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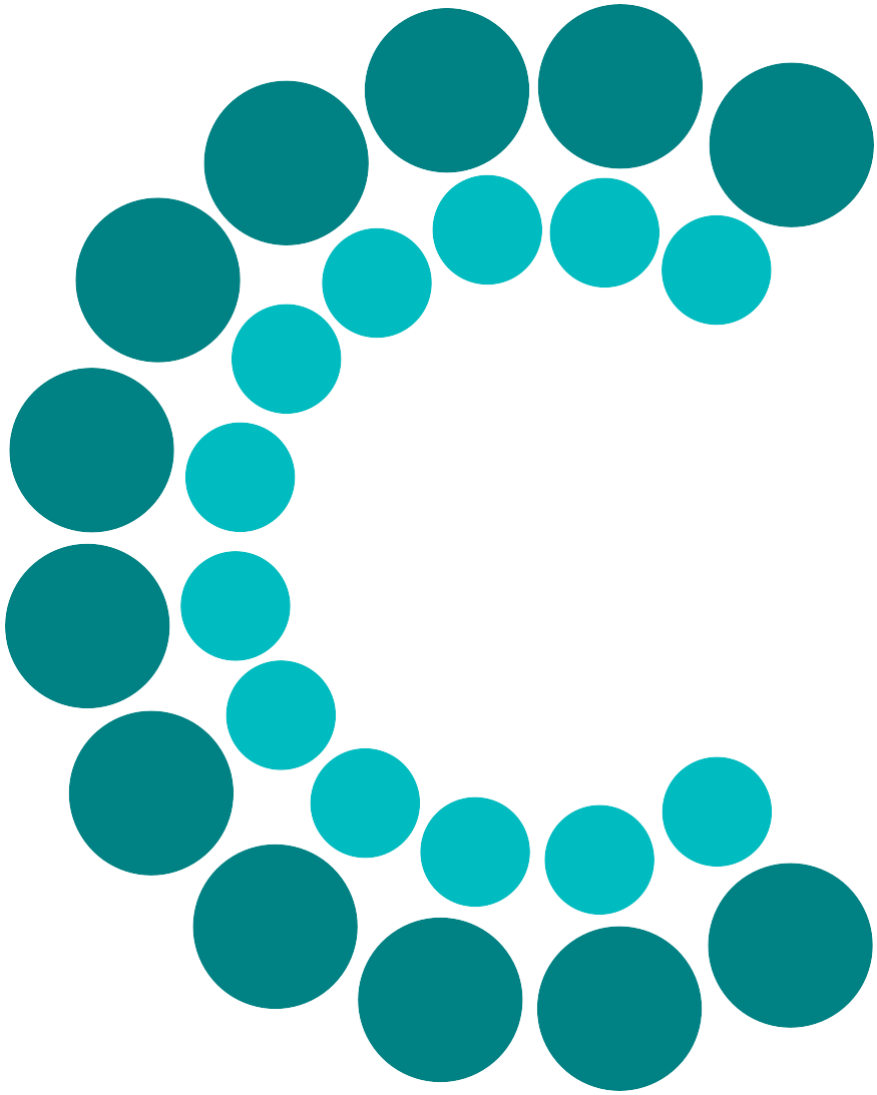

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EDITORIAL

TRANSFORMATION OF COMMUNITY/COMPLEMENTARY CURRENCY THROUGH DIGITIZATION

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At RAMCS2019[i], various research reports were presented on the theme of digitization of community/complementary currencies and crypto currencies. Similar to the previous issue, a special issue has been compiled using these research reports. The special issue is published in two volumes. This is the second volume, consisting of the following ten papers.

1. Masayuki Yoshida, Shigeto Kobayashi, Yoshihisa Miyazaki/ Relationship between Community Currency Issuance Organization's Philosophy and its Issuance Form: A Japanese Case Study
2. Ricardo Orzi, Raphael Porcherot, Sebastián Valdecantos / Cryptocurrencies for Social Change: The Experience of MonedaPAR in Argentina
3. Christophe Place, Jem Bendell, Ian Chapman, Jamie McPhie, David Murphy/ Integral Research on the Lake District Pound: Six Mixed Methods for Assessing the Impact of a Currency
4. Nourhan Heysham, Hisham Elkadi, Sara Biscaya/ Exploring Social Capital Within Damietta's Furniture Industry Value Chain as a Mode of Community Currency
5. Thomas Coutrot, Bruno Théret/Tax-credit Instruments as Complementary Currencies: A Policy Proposal for Fighting Austerity while Saving the Eurozone
6. Christian Gelleri, James Stodder/ Chiemgauer Complementary Currency-Concept, Effects, and Econometric Analysis
7. Kiminori Hayashi/ Rethinking the Significance of Regional Currencies: The Case of the Chiemgauer
8. A.A. Panachev, D.B. Berg/ Prospects of Implementation of Complementary Currencies at the Municipal Level by Dataset of Economical Agents Banking Transactions
9. Alexander Zatko/ Merit Signal - The Éminence Grise of Monetary Systems
10. Mayumi Dan, Kayo Okabe/ Revitalizing Local Communities through Regional Currencies Using GIS: A Case Study in Kasama and Kesennuma in Japan

These ten papers cover a variety of topics, including an analysis of the relationship between the ideals emphasized by regional currency-issuing organizations and the form of issuance in Japan (Yoshida et. al.); case studies of community/complementary currencies using cryptocurrency and digital currency technologies (Orzi et. al., Place et. al., Heysham et.al.); policy recommendations using complementary currencies in the Eurozone (Coutrot and Théret); an econometric analysis and thought study of Chiemgauer (Gelleri and Stodder, Hayashi) ; network analysis to examine the prospects for the introduction of complementary currencies (Panachev and Berg); examining economic

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systems that provide "merit" reward, separated from the exchange value reward (Zatko); case study of GIS-based education on local revitalization using local currency (Dan and Okabe).

In Japan, many digital community currencies have been planned since precedents such as the Sarubobo Coin in 2017. Additionally, we have seen some cases where local governments have signed agreements with local chambers of commerce and financial institutions and companies to issue digital community currencies. In Japan, a trend different from past community currency initiatives has emerged in response to this form of digitalization. It is for this reason that the title of this special issue is "Transformation of Community/Complementary Currency through Digitization." These ten papers will provide some hints to help us understand this new trend.

I would like to thank the referees for their cooperation in this special issue. Without them, these special issues would not have been possible. In addition, I would like to thank Prof. Georgina Gomez, the president of RAMCIS, who gave me a great deal of advice for editing the special issue.

ENDNOTES

[i] RAMICS 2019 won the Japan National Tourism Organization (JNTO) Award for Contribution to the Attraction and Hosting of International Conferences in the category of hosting international conferences (small-to-medium size).

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RELATIONSHIP BETWEEN A COMMUNITY CURRENCY ISSUANCE ORGANIZATION'S PHILOSOPHY AND ITS ISSUANCE FORM: A JAPANESE CASE STUDY

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ABSTRACT

What kind of philosophies do analog or digital community currency (CC) issuance organizations focus on? To answer this question, we conducted a questionnaire survey on 117 CC issuance organizations in Japan. In this survey, we categorized the target organizations into four groups based on their issuance philosophy. We found three major factors related to the organizations' self-evaluation regarding the impact of their CC issuance on society. Under such classification, we found a relationship between the organizations' issuance philosophy and their CC evaluation, and a relationship between their issuance philosophy and their issuance form. From these results, we observed that an issuance philosophy does not uniquely decide the issuance form, but an organization issuing digital CC emphasizes economic value as a philosophy. In addition, we considered that organizations emphasizing economic value when issuing digital CCs may provide positive feedback; they will emphasize economic value based on a self-evaluation that results in fair and efficient trade using digital CCs. Our survey provides some explanations for issuance organizations that use CC as a medium for conveying certain philosophies.

KEYWORDS

Currency issuance philosophy, currency issuance form, community currency as a medium, questionnaire survey.

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1. INTRODUCTION

In Japan, 792 community currencies (CCs) had been issued by 2016 (Kobayashi, Miyazaki and Yoshida, 2020). Kobayashi, Miyazaki and Yoshida (2020) point out that the combinations of issuance purposes have changed in line with the Japanese economy and society[i]. For example, the number of CC issuances peaked in Japan around 2002. Prior to this time, the CCs that aimed at creating connections between people were the most prevalent, but in 2002, those targeting regional economic revitalization prevailed. However, after 2012, the most predominant CCs were those that aimed at the revitalization of forestry and regional economies. According to them, one of the main reasons behind the change in the combinations of issuance purposes is the propagation mechanism of a CC issuance organization's circulation model to other organizations. It is important that such a propagation mechanism includes not only the issuance form of the CC, but also the values to be emphasized in CC issuance.

In addition, digital CC issuance has been rapidly increasing in Japan. Although such digital currency has initial implementation costs and security issues, it has many advantages too, such as ease of management, reduction of operation costs, and more accurate transaction data[ii]. Tanabe and Niitsu (2016) point to the potential of digital currency technology to further enhance the economic functions of CCs in Japan. In addition to the advantages for the issuer, the users are also evaluated differently for digital and analog CCs. Using a game simulation, Yoshida and Kobayashi (2019) observe that participants evaluated digital CCs to have economic effects, while analog CCs strengthened community ties. Based on these studies, digital CCs seem to have advantages over analog CCs in economic function. It is necessary to verify not only the convenience, but also the effects of digital CCs that have appeared in recent years, in comparison to analog CCs.

In this study, we position CC issuance as a socio-economic system that builds on its own philosophies. Lietaer (2004) discusses some of the early community currencies in Japan and shows that each has its own specific philosophy, such as mutual aid and promotion of local communities. However, this is not limited to Japanese community currency. For example, as Gelleri (2009) shows, Chiemgauer, a regional currency started in Germany in 2003, is based on Steiner's Philosophy such as freedom, democracy, and solidarity. These cases show that the founder's philosophy is behind the establishment of the community currency. Thus, we also position CCs as a medium for instilling essential philosophies in the system[iii] and as a medium for building a socio-economic zone based on specific philosophies. Therefore, we first consider the philosophy emphasized by community currency issuance organizations. This philosophy implies the combination of values and ethics that the CC issuance organization emphasizes. We analyze whether the CC issuance purposes and forms are different according to such differences in philosophy, and what kind of self-evaluation is being performed by such organizations. Through these analyses, we explore how the properties of CCs as a medium differ depending on the issuance philosophy.

2. QUESTIONNAIRE SURVEY DESIGN

We investigate the relationship between the variety of philosophies on which CC issuance organizations depend and the issuance form. We examine three research questions.

RQ1 What kind of philosophies do CC issuance organizations emphasize?

RQ2 How do the philosophies affect the CC being issued?

RQ3 What is the relationship between the issuing philosophies and the issuing forms?

To clarify these research questions, this study uses a questionnaire-based survey of CC issuance organizations in Japan; we survey a total of 117 CC issuance organizations. The targets of the survey are the CC issuance organizations currently in operation derived from the survey list by Kobayashi, Miyazaki, and Yoshida (2020), along

with newly-established digital CC issuance organizations; that is, those established in and after 2016[iv]. In this survey, we clarify how the philosophy (values and ethics) of each CC issuance organization influences its issuance form and evaluation. The questionnaire responses were collected from the representatives of each CC organization.

In order to clarify RQ1, we ask about the philosophy of the CC issuance organization. Regarding the philosophy emphasized by the organization, we ask the following 10 questions (Table 1). We asked each organization to give a five-point rating for each of these questions (5: very important, 1: not important at all).

Table 1. Ten questions about the philosophy of CC issuance organization

1. Revitalization of the regional economy
2. Rebuilding of the relationship between local residents
3. Support for the socially vulnerable
4. Promotion of regional environmental conservation activities
5. Improving the local living environment
6. Activation and continuation of local culture and tradition
7. Robustness of the financial system
8. Efficient financial system
9. Creation of new assets
10. Diversification of payment methods

In order to clarify RQ2, we asked the organizations about their issuance purposes and CC issuance self-evaluations. In order to know the issuance purposes, we prepared ten categories and asked the respondents to select all that applied (Table 2).

Table 2. Ten categories of issuance purpose

1. Supply of local activity funds
2. Enrichment of local communication
3. Promotion of consumption within the region
4. Promotion of welfare and medical care
5. Promotion of resource recycling
6. Conservation and restoration of the natural environment
7. Securing public facilities' management and operating expenses
8. Activation of festivals and events in the region
9. Activation of exchanges outside the region
10. Others

In order to understand how the CC issuance organization evaluates the CC issuance, we asked for responses to the following 15 questions on a five-point rating scale (5: I think so very much, 1: I do not think so at all) (Table 3)[v]. By analyzing these responses, we will clarify how CC issuing organizations consider their CC to affect society.

Table 3. Fifteen questions for the CC issuance self-evaluation

1. It is desirable to use the currency issued by your organization as a reward if you want others to do something
2. The currency issued by your organization leads to efficient trading
3. The currency issued by your organization brings about fair trade
4. You can increase social diversity using the currency issued by your organization
5. You can create new products and services using the currency issued by your organization
6. By using the currency issued by your organization, you can support socially vulnerable people as members of society
7. Enrich the culture using the currency issued by your organization
8. Become more compliant with rules and laws using the currency issued by your organization
9. You can control the use of materials and resources by the currency issued by your organization
10. If you have a currency issued by your organization, people's actions and thoughts will be more free
11. As you use the currency issued by your organization in various aspects of society, the norms

for determining good and evil change
12. You can achieve personal success using the currency issued by your organization
13. You can achieve social stability by trading with the currency issued by your organization
14. Trade with the currency issued by your organization respects individual dignity
15. You can bring trust to others using the currency issued by your organization

In order to clarify RQ3, we asked about the issuance form. For the CC issuance form, we prepared eight categories and asked the respondents to select all that apply. We classify these forms into the analog- and digital-types (Table 4). A contact type makes a transaction with a reader like a credit card. A non-contact type makes a transaction by holding the card over the reader, although a reader is similarly used. In code reading type, a Quick Response (QR hereafter) code or bar code is displayed using an application on a smartphone and read by an application on the other side to complete a transaction. An online settlement type makes a payment using a transaction site on the Internet.

Table 4. Issuance form of CC

Category	Question items	
Analog-type	1. Banknote, 2. Passbook, 3. Bill	8. etc.
Digital-type	4. Contact type (plastic card), 5. Non-contact type (NFC (Near Field Communication), Felica), 6. Code reading type (QR code, bar code), 7. Online settlement	

The following procedure is used to analyze the relationship between these three elements. First, we conduct the factor analysis of the questions related to the issuance philosophy, and cluster the issuance organizations based on the subscale factor scores. Then, we examine the issuance philosophy of each cluster. Second, we conduct the factor analysis on the organizations' self-evaluation of the CC's influence on the society, and the subscale factor score is compared by cluster based on the issuance philosophy. When conducting these analyses, it is possible to examine the characteristics of the CC as a medium connecting the issuance philosophy with its results by focusing on the differences in the issuance purposes and the ratios of the issuance forms for each cluster.

3. RESULTS

3.1 Questionnaire Response

We sent the questionnaire to 117 CC issuance organizations (104 for analog CC, 13 for digital CC) in Japan. We prepared two questionnaire formats: paper and web. The respondents could choose to either mail their responses to the paper questionnaire or enter their responses in the web-questionnaire. Responses were collected from March 22, 2019 to April 5, 2019. We received 39 responses, and of these, 38 responses were valid. The effective response rate was 32.5% for the total, 25% for analog CC, and 76.9% for digital CC (Table 5).

Figure 1 shows the issuance forms from the organizations' questionnaire responses. Some organizations are shown as taking multiple issuance forms. This figure shows that the banknote is the most common type of analog issuance, while the digital type takes various forms, including mailing lists, shards of glass, stickers, and coins.

