

KEY INDICATORS OF TIME BANK PARTICIPATION: USING TRANSACTION DATA FOR EVALUATION OF “BANCO DE TEMPO – FLORIANÓPOLIS”

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Abstract: Community currencies are growing worldwide and exist in a variety of forms. One interesting type of local currency is “time”. A time bank operates like a volunteer organization, with a member registering all member transactions. The principal characteristic of time banking is that the credit, that every member receives for a good or a service supplied, has the same value – one time credit per hour – regardless of type or quality of product or service provided. Even though time bank is diffuse worldwide, being also considered by academic researches, the same diffusion can not be registered in Brazil and, consequently, Brazilian literature about this topic is poor. Therefore, the objective of this paper is contributing to the literature on this subject, doing an exploratory analysis of one of the first experiences of time bank developed in Brazil: “Banco de Tempo – Florianópolis” (BTF). BTF is a time bank developed and situated in Florianópolis, city in the Southern region of Brazil. BTF was created in mid-2016 and in few months, increases considerably the number of member, reaching approximately 1000 active members in February 2017.

This paper shows, primarily, some basic indicators, secondly, it presents some evidences and knowledge about time banking in international literature, and finally utilizing a social network analysis software package, presents advanced indicators of time banking participation.

The indicators on BTF show an increasing member participation and a beginning of creation of social capital within the group. The paper can be considered a starting point for further researches about time banking in Brazil.

Key-words: time banking, community currencies, social capital

Introduction

Community currencies are growing worldwide and exist in a variety of forms. Community currencies have a long and important history outside Brazil: generally, they raised in situations of economic recession when cash shortages hampered normal economic activity, but recently they have been implemented to achieve also social and environmental objectives as well as economic (Seyfang, 2000).

“Local exchange trading schemes” (LETS) are the most popular form of community currency. A LETS is a type of trading organisation in which members do not use cash in transaction of goods and services among themselves and it is usually managed by community volunteers. Instead of using money, participants utilize a “local currency”, which can be used and circulates only within the LETS, in contrast with footloose conventional money (Seyfang, 2001).

One interesting type of local currency that can be used in LETS is “time”. A time bank operates like a volunteer organization, with a member registering all member transactions. The principal characteristic of time banking is that the credit, that every member receives for a good or a service supplied, has the same value – one time credit per hour – regardless of type or quality of product or service provided. A member that helps another member, providing goods or services, earns credits, that afterwards will be spent by this member to receive help as well (Cahn, 2000).

Even though time bank is diffuse worldwide, becoming an important reality in UK, US and other regions of the world¹, being also considered by academic researches, the same diffusion can not be registered in Brazil and, consequently, Brazilian literature about this topic is poor. Therefore, the objective of this paper is contributing to the literature on this subject, analysing one of the first experiences of time bank developed in Brazil: “Banco de Tempo – Florianópolis” (BTF).

BTF is a time bank developed and situated in Florianópolis, city in the Southern region of Brazil with a population of 477798². BTF was created in mid-2016 and in few months, increases considerably the number of members, reaching approximately 1000 members in February 2017.

¹ In 2008, timebanking was celebrating its 10th anniversary in the UK, with 600,000 hours of mutual exchange and 109 active timebanks (Ryan Collins et al, 2008). Besides this, time banks have arisen in Mexico, Uruguay, Senegal, Thailand, Japan (Seyfang, 2011)

² Estimated inhabitant in 2016. Source: Brazilian Institute of Geography and Statistics (IBGE).

This paper aims to analyse economic transactions between BTF members, utilizing some indicators, with the objective of assessing the health of the network, evidencing the ways by which participation increases and analysing the presumed increase of social capital in the city.

The data used are about members and transaction furnished by the organization of BTF³.

The essay is divided in three sections, excluding introduction and conclusion: in the first section, some operational information of BTF is presented and key indicators about BTF are analysed; in the second section, the literature review puts into evidence the history, the experiences and the knowledge about timebanking in the international literature; and the third section advanced indicators about BTF are showed and analysed.

1. Banco de Tempo – Florianópolis

Banco de Tempo – Florianópolis is based in the city of Florianópolis and accepts as members only inhabitant of this city. A person that wants to become a member has to apply and indicate the types and characteristics of goods and services that wants to supply.

In the website of BTF, it exists a list of all members specifying the goods and services supplied, so every member can check the list and find the needed good or service.

