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Research Project Nº 106459-001

"Mobile Money and Local Development"

Proyecto de investigación Nº 106459-001

"Dinero Móvil y Desarrollo Local"

Final Technical Report

by Alicia Spengler and Henk van Arkel

Research & Development Partner Institutions

HEC MONTRÉAL   STRO SOCIAL TRADE ORGANISATION   FGV EAESP

Last technical report on the progress of the project

"Mobile Money and Local Development"

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Project leader:	Henk van Arkel (STRO), Eduardo Henrique Diniz (FGV – EAESP)
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1. The research problem

The aim of the research project is to conduct an in depth investigation on the way mobile money can affect local development. Mobile money facilitates the access of unprivileged communities to financial products and services and, at the same time, leads to the inclusion of these communities based on the digitalisation of money and payment systems. Regarding the effects on local development, the research team faces two separate questions being (1) what will be the straightforward effects of mobile money on financial inclusion and (2) what can be deduced about the impact of Digital Payment Systems.

One of the most relevant ICT – related phenomenon in the discussion around poverty reduction, among politicians, scientists as well as businessmen, lately has been the opportunity of full financial inclusion of the bottom of the pyramid through the access to diverse services and products offered by players as Telecom Operators, Governments and Financial Institutions. Nearly all think tanks, donor organization, foundations among others are involved in the discussion around financial inclusion, mainly based on the high potential seen in the growing usage of mobile technology in developing countries. In some regions the coverage of cellular phones overcomes the total population with numbers of more than one mobile phone per habitant.

Additionally, in recent advances in the field, another observable fact is the ongoing digitalization process of payments towards a cash-lite society, as e.g. promoted by the "Better than cash Alliance" (www.betterthancash.org). In all developed countries, but also in a considerable part of the developing world, electronic payments are widely accepted and found in a raising momentum of its usage. Normally smaller payments are still realized in cash, but overpassing a certain amount, consumers and businesses prefer to use any sort of digital payment tool. Besides of the overall goal of alleviating poverty, this movement also addresses the need of reducing costs in other areas related to

administrative issues as well as the rising transparency in all sort of payments within the development cooperation. Within this line other positive side-results are improved: security by less cash usage, traceability of monetary flows and specific directing and correction oriented spending of existing funds.

The results of the two years research work can be summarized as follows:

Within the most important overall outcomes of the research work is a wider understanding and systemisation of the process of financial inclusion through mobile money as well as closing the lack of academic research that focusses on the development effects of such shifts based on ICT. At the same time the process of financial inclusion develops considerably slower than the introduction of Mobile phones in poor communities.

First of all, the multidisciplinary research team had deepened profoundly the understanding on the worldwide existing electronic payment and digital banking systems identifying a lack of insight in the real economic impact of such initiatives, which raises the question if mobile money is not just another trend as microcredit was in the last century, but without the necessary scientific background to predict its long-term consequences.

Secondly, it became clear that it is nearly impossible to identify and define the single impact of individual implementations as any m-money system makes part of an overall economy. In order to circumvent this problem, m-money systems can be combined with alternatives currencies, which allows mainly the decision maker as well as the researcher community to give any monetary flow a "name" in order to be identified and analyzed (conditioned money).

Lastly, the project team has disseminated and communicated the research results to both academic and practitioner audiences, and a number of policy and decision makers are

waiting for further research outcomes and pilot tests. We have prepared the field for important partnerships with other entities working towards the financial inclusion of the bottom of the pyramid which allowed us to enlarge the scope and strengthen the results of our investigation as well as have disseminated some of our research findings to a broader audience.

2. Objectives

According to the grant agreement, in the beginning the research project dealt with the following question: "***How do conceptual, regulatory and technological characteristics of different Mobile Money implementations impact Local Economic Development?***"

The general objective of this research was originally formulated as

"To explore strategies that can maximize the potential impact of Mobile Money on Local Development".

To fulfill this general objective, a number of specific objectives have been identified, as follows:

1. To create a conceptual model connecting different types of Mobile Money, regarding their technological, institutional and socio-economic characteristics, to the effect each form has on Local Development

2. To validate the model against an existing development focused Mobile Money implementation, recommending strategies that promote Local Development.

3. To engage the community of decision-makers, involved in the implementation and regulation of Mobile Money, on the design of practical strategies to promote Local Development.

These three objectives were set to contribute to the knowledge base that combines theoretical analysis with empirical aspects of the operation and regulation of Mobile Money.

The activities of the first stages of the research, showed two main results:

- A lack of scientific data regarding the impact of mobile money systems on local development that made it impossible to create an evidence based typology.

- The expectation that mobile payment systems will open the door to a 100% virtual handling of the settling of debts, that might have effect on local development.

Next stages of the research therefore concentrated on the effects of Virtual Payment Systems on local development.

The targets became:

a. To construct an approach that can help to evaluate the impact of changes in the information and communication technologies on the functioning and availability of money in poor communities.

b. To apply the findings of that approach to discuss the potential impact of Virtual Currency Systems on local economic development.

c. To apply the results of the first two bullets in an evaluation of a pilot of a virtual currency.

d. To facilitate a discussion in the appropriate institutions and in the scientific area, on the effects of Virtual Currency Systems on local economic development.

e.   To prepare future R&D to further develop this field, both in terms of project proposals as well as in terms of preparation of the software to enable researchers to have access to scientific data of virtual currencies that use the Software Cyclos.

3. Methodology and main empirical activities

Figure 1 shows an overall picture of the *original schedule* of the main planned research and development activities of the research project from March 2011 to October 2012. Activities 1.1 – 1.3 were planned to finish in 2011, whereas activities 2 – 3 were planned to be prepared in 2011 to be executed in 2012. It is important to note that some of the activities were funded by complementary resources to those provided by IDRC as e.g. the IMTFI or FOMIN / BID, since STRO Group is also sponsoring the research project.
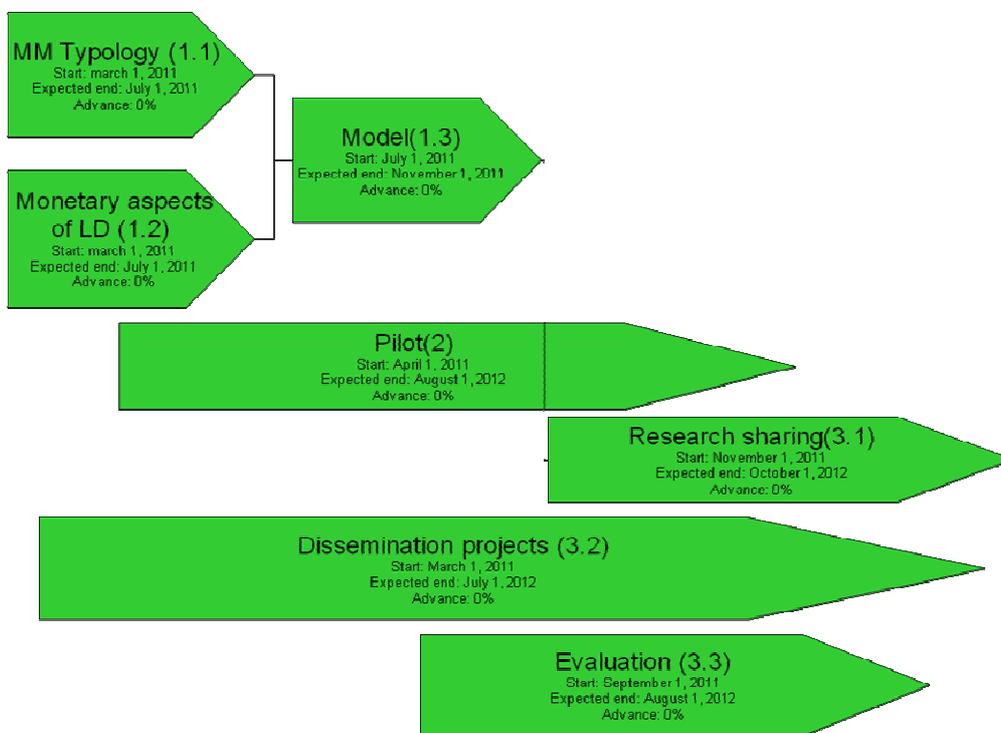