Table 5. Questionnaire response

	Survey target	Response	Response rate
Analog CC	104	26	25%
Digital CC	13	10	76.9%
Combined Analog and Digital CC	---	2	---
Total	117	38	32.5%

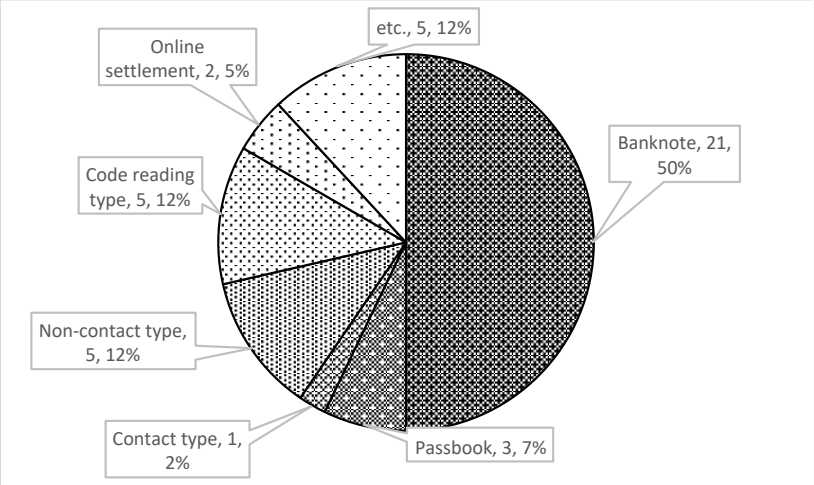


Figure 1. The issuance form of CC organization

3.2 Cluster analysis based on the currency issuance philosophy

First, in order to identify the philosophies that the target organizations focuses on, we conducted factor analysis based on the main factor method for 10 items of the currency issuance philosophy (Table 6).

Table 6. Factor analysis for 10 items of the currency issuance philosophy (n=37)

	I	II
F1: Enrichment of economic environment α = 0.891		
Efficient financial system	1.002	-0.074
Robust financial system	0.963	0.007
Diversification of payment methods	0.886	0.017
Creation of new asset	0.594	0.268
Revitalization of local economy	0.489	-0.199
F2: Fulfillment of the social environment α = 0.706		
Improvement of local living environment	0.02	0.761
Promotion of global environmental protection activities	-0.148	0.707
Rebuilding of the relationship between local residents	-0.169	0.481
Support for the socially vulnerable	0.101	0.457
Revitalization and continuation of local culture and tradition	0.116	0.419
Factor correlation matrix	I	II
I		0.428

Two factors are adopted from the results of the analysis. We performed factor analysis with the maximum likelihood method and Promax rotation for these factors. The factor loadings of all 10 items were 0.4 or more; these values were not observed for the two adopted factors. We named the enrichment of the economic environment as the first factor (F1), and the fulfillment of the social environment as the second factor (F2). The Cronbach's alpha coefficient was 0.891 for F1 and 0.706 for F2.

F1 is composed of elements such as strengthening the financial system and improving its efficiency and robustness, those related to the function of money such as payment methods and creation of new assets, and the revitalization of the local economy. F2 consists of improving the local living environment, protecting the global environmental with activities, reconstructing relationships between local residents, supporting those who are socially vulnerable, and revitalizing and maintaining the local culture and traditions. A high value of F1 means not only emphasizing the revitalization of the local economy, but also emphasizing the strengthening of the financial system and the diversification of the monetary system. And the high F2 value includes not only the improvement of the local community environment, such as the improvement of the local living environment and cultural traditions, and the connection among the residents, but also the emphasis on factors such as global environmental protection and support for the vulnerable.

Then, in order to classify the target organizations from these two factors, we have conducted a hierarchical cluster analysis on 37 CCs based on the subscale scores of the two factors (Figure 2). Ward's method was used for clustering, and the square Euclidean distance was used as the measurement method. In Figure 2, the first number on the label indicates the ID of the CC, and the alphabet after the hyphen indicates the form of currency. A indicates analog currency, D indicates digital currency, and A/D indicates a combination of analog and digital currencies. The horizontal axis shows the F1 score and the vertical axis shows the F2 score. The scores range from 1 to 5 (5: very important, 1: not important at all). The correlation coefficient of F1 and F2 was 0.287.

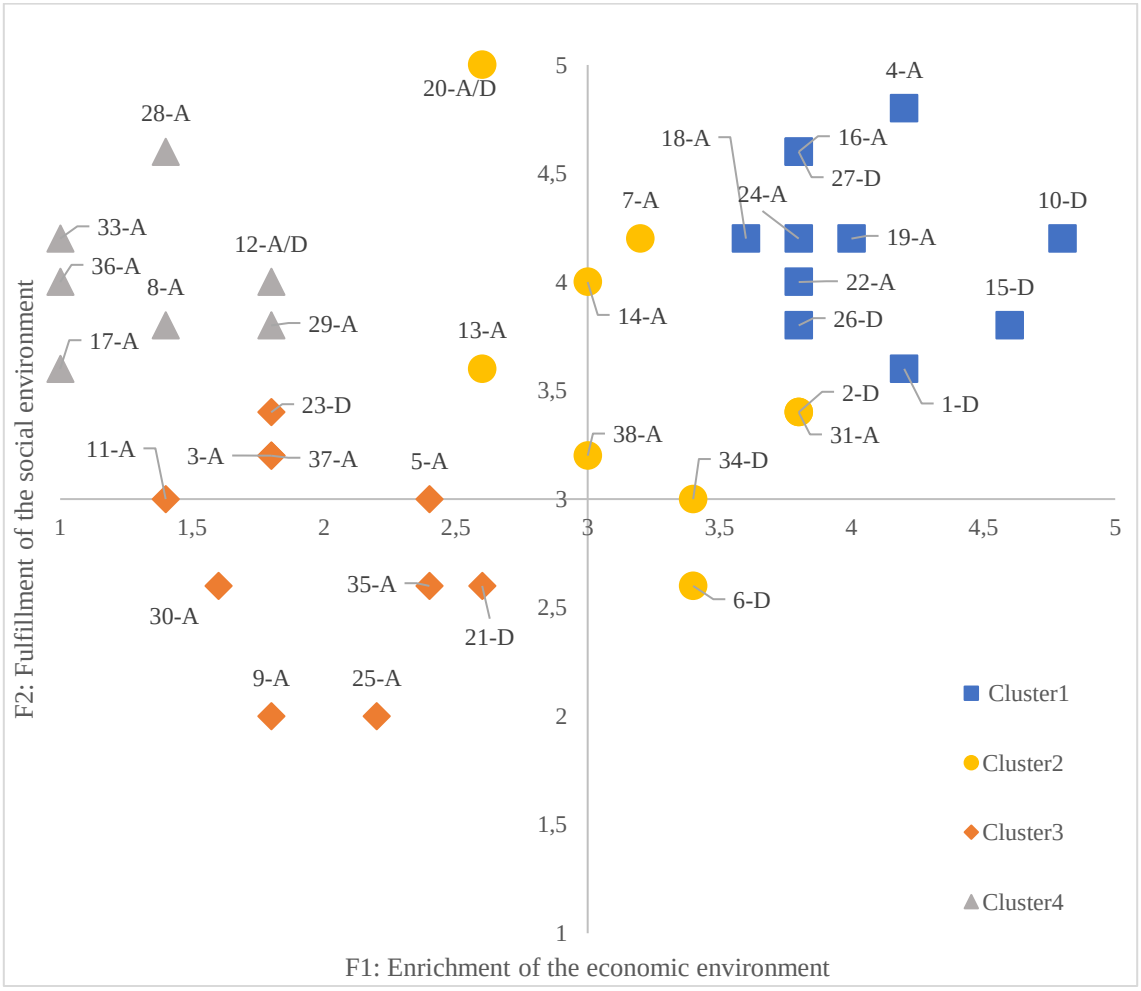


Figure 2. Four clusters of the currency issuance philosophy

The first quadrant is an area that emphasizes both economic and social environments, and the third quadrant is an area that emphasizes neither. The second quadrant is an area that emphasizes only the social environment, while the fourth quadrant is an area that emphasizes only the economic environment. We observe that there were few CC

issuing organizations in the fourth quadrant. Table 7 shows the average subscale scores of F1 and F2 to be 2.77 and 3.62 in total, respectively. This means that these CCs prioritize social environment fulfillment over economic environment enrichment on the whole[vi]. Kobayashi et al. (2018) show that CC officials emphasize the publicity rules over financial officials; our study has many similarities with this study.

Table 6. Cluster comparison of subscale scores on the currency issuance philosophy

	Cluster	n	Ave.	SD		
Factor1: Enrichment of the economic environment	1	11	4.04	0.38	F(3,33)=84.22	p=.000
	2	9	3.2	0.45		
	3	10	1.98	0.39		
	4	7	1.34	0.36		
	Total	37	2.77	1.12		
Factor2: Fulfillment of the social environment	1	11	4.18	0.37	F(3,33)=15.82	p=.000
	2	9	3.6	0.71		
	3	10	2.76	0.49		
	4	7	4	0.33		
	Total	37	3.62	0.75		

From this analysis, we can divide CC issuing organizations into four clusters. Cluster 1 emphasizes both the economic and the social environment. Cluster 2 emphasizes the fulfillment of the social environment. Cluster 3 places little emphasis on both the economic and the social environment. And Cluster 4 emphasizes the fulfillment of the social environment but does not emphasize enrichment of the economic environment. When compared to the average, the four clusters show the following features (Table 7). Comparing the mean of the subscale scores, we find significant differences among all clusters for F1, while Cluster 3 has a significantly lower score than the other three clusters for F2. Concerning the issuance philosophy, it means that, while clear differences exist among the four clusters on the enrichment of the economic environment (from emphasis to no emphasis), all clusters except Cluster 3 emphasize the fulfillment of the social environment.

Because each factor consists of five items, the issuance organizations of Cluster 1 emphasize all the items while other clusters emphasize some items while not emphasizing others; therefore, the average factor score may be low. Figure 3 shows the subscale scores of issuance philosophy for each item by cluster. The solid line shows the average of each cluster, and the broken line shows the overall average. Focusing on the components of F1, there is a tendency for Clusters 1 to 4 to not emphasize strengthening financially and the diversification of the monetary systems. In addition, it can be seen that all but Cluster 4 emphasized local economic revitalization. Looking at F2, we can see that Clusters 1 and 4 are similar and place an emphasis on each item. It can also be seen that Cluster 2 places less emphasis on support for the socially vulnerable than Clusters 1 and 4, and Cluster 3 places no emphasis other than the rebuilding of the relationships between local residents.

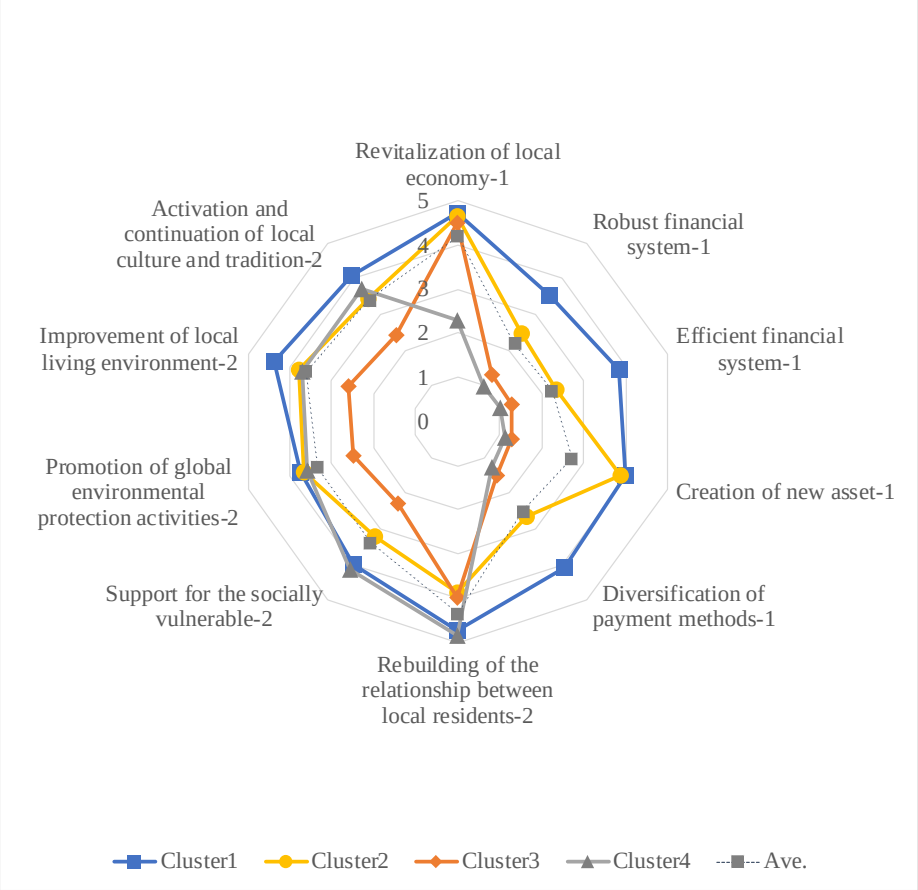


Figure 3. The subscale score of issuance philosophy for each item by cluster

3.3 The organizations' self-evaluation regarding their CCs: impacts on society

What impact do the four categories of CC issuance organizations based on their issuance philosophy think their CCs have on society? To determine this, next, we look at the results of the organizations' self-evaluation regarding the CCs. Factor analysis based on the main factor method was performed on 14 of the 15 questions about the impacts of the issued CCs on society by each organization[vii] (Table 8).

Table 8. Factor analysis of the impact of issued CC on society (n=38)

	□	□	□
F1: Formation of connections to accept various individuals α=.854			
Personal dignity	1.016	-0.107	-0.05
Social inclusion	0.813	-0.117	-0.041
Trust in others	0.726	0.162	0.04
Cultural enrichment	0.464	0.242	0.167
Social stability	0.439	0.109	0.407
F2: Realization of a free and diverse society α=.868			
Control how to use supplies and resources	-0.285	0.909	0.071
Transformation of norms	0.185	0.787	-0.197
Create new products and services	0.062	0.634	-0.056
Freedom of action and thought	0.394	0.602	-0.086
Personal success	0.089	0.599	0.057
Compliance with laws and regulations	0.048	0.521	0.188
Social diversity	0.344	0.396	0.012
F3: Realization of fair and efficient trade α=.804			
Fair trade	0.069	-0.138	1.071
Efficient trade	-0.286	0.475	0.491
Factor correlation matrix	□	□	□
□	1	0.494	0.184
□		1	0.567

We adopted three factors from the results of this analysis. We performed factor analysis with the unweighted least squares method and Promax rotation for these factors. We named the formation of connections to accept various individuals as the first factor (F1), the realization of a free and diverse society as the second factor (F2), and the realization of fair and efficient trade as the third factor (F3). The Cronbach's alpha coefficients are 0.854 for F1, 0.868 for F2, and 0.804 for F3.

F1 is composed of elements that enhance the social environment, such as personal dignity, social inclusion, trust in others, cultural enrichment, and social stability. F3 consists of elements that measure the enrichment of the economic environment, such as fair and efficient transactions. F2 consists of two factors: the economic environment such as control over how to use supplies and resources, the creation of new products and services, personal success, and the social environment such as the transformation of norms, freedom of thought of action, compliance with laws and regulations, and social diversity. Table 9 shows the correlation coefficient of the three factors. The table shows there is a positive correlation between F1 and F2, and F2 and F3. It means that CCs are evaluated as realizing a free and diverse society, as being able to form various individual connections, and realizing fair and efficient trade.