In BTF the use of money is forbidden. The only means of payment is hours. Every member can buy (or sell) a good or a service using (or receiving) an amount of hours. The price, in hours, of goods or services is decided by mutual agreement between the seller and the buyer.

Every new member that enters BTF receives the 4 credits on loan, that can be use to make transactions in the system. Every new member that enters BTF generates 10 credits for bank: of these, 4 credits are lent to the new member and 6 credits are used for social project of BTF⁴. The movement of hours used is updated by the bank's administration virtually in the bank's own webpage: for this purpose, the buyer of a good or service must inform bank's administration about the type of good or services received, the time of the transaction and the hours that are exchanged.

³ I thank BTF administrators for the data supplied and the availability, in particular Ms Geovana Madeira Narcizo.

⁴ In this paper, social projects are not considered, given that its objective is focusing on transactions of goods and services.

1.1 Member participation: key indicators

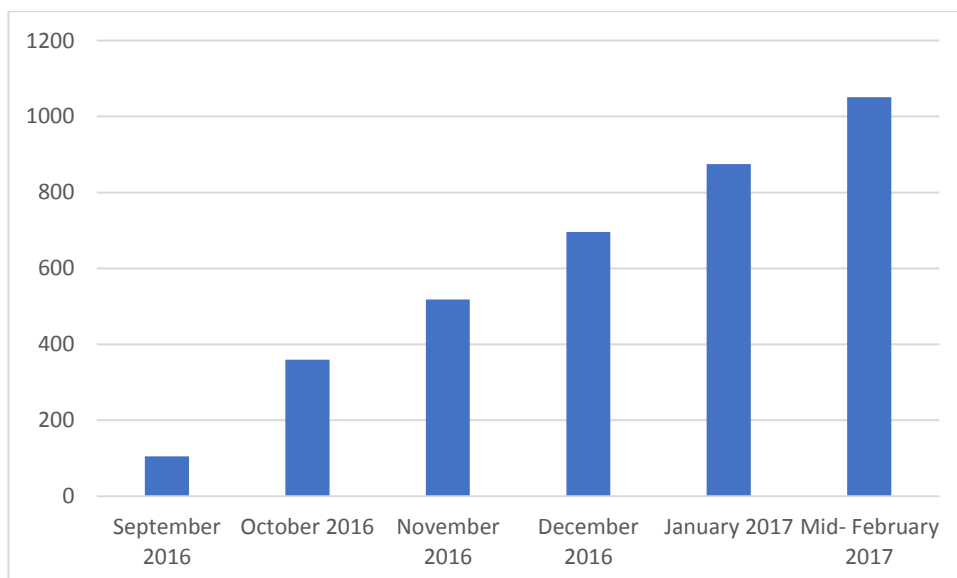
BTF was created in September 2015. During the first year, BTF did not grow and after a relaunch in August 2016, there was a boom in the number of members, which grows 900,95% in five months.

The first indicator about BTF that can be studied is member participation. Participation in voluntary organizations generally tends to vary greatly among members of the organization. This is known in the literature as differential participation. On one hand, some people join organizations and never really contribute, on the other hand, other people is only rarely active, and, finally, there are those who are extremely involved (Collom, 2012).

Also in the case of BTF, there are persons that are interested in the organization but do not participate, in this case they can not be considered members of BTF; others that are members but transacted few times or never; finally, others that are very active in buying and selling goods and services. The last two categories are included in the group of active members of BTF.

Data about active members are showed in Figure 1: the participation in BTF is increasing quickly and constantly in the few months since the relaunch in August 2016. The number of members that are registered as active has passed from 105 to 1051 between September 2016 and Mid-February 2017.