Figure1 – MM and Local Development: Original Research Agenda (2011 – 2012)

The different action lines of the Research project are (1) scientific investigations on Mobile Money Systems and Monetary Aspects of Local Development in order to define a Conceptual Model of possible designs of Virtual Money Systems; (2) validation of the model in a specific Pilot Project which follows the identified best design dimensions of a Mobile Money System with positive impact on Local Development and (3) stimulation of the debate on this topic among scientists and decision makers through dissemination activities, publications and conferences.

The research project also included the preparation of three mobile money systems on the level of business plans that would integrate the acquired knowledge into the specific design and planning of the system.

Following the obtained results and based on essential delays caused by the investigations on the agreed research questions, the originally set planning including the overall research question of the project have been adapted in order to adhere in the best manner to the original estimated timeframe and, nevertheless, obtain innovative and future oriented research results.

During the whole project dissemination activities based on lessons learned from theory and practice were to be hold, in order to prepare the design and implementation of innovate virtual currency systems in the Latin American region.

Figure 2 shows the adaptations which occurred during the project implementation based on previously not foreseen delays in the basic research as well as changes in the planned empirical testing of the research outcomes.
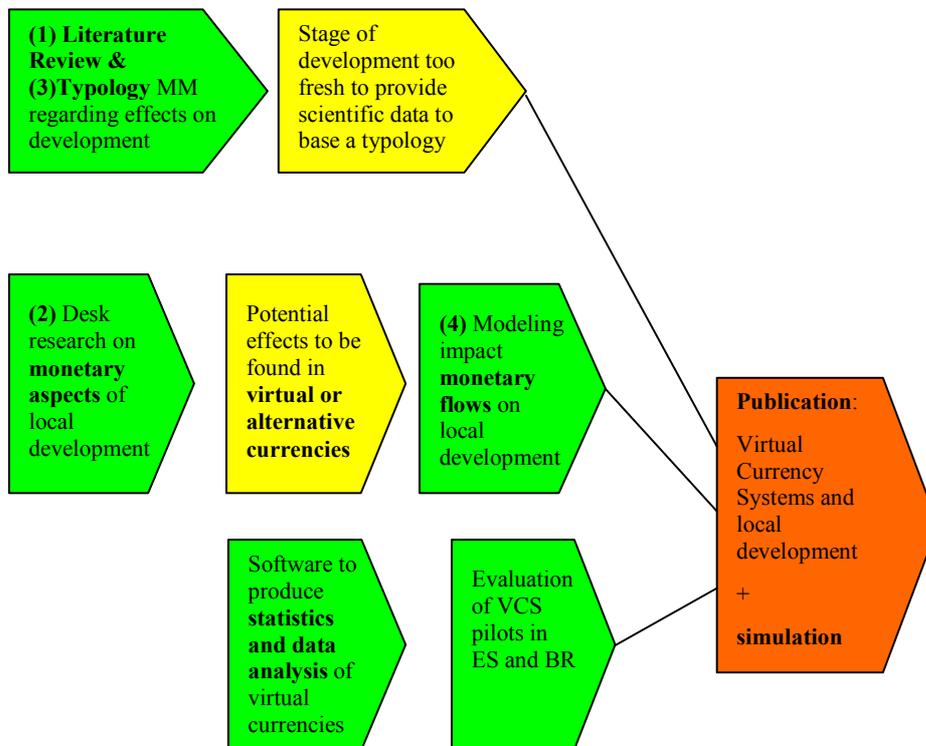
Figure2 – MM and Local Development: Adapted Research Agenda (2011 – 2013)

In the first semester of the project (March – October 2011) the focus of the multi-disciplinary research team was laid on producing **(1)** a basic investigation regarding the state of the art of worldwide existing experiences in Mobile Money implementations. This initial literature review showed a lack of peer reviewed research that would allow evaluating the development impact and to create evidence based typology.

At the same time it provided a lot of information:

(a) Who are the actors and what kinds of institutions (e.g. telecommunication companies, banks, branchless banking, micro-finance institutions etc.) are involved in Mobile Money initiatives;

(b) How can these actors be classified and what are the requirements in terms of processes, technology and regulations;

(c) What different services do ICT organised Mobile Money systems provide?

Another important approach was the **(2)** publication on monetary aspects of local development (<mark>title</mark>). This research focused on the possible impact of locally concentrated monetary flows. A literature review has been conducted to help conceptualize the impact that the various monetary elements (such as credit and interest) and flows (such as imports and exports) have on Local Development. The specific research questions answered in this part of the project were (a) which (changes in the) flows of money entering the local market have been caused by the digitalization of money and which conditions favour these flows; (b) how does mobile money influence the (changes in the) flows of money leaving the local market and can these be redirected; (c) how does Mobile Money "behave" while flowing through the market (multiplier effect).

In the second period of the project (November 2011 – June 2012) the investigations of the first publications were used to bring the outcomes to a higher level of abstraction. The literature review around existing mobile money and payment initiatives was used to produce **(3)** a typology of mobile money services based on different dimensions: economic agents, transaction types, services and technological infrastructure. The focus was laid on answering the question of how the type of m-issuer influences in the design of any mobile money system.

It was planned to combine the typology of Mobile Money with the Monetary Aspects of Local Development into a conceptual model. As the literature review of mobile money implementations already showed that there were very few or none analysis of the socio-economic impact of such systems and the investigation around the typology was delayed, the research team decided to base its further investigations on the innovation of combining electronic money systems and alternative currencies **(4)** in order to be able to identify the impact of extra monetary flows within a conceptual model. Additionally, this approach helped to answer specific questions as (a) which offered services have an impact on the flow of money; (b) which services and ways of usage will be altered when Mobile

Money starts to dominate the market over the present facilities; (c) which are the differences within banking technologies and how might these affect spending patterns in the community, etc.

As the innovations being introduced by the virtualization of currencies are still highly unknown, in the last semester of the research project, from July 2012 – January 2013 (with a 3 month extension period) five extra case studies have been included in the investigation catalogue in order to support the understanding of the digitalization of money and its role on the level of community-based development impact as well as prepare for the dissemination stage.

The following two reports have been selected in order to serve **as background input on virtual currency systems and local development:**

4. **"Digital Money and its impact on local economic variables. The case of Uruguay."**

To participate in the policy making debate and fully understand the research concerning the modeling, it is firstly necessary to have a broad overview of the current practice regarding the digitalization of money on national level that (might) effect(s) the monetary flows that determine development. It also makes sense to include some of the earlier technologies such as credit cards, because fully understanding how these technologies impact the monetary flows in the local economy makes it easier to understand newer types, such as the M-pesa. The first case study describes the situation in Uruguay, as being a small country with a wide range of longer existing and very recent introductions of digitalization processes.