Table 9. The correlation coefficient of three factors of the self-evaluation of the issue CC

	F1: Formation of connections to accept various individuals	F2: Realization of a free and diverse society	F3: Realization of fair and efficient trade
F1	1	.634**	.287
F2		1	.536**

** p<.01

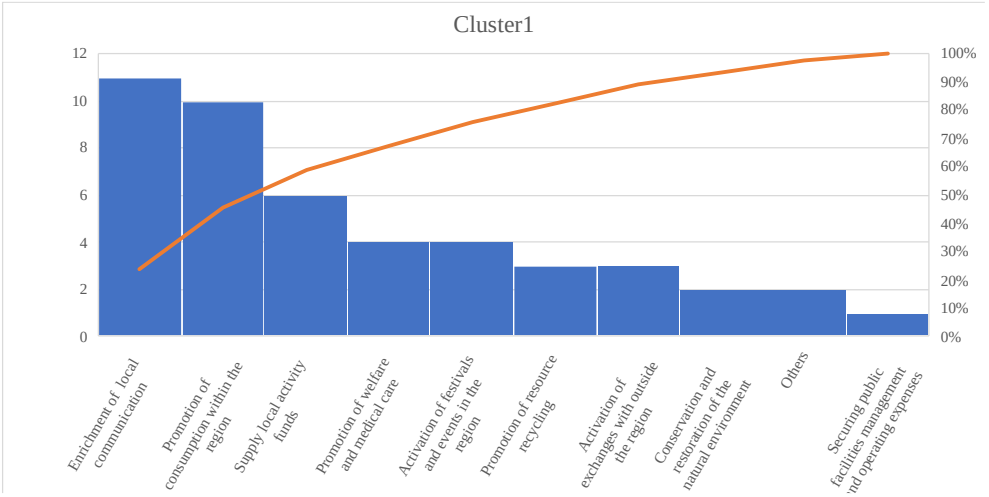
Table 10 compares the average of the subscale scores for the three adopted factors by cluster of the issuance philosophy. Cluster 1 is higher than the average for all three factors and it can be seen that the issuance organizations from this cluster give higher evaluations for their CCs. Although Cluster 2 is lower than Cluster 1, it can be seen that they give higher evaluations for their CCs, too. Conversely, it can be seen that the organizations belonging to Cluster 3 rate their own CCs lower than average across all three factors. Lastly, the organizations belonging to Cluster 4 evaluate F1 higher than the average only, and the other two factors are evaluated lower than the average. The evaluation of CCs in Cluster 3 for F1 and F2 is significantly lower than that in Cluster 1. For F3, the CC evaluation of Cluster 4 is significantly lower than that of Cluster 1. Cluster 3 does not emphasize social fulfillment on its issuance philosophy, and it assigned a low evaluation to the influence that the CC it issued has on society. However, the fact that Cluster 4 does not view its CC as bringing about fair and efficient trade is clearly influenced by an issuance philosophy that emphasizes social value over economic value.

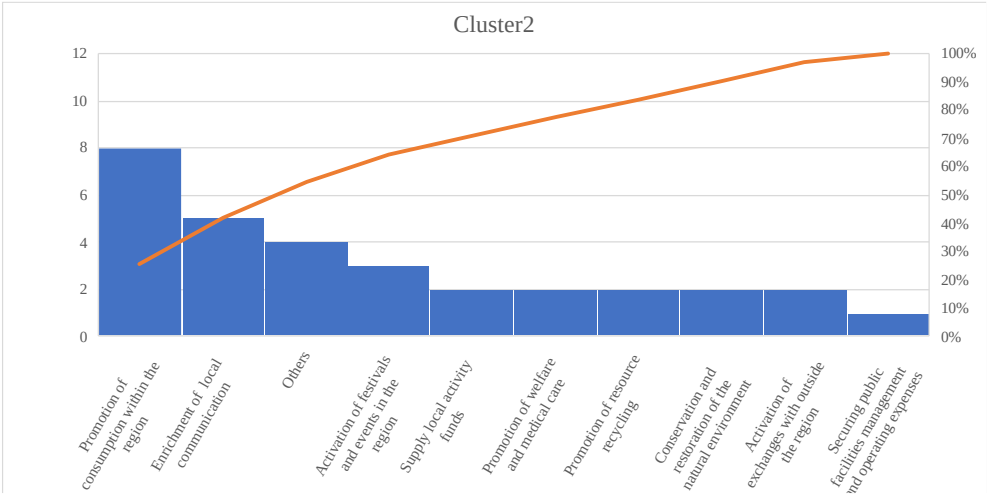
Table 10. Cluster comparison of subscale score on the evaluation of CC

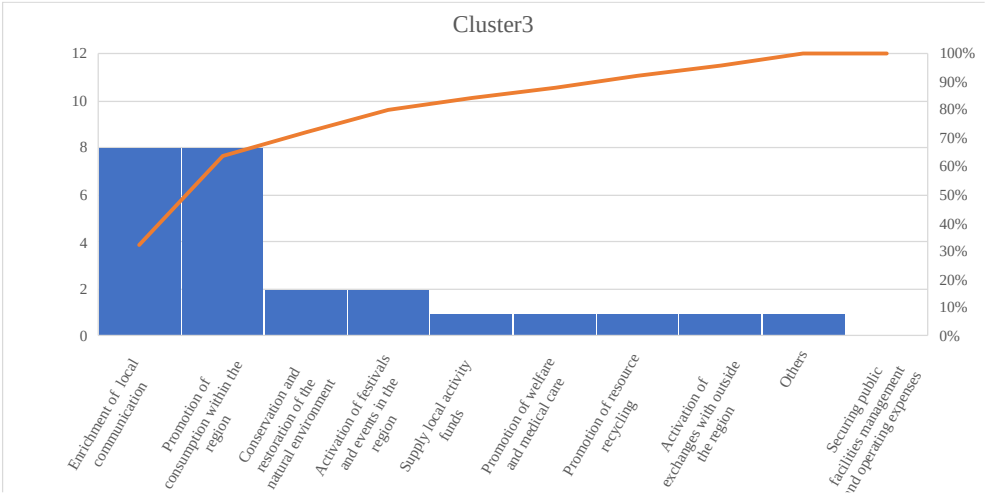
	Cluster	n	Ave.	SD		
Factor 1: Formation of connections to accept various individuals	1	11	3.76	0.56	F(3,33)=4.01	p=.015
	2	9	3.6	0.71		
	3	10	2.58	1.04		
	4	7	3.43	1.01		
	Total	37	3.34	0.94		
Factor 2: Realization of a free and diverse society	1	11	3.64	0.61	F(3,33)=5.68	p=.003
	2	9	3.22	0.44		
	3	10	2.4	0.85		
	4	7	2.76	0.94		
	Total	37	3.03	0.85		
Factor3: Realization of fair and efficient trade	1	11	4	0.84	F(3,32)=3.63	p=.023
	2	9	3.56	0.46		
	3	9	3.06	1.10		
	4	7	2.5	1.5		
	Total	36	3.36	1.11		

3.4 Issuance purposes

What are the issuance purposes of each of the four categories of CC issuance organizations based on their issuance philosophy? Figure 4 shows the purpose of issuance for each cluster based on their issuance philosophy. The histogram shows the frequency for each issuance purpose and the line graph shows the cumulative percentage.







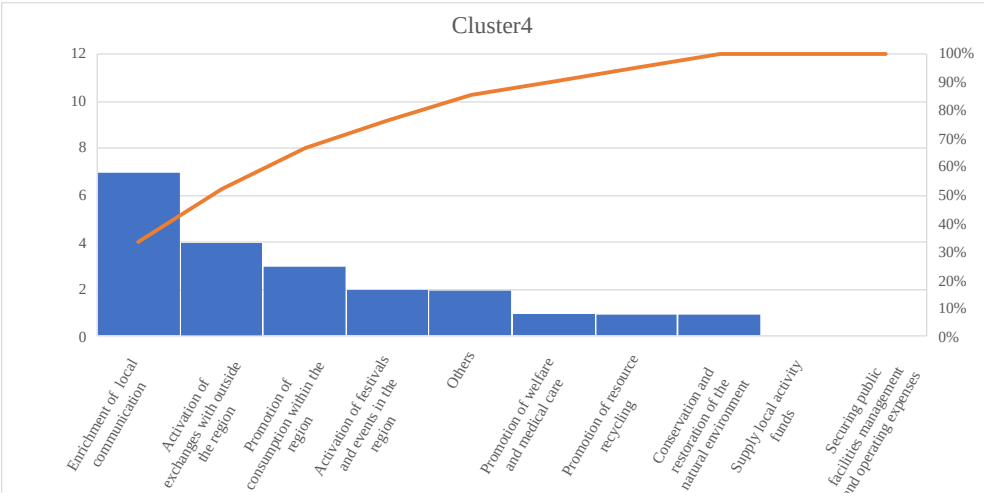


Figure 4. The issuance purposes by each cluster

The purpose of enriching local communication is within the top two for all clusters. In addition, the promotion of local consumption is among the top two purposes, except for Cluster 4. Clusters 1 and 2 are similar in terms of types of issuance purposes, but a feature of Cluster 1 is that funding for local activities is one of the top three purposes. Cluster 3 occupies about 64% of the whole for the purpose of enriching local communication and promoting consumption within the region, and there are few variations in issuance purposes compared with other clusters. Cluster 4 is characterized by the activation of exchanges outside the region at the top. When these results are combined with the issuance purpose of each cluster (Figure 3), it can be seen that the issuance purpose corresponds with the philosophy to be emphasized.

3.5 Issuance form

Table 11 compares the issuance forms for each cluster based on the issuance philosophy. There was no significant difference in the issuance form because of the difference in the issuance philosophy.

Table 11.7 Issuance form of each cluster

Cluster	AC	DC	AC/DC	Total
1	6	5	0	11
2	5	3	1	9
3	8	2	0	10
4	6	0	1	7
Total	25	10	2	37

However, there is room to consider the influence of the issuance form (such as analog and digital) on the issuance philosophy and the self-evaluation of the issued CC. We compare analog and digital currency types, except for the combination of analog and digital currency types, with a small number of samples among these three forms.

First, we compare the CC issuance philosophy (Table 12). The table shows that digital CCs emphasize F1 more than analog CCs. This reflects the fact that digital CCs involve the strengthening of the financial system and the diversification of the monetary system. Although the currency issuance philosophy does not uniquely determine the issuance form, digital CC issuance organizations emphasize economic value more than analog CC issuance organizations.

Table 12. Comparison of issuance form of subscale score on the currency issuance philosophy

	Cluster	n	Ave.	SD	t	DF	p
Factor1: Enrichment of the economic environment	Analog	25	2.47	1.07	-2.997	33	.005
	Digital	10	3.62	0.90			
Factor2: Fulfillment of the social environment	Analog	25	3.6	0.77	0.36	33	.719
	Digital	10	3.5	0.65			

Next, we compare the self-evaluation of CCs. Table 13 compares the average of the subscale scores by issuance form. This table shows that the self-evaluation of digital CCs is more about fair and efficient trade in society than the self-evaluation of analog CCs.

Table 13. Comparison of the subscale score on the evaluation of CC

	Cluster	n	Ave.	SD	t	DF	p
Factor 1: Formation of connections to accept various individuals	Analog	26	3.28	0.99	-0.36	34	.725
	Digital	10	3.4	0.73			
Factor 2: Realization of a free and diverse society	Analog	26	2.90	0.99	-1.01	34	.32
	Digital	10	3.24	0.69			
Factor3: Realization of fair and efficient trade	Analog	25	3.16	1.22	-2.44	32.03	.02
	Digital	10	3.9	0.57			

From these results, it can be seen that the value of digital CCs is more important than that of analog CCs and that the economic function is more important for the CC's social impact. This means that, even though the philosophy that is emphasized does not determine the issuance form, differences in important aspects are related to the issuance form selected.

4. DISCUSSION

In this study, we set forth three research questions.

RQ1 What kind of philosophies do CC issuance organizations emphasize?

RQ2 How do the philosophies affect the CC being issued?

RQ3 What is the relationship between issuing philosophies and issuing forms?

The findings of this analysis are as follows: First, regarding the issuance philosophy (RQ1), we categorized the target organizations into four groups based on the evaluation axes of the enrichment of the economic environment and the fulfillment of the social environment. Regarding the enrichment of the economic environment, there is a tendency for the philosophy to cease to be emphasized from Clusters 1 to 4. Comparing these four clusters, the other three clusters, excluding Cluster 4, place importance on the revitalization of the local economy. In addition, we found that only Cluster 1 places importance on strengthening the financial system and diversifying the money system. Regarding the enhancement of the social environment, we found that Clusters 1 and 4 have similar principles. We also found that Cluster 3 did not focus on this other than the rebuilding of relationships between local residents.

Second, three major factors related to the self-evaluation regarding the impact of the CC issued on society were found (RQ2): the formation of connections to accept various individuals, the realization of a free and diverse society, and the realization of fair and efficient trade. When comparing the subscale scores of these three elements in four clusters classified by issuance philosophy, Cluster 3 is significantly lower than Cluster 1 for formation of connections to accept various individuals and the realization of a free and diverse society, and Cluster 4 is significantly lower than Cluster 1 for the realization of fair and efficient trade. These results point out that the issuance organization's philosophy reflected in the self-evaluation and issuance purposes.

Third, when focusing on the relationship between issuance philosophy and issuance form, no difference in the issuance form was observed among the four clusters. However, digital CCs emphasize the enrichment of the economic environment as an issuance philosophy more than analog CCs and are viewed more as bringing about fair and efficient trade (RQ3).

In this study, we investigate the issuance philosophy of Japanese CC issuance organizations and point out that there is a definite relationship between the purpose of issuance and the self-evaluation of issued CCs, and that there are differences in which philosophies are emphasized, depending on the issuance forms. The results of this survey have a limitation in the number of samples, and although it cannot necessarily be said that they represent the characteristics of all the CCs in Japan, we will refer to these results for further research on this subject.

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Endnotes

[i] Kobayashi, Miyazaki and Yoshida (2020) classify CCs in Japan into five clusters in terms of environment and regional activities: revitalization of regional economies based on environmental protection and resource circulation; multipurpose CCs; revitalization of forestry and regional economies; formation of people's connections and regional economic revitalization; and promotion of regional activities and community welfare based on people's connections.

[ii] The Bank for International Settlements (2015) points out that digital currency has three aspects. The first aspect is the assets featured in many digital currency schemes. The second aspect is the way in which digital currencies are transferred, typically via a built-in distributed ledger. The third aspect is the variety of third-party institutions, almost exclusively non-banks. Digital CCs, which are the subject of this study, are a kind of digital currency with these three features.

[iii] Nishibe (2012, 2018) points to the feature of CCs as integrative communication media. According to this, people use multiple currencies to maintain the interest, values and ethics, and uniqueness of the region, organization, and group.

[iv] Digital CCs issued before 2016 are included in the list of Kobayashi, Miyazaki, and Yoshida (2020).

[v] We referred to Corrons (2017) to develop these questions.

[vi] The case 6-D is an electronic version of a gift certificate used by tourists to purchase accommodation, meals, and souvenirs, and is not designed for use by local residents. See Shimatoku Tuka (2019).

[vii] The question "It is desirable to use the currency issued by your organization as a reward if you want others to do something," was excluded from the analysis as the score for commonality was low.

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CRYPTOCURRENCIES FOR SOCIAL CHANGE. THE EXPERIENCE OF MONEDAPAR IN ARGENTINA

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ABSTRACT

Recent technological progresses made it possible for complementary and community currencies to be increasingly transformed into digital currencies. An increasing number of them run on blockchain, a technology that allows for greater decentralization and trust-less systems. This fusion between social and cryptocurrencies opens a series of questionings: can social currencies maintain their values regarding the creation of community and a fuller citizenship? Is the total decentralization an important value for the communities that use social currencies? Can "trust", as defined for these monetary systems be replaced by a system that presupposes it? These comprehensive questions conform our current research project. With an inductive and multidisciplinary plan of demonstration in mind, this particular document tries to put in discussion the characteristics and potentialities, as well as the problems, limits and tensions generated by the circulation of digital currencies that run on Blockchain (cryptocurrencies), leaving for future research the in-depth discussion that this new mixture of technologies brings up. These issues will be addressed by studying the case of a digital social currency system running on blockchain, based on mutual credit, implemented in Argentina today: MonedaPAR, which was conceived as a defense mechanism against the economic crisis that plagues Argentina since 2016.

KEYWORDS

Social currencies, blockchain, local development, decentralization, trust

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1. INTRODUCTION

The growing trend of recent decades - especially since the 1980s - towards monetary plurality at the local and regional levels is challenging the bank's monopoly over the official currencies. Since then, more than 5,000 experiences of complementary / alternative, local, community and social currencies have been developed, as estimated by Blanc (2018).

In the last ten years a new technology, Blockchain, has arisen and opened up a new range of possibilities for alternative currencies. Blockchain offers greater decentralization and trust-less systems, which begs the question of whether and to what extent this constitutes new paradigm in the construction of complementary and social currencies. In this respect, it becomes important to reflect on the limits that alternative currencies have historically faced and whether Blockchain provides the tools to overcome them.

