, L.: Análise de Conteúdo, 7th edn. Almedina, São Paulo (2011)
29. Gil, A.C.: Como Elaborar Projetos de Pesquisa, 4th edn. Atlas, São Paulo (2002)
30. Silva, A.H., Fossá, M.I.T.: Análise de Conteúdo: Exemplo de Aplicação da Técnica para Análise de Dados Qualitativos. In: Proceedings of IV Encontro de Ensino e Pesquisa em Administração e Contabilidade, Brasília (2013)
31. Marconi, M., Lakatos, E.: Fundamentos de metodologia científica, 5th edn. Atlas, São Paulo (2003)
32. Trivinos, A.N.S.: Introdução à pesquisa em ciências sociais: a pesquisa qualitativa em educação. Atlas, São Paulo (1987)

33. Laville, C., Dionne, J.: A construção do saber: Manual de metodologia da pesquisa em ciências humanas. Artmed, Porto alegre (1999)
34. Freitas, H., Janissek, R.: Análise Léxica e Análise de Conteúdo: Técnicas complementares, sequenciais e recorrentes para exploração de dados qualitativos. Sphinx-Sagra, Porto Alegre (2000)