5. Improving the local multiplier: The Banco Palmas Methodology and the Expansion of Community Banks.

This research presents a number of results of the analysis of the Banco Palmas case, a particular Brazilian microcredit experience that combines three innovative mechanisms – social currency, intense training and coaching, and a smart local consumption and production mapping strategy. In addition to briefly presenting the innovative methodology for local development created by Banco Palmas, this report also describes the impressive expansion of this methodology across seventy eight other community banks in Brazil and more recently also outside the country.

The paper seeks to provide rich elements regarding the role that information and communication technologies (ICT) is playing to support the development and expansion of a network of community banks, therefore encouraging reflection about new opportunities.

The following article has analyzed the Data of a C3-barter network in order to work with / verify the output of virtual currency systems and local development. The outcomes became part of the Conceptual Model itself.

6. Boosting inflows and multiplier in a community of small enterprises using a virtual currency system: the case of Punto Transacciones in El Salvador.

The researcher Octavio Groppa, Catholic University of Argentine analyzed, with the help of the developed tools (Statistics & Data Warehousing), the existing data of the business network, which led to the production of the article. Punto Transacciones is driven by developmental objectives, and supported by advanced ICT, so it offers the opportunity to test several of the hypotheses which are presented in the conceptual model in a practical application.

Furthermore, the produced article will still be updated with a second phase of data analysis, in order to be able to compare two periods and threw conclusions on the ongoing developments. The outcomes will also be integrated in the Conceptual Model in order to be able to base its hypothesis on empiric data evaluations.

The following text has been used to prepare for the development oriented proposal for pilot projects: *"Using virtual payment systems to improve the multiplier of CCT in poor regions"*

7. "Digitalization in Conditional Cash Transfer (CCT) Programs and its potentials: Analysis of the Bolsa Familia case"

The conditional cash transfers are by far the largest monetary flows in many underprivileged Latin American communities targeted on local development, as for example the Bolsa Familia in Brazil. In various communities situated at the bottom of the pyramid, these cash flows introduce significant amounts of new monetary inflows.

This case study researches the digitalization of these monetary flows; what is actually happening and what future developments can be expected to improve the impact on local socio-economic development.

This study has been realized in order to prepare for the institutional debate that will come with the next implementation stage of Virtual Currency Systems.

8. "Mobile money: the issue of regulation"

Regulations concerning digital payment systems, including mobile money, are being discussed in the Latin American countries at the moment. The need to develop a legal framework comes from three main sources: first, there is great concern about the financial risk connected to these kind of operations; second, the need to control the compliance of regulations regarding money laundering and terrorism financing; last, the

need to protect consumers from fraud on behalf of the system administration and also the need to protect personal private data.

This case study describes hereby the main features of mobile payment systems in Ecuador, Brazil and compares them to the successful experience in Kenya. While Kenya opted for a light regulation which helps to promote business expansion, Ecuador chose a State-controlled legal framework. Hereto, the research shows some hints for debate, with a comparison between cash, e-money and m-money.

Figure 3 reflects the latest changes in the research agenda of the project "Mobile Money and Local Development".
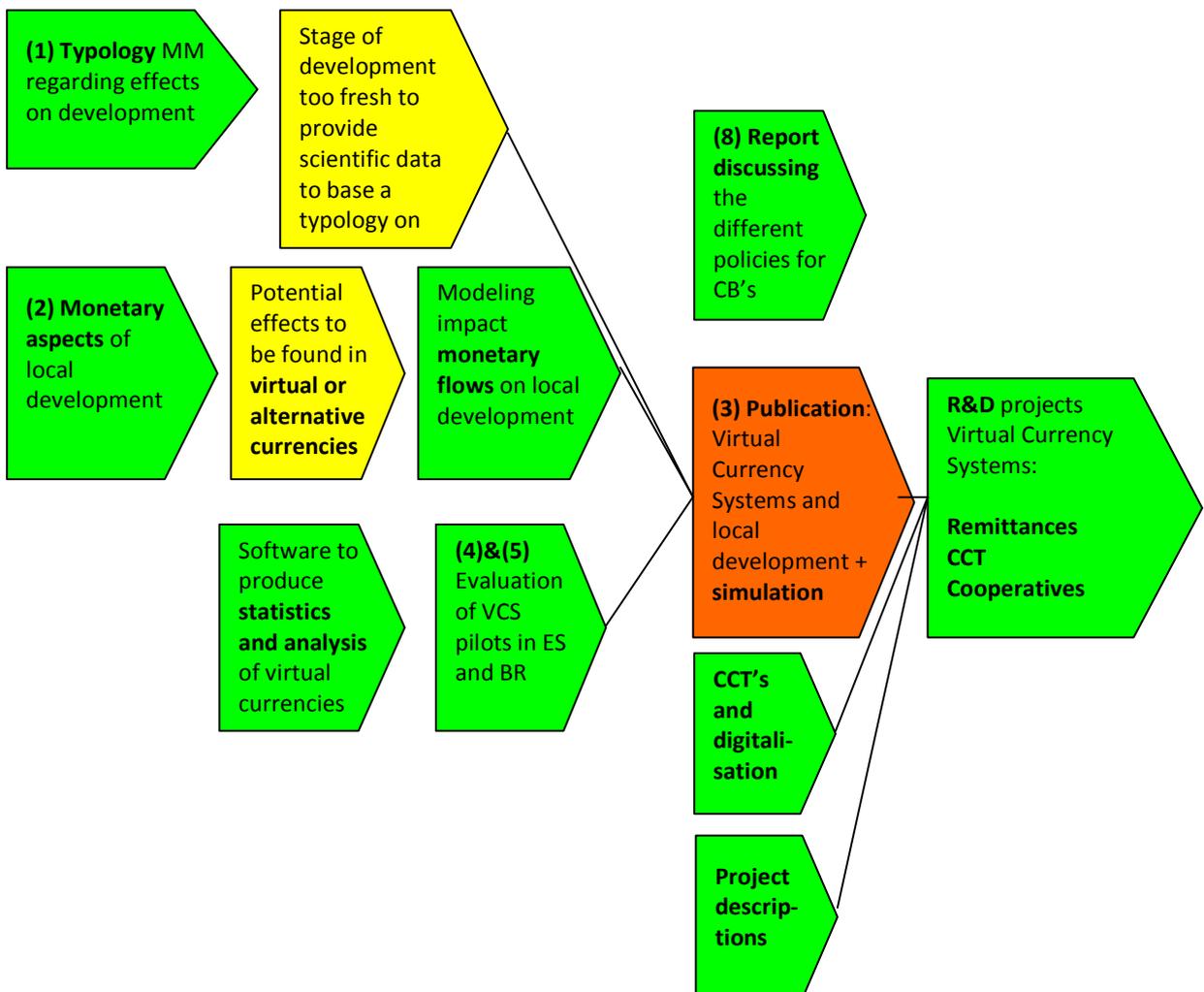
Figure3 – MM and Local Development: Final Research Agenda (2011 – 2013)

In summary, as previously stated, from March 2011 to January 2013, the research team worked to conclude activities 1 to 8. Five additional reports were included in the original planned activities. These analyses allowed us to achieve part of our goals and to provide the basis for the parallel initiated development and dissemination work which started in November 2011, illustrated by activities 9 to XXX, which are explained in Chapter 5 "Project Activities". Through these research activities, the present research project was aiming to not only make a first step towards a more comprehensive model for measurement of impact, but at the same time to offer valuable insights in how the different designs of virtual money systems generate different impact on their diverse target groups.