This article's purpose is to study the characteristics and potentialities, as well as the problems, limits and tensions generated by the circulation of digital currencies that run on Blockchain (from now cryptocurrencies). The focus will be on alternative currencies with social purpose and operating in solidarity markets[i], in order to promote the restoration of social bonds that allow for an improvement in the quality of life of the "popular sectors[ii]" (Orzi, 2011, 2015, 2017). In order to illustrate these issues, we analyse the case of MonedaPAR, an experience developing in Argentina since 2017. This medium of exchange is based on the idea of mutual credit and promotes monetary circulation over hoarding and speculation. For more than a year, it has been adopted by a large number of communities grouped into nodes, which operate with it as a social currency, in general agreeing with the values of the Social and Solidarity Economy (SSE), in search of mitigating the crisis that the country has been suffering since 2016[iii].

The advantage allegedly inherent to cryptocurrencies is that they allow to organize a network of decentralized exchanges that does not require intermediaries in the payment system and whose governance is horizontal and equal. Transaction verification is carried out by the members themselves, based on cryptography, and all the exchanges made are recorded in a ledger that is public and that is stored by the computers of the network. This is what according to Desmedt (2016) and Lakomski-Daguerre (2015) makes the record unforgeable, "since any attempt to manipulate transactions results in a computer block incompatible with the previous one and the next one". That is why researchers from the field of IT (Information Technology Systems) and Blockchain advocates call these systems trust-less, because they replace the trust in the currency by a computer code with identical replications spread across the nodes of the network, thereby doing away with a centralized third party that validates the transactions.

The fact that a system is trust-less in its technological dimension does not imply, however, that its underlying currency becomes easily adopted by the members of a given community. As Hawlitschek et al. (2016) have pointed out, there is a tension between the notion of trust used by the researchers of the IT and that of the researchers working in the field of alternative economics. The different ways of understanding trust when analysing social digital currencies and their implications for the construction of community currencies is one of the focal points of this paper. The issue of decentralization exhibits a similar tension across the two research fields: while cryptocurrencies, are seen by researchers in the IT field as fully decentralized technologies, in the case of social currencies that operate in solidarity markets, a complete decentralization is not possible (regardless of the technology upon which the currency is built). Finally, completely horizontal governance by the peers of the network also raises difficulties when creating a community that works under the principles of a solidary market, experience shows that some degree of hierarchy is required to attain an efficient control of the currency.

In sum, the recent development of cryptocurrencies raises a number of questions regarding the issues of trust, governance and decentralization when dealing with social currencies. Can social currencies maintain their principles and values when they use a technology that advocates for complete decentralization? Can trust as defined for the sustainability of these alternative monetary systems (Orzi, 2017) be replaced by a technological system that presupposes it? Will Blockchain, with its advantages (lower costs, higher security and transparency), lead to a turning point in the construction of monetary plurality? Or does the emergence of Blockchain imply new, different challenges for social currencies? This paper provides some reflections on these issues, based on the experience of MonedaPAR.

The methodology applied in this document is sustained on an inductive and multidisciplinary[iv] approach. The theorization effort starts from experiences that can teach us new ways of reconceptualizing currency and also economy itself, as proposed by Aglietta and Orléan (1982, 1998, 2002), Théret (2008, 2014), Coraggio (1998), Godelier (1974), among others. This paper thus features a predominantly qualitative approach, although we used transaction data available on the Bitshare's blockchain to contextualize MonedaPAR.

Because of that, the paper was structured on three simultaneous analysis instances:

1. The structural dimension, which refers to the economic, socio-political and institutional conditions in which these experiences are generated.
2. The procedural dimension, which points to the historical-social constructions in which the socioeconomic effects that occur and are generated by these experiences are produced.
3. The microanalytical dimension, that is the discourses and practices supported by the various social agents involved in them.

The investigative tools used in our field work includes over 20 interviews, open and semi-structured, that were carried out in different nodes of MonedaPAR such as the monetary communities (hereafter "nodo" or "nodes") located in two Buenos Aires' neighborhoods, Boedo, Chacarita, in the cities of Buenos Aires Province: Moreno, Escobar, La Plata, as well as in the cities of Mar del Plata and Gualeguaychú. Participant and non-participant observations were also made, along with a review of the constitutive documents of the different nodes, the mutual that legally supports the experience, and the federation of nodes that compose the current structure of MonedaPAR.

Field work constitutes for our research a nodal instance for the production of knowledge. It included alternative stages of permanence in the field and analysis of the data, for the purposes of control and adjustment to the knowledge of the phenomena investigated.

In the following section we provide a brief description of the MonedaPAR. Then we discuss the implications that Blockchain seems to entail for social currencies in the domains of trust, governance, and decentralization. Finally, some conclusions are drawn.

MONEDAPAR: ITS ORIGINS AND PLACE IN THE WORLD OF ALTERNATIVE CURRENCIES

First a brief description of the history of MonedaPAR is provided. Then we introduce a typology of alternative currencies to get some insights on the main features of MonedaPAR. This analysis lays the foundations for the reflections provided in the third section.

The origins and evolution of MonedaPAR

In December 2015 a democratically elected neoliberal government took office in Argentina. For the previous four years the economy had been stuck in a stagflation process. Even though inflation - which was around a 25% annual rate -was a problem, the stagnation found the country at record levels of economic activity, consumption and employment[v]. In order to solve the macroeconomic disequilibria and switch the growth pattern from a consumption-driven to an investment-driven model the new government led by the "Cambiemos" coalition (whose main political leader was Mauricio Macri) launched a fully-fledged neoliberal package.

As always that those packages were applied, the situation turned worse, and in the first months of 2016 it was clear that the economy was heading towards a deep recession. A group of intellectuals, opposition politicians, unionists and independent people worried by the political and economic situation gathered to work out a solution to the adverse scenario that MSMEs, cooperatives and workers were facing. The solution would be oriented to productive sphere of the economy. A quick, practical and powerful tool was needed. After a couple of meetings in the second half of 2016 the groups gathered in this working alliance called themselves the "Observatorio de la Riqueza Padre Arrupe" (Father Arrupe Wealth Observatory)[vi].

Before long, the issue of money was on the central stage. The successful experience of the Swiss WIR Bank and, more recently, Sardex in Sardinia, proved that Gesellian and Keynesian theories could be put into practice to create a social currency. Once that it was agreed that a Local Exchange Trading System (LETS) organized nationwide could provide the agents of the productive sphere with a tool to keep economic activity going on, not so heavily exposed

to the liquidity conditions of the financial system, a new issue arose: how could a nationwide LETS could be developed? Several problems had to be tackled: First, the immediate precedent of a massively adopted complementary currency in Argentina, the Trueque Argentino (Argentinian Barter) of the late 1990s and early 2000s taught the lesson that paper-based currencies are highly susceptible to counterfeiting. Thus, a more secure and scalable technology was required. Second, the multiplicity of barter networks, each of them with their own currency, gave rise to coordination problems which could be easily spread to other nodes. Hence, some sort of global and solid coordination was needed. Third, there should be no room for discretionary decisions at the level of the governance. A transparent and auditable governing structure was highly desirable.

Among the participants of the weekly meetings of the Observatorio were some members of the Espacio Bitcoin (Bitcoin Space), an NGO that gathered different people who were somehow involved in the Blockchain ecosystem. In these meetings, when the members of the Observatorio understood the advantages of Blockchain they decided to join efforts with some of the members of the Espacio Bitcoin to develop the software where the complementary currency would run.

Then, the beginning of a solution, the eagerness, the inspiring cases and the technology were all exposed. The only thing missing was where to validate the idea. It was the "Movimiento Nacional de Empresas Recuperadas" (MNER, National Movement of Recovered Enterprises) which offered its network of cooperatives for the first implementation[vii].

The proposal was given the name PAR (the Spanish word for "peer"), in line with the Blockchain proclamation of decentralization. The goal was to free the productive power of the different agents that comprise the economy from the yoke of the traditional financial system. The value of the complementary currency created was to be derived from the cooperation of the different peers that were part of the network and their ability to produce value. All these features made PAR a reasonable name for the system (the word moneda translates to "currency" or "coin"). The only issue that had to be decided upon were the criteria by which participants would be allowed to join and use the system. An endorsement mechanism whereby trusted participants could be granted an overdraft facility was designed to address the money creation issue in a secure manner. The founding members could delegate the money creation function on specific participants who, in turn, could endorse new members[viii]. The unit of account of PAR would be the Argentinian peso and a non-convertible parity of one-to- one was agreed. The fact that the issuances of endorsements was traceable thanks to the Blockchain reduced moral hazard, but as it will be shown, was not enough to create a trust-less structure.

In May 2017, the system of endorsements was incorporated into the software upon which MonedaPAR LETS was working. In the second half of 2017 the founders carried out different activities to foster the adoption of MonedaPAR within the MNER, but none of them was successful[ix]. The year 2017 ended with very few, isolated, transactions. Tackling the supply chain problem seemed almost impossible given the lack of resources. A new strategy was needed.

By the beginning of 2018 MonedaPAR did not have a real use case. Nevertheless, there had been some promotion in the media[x]. As a result, some people that were working along similar lines became aware of the initiative. One of those cases was the organization Proyecto Sierra, from the city of Sierra de los Padres. After a meeting with one of the founders of MonedaPAR in Sierra de los Padres in January 2018 it was decided to open a node in Mar del Plata (a big city 20 kilometers away from Sierra de los Padres). The idea of a node implied that, once the founders of MonedaPAR consented to its creation, those who constitute the node would have the autonomy to give themselves a regulation and define an action plan.

As of October 2019, MonedaPAR has five nodes running and regularly using the system. More than 2 100 000 PAR-worth goods and services had been realized through about 9000 transactions[xi] . Accounting for inflation using the CPI of the Great Buenos Aires[xii]. These nodes are spread across the center-east wing of Argentina comprising the cities of Gualeguaychú, Escobar, Moreno and Buenos Aires (where there are two nodes, one in the district of Boedo and another one in Chacarita). Except for the Boedo node in Buenos Aires, MonedaPAR is being used in fairs of the so-called "popular economy[xiii]". These places appear to have been quite receptive to the project because illiquidity is perceived as one of the main obstacles for the satisfaction of their needs. Most of the transactions take place at the fairs that are weekly organized by the nodes. Both the fairs and the meetings are important spaces because as

people meet one another trust starts to be built. Social ties are consolidated upon this trust, which lays the foundations for the building of a team that designs and executes the action plan in the field.

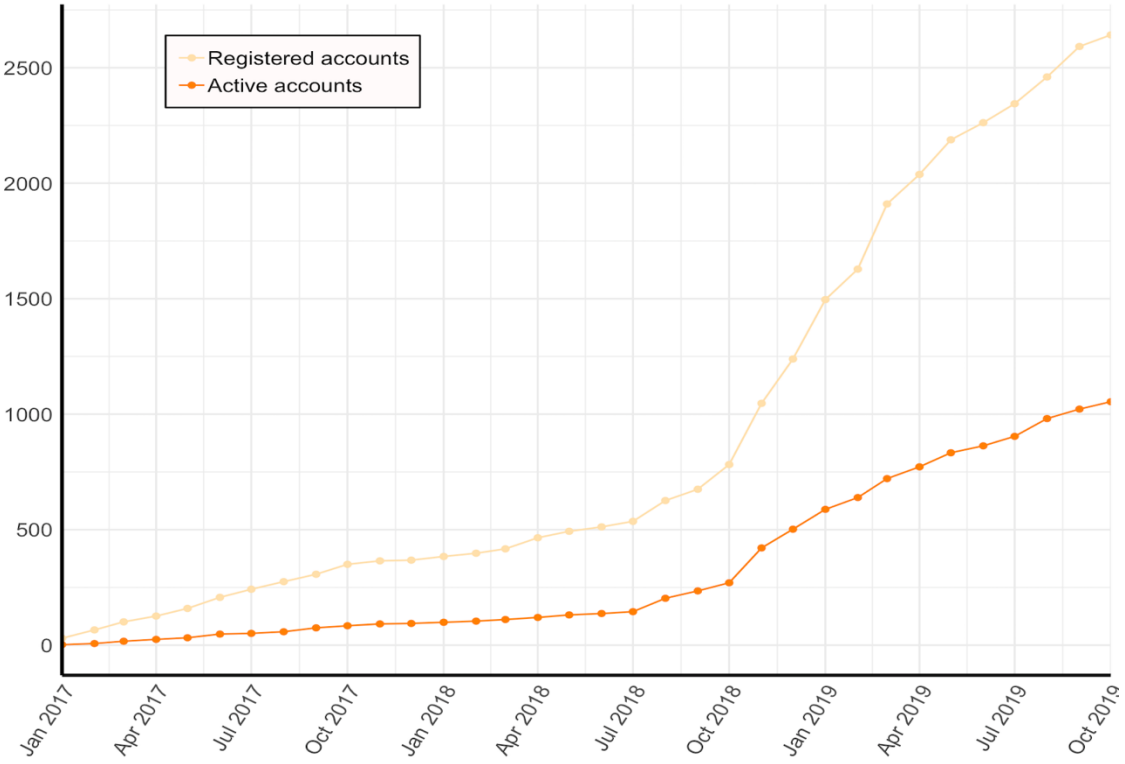

Figure 1. Evolution of registered and active accounts over time (Note: An active account is defined here as an account which has done at least one transaction since its creation) Source: Bitshare's blockchain, accessed through the block explorer http://bts.ai, authors' elaboration.

The process of founding these nodes has been case-specific because different alliances have been built in each of these cities. In the case of Moreno, the node was the outcome of a presentation that the founders of PAR gave at the local university. After the presentation some of the attendees were so enthusiastic about the project that they decided to contact different social organizations of the town. After a couple of meetings, they decided to join the project and start using the system.

The case of Gualeguaychú is quite different because, unlike the others which were built bottom-up, MonedaPAR has been there boosted by the local government. Convinced that new technologies have a lot to offer to the problems of contemporary societies, the local authorities helped the organization in the establishment of the node. The local government actively participates in the fairs having its own stand, where fruits and vegetables can be bought in exchange of PAR.

In the case of Boedo (Buenos Aires) the node comprised of middle-class people who adhere to the social and sharing economy movements. The dynamics of the fairs of this node is very similar to the others with the exception that in this case most of the participants are independent persons, not affiliated to a certain social organization or group of organized producers.

In Chacarita, on the other hand, the project was built among the same lines than in Moreno, i.e., by establishing a direct relationship with a social organization (the Mutual Sentimiento) with a very important track record on the social economy.

Finally, in Escobar the system has been adopted by a mutuality of bus drivers that wanted to replace an old-fashioned purchasing order system with MonedaPAR. By means of PAR, the mutuality provides credit to the workers who, in turn, use it at many shops of the town. It is worth mentioning that in this case the system is not

being used under the form of a LETS but as a credit card with zero interest rate. Money is not created out of thin air but as a result of the wages that the bus drivers earn every month.

In MonedaPAR thus coexist two distinct systems: in Escobar, a purchasing order system and in the rest of the nodes, a "pure" mutual credit system. While the latter exhibits the largest number of active accounts, both monthly and since the inception of the whole PAR system, the monthly mean of transaction values in the former is far greater. This reflects the differing necessities and thus ways to construct trust in the alternative currency.