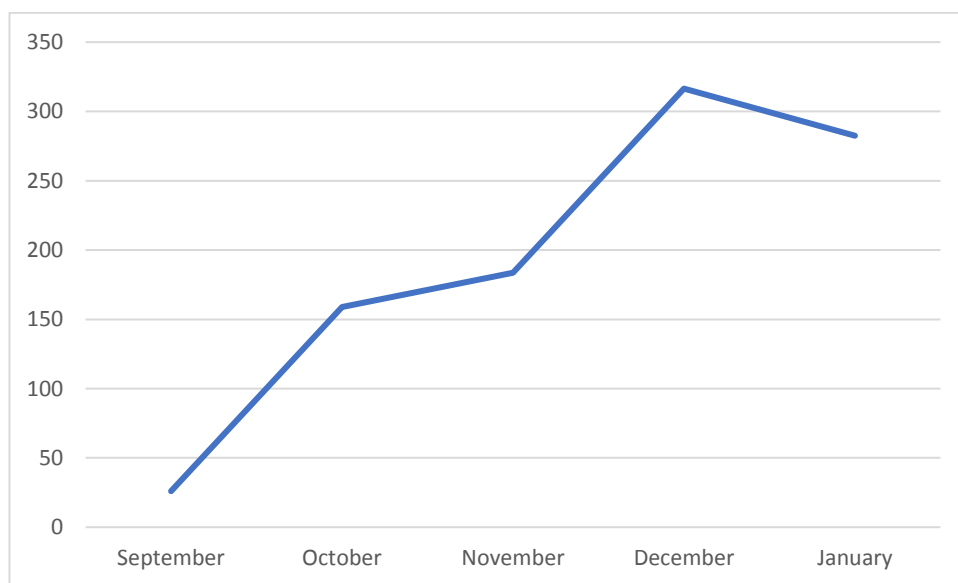
Figure 1. Active members of Banco de Tempo - Florianópolis



Source: Own elaboration – BTF data

The second key indicator is total number of hours per month. This identify turnover in the system, the number of hours used each month. Once the dataset is sorted by date of transaction and separated into month (as was done for the computation of number of active members), one can easily sum the total hours used for transaction in each month and plot them in a graph as in following Figure 2. The total number of hours has become almost 12 times greater in three months, in the period from September 2016 until December 2016, passing from 26 to 316,5. There was a small decrease in the hours used in January 2017.

Figure 2. Total number of hours used per month



Source: Own elaboration – BTF transaction data

Another basic indicator is gender, which is the only socio-economic characteristic that can be extracted from transaction data. Previous researches (Seyfang, 2001; Collom et al, 2012) evidenced that female participation normally is higher than male participation in timebanking.

One first explanation could be the revaluation of women in community currencies, respect the devaluation of them in formal economy. In fact, time banks are highly egalitarian: each member's hour has the same value regardless of the gender of the person.

A second explanation is the fact that normally women have had historically a larger participation in informal economy than men. Most of time, timebanking has characteristics similar to informal economy, and for this, women have a higher probability to be present.

A third explanation can be derived from the fact that participation in timebanking is normally linked to volunteering, in fact, various activities developed within a time bank has the

objective to help community (Collom et al, 2012). Given that, Wilson (2000) evidenced that in the U.S. women are more likely to be volunteers than men.

Considering members and transaction data of BTF, table 1 defines the percentages of women and men participation as members and their participation as members that transacted in the period from October 2016 to January 2017. We can see a large female participation in BTF: women are more than three-quarters of total members. This large female participation as members is also reflected in the transactions: women are 77,88% of total members that transacted in the four months considered.

Table 1. Gender percentages in total members and transaction members.

	Total members	Transaction members
% men	23,89	22,12
% women	76,11	77,88

Source: Own elaboration – BTF transaction data

Another basic indicator divides the hours into categories of goods and service transacted. Table 2 provides these broad categories, with some examples of goods and services transacted in each category. The category “not specified” was added because, in recorded transaction data of BTF, some transaction have not specified the type of transaction. This happens more frequently in the first months, reducing with the passage of time, and it is due to adaptation of the organization and the members in the initial period.

Table 2. Good and service categories

Good and service category	Examples
Arts and music	Artwork, musical instrument class
Beauty	Haircut, hairdresser, depilation
Cleaning, Light Tasks and Errands	House cleaning, dressmaking
Computers and Technology	Computer repair, audio/video production
Construction, Installation, Maintenance and Repair	House repair, electrician, plumber
Events and Program Support	Space rent, events
Food Preparation and Service	Cooking, catering, food