4. People involved in the research team

The project research team has grown in the mentioned period consisting of the persons listed in Table 1, whose involvement occurred in different tasks, locations and periods of the project.

Table 1 – People directly involved in the research team

Name	Institution
Henk van Arkel	STRO-Uruguay
Camilo Ramada	STRO-Uruguay

Magdalena Ramada	STRO-Uruguay
Eduardo Henrique Diniz	FGV-EAESP
João Porto de Albuquerque	ICMC-USP
Adrian Kemmer Cernev	FGV-EAESP
Adriana Cassoni	ORT Uruguay
Octavio Groppa	Universidad Catolica de Argentina
Marlei Pozzebon	HEC Montreal
Fabio Prado Saldanha	HEC Montreal
Diego A. B. Marconatto	HEC Montreal

Table 2 lists researchers and other individuals who have been contacted within the project scope working in similar research fields, and showing interest in the research outcomes for possible future collaboration.

Table 2 – People indirectly involved with the research team

Name	Institution
Camilo Telles-Merchan	CGAP – Technology & Business Model Innovation
Tavneet Suri	Applied Economics, MIT Sloan School of Management
William Jack	Economics Department, Georgetown University

Bill Maurer	IMTFI
Henry Jackelen	Jackelen Consulting
Stephen Rasmussen	CGAP – Technology & Business Model Innovation
Eric Tyler	New America Foundation
Jorge Maldonado	Facultad de Economia, Universidad de los Andes,
Claudia Martínez Alvear	Departamento de Economia, Universidad de Chile
Johanna Yancari	Instituto de Estudos Peruanos

5. Project activities

Besides of the pure research activities, the project also proposed to translate the research outcomes to practice in form of developing specific tools for decision makers as well as the preparation and evaluation of a real-case scenario. Therefore, this research project aimed to contribute to the creation of knowledge, debate and a practical base that focuses on optimising the use of banking technology in terms of development output. The modelling should support decision making processes and open a dedicated field of research to reinforce this target.

At the beginning of the research project, three important elements have been identified that traditionally limit the analysis of the impact of Virtual Money implementations:

1. Most Mobile Money practices do not have Local Development as a target and therefore do not collect evidence regarding this subject.

2. Most existing information and research is about the success or failure of the initiative, which is largely independent from its outcomes concerning Local Development.

3. Being Mobile Money an ICT-based concept, the most innovative initiatives will always rely on the latest IT developments, which might also proof to be more difficult and risky to deploy.

Initially, the proposed approach of this research project was to validate the theoretically set-up conceptual model by a high-tech and development oriented dedicated project, in order to counter these three elements. The most effective way to stimulate debate among policy makers and encourage the creation or adaptation of policies is to make use of a real-life scenario which shows how banking technology can be used to achieve increased Local Development. As Fundación STRO was preparing together with counterparts from the Uruguayan government a nation-wide electronic account system following the philosophy of "one citizen, one account", this activity was planned to help to attract the attention of decision makers relevant to this research, and provide information that might reinforce the modelling.

In order to test the impact of Digital Money and Digital Payments on the local circulation of money, it is vital to have access to an environment where trade can be mapped and measured. Most Digital Money Systems are *for profit* initiatives or dominated by for-profit partners. The evaluation of the effects of Mobile Money on the local economy will require of information that goes beyond pure mobile transactions. More data is needed on the effects of previously made and consequent transactions within the local supply-chain, to allow for greater understanding on how this has been changed as a result of the circulating Mobile Money. An initiative that focuses on development, and can be witnessed since its initial start-up phases, would have provided a very rich domain of research delivering vast information, allowing for deeper insight on the know-how of the

opportunities and setbacks ICT based payment technologies might have on Local Development.

The main question to be answered through the more practical oriented activities of this project, is where did the Mobile Money come from, and where does it go to? To acquire knowledge on the impact of Mobile Money on local trade, it should be possible to map monetary flows or to give them a traceability feature.

In order to prepare the multiple mapping of transaction data, **(9)** the banking Software Cyclos which is being developed by a multinational programmer team, was adapted to these needs. STRO has been working for two decades on a broad range of instruments and approaches that can support private or public initiatives to make money work even in conditions of a semi-permanent economic depression. Through research STRO has developed and tested economical models in pilot projects worldwide. To support these models STRO started the Cyclos project in 2003. Cyclos is being published Open Source to allow other initiatives to benefit from the efforts of STRO.

Cyclos offers a complete on-line banking platform with additional community modules such as an e-commerce platform, a card module and a messaging and notification system. In 2005 the first stable version of Cyclos was released and published open source. A project site www.cyclos.org, user forum, and 'wiki' (documentation) site were launched and an active community was formed around the Cyclos software. Over the years Cyclos has become the standard for open source 'home-banking' software. So far, more than 100 organisations and financial institutions have adopted Cyclos as their payment platform. Ten languages are currently supported and volunteers work hard to make more languages available soon.

The mobile banking module creates opportunities to address new sectors, such as conditional cash transfers, remittances, consumer loyalty programs, mobile shops, cash-in cash-out services, taxi payments, campus payment systems, prepaid cards, and low cost ATM's.

The Cyclos Software counts with two essential tools in order to facilitate the analysis of the internally collected data:

(I.) Statistics

The version Cyclos 3.7, which has been launched in 2012, contains a basic statistics unit which produces overviews of key elements (for example: gross product, number of members, number of logins, etc) over time, and allows for statistical analysis in order to determine if the observed trends were really statistically significant (in terms of p-values as outcome of statistical tests like student t's or F-tests). The statistical module of Cyclos 3 is accessible via the web through the admin user-interface; the admin can choose what statistics to view, and can choose to compare two periods, or can decide to plot the results over a whole time range.

Though the statistics in Cyclos 3 are a very useful tool, this approach proved to have its drawbacks. The main problems lie in the load of the process: on larger databases, calculations have a tendency to become so heavy that there is a serious risk that they'll bring down the web server on which the Cyclos application is hosted. In Cyclos 4, this is solved by valuing each statistic calculation with a certain amount of load points; users are only allowed to request a maximum of load points at a time in the web form. For example, it is forbidden to request graphs over too long time ranges, as this will cause too heavy loads for the server.

The approach of Cyclos3 appeared not to be scalable to the bigger databases Cyclos 4 is expected to serve. So there was a need of change of strategy. The approach for Cyclos 4 can be summarized as follows:

1. Provide all basic reports in Cyclos 4, but no statistical analysis calculations on a live server, as it causes to heavy server loads on big systems.

2. Make data and database exportable, so off-line copies can be fed into programs for statistical analysis (Data warehousing).

3. Take care there is a historical record created and available for all interesting data features.

4. Research and development of new variables that can estimate chain length in transaction chains.

More details can be found in the attached report of the responsible consultancy (Annex 1).

(II.) Data Warehousing

The statistical analysis is to be performed outside the scope of the Cyclos program, on off-line databases. To facilitate that process, an external developer team took care of the following:

1. Cyclos databases are backed up every day. Old backups serve as a good source for statistical analysis. With the regular backup scheme, there is plenty of historic data available.