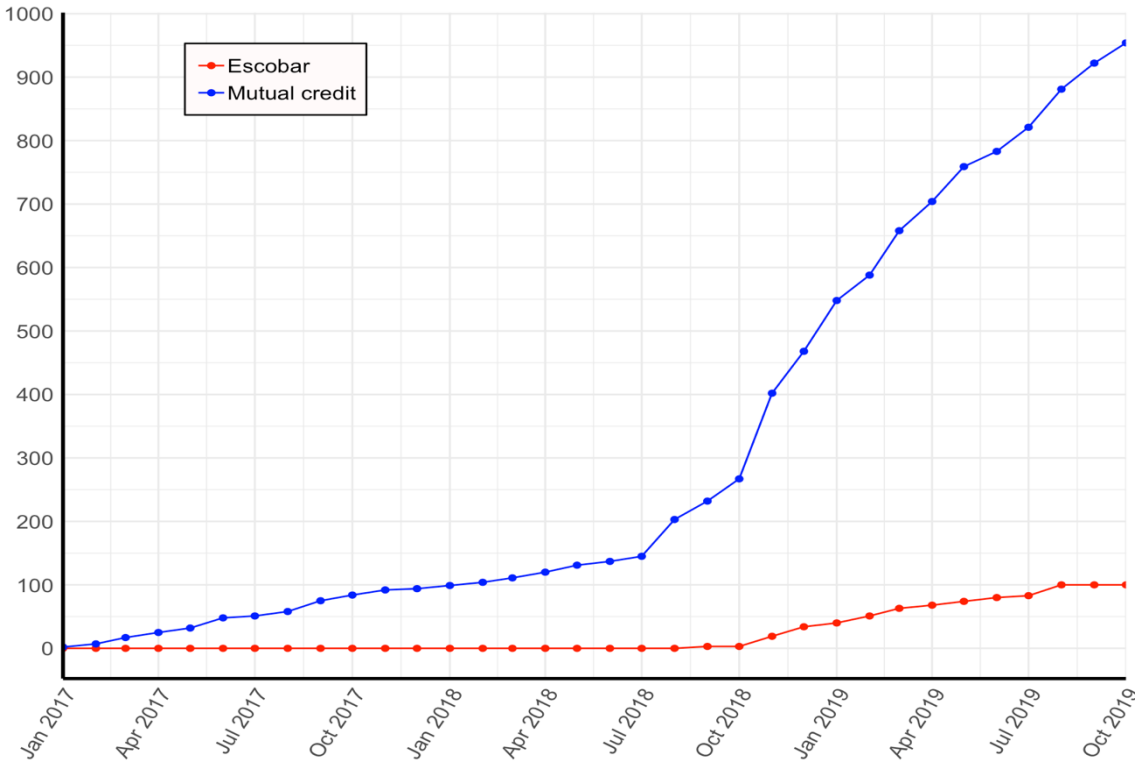

Figure 2. Evolution of active accounts in Escobar and in the "pure" mutual credit system (Note: An active account is defined here as an account which has done at least one transaction since its creation) Source: Bitshare's blockchain, accessed through the block explorer http://bts.ai, authors' elaboration.

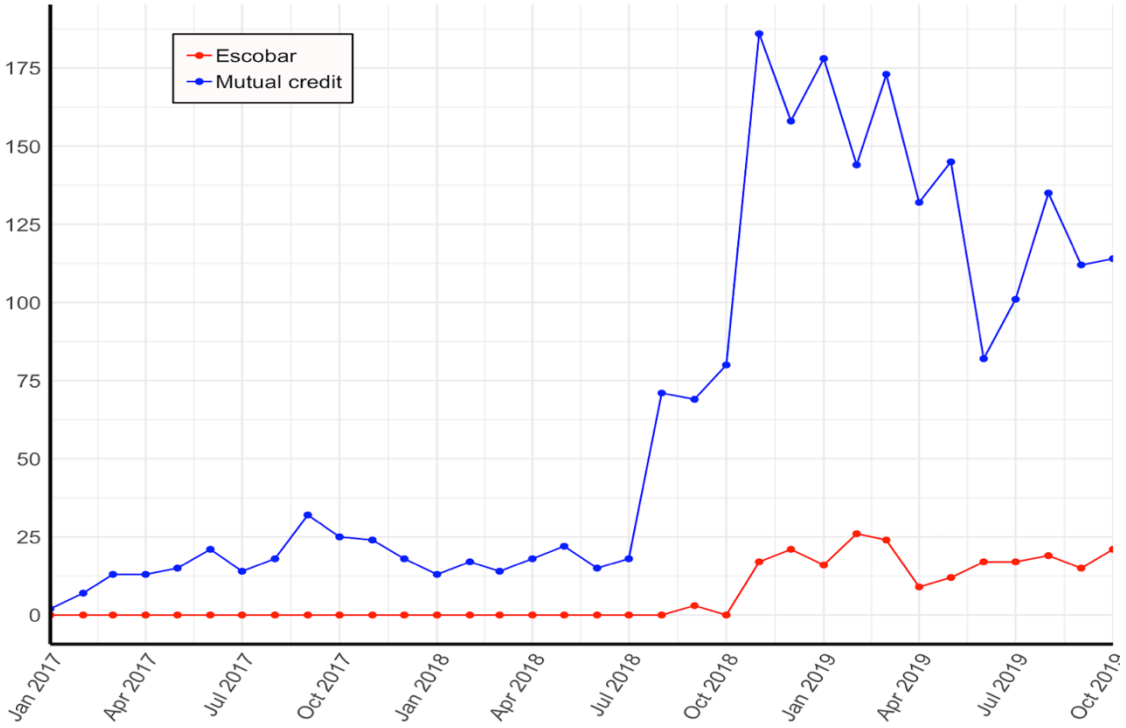

Figure 3. Monthly active accounts in the two monetary sub-systems (Note: An active account is here defined as an account that has done at least one transaction in the month) Source: Bitshare's blockchain, accessed through the block explorer http://bts.ai, authors' elaboration.

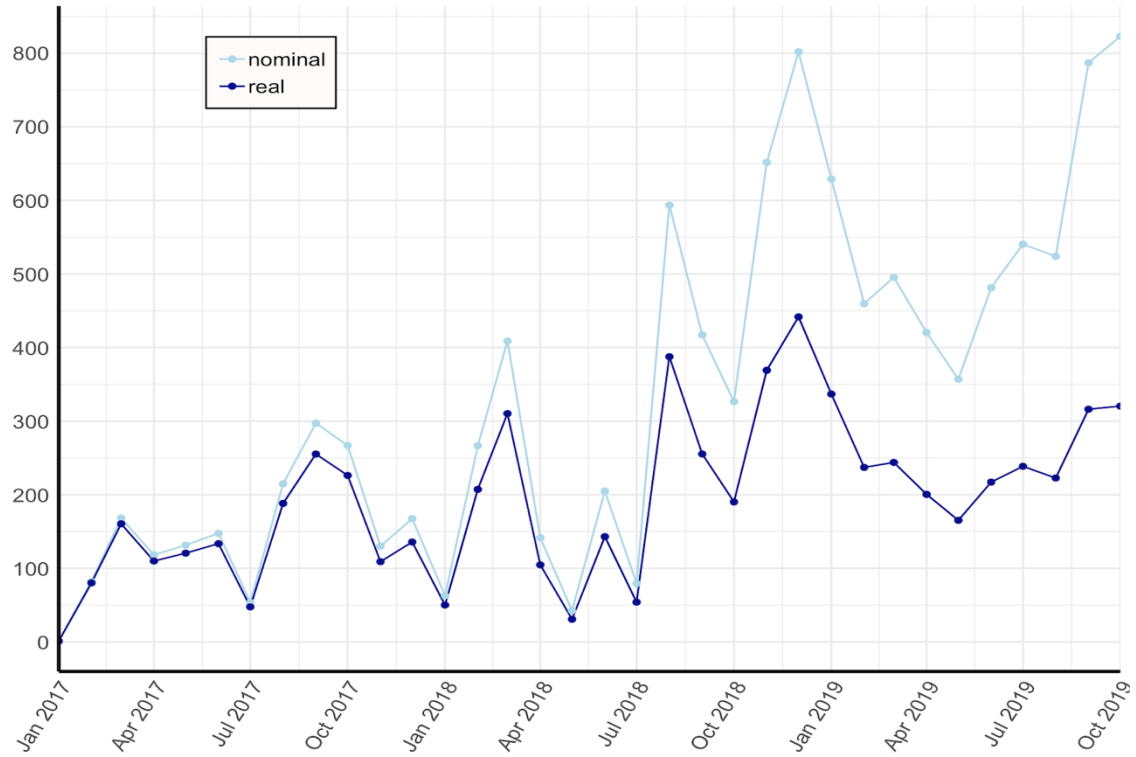

Figure 4. Monthly mean transaction value per active account in the "pure" mutual credit system (Note: inflation has been proxied using the CPI of the Great Buenos Aires computed by INDEC. An active account is one which has realized at least one transaction during the month) Source: Bitshare's blockchain, accessed through the block explorer http://bts.ai, authors' elaboration.

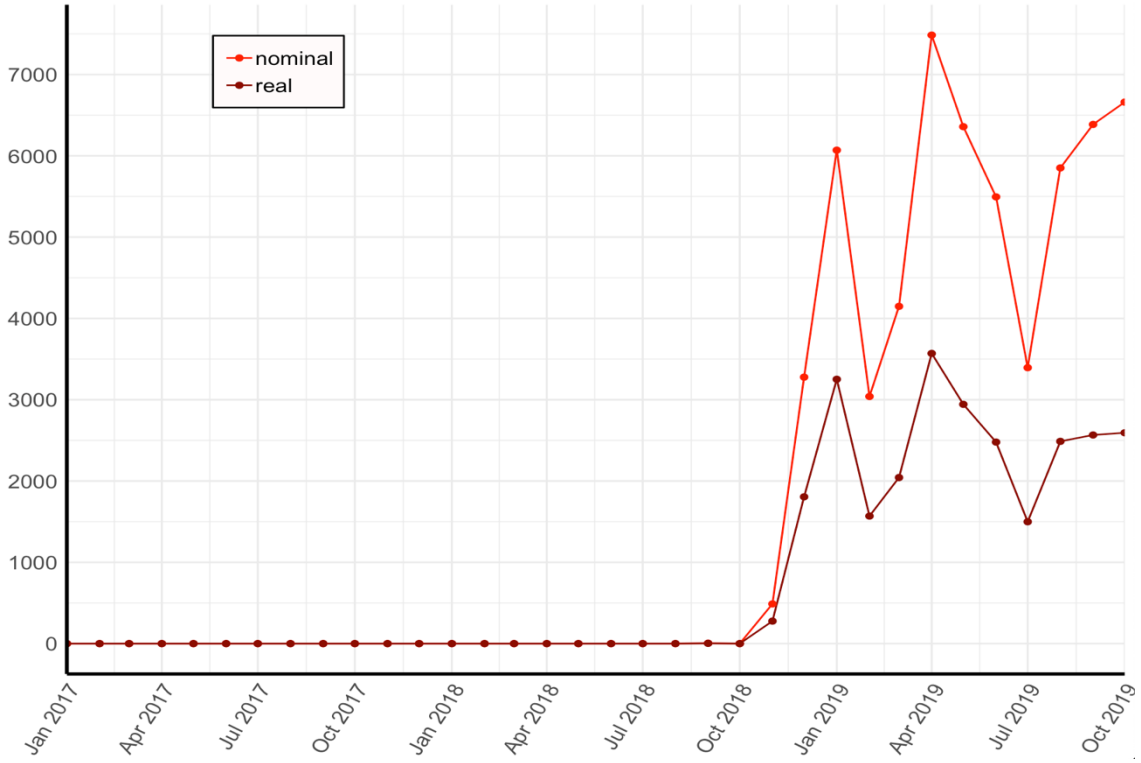

Figure 5. Monthly mean transaction value per active account in Escobar purchasing order system (Note: inflation has been proxied using the CPI of the Great Buenos Aires, computed by INDEC. An active account is one which has realized at least one transaction during the month)
Source: Bitshare's blockchain, accessed through the block explorer http://bts.ai, authors' elaboration.

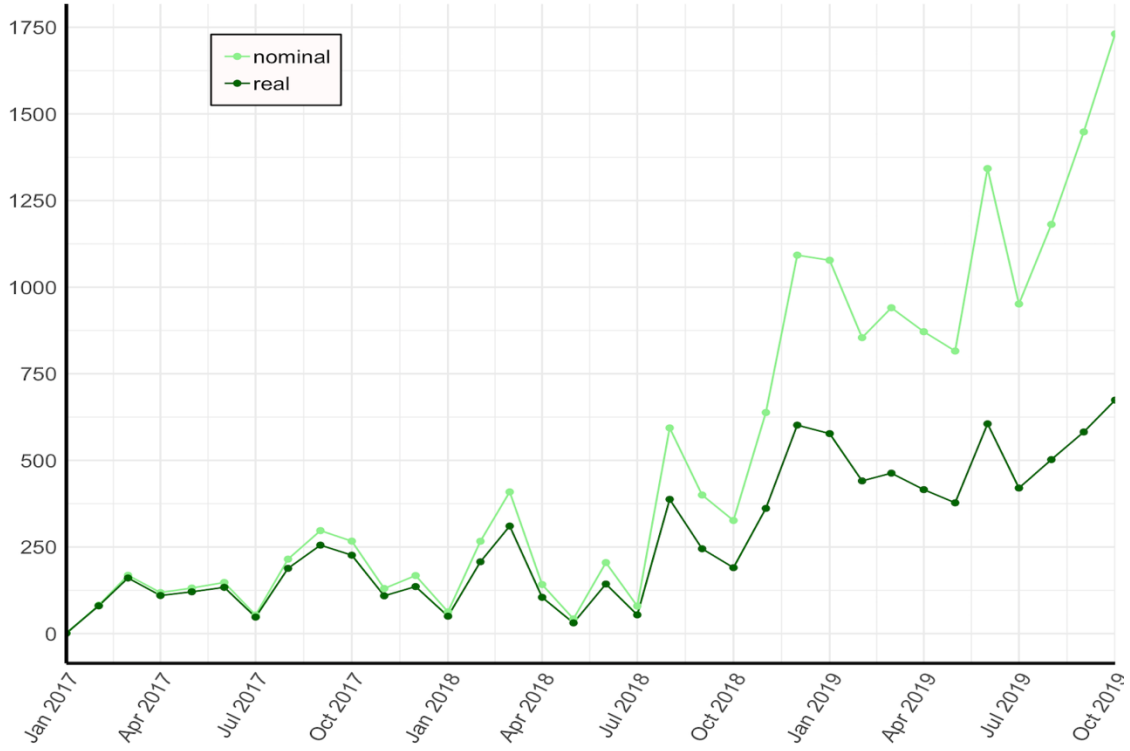

Figure 6. Monthly mean transaction value per active account in the whole PAR monetary system (Note: inflation has been proxied using the CPI of the Great Buenos Aires, computed by INDEC. An active account is one which has realized at least one transaction during the month)
Source: Bitshare's blockchain, accessed through the block explorer http://bts.ai, authors' elaboration.

Nodes have full autonomy to define their regulation, strategy, and decision-making procedure. This implies that the criteria for granting credits can vary across nodes. This is reasonable considering the heterogeneity of communities

that can be found across our wide territory. The only aspect where nodes do not have full control is in money creation. This obeys to the lessons learnt from previous experiences like the Trueque Argentino[xiv]. However, this does not imply that nodes have no control of money supply. The monetary policy of MonedaPAR is conducted by mutual agreement with the Federation of Nodes.

The Federation of Nodes is the governing body of MonedaPAR at the nation level. Its mission is to define the goals of the project and to design the strategies to achieve them. One of the main duties of the Federation of Nodes is the execution of the monetary policy. Another important task is to help new nodes in the process of implementation of the system. It is comprised of one representative of each of the nodes of the network. Each node chooses its own representative, which can be changed at any time. This implies that the power within MonedaPAR is built bottom-up.

With regard to the relationship with state regulatory bodies, there have been no relevant interactions to date (possibly due to the fact that MonedaPAR's experience is still very small). Given that the monetary issuance of MonedaPAR is not carried out by a government but by the associative private sector (that is, people or productive units framed in the logic of reciprocity), no Central Bank regulations are being violated. In order for exchanges in PAR currency to be formalized (including the possibility of issuing invoices), a payment order service was created within the framework of a mutual, appealing to a common and historical practice in the solidarity economy ecosystem. This service was presented to the competent authority (the INAES, National Institute of Associativism and Social Economy) enabling the possibility that payment orders, the technical name of each unit of PAR, could operate with any digital technology, including Blockchain. The approval of the payment order service by the INAES in December 2017 implied that, as long as MonedaPAR transactions are carried out by people registered in a mutual adhered to the service, they will be totally formal and legal.

MonedaPAR in the ecosystem of "alternative cryptocurrencies"

Many typologies of alternative currencies have been proposed in the literature[xv]. However, Jerome Blanc's Polanyian typology of systems (2018a) seem to be the most useful one for the purpose of this paper, not least because it aims at more systematicity in the theoretical construction. Indeed, instead of classifying "objects", that is, specific alternative monetary system, it distinguishes three ideal-types of monetary systems, may they be alternative or not : public money, which "relates to logic of authority and sovereignty via a fiscal circuit in which the treasury historically has pride of place. [They] comes from political entities with rationales of political control"; Business money, which "relates to logic of resource seeking by business organizations. Currency issuance and management are the ways they capture resources", and associative money "relates to the construction of schemes by groups of people who voluntarily associate for the purpose of collective utility".