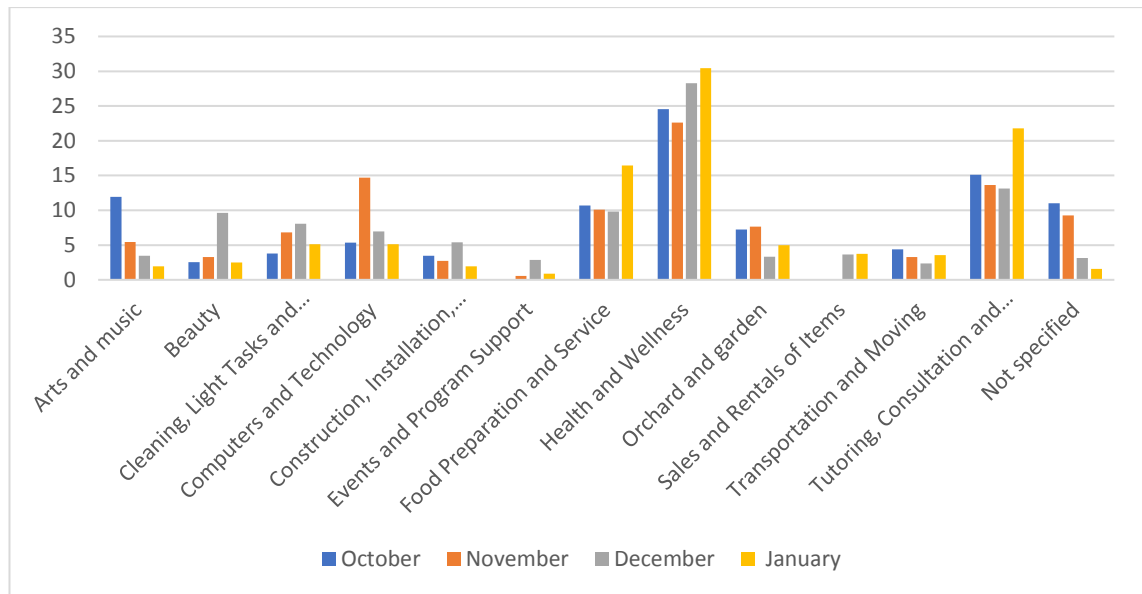
Health and Wellness	Medical and psychological consultation, massage, natural products, body therapies, sports
Orchard and garden	Orchard and garden maintenance, fertilizer and seedlings sale
Sales and Rentals of Items	Purchase of new and used goods
Transportation and Moving	Transportation, rides
Tutoring, Consultation and Personal Services	Lessons, tutoring, childcare, language classes
Not specified	Good or service is not specified in BTF data

Source: Collom, 2012

Figure 3 puts into evidence the percentage of hours of each category respect total hours transacted in each month. The category that stands out is “Health and Wellness”: the percentage is between 22% and 30% in the four months considered. Disaggregating the data about “health and wellness” category, “massage” is a service that contributes the most to the high percentage of this category.

According Collom, et al (2012) and Seyfang (2003) time banks are often depicted as a way of having access to services that users otherwise cannot afford, so also BTF incentives most of time the demand of goods or services that normally in traditional monetary economy have not high demand.

Figure 3. Percentage of Total Hours of Goods/Services Provided by Category



Source: Own elaboration – BTF transaction data

The second most used category of services is “Tutoring, Consultation and Personal Services” with a percentage between 13% and 21% in the months considered. Disaggregating the data about “Tutoring, Consultation and Personal Services” category, “professional consultations” are services that contribute the most to this category, with a great importance of graphic design and architecture.

The third category in order of importance is “Food Preparation and Service”. Disaggregating the data about all goods and services transacted in BTF, the “selling and preparation of food” is the good/service most used by time bank members.

Further basic indicators are mean of hours used per member and mean of hours available per member (table 3).

Table 3. Use and availability of hours in BTF

Month	Mean of hours used per member	Mean of hours available per member
September 2016	0,25	4,01
October 2016	0,44	4,04

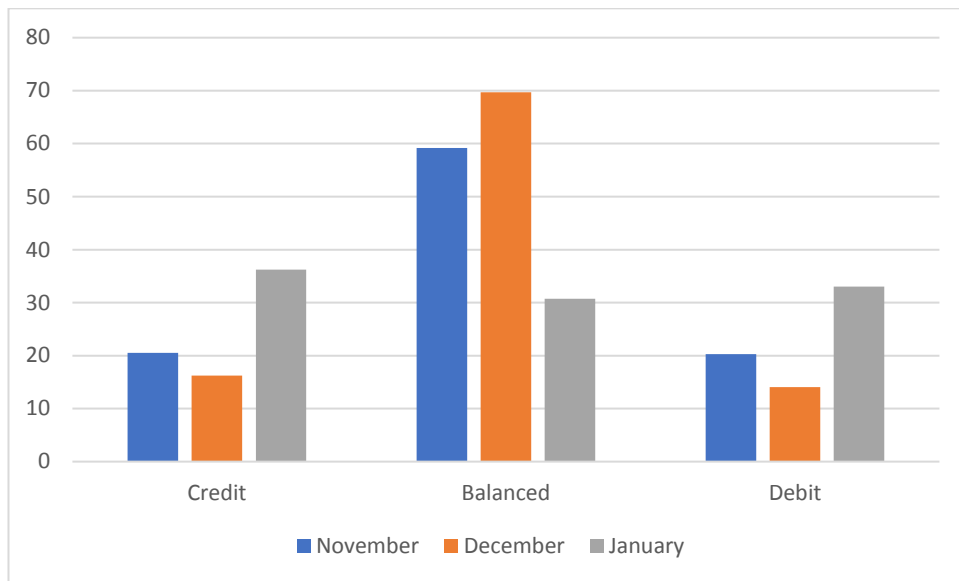
November 2016	0,35	4,06
December 2016	0,45	4,27
January 2017	0,32	4,41
Mid- February 2017	0,53	4,57