2. The databases are structured as such, that they are easy to use as input for statistical processing.

3. Templates and guidelines for statistical analysis have been formulated, available for the ones interested.

Furthermore, a survey has been done amongst administrators of Cyclos systems, in order to do an inventory of the wishes and needs for statistical analysis. The goal of the survey was to investigate what kind of data Cyclos users would like to put in a datawarehouse system: a system in which the live program puts away certain information on a regular basis (via a deamon program), for later analysis.

As a consequence of the obtained result and the changes in the statistics tool within the Cyclos Software, a first model of a Data-Warehousing has been developed (for further information please see Annex 2).

The digital statistical annalistic tool and the data-warehouse, which allow research of the data, are available for free for all projects using the Cyclos software (www.cyclos.org). One example for the usage of these tools is the Barter - Network of Micro, Small and Medium Sized Enterprises as well as Consumers called Punto Transaciones (http://www.puntotransacciones.com/), located in El Salvador. Punto Transacciones offers reciprocal credit between the participating businesses. At the same time, the tendency in Punto Transacciones is to gradually introduce more consumer money in the system, in which case it might gradually migrate to a system based on restricted monetary circulation.

6. Research Outcomes

We can see different kinds of outputs provided by the project from March 2011 up to the end in January 2013 and further on. Those outputs are organized in three groups: (1) Contributions for academic community, (2) Knowledge management on virtual money systems and (3) Consolidation of research and practitioners` community. Outcomes produced in our research work should be considered in terms of serving the academic community, for professionals and policy makers, and to consolidate a research group focused on the important subject of ICT for financial inclusion.

6.1 Contributions for academic community

The project delivered significant overviews and insights on the research topics "Mobile / Digital Money" and "Local Development". In the following section the most important

outcomes in terms of specific facts as well as further research interests will be presented in chronological order.

Mobile Money and Payment: literature review based on academic and practitioner oriented publications, Eduardo H. Diniz, João Porto de Albuquerque, Adrian Kemmer Cernev.

In total, 186 papers – 94 peer-reviewed and 92 non-peer-reviewed – were reviewed to search in each of them for information related to the actors and institutions involved in mobile money initiatives - i.e. what are the main motivations of such initiatives, what are the barriers of implementation, and what are the social and economic implications of such implementations. The review helped to point out what are the main sources of information related to the subject, what topics are most frequently being researched, in which locations most studies are focusing on, which methodologies are being applied in those studies, as well as what are the main motivations and the contexts of the published studies.

Although there are more than 120 mobile money projects deployed in about 70 emerging markets (Beshouri et al. 2010), it is a fact that mobile payment has taken off only in a limited number of countries. The lack of worldwide dissemination of a service with such a huge potential shows that:

1) Successful cases are not clearly understood, and as a consequence, are not being easily replicated;

2) Barriers and failure cases are not being investigated deeply enough to allow implementation strategies in most countries to be built around consistent business models;

3) Potential social and economic impacts are not well measured so policy makers are not convinced to invest strongly in fostering favorable regulatory environments for digital payment.

4) The varying local circumstances (economic, juridical, technological, institutional) and the variations in used technology and methodology for mobile money and payments demand custom made solutions for each country.

"*Mobile Money and Payment: Case analysis based on literature review*", Eduardo H. Diniz, João Porto de Albuquerque, Adrian Kemmer Cernev

This paper represents the second stage in the process of creating a typology of mobile money solutions based on projects currently being implemented around the world with the aim of modeling their potential impact on local development.

An important outcome is that there is a lack of in-depth analysis of socio-economic implications of Mobile Money Systems. Although there are some in-depth case studies that analyze the micro-level of implications of mobile money and payment platforms for its individual users, these studies are not only few in number but also most of them are initial and representative of work-in-progress. Furthermore, there is a noticeable lack of in-depth case studies that analyze carefully the wider socio-economic implications (i.e. at the meso-level of communities and at the macro level of countries) of practical mobile money/payment initiatives. Many of the analyzed cases mentioned for instance the financial inclusion of the unbanked poor as a presumed socio-economic benefit that comes along with mobile money, but there seems to be neither a case study that makes an in-depth empirical investigation on nor a theoretical model that explains the effects/consequences of mobile money/payment for society/communities (local development). It seems that the positive impact of mobile money systems on local development is mostly taken for granted, but not analyzed and evaluated in detail, so that this is an important topic for future research in this area.

"***Can Mobile Money Systems Have a Measurable Impact on Local Development***?"
Ramada-Sarasola, Magdalena, Available at SSRN: http://ssrn.com/abstract=2061526"

The paper was targeted on a literature review with an inventory of the different aspects that influences inflows, outflows and behavior of the money in local communities and systemizes the obtained information in a tool of existing data sources and relationships among the identified aspects.

The author came to the conclusion that Mobile Money Systems can be seen as a technological innovation of high impact on developing countries and poorer population segments. The MMS show a direct impact on 1) increasing the financial connectedness among distant households and individuals, 2) enabling and facilitating trade, 3) increasing households' ability to share and bear risk, 4) increasing households' ability to allocate their resources more efficiently and 5) modifying households' consumption patterns. The MMS further have an indirect impact on 6) the challenging efficiency of the local traditional financial market, 7) boosting local infrastructure and hence 8) increasing labor demand and 9) rising the need for local innovation. In other words, MMS can be supposed to have a positive impact in terms of households' and the economy's allocation of resources and management of risks. The paper points out that if a Mobile Money System is defined in its pure form – with no ability to generate credit and with no conditionality of the localization of monetary flows – an economic impact at the local level cannot be hypothesized to be significant *a priori*. In that sense a local impact stemming from a pure MMS will not be measurable, either because it is negligible or because it is too complex to measure and to recognize given the interaction of the several local monetary inflows and outflows. The paper develops a framework to assess MMS' impact on local development and suggests MMS design strategies that can influence consumption and saving behavior to redirect it so as to boost local development.

Ramada-Sarasola concludes that it is difficult to hypothesize the economic impact on local monetary flows stemming exclusively from a pure MMS, given MMS are not conceived as

systems aiming at increasing local development, as opposed to Alternative Currency Systems (ACS). MMS are not geographically bounded and monetary transactions hence occur in a cheaper and faster way than with traditional money, but following the same geographical dispersion rules.

In the researchers´ opinion, it is hence not correct to derive conclusions on local development impacts stemming from a pure MMS, given MMS focus on allowing for more financial transactions and increasing financial inclusion of unbanked people through a less costly delivery of financial services, but not on local development (as opposed to ACS). Therefore, MMS will have an economic impact, but it is difficult if not impossible to forecast its geographical localization. The research therefore concludes that the combination of the principles behind Alternative Currency and Mobile Money Systems will do the trick, using a specific MMS design to redirect the economic impact of mobile money to local communities, as well as to provide a more stable, safer and cheaper way of implementing an ACS through a mobile phone platform.

"*Typology of M-Money Systems*", Eduardo H. Diniz, João Porto de Albuquerque, Adrian Kemmer Cernev.

The categorization of the relationship of agents within DPS has been deepened as well as the classification of the cases analyzed in the former papers of FGV has been realized. Furthermore, the dimensions identified in the interim workshop in October 2011, have mostly be included:

1) Agents (Financial Institutions / Governments / NGOs / Mobile Operators)

2) Products (Saving accounts / loans / remittances etc.)

3) Level (Local, Regional, National, Supranational)

4) Issuer (yes/no; if Yes, what is issued)

5) If 4) is Yes: Emission rules (Backing / Risks / Restrictions)

6) If 4) is Yes: type of claims/guarantees in case credit is generated (based on

real short term claims / salary stream / real collateral etc.)