Ideal-types	Subtypes	Cases
Public money	Sub-State public money	Argentinian provincial currencies (1984-2003)
	State public money	National *fiat* currencies
Business money	Convertible business money	Bank money
	Inconvertible business money	WIR, Sardex ; tokens of colonial landowners ; purchase of loyalty schemes
Associative money	Market-value associative moneys	Bitcoin
	Fixed-value associative moneys	Local currencies (e.g. Chiemgauer), Anglo-Saxon LETS
	Non commensurable associative money	Time banks, and some LETS-type systems

Table 1. A systematic typology of currency schemes
Source: Blanc, 2018a, p.13, authors' own translation.

Each type in turn is subdivided in several subtypes. As MonedaPAR would best fit within the associative category, only the latter's subtypes will be briefly explained. The main criteria to differentiate sub-types is the way their value is defined rather than their convertibility into ordinary money. Blanc distinguishes three cases : "when the value of

the associative money is defined by market exchanges; when it is fixed to the public money; and when it is defined independently" (*ibid.*) corresponding respectively to the three emblematic cases of the cryptocurrencies of the Bitcoin type, the French "*monnaies locales complémentaires*" fixed at par with public money and based on previous monetary issuance (through the conversion of ordinary money inflows) and time banks and other LETS-type experiences generally based on mutual credit in which the definition of value is inward-oriented.

In that perspective, MonedaPAR would be a peculiar case of fixed-value (i.e. commensurable) unconvertible associative money. Indeed, its value is fixed at par with the Argentinian pesos (1$ equal to 1 PAR). However, no effective convertibility mechanism is contemplated. At its current development stage, it therefore stands at the intersection of two sub-types of the associative monies.

Accordingly, it exhibits both mutual credit (*clearing* principle) and monetary emission (*liquidity* principle) technical features. The *nodos* can be seen as higher-order individuals allowing the lesser-order individuals to enter into mutual credit relations with one another within the limits set by the *Federación de Nodos.* The latter are fixed essentially through two channels. One parameter is the number and type of network members, as each one receives a maximum level of indebtedness (*descubierto*) he can go into with respect to the entire network. Another one, is the specific rules to each node, whose members decide if (and when applicable, how much) each new candidate should receive a certain amount of credit from the node in order to start with a negative balance. The amount of credit each node can distribute to its members in turn depends on the overdraft limit set by the Federation of nodes.

In that sense, MonedaPAR could be seen as a network of mutual credit systems unified through the implementation of the Blockchain. The last is indeed the tool allowing the synthesis of the fixed-value/non-commensurable associative subtypes, as it lifts the drawbacks respectively affecting mutual credits schemes, and schemes based on monetary emissions: on the one hand, the transactions are automatically recorded into the Blockchain, thus there is no need to tediously centralize all the information ; on the other, as all transactions are recorded into a decentralized public unforgeable ledger, no falsification is possible, and the monopolization of the monetary creation power is more difficult.

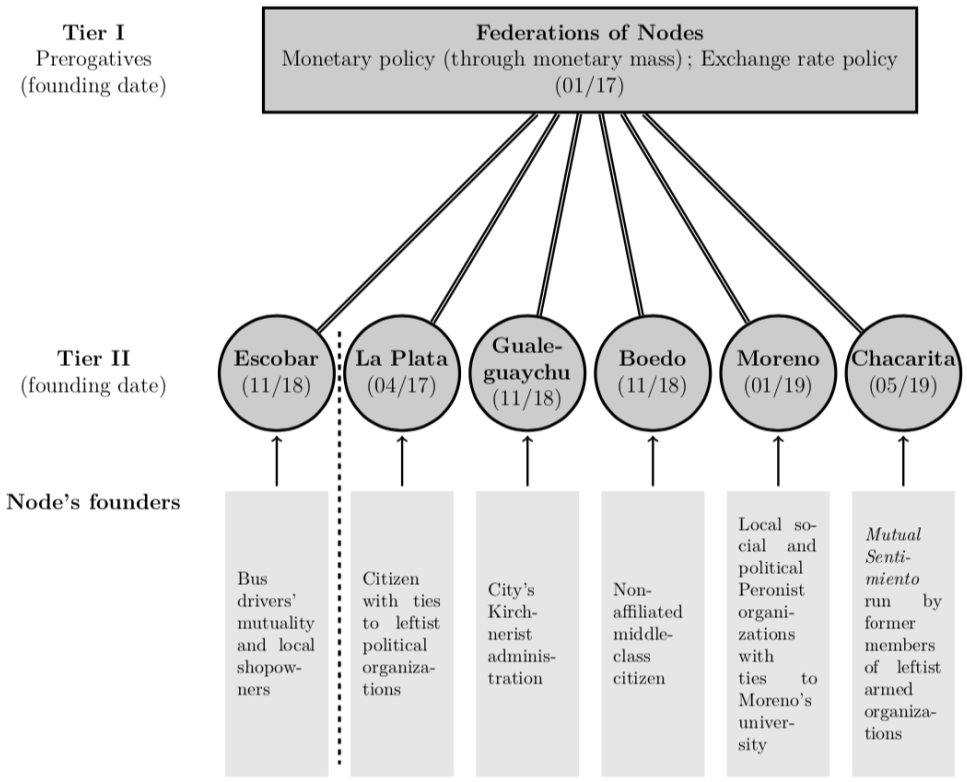

Figure 7. Organizational structure of MonedaPAR Source: participating observation and Bitshare's blockchain, accessed through the block explorer http://bts.ai, authors' own elaboration.

MonedaPAR is thus a mutual credit currency allowing for monetary emission which runs on Blockchain. It formally reproduces the two-tier structure of ordinary monetary systems, the federation of nodes acting as the central bank, while the nodes are in direct contact with the participants. The major difference is the nature of the ledger recording the history of the system: instead of being fragmented into the ledger of the central banks and those of the second-tier banks, that is, privately owned by the core institutions of the monetary system, it is now public and unified. The latter feature is the reason why there is no distinction between the nodes' money and the nodes federation's money as there is one between high-powered central bank money, only available to second-tier banks, and ordinary bank credit money, the only one common individuals can gain access to.

As described in subsection 2.1 the use of MonedaPAR is mainly restricted to P2P exchanges, reproducing on a much smaller scale the *clubes de trueque* subsistence-oriented economy. This implies that the exchanges with MonedaPAR are embedded in the logic of reciprocity, exchange taking place in regulated solidarity markets. However, it has the potential to blend several forms of solidarity, from the organic solidarity of prosumers[xvi] and firms, to the vertical solidarity from the local government to its citizens[xvii], both remaining, at least in intentions, subordinated to democratic solidarity between all the participants.

Therefore, MonedaPAR proves to be a very flexible instrument which is not « technologically-wise » preferentially bound to one type of users only. It is available for use by private individuals as well as by businesses in their relationship with one another and with consumers. Its potential uses are thus not to be vindicated on its currents uses only.

However, from the study of MonedaPAR, three big questions need to be introduced, not to exhaust the subject but to incorporate it in future discussions on the use of this mixture of technologies that are produced when working with a social currency that runs on blockchain.

In the first instance, it is essential to work on the issue of trust in currency (Aglietta and Orléan, 1982, 1999, 2002), considering that the vision of information technology (IT) professionals (Diniz et al. 2016) is very different from the social complementary currencies researchers analysis (Orzi, 2011, 2017). Decentralization is also positioned as a problem to be solved, since IT professionals propose complete decentralization, when this is not possible for social currency systems (Hawlitschek F. et al. (2016); Orzi, 2011, 2017). Finally, the issue of governance emerges as a second dimension of the discussion about decentralization: does technology in general and Blockchain in particular have something to offer for the creation of governance systems that rely more on the principle of identity - which implies greater participation and autonomy - than on that of representation? These problems and theorical tensions will be presented and discussed in the next section.

ANALYSIS OF MONEDAPAR'S CHARACTERISTICS

MonedaPAR and Trust

Before considering the specific issue of trust, it is useful to recall the debate between two groups of people studying and developing cryptocurrencies but differing in origins (Hawlitscheck et al., 2016): the IT groups (Information Technologies) on the one hand, and those of SSE and collaborative economies (EC) on the other.

According to Hawlitschek et al., there is a tension on the respective conceptions of trust between these two groups. This conceptual difference has important implications for both theory and practice and can compromise the sustainability of cryptocurrencies. IT professionals hold the Blockchain as a "trust-free system". However: "When it comes to more complex social relationships, involving the sharing of resources and assets, Blockchain technology alone is not enough for people to develop interactions based on trust" (ibid., 2016).

This dispute has not yet been settled and it is vitally important that both groups can agree on a set of concepts that will allow them to talk about the same thing when considering the issue of trust in the currency. For the SSE and proponents of collaborative economies, trust in money is an essential condition for its development.

Considering the current situation of this dispute and the insufficiency of the idea of Blockchain as a "trust free system" for its implementation in social cryptocurrencies, it is useful to use the conception of trust from Aglietta and Orléan (1982), whose theoretical framework has been repeatedly applied in contemporary studies on money.

They consider currency as the "cohesive link of our mercantile society", and not the mere "veil" conceptualized by classical and neoclassical economists (ibid). That analysis will allow us to characterize the advantages and the difficulties that the cryptocurrencies present, with special mentions to MonedaPAR. "The currency becomes recognized value through the establishment of mutual confidence in each one of the other" (ibid., authors' translation).

Trust in money designates a multiplicity of phenomena, which can be grouped according to these authors in three types or forms. These forms interact in an articulated way, each one developing from its own logic: ethical trust (trust as such), hierarchical trust (credibility) and methodical trust (confidence).

Ethical trust is of higher order than hierarchical trust, which refers to the credibility of the institutions regulating the monetary system. While the latter defines the legality of a given system, the former aims at its legitimacy. In today's mercantile societies witnessing the prevalence of individualism, ethical trust is based on the recognition of human rights' universality. This is due to the disembedding of the market economy from the wider social whole. The difference compared to pre-capitalist societies in which the group subordinates the individual, is that now this is the individual whose well-being represents the supreme value. Of course, this individual is but an abstract notion: it reduces to the "homo economicus", hiding "the difference in social status" behind "the homogeneity of mere quantitative evaluations" (ibid.). Where do the values inherent to the monetary order that a social currency seeks to institute come from? It necessarily implies the revaluation of the community with respect to the individual - re-embedding the economic realm within the social totality, as Polanyi (1957) proposed. The objective is to promote the values of reciprocity, solidarity, autonomy, and participation that constitute the bases on which both the SSE and the collaborative economies are based.

Hierarchical trust (credibility) recognizes the necessity of a higher-order instance with respect to mere inter-individual relations. It establishes a relation of subordination that allows to bear the uncertainties of the day to day. It fulfils the function of norm. Through this institutional mediation, the bond to the other is transformed into a social bond, hierarchically structured. In the monetary order, hierarchical trust is expressed in the form of an institution that enunciates the rules of use of currency and that issues the official currency. When it comes to legal tender, the prevalence of hierarchical trust requires belief in the good performance of the Central Bank in the process of finalizing payments, in defending the value of the currency and, in the face of turbulence, in its performance as lender of last resort. In the case of a social currency, at the top of the hierarchy is the organization (or group of organizations, for example the Federation of Nodes) that ensures compliance with the specific properties given to the currency (convertibility, liquidity, etc.).

How do these hierarchies change when the social currency runs on Blockchain? In line with the idea of decentralization in the sphere of government, hierarchical positions at the super structural level should be diluted and replaced by technology. This is reflected in the phrase commonly read in the Blockchain community "the code is law" or in the ideas of decentralization both in the operational and governance dimensions. In that perspective, currency credibility changes content and form: rather than stemming out of the action of a centralized institution, it is deemed as resulting from the disappearance of any hierarchy: it should not be possible anymore for any actor to reach dominant positions enabling them to impose decisions foreign to the will of the majority. However, in the case of social cryptocurrencies, the total decentralization allowed by the Blockchain technology is difficult to apply. Social cryptocurrencies are currencies that operate according to specific social values. Because the latter are not the dominant ones, they are in a state of continuous construction, through the operation of social cryptocurrencies in solidarity markets that promote a horizontal hierarchy in decision making, reciprocity, solidarity, autonomy and participation. To uphold them, rules therefore needs to be created to regulate monetary emission and circulation and the fixation of price ratios: this requires some higher-order authority, to be sustainable. This is the case of MonedaPAR in which sovereignty rests on those values. In this experience, the authority in charge of generating and maintaining hierarchical trust (that is, PAR's credibility) is the Federation of Nodes.

Methodical trust (confidence) is the simplest and the lowest form of trust. It refers to the stability and trustworthiness of the chain formed by individual transactions. The repeated successful completions of acts of buying and selling lead its establishment. The outcome is a social bond located at the inter-individual level. In the case of a social currency, methodical trust implies that transactions can be carried out in a habitual manner. The successful repetition of these tends to install the idea that the currency effectively fulfils the function for which it

was created. When it comes to social currencies used in a digital format (and running on a Blockchain in particular), the fulfilment of the methodical trust not only requires the good performance of the currency in the functions for which it was created, but also the correct performance of the technological platform (security, high availability, purpose, etc.).

Considering MonedaPAR, the main challenge is in the generation of methodical trust. The growth limit which has been experienced does not seem to be linked to issues primarily related to ethical and hierarchical trust. MonedaPAR currently finds itself in a stage in which a series of virtuous markets must first be consolidated. This early stage of development may explain why the first attempt to integrate "workers' recovered entrerprises" (empresas recuperadas del MNER) in the PAR system was not successful. There was simply no previous community construction. As pointed out by Desmedt et al. (2016) "to become a true monetary project, the robustness of the technical processes alone is not enough".

An alternative strategy was thus needed: people and community organizations that wanted to exchange among themselves became the primarily development axe. The creation of community simultaneously with the incorporation of the currency allows confidence to develop more easily.

MonedaPAR and decentralization

Money as social relationship can acquire different meaning depending on the specific combination of integration forms (Polanyi, 1944) that predominates. Ordinary money is a hybrid of state money and bank credit money: it is issued through an "oligopoly" formed by the state and the two-tier banking system headed by the central bank. Here, (captative) exchange predates reciprocity and redistribution. In the case of a social currency, the dominant form of integration is generally reciprocity, which is usually associated with participation and an autonomous management of the circulation, which links us to the idea of decentralization.

The blockchain's technology proposal is one of total decentralization, a perspective that, as it has been pointed out while discussing on the three forms of trust, is not currently a present possibility in the case of social currencies. Indeed, in order to uphold their alternative social values, they have to circulate in solidarity markets, which implies some degree of hierarchy and concentration of decisions.

In this sense the work of Rolland and Slim (2018), taking up contributions from De Filippi and Loveluck (2016), allows us to reflect on the subject. They argue that even the Bitcoin cannot escape the general rule wanting that socio-technical systems to be integrated into their social, cultural and political context. An institutionalist perspective of the Bitcoin is therefore, and despite what could be inferred from the imaginary of an a-political monetary system associated with it, necessary. The key idea of a dual governance: "to the governance by the infrastructure (internal) is superimposed a governance of the infrastructure (external) and that concerns the code and its modifications". They dedicate their article to study the latter dimension, labelling it "superstructure", which would be in the case of MonedaPAR and other social currencies, their institutional dimension - made up of actors, networks and representations, not exempt from complex power struggles.

When referring to decentralization, then, three dimensions must be distinguished: the technological dimension, the one on which the currency is mounted; the institutional dimension (super structural), the one where the governance of the system is exercised; and the operative dimension, the one referring to the daily routine of the system.

Decentralization in the technological dimension occurs by definition at the moment of choosing Blockchain as technology. The discussion should focus, at this level, on the degree of decentralization chosen, which depends on the specific type of Blockchain used by the currency circulates. The aspect where, perhaps, the degree of technological decentralization ends up being most decisive is the finality of the transactions; a highly decentralized Blockchain with high finality times becomes impractical for a currency that seeks to fulfil the function of medium of exchange. The choice of MonedaPAR has been to use Blockchains such as Bitshares or EOS, with a lower degree of decentralization than others -like Ethereum-, but, at the same time, with lower transaction costs and shorter finality time. It is a good example of how the question of technological decentralization enters a social currency that runs over Blockchain.