Source: Own elaboration – BTF transaction data

In the second column of table 3, it can be observed the quantity of hours that each member spent on average each month. The figures indicate that there is not a trend in the expenditure of BTF members: with the passage of time, expenditures do not increase constantly. In the third column of table 3, it can be noted that the quantity of hours available for each member is increasing constantly: this fact is due to the growth of social projects linked to BTF. At the beginning of BTF, each member had only the availability of four credits received to be a member. With the creation of social project, some credits allocated to social projects are used to pay members involved in these projects and, so, they enter in the bank time system.

Account balance is the next key indicator, which is simply the difference between hours or time dollars earned (credits) and spent (debits) by each member every month. Within BTF it is not allowed to enter in a negative balance position, that is a member can not make a loan to pay for a transaction because it does not have enough hours. Consequently, when a member has spent more than earn in a month, it means that this member has saved hours in the previous months.

Figure 4. Percentage of Members in Account Balance Categories (Credit, Balanced, Debit)



Source: Own elaboration – BTF transaction data

Figure 4 puts into evidence that the majority of members are in a balanced situation in BTF. Due to the prohibition of negative balances, normally it is more common have a credit situation than a debit situation.

2. Literature review

Many researches [Gessel (1958); Keynes (1973); Douthwaite (1996); Robertson (1999); Jackson (2004)], most of time not directly linked to time bank, put into evidence some problems of current mainstream money system that can explain the emergence and the diffusion of LETS.

First of all, the fact that money has not only the function of medium of exchange, but also it is a store of value, incentives people to hoard money, withdrawing it from circulation and thus reducing the quantity available for transactions. In the modern economic system, the shortage of money leads to the fact that, on one side, there is people with skills and labour to offer, and, on the other, there is work that needs to be done or goods that are demanded, but there is not enough money to bring them together. So, the result is unemployment and needs that are not met.

Second, local economies normally suffer due to the possibility of money changing place without difficulty within a country. The mobility of money leads to 'capital flight' away from

peripheral economic areas and in the direction of centres, so reducing the availability of means of exchange in some regions and communities.

Third, the current economic system gives a great value to some kinds of wealth and overvalues others. Environmental and social costs and benefits are not considered in economic prices, and so the economic process of decision-making does not consider these costs and benefits. This fact leads to economic behaviours which worsen social quality of life and the environment, but which are completely rational within the market context. (Seyfang, 2004)

Continuing the analysis of the literature, the work of Seyfang (2001) analyses the impact and potential of a LETS to contribute to sustainable local development (SLD). The author introduces two different and contrasting models for sustainable local development: a mainstream approach, focused on local regeneration, called ‘local economic development’ (LED) approach; and a radical ‘green’ or ‘new economics’ strategy, called ‘sustainable local development’ (SLD) approach.

The following table 4 illustrates the differences between the two approaches.

Table 4. Characteristics of LED and SLD approach

According to LED view, local currencies..	According to SLD view, local currencies..
Increase income of local economies	Local needs are met through informal economy
Incentive the formalization of economy	Work is redefined according to a new economy system
Help unemployed with “welfare” services	Promote localization
Offer training or work experiences	Change consumption and prioritize sharing and recycling
Increase social networks	Build “green” social networks
Rise self-esteem of people	

Source: Seyfang (2001)

Ryan Collins et al (2008) affirm that exist three types of timebanking model: person-to-person, person-to-agency and agency-to-agency.

The original model of timebanking, created by Edgar Cahn (1992), was the person-to-person (P2P) with time bank members can use time credits in exchange for goods and services managed by a central “time broker”.

In person-to-agency approach (P2A), people can receive time credits in exchange for contribution to the objectives of an agency or community, normally public or third sector. In this case, the “bank” is the agency, which issues time credits for repaying time and effort received for their goals. The agency also offers a variety of choices for people to use these time credits.