7)   Motivation (Social goals / Financial Inclusion / Profits)

8)   Target Audience (BoP / Firms /MSMEs / Consumers etc)

9)   Logistics: type of cash-in/cash-out points; retail network and how this impacts chicken-egg trap.

Main conclusions of the research pointing towards interesting future research on the issue have been:

The proposed typology is based on business models depending on the involved economic agents and their possible relationships, exemplified with mobile money services that already exist somewhere. It is not based on the existing mobile money services, because many MMS cases are not adequately documented or are not investigated enough in order to enable a broad and comprehensive vision of the different possibilities for their design. The research doesn´t go in detail of specific characteristics of the services, as even small differences in context (regulation, capillarity of mobile telecommunications services, power of economic agents in the value chain, government and/or of NGOs initiatives, etc.) can significantly modify the value proposition of the services and its characteristics, allowing a large diversity in each described type of MMS.

In general it seems that MMS involving individuals are more important and relevant than the MMS which only involve other economic agents, since these other agents usually already use electronic services (not necessarily mobile) that are serving their needs.

In particular regarding corporate and/or government relationships, the importance of mobile devices might be minimal when compared with the technological networks, systems and services already consolidated for payments and financial transactions.

The researchers conclude therefore that instead of following the hype around "mobile" money systems, one should analyze "electronic" and/or digital networks.

The following table presents a synthesis between the types of transactions within a MMS and the possible relations with social currency and potential impact on local development.

MMS types of transactions	P2P	B2P	P2B	F2P	P2F	G2P	P2G
Possible relations with social currency	Maybe	Yes	Yes	No	No	No	No
Potential impact on local development	Maybe	Yes	Yes	Yes	No	Yes	No

Based on this typology new studies might explore existing microeconomic relations between the economic agents involved in different mobile money services, including emission rules, possible credit generation, risks involved, guarantees, logistics of money flow, and so on. Similarly, different perspectives and emerging scenarios might motivate further studies, such as regulation context, specific local development initiatives, technology diffusion, new competitors and strategic alliances between players from different economic industries, among others.

Some research questions might also emerge, such as: what is the effect of the specific types of digital money on the availability of means of payment in the local market? What types of digital money can be identified that show systematic effects on the flow of the purchasing power through the local market?

It is important to notice that the impact on local and regional development of each identified type of MMS has not been investigated further, being still a relevant work to be done.

The typology was originally foreseen for month 5 of the project, meaning that it suffered a delay of 13 months. This fact led to serious problems in terms of compliance with the original deadlines as well as with the overall content of the research project "Mobile Money and Local Development".

"Modelling the use of digital payments as tool for development impacting the money volume available in underprivileged communities", Henk van Arkel, Camilo Ramada and Andreu Honzawa.

The authors analyzed and modeled the monetary aspects of Local Development and the opportunities of Virtual Currency Systems as tool for impacting the money volume available in underprivileged communities. The different forms of Digital Payment Systems, which have been designed, are a sequence of generations (DPS.1, DPS.2 and DPS.3) which have specific characteristics caused by the configuration of the used technology as well as by the inherent capacities of the system.

The development of digital payment technologies represents a change of paradigm, in which the conditioning of monetary flows allows the increase of the multiplier effects of economic activities of targeted groups. It offers, for example, the opportunity to redirect the costs of credits from the consumer towards the supply chain. Digital payment technologies will be able to activate selected markets, foster trade where it is most needed. Information and Communication Technology (ICT) is bringing about radical changes in the monetary field. These changes start with a more effective transfer of values against far lower transaction costs. This offers opportunities for the inclusion of new groups into the financial system, for example, banking the unbanked, or improving access to basic financial services of low-income groups. ICT can also integrate small- and medium-sized enterprises (SMEs) to e-commerce networks, therefore upgrading productive capacity. Next-generation software opens new opportunities for economic development, understood as maximization of purchasing power, in countries facing recession and poor regions stuck in a permanent depression. Currently available hardware and software make it possible to identify commercials needs of producers and increase productivity of their Points of Sale (POS). The ultimate goal is activating markets, providing opportunities for employment and business turnover. Over the last decade, digital payment systems have rapidly developed quantitatively and qualitatively, and have become a reality in both developed and developing countries. These new technologies

create new opportunities and new threats for economic development and stability, as depending of their modality of implementation, they can help upgrade or degrade local productive capacity. Currently, there is an exponential rate of ICT innovations in the monetary and payment systems field.

6.2   Knowledge management on virtual payment systems

There are several project activities which had as primary goal to contribute to the dissemination of the realized researches and lessons learned.

Mid-term meeting, October 2011, Montevideo, Uruguay

One of the strategic objectives of the project was to involve key stakeholders in the discussion and debate of the addressed topics. As planned in the original proposal, after delivering the first scientific papers elaborated by the research teams these results have been discussed publicly in the project´s midterm meeting. This meeting was held at the IDRC regional office in Montevideo on October 28th; divided in two parts having different attendants and objectives.

During the morning program, the researchers had the opportunity to present the main conclusions of their papers, and receive the comments and feedback from the very high level and strategic audience formed by 16 people: two IDRC program managers, six project members – including the main researchers from STRO and FGV – and eight representatives coming from external organizations: Planning Office of Uruguay's Presidency (OPP), Institute for Cooperatives (INACOOP), National Institute for Alimentation (INDA), National Agency for Electronic Government (AGESIC), National Post Office (DNC) and Electronic Stock Exchange (BEPSA).

During the afternoon a working meeting was held, where the STRO and FGV research teams – under advice and guidelines of IDRC – integrated in a deeper way the achieved

results and planned the elaboration of the next objectives, specifically, the model creation.

(10)   Simulation Tool, FSCT Unipessoal Limitada

A simulation tool has been developed which helps decision makers to understand the impact of monetary flows on development strategies aiming to show how Mobile and Digital Money Systems can contribute to maximize this impact. The Digital Money Simulation (DMS) is a web-based simulation tool that allows users to compare the effect that monetary flows have on a local economy between different scenarios. In the base version of the tool, the user compares these effects between a regular economy and one in which a Digital Money System has been implemented.

Throughout the simulation, the user will be introduced to important concepts and will be able to take decisions and see how they play out. It is meant as a starting point for a reflection process and further discussion. The outcome of the simulation also does not pretend to be a precise reflection of reality, but is meant to stimulate thinking about the concepts and hypotheses.

This product will be delivered as a simple software implementation of the conceptual model, principally based on the conclusions of Ramada-Sarasola and on the paper produced by Hendrik van Arkel, Andreu Honzawa and Camilo Ramada. It allows simulating how different configurations of Digital Money impact transaction flows. The simulation is highly configurable, and can be adjusted to support a different model, or even simulate different scenarios.

The **objective** of this tool is to make decision makers reflect on the effect of Digital Money Systems (DMS) on local economic development and how Alternative Currency Systems (ACS) can be used to optimize them. It will be targeted at policy makers and scientists with

an interest in DMS and local economic development and allow them to experiment with monetary flows. The tool aims to transmit the following learning objectives:

1. DMS are not designed to increase economic activity on the local level in particular and it is difficult to predict if and how they actually do;

2. Effects of DMS on the local economy that can be expected are changed consumption patterns because of a higher degree of safety for the users and lower transaction costs and barriers;

3. ACS are designed to positively influence local monetary flows by penalizing outflows;

4. ICT allows an ACS to set rules that increase the economic multiplier effect of the inflows of money and hence increases local economic activity.