The use of Blockchain technology not only entails a decentralization that provides the system with enhanced security and transparency, but it can ideally reinforce the (moral) rules that in daily practice reproduce the intrinsic social values of the system. That is, using the blockchain may help to increase the legitimacy of the monetary system, fostering ethical trust. As it is used in digital form, it is much easier to delimit the sphere of transactions that can be carried out through the currency. Moreover, since all interactions are recorded, accessible to all and it is possible to develop metrics that quickly inform the behavior of each member of the network, there seems to be more incentives to follow the rules. But the question of decentralization cannot leave aside the analysis of the institutional dimension, reviewing the forms of governance that a social currency can adopt.

Governance of MonedaPAR

The second dimension of the discussion about decentralization, which has to do with the exercise of power in a community, does not arise from the Blockchain itself. Indeed, the promoters of the latter technology have joined hands with the numerous initiatives from civil society to demand a better exercise of representation by political professionals, putting in the center of the debate the question of the governance of organizations.

The Decentralized Autonomous Organization (DAO) model[xviii] is, at a theoretical level, one of the most complete realizations of the idea of decentralization applied to the governance of a community. Projects such as Democracy Earth or Aragon[xix], which combine the claims of citizens with Blockchain technology, are a good example of the revival of the calls for greater decentralization in governance. The question is whether technology in general and Blockchain in particular have something to offer for the creation of governance systems that rely more on the principle of identity - which implies greater participation and autonomy - than on that of representation. A priori, it would seem that the security and transparency offered by technological decentralization are an essential element to progress towards greater decentralization in governance.

The contending issue is that of the optimal degree of decentralization in the governance of each community and, fundamentally, what are the criteria to define the optimality. When analyzing decentralization in governance, the determination of levels of "optimality" must also consider other variables. The tensions between the horizontal and vertical modes of construction appear here, the former more associated with the idea of decentralization and the latter more linked to centralized systems. It seems that the creation and consolidation of a project (on Blockchain or not) requires an initial phase in which a person or small group of people occupy a leadership position that, if not exercised, leads to the stagnation of the project.

However, progress towards greater decentralization in governance seems necessary not only because of the problems mentioned above associated with the preservation of the project's core values, but also because of issues of growth and scalability. Analyzed under the angle of governance, the structural configuration of MonedaPAR experience confirms these reflections. At its beginning, what seems to dominate was a “missionary governance” based on the ideology and values of the creators. This type of governance, with which the project arises, is a combination of utopia (mobilizing project) and ideology (norms that keep us united), which build the identity of each organization. In democratic institutions it is a question of adhesion, which has to do with the strength of cohesion (Maló, 2003). It is expected that this experience will evolve through “mutual adjustments” towards a governance more related to the experiences that seek a more horizontal and decentralized decision making (cooperatives, for example).

This will thus allow to finally consider the third and last dimension of decentralization in the experiences of crypto-currency and social currencies in general: the operational dimension. This includes all the aspects associated with the daily working of the system and its growth. Questions such as the following: who is in charge of assisting users who encounter issues? Who is in charge of dissemination? Who is in charge of issuing money? Who is in charge of monitoring the state of the system? If there is no decentralization here, the potential for growth will be limited by the ability of those in charge of these functions to respond to the needs of users. It is therefore necessary to generate a network of "promoters" who oversee disseminating the project and accompanying those who decide to join and integrate the different tasks. In the case of MonedaPAR, the creation and maintenance of the nodes that are currently in operation would not have been possible without the effort of the territorial referents who took charge of the multiple required tasks (convene meetings, prepare presentations to give in front of the audience, encourage the

drafting of regulations, organize logistic, carry out communication, etc.) to enable the construction of the (market) exchange situation.

CONCLUSIONS

Many of the advantages of blockchain adoption for social currencies are the same as those that can be described for cryptocurrencies in general: reduced transaction costs, data integrity, data replication at network nodes, transparency, and auditability (Alves Rodrigues et al., 2018).

Particularly, for social cryptocurrencies, in addition to ensuring the auditing of transactions, it would allow solving problems regarding storage security, facilitated administration, making fraud and counterfeiting more difficult and allowing control of circulation and prices, from its computer platform open to all its members. As argued by Alves Rodrigues et al. (2018), the adoption of blockchain technology in digital social currencies is based on the search for trust, security and scalability. In turn, it is adopted with the necessary modifications in its superstructure to allow governance in accordance with the values of these currencies that operate in solidarity markets.

This situation was verified by the fast construction of nodes around this new technology applied by MonedaPAR. Within a year, more than 9 new nodes began their activities[xx]. Their sustainability seems to heavily depend on their diverse organizational characteristics, which will be a topic for future research.

As it has been exposed in the case of MonedaPAR, the solution to governance brought about by the Blockchain, a total decentralization based on the idea of a trust-free system, cannot currently be applied to the construction of solidarity markets with social currency. Total decentralization might lead to the dilution of the alternative social values sustaining these currencies, and to the predominance of the dominant power groups.

The experience of MonedaPAR entails that social currencies depends on underlying solidarity markets to endure. This implies a previous or concomitant construction of communities (Orzi, 2011). This difference with fully decentralized markets is a challenge for communities and investigators on the subject. In this sense, the consideration of a democratic, horizontal, and participatory governance is fundamental in currencies of the MonedaPAR type. This argument arises from the experience of the different nodes, on which -for reasons of space- we could not extend.

Another potential obstacle deriving from the implementation social crypto currency has to do with the irruption of new actors that come from technology (IT), as argued by Diniz et al. (2016). If no way can be found to integrate them in a broader set of values still upholding the core principles defining the experiments as alternatives to the dominant monetary system, these practices could be compromised.

In relation to the current limits exhibited by MonedaPAR and social crypto-currency, and social currencies in general, there are still challenges to be resolved. These have to do with the scalability from the local to the meso- and to the macro-economic, the difficulty of not using money as capital and the scope of these currencies in a society that naturalizes and institutionalizes the monopoly of the currency by the national states (Orzi, 2017). However, blockchain technology, by facilitating the appropriation of these alternative monetary systems, seems to open the way for us to concentrate in the research for remedies to those problems, which would contribute to overcome of the anachronistic, though contemporary, monetary and financial system.

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ENDNOTES

[i] For an exhaustive description of the characteristics of solidarity markets and social and complementary currencies, see Plasencia and Orzi (2007).

[ii] In Latin America, by "popular sectors" is meant those self-employed workers that, having been expelled from the labor market, make their living by doing temporary informal works or producing goods or services at a small and local scale.

[iii] See MonedaPAR's website: https://monedapar.com.ar/#queEs. Additional sources come out of the use of ethnographical methods, such as informal discussions between the researchers and actors of MonedaPAR and participating observation sessions during fairs or organizational meetings.

[iv] We understand "multidisciplinarity" as the convergent investigative effort of several different disciplines towards the approach of the same problem or situation to be elucidated. In general, such problem or situation has been being investigated by one or another discipline as its object of study and, at a certain point, that object of study begins to be approached "multidisciplinary" with the convergent contest (sometimes of the methods, sometimes from conceptual developments) from other disciplines (Sotolongo Codina *et al.,* 2006).

[v] See the website of the national statistical institute, INDEC: https://www.indec.gob.ar. Figures can also be accessed through the usual international organizations databases, or else in the Penn Tables (https://www.rug.nl/ggdc/productivity/pwt/?lang=en).

[vi] Father Pedro Arrupe was a Spanish priest that claimed that the religious order should develop a close tie with the poor sectors of society. He was among the advocates of the promotion of Jorge Bergoglio (Pope Francis) as the leader of Argentine Jesuits.

[vii] According to the leaders of the MNER, they had been thinking on the possibility of launching their own currency for a long time, but they had never managed to successfully deal with the process that this challenging endeavor entails.

[viii] The beneficiaries of these endorsements were susceptible to accessing a credit facility, which in practice gave them the possibility of having a negative balance in their accounts (at a zero-interest rate cost). In order to distinguish between the different types of participants of the network three credit categories were defined: individuals could be given an overdraft facility of up to 1,000 PAR, small producers (self-employed) could be granted a credit facility of up to 10,000 PAR and enterprises were able to access an overdraft facility of up to 30,000 PAR.

[ix] Out the conversations with the managers of the cooperatives another hypothesis came up: the system, though attractive in ideological terms, does not bring value if the whole supply chain is not incorporated. The claim of the managers was valid, but the solution was very difficult.

[x] For instance, in Pagina12, a newspaper with national coverage: https://www.pagina12.com.ar/53217-moneda-de-pares.

[xi] All MPAR statistics are public datas that can be accessed through any Bitshares block explorer. See, for instance, http://bts.ai.

[xii] This is a rough estimate likely to overestimate inflation in PAR. Indeed, it includes the evolution of prices of goods and services that are not readily available for PAR, as transportation or electricity.

[xiii] What in Latin America is referred to as the "popular economy" is sometimes translated as "grassroots economics". However, the translation does not seem to accurately describe the entire meaning of the concept in Spanish. Broadly speaking, the "popular economy" gathers all the self-employed workers that, having been expelled from the labor market, make their living by doing temporary informal works or producing goods or services at a small and local scale.

[xiv] For those interested in the history of the Argentinean barter networks of the 1990s and early, see the doctoral thesis of Georgina Gomez (2008).

[xv] Kennedy and Lietaer (2004) were one of the first to offer a typology, but received criticisms from Martignoni (2011), which argued that they fail at providing a systematic typology, that is, one that would not rely on the features the authors considered relevant. Seyfang and Longhurst (2013) tried to avoid the overlapping categories justifying Martignoni critique to Kennedy and Lietaer, but their choice of four types of monetary experiments (credit services, mutual exchanges systems, local currencies and barter clubs) has been in turn questioned by Tichit *et al.* (2016, 2018). The latter authors consider the definition of barter clubs and local currencies provided by Seyfang and Longhurst to be "nearly equivalent" and use lexical analysis on French-language web data to reconstruct the way the actors themselves classify alternative currencies.

[xvi] Prosumers is a concept created by Alvin Toffler that means producer-consumer, trying to recover the capacity of production of goods and services which is parts of every person.

[xvii] This could happen in the case of Gualeguaychú, where MonedaPAR is being sponsored by the local government.

[xviii] See for instance Chohan (2017).

[xix] https://democracy.earth and https://aragon.one.

[xx] The MUYU in Ecuador, y el SOL en Uruguay are two recently created alternative currencies based on the technology used by MonedaPAR, which they replicate.

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INTEGRAL RESEARCH ON THE LAKE DISTRICT POUND: SIX MIXED METHODS FOR ASSESSING THE IMPACT OF A CURRENCY

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ABSTRACT

How does one assess the impact of a currency innovation? This study explores the experience of the Lake District Pound (LD£), a free local currency issued by a social enterprise from May 2018 to January 2020, for approximately LD£215'000 within 342 local independent businesses and 28 bureaux de change – who were also stamping passports – and based in the Lake District National Park, a UNESCO World Heritage Site in Northwest England. After presenting the historical and regional context, we will introduce six mixed methods – consistent with integrative research approach of Integral Methodological Pluralism based on Complex Integral Realism – and analyse the respective and combined results of 12 data collections over 25 months to provide a holistic impact assessment. By promoting the local heritage and by providing a unique visitor experience, it has had some impact on local spending and the local economy and has raised some awareness of localism and Money; without transforming behaviour and the local supply chain. It has proven its ground-breaking revenue model based on the annual leakage once the currency expires: keeping rather than spending it – targeting visitors rather than residents. Its short-term financial plan proved unsuccessful in generating profit for two charities (environmental conservation, community support).

KEYWORDS

Integral research, mixed methods, impact assessment, currency innovation, Lake District Pound, National Park, World Heritage Site.

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1. INTRODUCTION: HOW DOES ONE ASSESS THE IMPACT OF A CURRENCY INNOVATION?

In the field of currency innovation, there is a research gap in terms of its impact assessment and improvement of complementary currencies (Place, 2018; Place and Bindewald, 2015; Michel and Hudon, 2015; Seyfang and Longhurst, 2013; Dittmer, 2013).

To investigate a phenomenon, to assess its impact (significant influence and effect), to measure its success (achieving assumed goals); the chosen perspectives and lens would influence both methods and results (data collection and analysis). Consequently, "How does one assess the impact of a currency innovation?" is a necessary preliminary question to, "What is the impact of a currency innovation?"

To explore a holistic approach to currency impact assessment, we will study the specific case of the Lake District Pound – launched on 01 May 2018 and ended on 31 January 2020 – and its associated research questions.

What are the initial conditions which influence the implementation of a local currency in a National Park and World Heritage Site?

How does one measure the impact of a local currency initiative in rural context impacted by substantial tourist influx?

To what extent does this currency innovation have the potential to become a social and sustainability innovation that supports the local economy and community?

To answer these questions, we will first present the historical and regional context of this complementary currency in order to provide background on the subject. We will then address the six mixed methods consistent with Integral Methodological Pluralism and their respective results to assess the impact of this complementary currency in a holistic manner. Finally, through a combined analysis of these research approaches and techniques, we will discuss the methodological contributions and perspectives.

This paper is written in the first-person plural (we), except for the sole and direct experience of the lead author – namely Christophe Place – written in the first-person singular (I).

2. HISTORICAL BACKGROUND AND REGIONAL CONTEXT: A LOCAL CURRENCY IN A NATIONAL PARK AND WORLD HERITAGE SITE IN THE ERA OF CASHLESS SOCIETY.

Focusing on the Lake District National Park in the county of Cumbria in the United Kingdom, this paper explores a unique and arguably benchmark case with its impact assessment research being supported by both the Institute for Leadership and Sustainability and the Eco-innovation Cumbria programme. The Lake District Pound (LD£) was a complementary currency that supports local independent businesses and community projects – and was managed by a Social and Solidarity Economy organisation, called social enterprise (Lafferty and Place, 2019; Moulaert and Ailenei, 2005). This project was an example of sustainable development in action and was consistent with the critical agenda of the 2015-2020 management plan and actions of the Lake District National Park Partnership (LDNPP, 2019). This partnership, launched in 2006, agreed on a vision linked with the 2030 Agenda of the Sustainable Development Goals (SDGs) – to realise greater and wider sustainability in diverse contexts (UN General Assembly, 2014; Dodds et al., 2016).

With 19.17 million tourists visiting the Lake District in 2017 and spending approximately £1'417 million – of which 0.2% swapped in LD£ was projected as its Serviceable Obtainable Market (SOM), equivalent to LD£2.834 million or 38'340 tourists, similar to the 41'000 inhabitants in the Lake District. This tourism sector provided 18'565 full time jobs in 2017 and represented 25.31% of Cumbria's Gross Domestic Product in 2006. It is the most visited and richest National Park in United Kingdom, and the first and only one which is also a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site – since July 2017 thanks to its unique natural landscape and historical culture (Cumbria Tourism, 2017; LDNPA, 2017; National Parks, 2014). This creates tension between economic development (e.g. agriculture, tourism) and culture or nature conservation (e.g. reforestation, rewilding) (Waterton, 2005). Economic tension accentuated by the fact that Cumbria is one of the poorest counties in England, with migrant workers living outside the Lake District but working within it (Cumbria Tourism, 2017). Therefore,

Cumbria is a unique place that brings together individuals and organisations engaged in and committed to local efforts to find a balance between environmental, social, and economic sustainability.

Concerning the rise of a cashless society and the fall of cash system, cash was still representing 40% of the payment, with a 10% rise of banknotes in circulation for both storage and payment between 2015 and 2016, despite cashless growing by 11% from 2015 to 2016 (BRC, 2015; Tetlow, 2017). Already 58% of the population were using contactless in 2018 in North West England. It is predicted that cash could fall to just 10% of all payments within the next 15 years (UK Finance, 2019; Access to Cash Review, 2019). Not to mention the mass arrival of RFID (i.e. radio frequency identification) cashless payment wristbands for events and festivals.

The historical and regional context of this complementary currency was at the heart of the tension between economic growth (the LD£ was surfing on the wave of tourism opportunity) and socio-environmental conservation (the LD£ was supporting the conservation of both culture and landscape in a National Park and World Heritage Site). Within the economic context of cashless society, the LD£ was launched as a paper format with the intention to evolve into a digital one. We will continue our research journey to discover how the LD£ tried to reconcile these tensions.