The agency-to-agency approach has several benefits. Through timebanking, organizations can share people and resources, without needing to use additional resources. The majority of the organisations, including commercial organisations, does not completely utilise the assets and staff capacity at their disposal. Therefore, organization can share, for example, empty meeting rooms, stationary mini-buses, wasted food and energy, old IT equipment (Ryan Collins et al, 2008).

According to this literature, we can affirm that BTF has characteristics for which it is person-to-person and person-to-agency organization at the same time. In fact, in BTF time bank members can earn time credits in exchange for goods and services (P2P) or can receive time credits in exchange for contribution to a social project (P2A).

Passing to the literature relative to timebanking, it can be affirmed that researches about this type of LETS have been predominately exploratory and descriptive, appropriate to a relatively new area of study in Brazil and internationally.

While surveys or interviews are necessary to study participation in printed community currencies where circulation is not able to be tracked, transaction records offer tremendous advantages for the study of time banks. There is very little published research on participation in time banks or LETS (Local Exchange and Trading Systems) that analyses official recorded transaction data.

An interesting topic of research about timebanking is the possibility of these organizations to reduce the suffering of poor people or to give some opportunities to unemployed people. Williams et al. (2001) evidence that 27.4 percent of transactions in British LETS are made with goods and services that otherwise would not have been bought, being a complement to regular income.

In Manchester time banks, 48.1 percent of the poor members and 44.4 percent of unemployed members declared that timebanking improved their life: more than one third of participants bought food in time bank, one third clothing, and 30 percent had done renovation and repair work via time bank. Considering traded goods and service, 52.5 percent of members would have bought them with traditional money if time banks hadn't existed (Williams, 1996).

Another important role of time banks is building social networks and social capital being an alternative to traditional family and community networks.

Most time bank participants say that the time bank helped them to build a network and solid friendships. In the research of Seyfang (2003), at Rushey Green Time Bank, situated in a deprived area of south London, 72 percent of the members affirmed that the project helped them to get to know more people, and 17% claimed to have acquired tight friendships.

3. Advanced indicators of time bank participation

For obtaining the advanced indicators of BTF participation, it was used UCINET 6 (Borgatti et al., 2002), a software developed for social network analysis. The data considered are transaction data of the period from October 2016 to January 2017.

The first indicator is "size" which provides each member's number of trading partners. The value of this variable for each member can be a number between one (for a member who have only transacted with one other member) and the total number of active members of BTF (for a member who have transacted with every member in the system).

The variable size is an useful information for a bank time: the coordination could suggest to the members with few trading partners that it might be a better situation if they requested the service or good from different members. It is a new social opportunity that helps to integrate the new or inactive member into the system (Collom, 2012).

Considering the theory of social capital, it can be affirmed that a bank time with members transacting many times with few members is a system that is building "bonding" social capital. Bonding in social capital is referred to social networks between homogenous groups or individuals. In bonding social capital, individuals are normally connected to few others individuals and protect the group from external individuals or new members.

On the other hand, helping the entrance of new members in a group and facilitating the relations with different members increase the bridging social capital, which is referred to social networks between socially heterogeneous individuals.

At Banco de Tempo - Florianópolis, the number of trading partners ranges from 1 to 24 with 2.88 being the average. Nearly half (46,36%) of all the members traded with only one other member. The median value is 2 as 21.51% traded with two other members. At the high end, 4.54% of members had bought goods and services with 10 or more different members.

To observe if “bonding” if social capital is only at the beginning or is already an established reality, it is important to analyse the reciprocated contacts in BTF.

When a member transacts with another from whom it has previously received a service or a good, the relationship becomes reciprocal. Reciprocation further develops a social relationship, represents a second stage of bonding social capital as these two participants have chosen to transact once more.

There are two approaches to calculate the number of reciprocated contacts: Dyad-based Reciprocity and Arc-Based Reciprocity.

Dyad based reciprocity is the number of reciprocated dyads divided by the number of adjacent dyads. A dyad, representing a pair of actors and the possible relational ties between them, is a (node-generated) subgraph consisting of a pair of nodes and the possible line between the nodes.

On the other hand, Arc-Based reciprocity is the number of reciprocated arcs divided by the total number of arcs.

At BTF, using dyad-based method, only two members (0.34%) had two reciprocated contacts, six members (1.01%) had one, and the large majority of the members (98.65%) did not have any reciprocated contacts. Thus, reciprocation was rare at Banco de Tempo – Florianópolis in the period considered.