Since Ramada-Sarasola concludes that there is no evidence that MMS in themselves translate into increased economic activity on the local level, a combination with an ACS – a system specifically designed for that purpose – will be introduced. The proposal is to focus the simulation on contrasting these effects to the users.

This tool is available at http://digitalmoneysim.org/. For further information, please see Annex 3.

Final Meeting, November 2012, Sao Paulo, Brazil

Another outcome in this project phase is the realization of the final event which was realized among all project partners, involved researchers and the Program Officer of IDRC.

Objective of workshop:

Identify, analyze and discuss the implications of the outcomes of the research project on the design of Digital Payments Systems in order to consider and raise the impact on individual and community development.

Summary:

All project partners, as well as external researchers who were involved in the research project, met for a 2-day meeting in São Paulo, in order to do a wrap-up of the project together with the Programme Officer of IDRC. All participants agreed upon the need to dispose of additional empirical data of real case scenario(s) with a considerable transaction history (in form of Randomized Controlled Trial) in order to be able to get to concrete conclusions and recommendations regarding the setting up of a Digital Payment System / Virtual Currency System in pro of sectoral or geographically concentrated development.

Discussion / Main issues discussed:

The main issues discussed during the workshop were as follows:

- Mobile Money is just a wave on which several institutional players are riding
- As a wider approach Electronic, Digital and / or Virtual Money and Payment Systems have been investigated.
- A systematization is still needed, as the initial approach investigated pure Mobile Money and / or Payment Systems.
- Research group should define next steps, necessary research, improvement of papers, etc.
- Data is actually not stored in the right format to be analyzed. Additionally regulatory restrictions are in place regarding analysis of financial data.

Remarks of presentations:

All researchers presented their respective realized investigation and most important outcome:

- The Mobile Money Typology fulfils the criteria in terms of different possible Business Models, but does not approach a economist point of view, as several items are missing.
- The industry of electronic payments investigated on a national level (case Uruguay) has been steadily growing and innovating, every time faster and bringing several challenges to society.
- As Mobile Money Systems are not thought to impact on local development, the combination with so called Alternative Currencies makes sense, as these have a

social background, although if talking about Conditioned Money, any Virtual Currency System can be designed in favour of targeting its economic impact.

- Virtual Currency and Payment Systems can change on purpose behaviour of economic agents and help to gather, map and analyze de generated data.
- An Alternative / Social Currency improves the economic behaviour of community in terms of higher local consumption, which at the same time raises the economic impact as a total.
- A Virtual Currency enables the possibility to generate extra liquidity and turnover in a semi-closed environment of a business and consumer community.
- The digitalisation of a Conditional Cash Transfer Programme can bring further opportunities to its beneficiaries as financial inclusion, lower transaction costs, less time-consumption etc.

Recommendations from participants:

Summarizing the different suggestions given by the participants of the workshop, the following points can be highlighted:

- It is clear that theory (research) and practice (real case scenarios) need exchange in order to produce empirical feedback of set-up hypothesis.
- It is necessary to create / finish creating a theoretical framework which should be supported by empirical data.
- In order to proceed with a profound analysis of digital money and payment systems, the confidentiality of the data must be secured in order to be able to access the information.
- It is important to identify the right type of data needed to analyze the socio-economic impact of digital money and payment systems, so it is necessary to identify what kind of data already exist, what doesn´t exist and what should still be produced.

General Recommendations:

The Programme Officer of IDRC, Fernando Perini, recommended realizing improvements of all presented researchers, in order to be able to publish individually each article in scientific journals.

In the collective line, STRO should aim at re-editing the theoretical framework, integrating the related researches and generate more empirical data in order to upgrade the scientific outcomes of the research for the community of practitioners.

(11) Project webpage and Forum

Originally it was planned to organize a Seminar / Conference for decision makers, practitioners and scientists in order to disseminate the outcomes of the project, discuss innovations based on ICT in G2P payment systems and agree on further steps in order to advance in R&D activities.

In order to obtain the main effect in terms of goal-oriented dissemination a project webpage has been created. The webpage will offer insight and tools to policy makers at governments, central banks and development institutions in order to evaluate the potential impact of innovations in Digital Payment Systems for local economic growth, the opportunities it offers and the need for definitions in order to influence these systems.

The forum within the webpage will help participants to understand how Digital Money and Payment Systems can be specifically designed in order to maximize their impact on local economic growth. The design of Digital Systems can vary largely. This design does not only imply the technological applications the system uses, but also the basis of emission of the digital means of payment, its administration, the kind of spending behavior that is stimulated or discouraged by the system of fees and rewards and the way the system interacts with the potential target groups.

By explicitly targeting the issue of *design* of Digital Payment Systems and *impact on local economic growth*, the forum will offer valuable insight to policy makers. At this moment, governments must decide if they wish to structure their rules and regulations in such a way that these contribute to, or at least do not hinder the potential economic growth impact of Digital Payment Systems.

All project results mentioned in this Final Report will be published on the project webpage which will be accessible under the URL www.ict4cct.org.

6.3 Consolidation of research and practitioners community

The final publication targets to contribute to the creation of knowledge, debate and a research base that focuses on optimizing the use of technology in terms of development output. The publication shows the need for further R&D. In the project descriptions some proposals are being made which could lead to a better understanding of the potentials of Virtual Currency Systems for local development.

Mobile Money Systems do not easily find massive use in less developed areas. Virtual Currency Systems have some advantages because they can introduce rules who force people that hold purchasing power to push new businesses to accept that purchasing power as payment. However it can be expected that some massive flow of initial purchasing power is needed for a successful introduction. In the proposal three sources are being targeted:

- Conditional Cash Transfers

- Remittances

- National Financial Inclusion Program

(12) "U*sing virtual payment systems to improve the multiplier of CCT in poor regions"*

Governments that wish to offer long term solutions for the beneficiaries of Conditional Cash Transfer Programs should have clear strategies aiming at a socio-economic dynamic for the excluded segments.

Based on the established theoretical framework, a dynamic community is one in which local actors (individuals, entrepreneurs and businesses) interact with each other in order to supply each other's demands. Such a process serves to identify and develop talents and capacities. A community with such an underlying behavior develops a diverse set of specializations contributing to its self-sustainability. This leads to increased opportunities for those community members who might not be active in the workforce yet but who do have talent and creativity, as well as increased employment opportunities and income for those who are already active in the workforce. Key in this process are the community members with entrepreneurial capacities. These individuals need the opportunity to develop their capacities in their own region instead of being forced to migrate to places which might be perceived as presenting greater opportunities.

When looking at the effects that these governmental expenditures can create, we will see that new technologies and dedicated policies provide ways to increase the multiplier both from quantitative as well as from a qualitative point of view.

In the last decades, innovative projects have shown very positive results in creating development from within communities by activating locally available resources. *Social Currencies* are locally emitted to stimulate the exchange within communities. Where social currencies have been introduced with the idea of creating an economic change the impact has often proved to be minimal. However, in those cases where they have been used as a *first step* in social activation, the results have been interesting. In Brazil, for example, they are used in the take-off stage of the, so called, community banks.