Network density is the next basic indicator of individual participation in time banking.

Density is expressed as a percentage, where the extreme values are zero, when a member’s trading partners have never transacted with one another, and 100, when all trading partners of a member have exchange with one another.

In this calculation of density, it is only considered the fact whether a tie exists between members, without considering the direction of the tie, buying or selling a good or service.

Density is important for a time bank: members during a transaction often talk about the network and other exchanges did in the past with other members. Thus, members living in well-

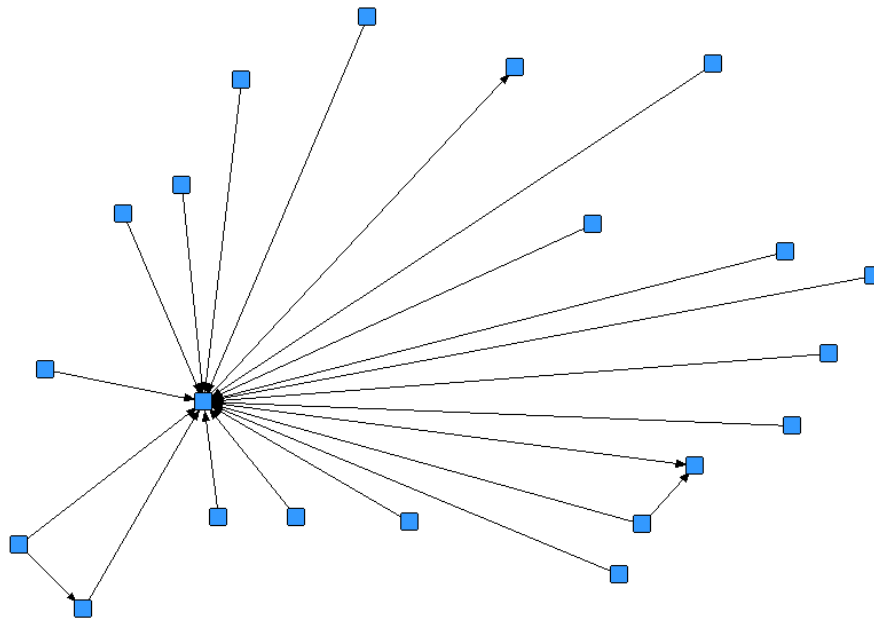
connected areas of the network are expected to have greater information about the quality of good or services of other members within the time bank and so, have an higher probability to be more active. Referrals are an important mode of learning about services and goods supplied, given the fact that advertising is not normally present in time banking. Moreover, the information that is widespread in highly dense network generally can increase bonding social capital (Collom, 2012).

The ego-network density indicator at BTF ranges from 0% to 100% with an average of 2,46%. A large number (84,54%) of the members have 0% density, no transaction connections among their alters.

To better understand and visualize the variable “density” it can be interesting to build graphs illustrating social network of some members of BTF.

The first graph (Figure 5) represents the social network of a BTF member that has many trading partners (20), but it has a low density (0,53%), in fact only two trading partners have exchange with one another over 380 possible pairs.

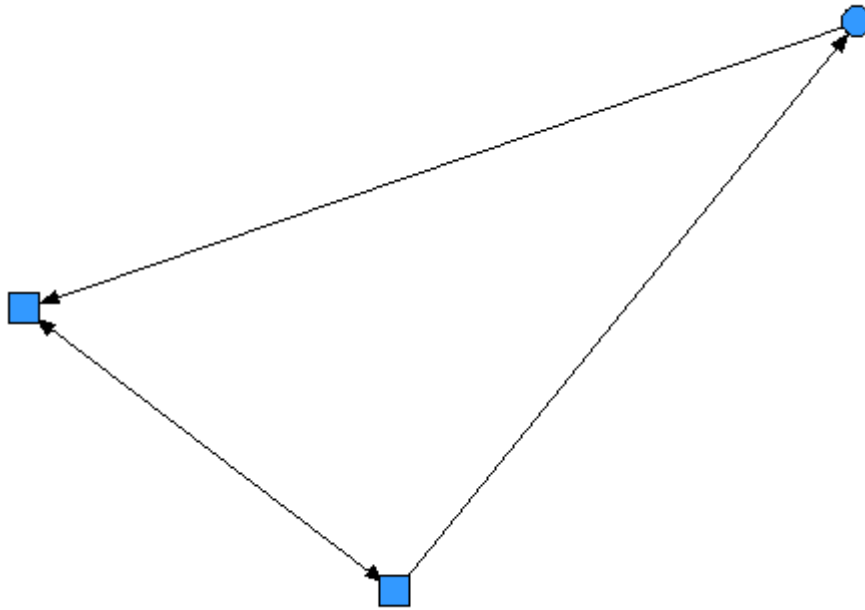
Figure 5. Time bank graph illustrating member network size and density



Source: Own elaboration – BTF transaction data

The following graph (Figure 6) represents the social network of a BTF member that has high density (100%) but this fact can be due to the low value of the variable “size” (2 trading partners).

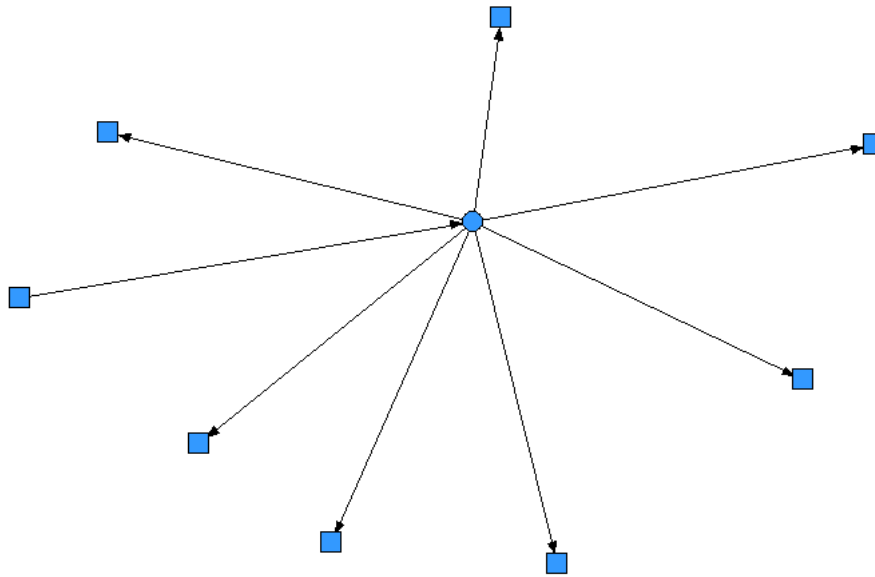
Figure 6. Time bank graph illustrating member network size and density



Source: Own elaboration – BTF transaction data

The last figure (Figure 7) illustrates the social network of a BTF member that has 8 trading partners and so the possibility to have 56 pairs, but trading partners do not transact with one another. Density in this case is 0%.

Figure 7. Time bank graph illustrating member network size and density



Source: Own elaboration – BTF transaction data

Conclusions

This paper can be considered an exploratory analysis of timebanking in Brazil and, given poor Brazilian literature in this area, one of the first papers studying this topic in the country.

Since Banco de Tempo – Florianópolis is an organization in the early stages of life, the analysis of this paper is limited. However, some small evidences of a beginning of social capital creation within the group were encountered. It can be supposed that with the passing of time, these evidences will be more robust given the increasing member participation and the increased confidence of the members in making transactions within time bank.

Beside that, some limitation of this paper can be showed. As other researchers (Seyfang 2001; Lasker et al. 2011; Collom, 2012) have evidenced, the use of transaction data can lead to some problems. First, some members can not inform the organization about some of their transactions. When this fact happens, it means, most of times, that time bank works in a good way. For example, some members that are very linked each other can exchange some goods or services directly without reporting the transactions or they become friends and do not charge for credit.

Second, the bank organization can record the data about transaction with some errors. For example, some transactions can be recorded with a wrong number of credits or registered with a wrong type of good or service.

Finally, we can suggest the next steps of research on BTF. Considering the lack of further data, mainly sociodemographic data, additional data will be collected applying a survey to BTF members. This survey will include variables such as gender, age, race, education, income, marital status, etc. With this information, we could exam demographic differences in member participation, that is, if exist some difference between BTF members and other people living in Florianópolis. Using the same tools of this papers, it could be also investigated the characteristics of trading partners.

Moreover, it can be studied whether BTF is contributing to build social capital in the areas where it is present and what type of social capital is created the most. Besides that, it is interesting to research whether BTF has a role of poverty relief and as opportunity to unemployed people. Lastly, it could be calculated what would be the value of the hours spent for transactions in BTF, to estimate how much was spent in time bank rather than in the traditional economy or how much was spent that otherwise would not be spent on the traditional economy.

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