The obvious line of this R&D proposal is to improve the effects of CCT programs so that Virtual Currencies can help activate beneficiaries and create a sense of awareness, especially within poor communities so that its people can ensure a better life for themselves by actively exchanging efforts locally. This represents the first step in making communities more dynamic in their relations with the market while learning about the value of specialization and initiative in the context of reciprocity. Going one step further,

beneficiaries of CCT programs are first responsible to improve as much as possible their lives and community, thereby contributing to its long term impact and diminishing the risks that beneficiaries grow in the long term cultural addicted on these transfers from the State.

This R&D would not only provide useful lessons regarding social activation and about facilitating community based entrepreneurship, but it also brings the technology to direct Virtual Payment Systems. These digital payment systems allow the liberation of the purchasing power of CCT programs in a way that when they channel these monetary flows, they can make use of the aforementioned activation of the community to increase the local multiplier. At the end, this does not only offer jobs in the targeted communities but also leads to additional economic activities that deliver new sources of income that can help to ensure the CCT program's financial sustainability in the long run.

In summary, this text provides a description of an innovative approach that will allow governments to increase the effects of Conditional Cash Transfers / welfare programs in terms of social activation, economic growth and job-creation. The presented approach is based on the Social Trade Group's experiences with innovative virtual currency and payment systems and community based social innovation.

(13)   *"Real scenario R&D Proposals on Remittances and Microcredit"*

The planning for the research project Nº 106459-001 "Mobile Money and Local Development" included the elaboration of proposals for the design of sustainable digital payment systems among diverse countries of the region in order to disseminate the outcomes of the research. Various R&D proposals that focus on practical applications of Virtual Currency Systems aim ingat generating specific impact on the local flow of money have been designed. These projects have been developed with local counterparts in Costa Rica, El Salvador, Ecuador, Uruguay, Nicaragua and Bolivia.

All designs are using open source banking software Cyclos in which the statistic function and the Data Warehousing is used in order to produce data for future research.

All projects share the premises of this research project in stating that Virtual Currency Systems may be instrumental in generating specific impact for local economic development by focusing on monetary flows, and specifically:

• Increasing the total amount of means of payment in the local market;

• Strengthening the impact of the locally circulating means of payment on the local value chain by increasing its multiplier effect.

In order to show different forms of applicability of the developed model seven business models have been developed together with the diverse partners from different sectors and countries aiming at improving the impact on local economies of existing or new activities:

- **Development Agency, Bolivia:** Improve the conditions of credit access and other supporting financial services of the small producer and rural micro entrepreneur.

- **Agricultural Cooperative, COSTA RICA**: Contribute to provide access to local resources with tools as extra capital and community development for the habitants of the operational area of the cooperative.

- **National Network of Credit Cooperatives, ECUADOR:** Implement a model of credit circuit using digital payment means contributing to the development of the rural sector of the Ecuadorian austro.

- **Micro-Finance Institution, EL SALVADOR:** Develop an innovative model promoting local economic development by channeling remittances flows of migrants towards their families in El Salvador.

- **Credit and Consumer Cooperative, NICARAGUA:** Introducing an innovative digital payment system which compromises the Nicaraguan migrants towards a local economic development of the rural areas of Nicaragua.

- **National Service Agency, URUGUAY:** Implement a commercial and financial transaction network on national level.

(13) *"Project Designs of Virtual Currency System on national level"*

STRO is working in Uruguay since 2007. Uruguay is an important hub of programmers for the international Cyclos project and also an environment where applications of the Digital Payment Systems and their impact for local economic development are being implemented and tested.

The strong institutional relations with public and private entities lead to the positive situation that different lines of action are being elaborated simultaneously. Every single line is aiming towards a specific profit for the partner(s), while designed in such a way that they can be combined in one single digital payment system at later stage based on parallel currencies which can target a multitude of specific needs ranging from transparency and security up till influencing the economic multiplier effect and trade balances on regional and national level.

Each project has its own specific goals, such as financial inclusion, safety, transparency and traceability of operations, modernization and efficiency. Their shared and overall main goal is sustainable socioeconomic development, which is best served once the different projects start to interact between each other.

From the point of view of raising the impact on development, STRO aims to take full advantage of the opportunities that Digital Payment Systems (DPS) offer in order to increase and optimize monetary flows. As stated elsewhere, this means maximizing the

inflow of means of payment, keeping it circulating locally as long and intensive as possible, and facilitating outflow where that creates a win-win situation for the market parties and the communities. Further information please see Annex 4.

7. Development Outcomes

(14) *"Final project publication on "Virtual Currency Systems and Local Development"*

The final publication will integrate the results of several researches. When the FGV research (1) showed that it was impossible to create evidence-based typology on mobile money and local development, as at the moment, too little empirical research is available around Mobile Money Systems to verify an impact at local level, even for very specific case studies, as in the cases of MMS in Kenya, Uganda and Bangladesh, the approach followed the literature review of Ramada-Sarasola in *Monetary Aspects of Local Development* (2). (As Ramada-Sarasola states in her paper "Can Mobile Money Systems Have a Measurable Impact on Local Development?" for M-PESA research implies that there is increased money velocity and the existence of new monetary channels increased the number of transactions, but in terms of geographical boundaries, M-PESA displays a delocalization of monetary flows. Empirical data does not even allow concluding that the overall value of remittances increased. Nevertheless, given a new pattern of consumption and transactions, a smoother transfer of funds and potentially an increase in local trade in rural areas can be expected. The system's impact at the overall national GDP can be assumed to be positive, but there is no way to predict its impact at the local level in underprivileged communities since data is scarce, not specific enough and the geographical pattern of flows generated exclusively by M-PESA cannot be distinguished from other flows. This is a direct consequence of M-PESA's design not accounting for local or regional development type of goals.

In the document of Ramada-Sarasola it becomes clear that, although Digital Payment Systems can create very specific impact on local economic growth (specifically if they create new and extra means of payment), at this stage at least it does not seem feasible to study this impact for existing systems.)

In order to follow Ramada's advice to check on the potential effects of alternative Virtual Currency Systems, the monetary aspect of development was systemised (3) and the potentials of Virtual Currency Systems were discussed against those findings using the results of the case studies (4-8). This approach was being applied using the data from the VCS pilot in Punto Transacciones.

8. Overall Assessment and Recommendations

Possible follow-up:

Our research project is a successful illustration of the benefits of creating international partnerships between NGOs / Think Tanks and Universities. On one site, the researchers of the NGO / Think Tank contributed with their huge experience and rich knowledge of pilot projects, technologies and business models. From the other side, the researchers brought their tradition in using theoretical models and methodological designs that fit each other. This combination of actionable, practical, and more theoretical knowledge was one of the most interesting elements of putting together STRO, FGV-EAESP and HEC Montreal. Likewise, the partnership allowed

From a perspective of contributing to development, we estimate that for a new project to be financed by IDRC for the next two years, our research team could provide enormous results towards social and economic development. We deal with a subject with a big potential.

STRO agreed with IDRC on the following next steps:

- Improve the theoretical framework of the approach on "Virtual currency systems and Local Development"

- Disseminate the outcomes of the research project on practitioners` level: policy makers, donors, think-tanks etc.

- Publish the outcomes via project webpage and offer an online discussion forum

- Identify possible pilot projects in order to support theoretical framework

- Realize a regional expert meeting in order to discuss a concrete practical approach to obtain empirical data.

Regarding our experience with IDRC, we learned how to work more closely with a the requirements of a Canadian funding agency and how to adjust our objectives and activities accordingly. We have invested a huge amount of time and effort to make this first phase of our research project a valuable project for society. We really hope that a further collaboration will follow at some point in the future.