3. METHODS, RESULTS AND IMPACT: AN INTEGRAL RESEARCH METHOD FOR A HOLISTIC IMPACT ASSESSMENT

Money is a discursive institution constituted by a system of rules, values, and norms: with Money as a concept, currency as its instantiations, and conventional money as we know it (Bindewald, 2018, p. 66). Discourse is at the foundation of institutionalism and refers to the rules, norms and conventions providing the structures and influencing our behaviours (Bindewald 2018, p. 74). As Money could be studied as an integral object of inquiry (i.e. a subjective value and belief, which objectively influence our behaviour and collaboration – and vice versa), a holistic and integrative research approach of this phenomena is relevant. Indeed, the investigation of currency and money is, intrinsically, a research study full of complexity and interdisciplinarity by nature; but it has predominantly been explored through a positivist and empirical lens throughout the ages (Arnsperger, 2009).

Integral research looks at reality through the lens of four quadrants, as well as various levels of evolution, depending on both an individual or collective point of view, and an interior or exterior point of view through a framework called All Quadrants All Levels (AQAL) (Marshall, 2012). Based on a post-postmodern metatheory, Integral theory model (scholarship and application) is by essence considered as a multidisciplinary, interdisciplinary and transdisciplinary approach (Esbjörn-Hargens, 2006, p. 91). Therefore, this complex transdisciplinary-driven research (which aims to explore and uncover the underlying assumptions and implicit foundations of the method, subject and object of inquiry) explicitly and superficially spans the methodological surfaces of any in-depth expertise and specialisation of discipline-based research (Montuori, 2013, p. 6). According to Christian Arnsperger, this framework is suitable and recommended for the study of economic and monetary systems, or Full-Spectrum Economics (Arnsperger, 2009) that we could also call 'Integral economics':

"The use of AQAL is our best chance to be able to use a whole spectrum of methodological tools that will gradually push our economies on an evolutionary-developmental path toward higher existential and critical performance." (Arnsperger, 2010, p.18).

This book has been reviewed in 2010 by Bernard Lietaer (Lietaer, 2010), and the two went on to co-author Money and Sustainability in 2012 (Lietaer et al., 2012).

Integral research (based on Ken Wilber's Integral theory and enhanced by both Edgar Morin's Complex thought and Roy Bhaskar's Critical realism, to propose a Sean Esbjörn-Hargens's Complex Integral Realism research approach (Bhaskar et al., 2016)) uses its own methodological research approach to validate knowledge – referred as Integral Methodological Pluralism – through the inclusion of irreducible methodologies for accessing reproducible knowledge, or verifiable and repeatable experience. Indeed, Integral research is an approach to research that explore the multi-faceted and multi-dimensional nature of complex phenomena. This is reflexively situated and informed at all major phases of the research process by Integral Methodological Pluralism. Its principles systematically integrate data sets, while broadening the methodological structure from the use of at least (Esbjörn-Hargens, 2006; Hochachka, 2008, 2009; Hedlund, 2010, p. 11-12, 23-26).

- One qualitative and one quantitative method.
- One first-, second-, and third-person methodology for the three domains of personal, interpersonal, and practical reality.
- One methodology from each of the six methodological families for: personal experiential and developmental, interpersonal interpretative and ethnomethodological, practical empirical and systems lines of inquiry – by excluding autopoiesis and social autopoiesis due to its limited implementation (in our specific case, we opted for this third option).
- All eight zones of methodological families, all the levels, all the lines, all the states, all the types, across all major validity claims and all major judgements – at most.

Although Integral research aims to be an integrated or mixed method research approach, it usually produces quasi-mixed studies or multi-method research. Integrated or mixed method research approach authentically mixes or integrates methods or data sets and by combining quantitative and qualitative research techniques, methods, approaches, concepts, or language into a single study. Quasi-mixed studies are without substantive integration of the data sets and findings or interpretations. Multi-method research is the inclusion of multiple methods or data sets in a single study rather than its integration (Tashakkori and Teddlie, 1998; Esbjörn-Hargens, 2006; Hedlund, 2010, p. 23-24; Creswell and Plano Clark, 2018). Producing the latter, we will aim for the former.

There are eight methodological families, or zones, inherent to a truly Integral research approach to understand and investigate a phenomenon (Place, 2021). Indeed, each quadrant perspective or dimension is linked to a methodological family, from an inside or outside viewpoint. And each methodological family is related to a mode of investigation (practices or techniques) and a validity claim or consideration (Esbjörn-Hargens, 2006, p. 90; Martin, 2008; Shaik, 2016).

Respecting the Integral Methodological Pluralism research by using a mixed method approach with a convergent core design, we will combine six research techniques corresponding to six out of eight methodological families: using at least one per quadrant but avoiding the two-fold (Social) Autopoiesis research methods as being difficult to implement and "the hardest methods to understand and use" (Esbjörn-Hargens, 2006, p. 101). This convergent core design uses parallel methodological strands to merge or integrate results and interpretations, to expand or provide understanding, to validate and confirm results, and to develop corroborated conclusions by comparing and combining the databases (Creswell and Plano Clark, 2018, p. 222, 293).

Table: Research techniques used according to Integral Methodological Pluralism

Research methods	Research techniques	Data collection
N/A. Autopoiesis (zone 5) Behaviours "IT" (inside)	N/A	N/A
N/A. Social autopoiesis (zone 7) Systems "ITS" (inside)	N/A	N/A
1. Hermeneutics (zone 3) Cultures "WE" (inside)	Participatory action research	Neutral 19 stakeholders mapping (05-11.2018)
2. Systems theory (zone 8) Systems "ITS" (outside)	Econometrics accounting	Positive 7 months' ledger (05-11.2018)
3. Structuralism (zone 2) Experiences "I" (outside)	Autoethnography	Positive 8 users' live autoethnography (06.2018, 11.2018, 02-08.2019, 08.2019, 08-09.2019)
4. Empiricism (zone 6) Behaviours "IT" (outside)	Case study: quantitative survey	Negative 100 users' live surveys (08.2018) Negative 50 users' live surveys (08.2018) Neutral 12 outlets' live observations (08.2018) Neutral 7 traders' online polls (10-12.2018) Neutral 100 stakeholders' live surveys (08-12.2019)
5. Ethnomethodology (zone 4) Cultures "WE" (outside)	Ethnography: qualitative interview	Negative 9 outlets' online questionnaires (09-10.2018) Neutral 40 stakeholders' live interviews plus polls (11.2019-01.2020)
6. Phenomenology (zone 1) Experiences "I" (inside)	Meditation Fasting	Positive 7 non-users' online interviews (02-03.2020) Positive 1 non-user's live phenomenology (02-06.2020)

To minimise the threats of such core design (Creswell and Plano Clark, 2018, p. 251), we did the following.

- Addressed parallel questions and concepts in data collection.
- Extracted half of the sample size for qualitative interviews from quantitative surveys (i.e. 18 out of 40 interviews), with few personal relatives – but expanded it due to the lack of sufficient follow-up agreement

(i.e. only 39% of 100 surveys from which 5% were relatives, followed by 85% of 40 interviews from which 15% were relatives in 2019).
- Analysed the data by integrating and comparing results side by side in a joint display.
- Engaged in new analyses to understand and resolve disconfirming or contradictory results from one method to another.

Indeed, I conducted 12 new data collections over a period of 25 months (collection period: 15 May 2018 to 06 June 2020) with negative, neutral, or positive results averaged; as well as a compared and integrated data analysis (analysis period: 24 February 2020 to 02 February 2021) (Place, 2021).

Furthermore, as the currency ended after 20 months of operation some research methods and techniques, originally planned, have been cancelled such as:

- assessing the currency velocity through the local multiplier methodology by integrating not only users and traders but also nonparticipating ones as a reference model (Ward and Lewis, 2002);
- a community-based participatory research, or community dock, by integrating the stakeholders (e.g. Booths retail, Stagecoach bus) in its impact assessment, continuous improvement, and community development (Kusago and Nishibe, 2018).

However, I conducted a limited participatory action research by including the project management team. The project leader of the LD£, Ken Royall, participated in the research design of the first interviews and surveys of the preliminary data collection of 2018 – and received some feedback and advice from their analysis and results.

The results of the data collection and analysis are presented chronologically as follows.

3.1 Hermeneutics: Participatory action research, a business model analysis

Participatory action research is a research approach: a method or technique at the crossroads of community participation and action. Participatory action research seeks to collaboratively understand and change the world through a collective process of self-investigation (Chevalier and Buckles, 2013). It is done through the interpretation and understanding of social events by analysing the participants' meanings, as in hermeneutics.

From May to November 2018, by immersing myself in this applied research project (e.g. participation in 4 promotional stands, preparation of 135 special offer deals), several stakeholders were analysed about their influence on the business model (Place, 2021). Therefore, I created a stakeholder map by identifying their respective influence power and their interest or legitimacy in relation to the currency project (Place and Bendell, 2019). 10 of 19 stakeholders were directly involved in the project.

The Bank of England and the Financial Conduct Authority classify local currencies as voucher schemes, with a limited network, a clear expiry date, and a no redeem policy (Naqvi and Southgate, 2013). There were 6 Business Improvement Districts (BIDs) in 2018 in Cumbria, all with their own gift cards and loyalty schemes, together with the ones of Cumbria Tourism. Their aim was to develop town and city centres (The BID Directory, 2019; Cumbria Tourism, 2017). Indeed, "for every £1.00 spent locally, around £0.50 to £0.70 went back into the local economy [against] £1.00 spent out of town or online, only about £0.05 trickled back to the community." (CLES, 2013). The founder and Chief Executive Officer (CEO) of the LD£, Ken Royall, participated in a course on complementary currency – delivered by Jem Bendell in 2015. He subsequently introduced The Lakes Currency Project Ltd. and employed a Business Relationship Manager (TLCP); and launched the LD£ on 01 May 2018 (LDP, 2018). Stagecoach Bus and Booths retail chains joined the network to provide credibility and trust – since 02 April 2009 and 01 June 2019, respectively.

The Lake District Park National Authority (LDNPA) always looked for an innovative scheme to obtain money from visitors to help environmental conservation (Lake District Foundation) and community support (Cumbria Community Foundation). So, with 22 other local impact investors they invested in TLCP, focusing on its cost-effectiveness and financial viability to make a profit for these two charitable foundations. Belonging to a network of independent local currencies created in 2014, they noted that a high proportion of two local currencies had not been redeemed by their expiry date (IMA, 2018, 2021). As traders were not keen in paying any membership for such an unproven scheme, the TLCP used an annual leakage on currency expiry as its unique revenue model (LDP, 2018).

Based on this legal environment and market competition – and to engage all stakeholders using an inclusive approach – TLCP adopted an entirely free and simple mechanism. The LD£ was a local currency entirely guaranteed and redeemable at par by national currency (pound sterling: GBP or £), with an assets-backed reserve fund, and totally convertible for both users and traders. It used a paper support in 4 denominations of LD£1, LD£5, LD£10 and LD£20 and annual versions in 2018 and 2019, with an expiry date on 31 January of the following year. The LD£ was only converted in some bureaux de change or its online website and accepted by some local independent businesses in the Lake District. The revenue model – free for both users and traders – was neither based on a membership, nor on a commission through convertibility or transaction; but on a leakage or breakage thanks to the yearly expiry date and a sale of collectibles such as collector set or storybook. Some shopkeepers participated in a souvenir passport trail.

Consequently, the revenue model was based on keeping the currency as a collectible; whereas the contradictory value proposition was based on both keeping it to benefit local charities – instead of saving it as a reserve of value to be spent later – and by spending it to support local independent businesses. Therefore, the LD£ could be seen as a numismatic currency to be kept by visitors or purchased by collectors through the sale of same serial number collector sets as part of the revenue model, rather than an economic currency to be spent or saved by residents through its circulation among traders and users in a business-to-business-to-consumer scheme.

Nevertheless, by co-creating a common value between stakeholders, interacting with the LD£ would ideally influence their awareness about local economy and community support (by purchasing in local stores and increasing their sales) and could ideally improve local spending and supply chain (by exchanging between local suppliers) for ecological footprint mitigation.

With a larger number of trustworthy partners than usual at a local currency launch (Lafferty and Place, 2019) and some relatively conservative assumptions about the SOM, TLCP was quite confident to take up a challenge with an unproven but promising revenue model.

However, we still need to assess how the LD£ advocacy not only increased local consumption through an econometric accounting but also proposed a coherent value proposition and a meaningful experience through autoethnography. Above all, this raised the stakeholders' profiles around this topic through a case study with quantitative surveys.

3.2 Systems theory: Econometric accounting, a currency ledger analysis

Econometrics is a research approach: a method and technique at the crossroads of statistics and economics. Econometrics aims to give empirical content to economic relationships through a quantitative analysis of economic phenomena (Hashem Pesaran, 1987). It is a cohesive conglomeration of interrelated and interdependent parts, as in systems theory.

From May to November 2018, a 7 months' ledger had been implemented to track the currency flow and stock of the LD£ (Place, 2021).

198 local independent businesses (traders) and 17 bureaux de change (outlets) attended the launch in May 2018. In August 2018, LD£76'663 were issued within a network of 252 traders (half stamping passports) and 20 outlets – which expanded to 24 outlets in November 2018. This was not only a relevant business sector diversity with one of the main visitor attractions, but also a sufficient geographic spread in the Lake District and extended to Kendal in September 2018. From May to November 2018, LD£81'201 were issued. From May 2018 to January 2019, LD£150'000 were issued. This was equal to LD£100'000 spent, plus LD£50'000 kept without any profit. This gives a velocity approximation of 67% comparable to the 78% of the pound sterling from January 2018 to December 2018 (IMF, 2018; FRBSL, 2019; Place and Bendell, 2019).

At its maximum extension from May to August 2019, LD£65'000 were issued within 342 traders and 28 outlets. For the second year of operation, they aimed for three times what they reached the first year; but actually reached half of it with one-third of the first year budget (Place, 2021). Unfortunately, on 21 November 2019, TLCP announced the cessation of LD£ after the second version expiring on 31 January 2020 after 20 months of operation (The Westmorland Gazette, 2019) – due to a lack of new impact investors after bankruptcy. In total, approximately LD£215'000 were issued, corresponding to 8% of the SOM, meaning a decade to reach the SOM (instead of 20

months of existing operation or 4 years of projected return on investment). Consequently, accomplishing a large network of participating businesses was not a guarantee of issuing a large amount of currency.

In the average of the reference cases in Europe for currency issuance and network size, the LD£ not only proved its satisfactory velocity but also its exceptional revenue model (Lafferty and Place, 2019; Le Farinet, 2019; IMA, 2018, 2021). Although, it was not sufficient to be financially viable in view of ambitious objectives to be concretely achieved, even with a great margin with online collectibles and a substantial marketing budget (for promotional injection or gift) and a diverse and wide network.

With a marginal impact on local spending or supply chain at the macroeconomic level of the regional market or rural context made of substantial tourist influx, we can still assess its impact on stakeholders through both quantitative surveys and qualitative interviews as well as autoethnography. Not only at a microeconomic level of individual buyers and sellers responding to price signals, but also at a mesoeconomic level of hidden structures of trust and encouragement. This might include patterns of behaviour or collaboration, and variations of beliefs or values thanks to a sociocultural anthropology prism.

3.3 Structuralism: Autoethnography, a value proposition analysis

Autoethnography is a research approach: a method or technique at the crossroads of ethnography and autobiography. Autoethnography is self-reflection, anecdotal experience and autobiographical story used to explore and connect to wider cultural and political meanings and understandings (Ellis et al., 2010). It implies that culture can be understood as a relationship to a broader system, as in structuralism.

Together with 7 relatives, I had 5 mutual and lived experiences using the LD£ through currency swapping and spending in 2018 and 2019 (Place, 2021).

Analysing the experiential feedback, we concluded that the protagonist and his relatives had a meaningful and playful experience using the LD£ and its passport, even though they were in a particularly good mood because of being on holiday or during a celebration. Indeed, the LD£ was promoting the cultural heritage and natural landscape of the Lake District through each note denomination and yearly version, as well as the passport stamp trail. It created a more authentic interaction with the traders: only 4 of 22 participating traders did not know about it, only 3 gave change in LD£ but 17 stamped the passport, and 8 of 30 visited places did not accept it. Whilst the process was inconvenient (e.g. numerous steps to swap, paper format, double set of currencies, embarrassing transaction from traders, restricted stamps, limited network) and there was a lack of incentive to spend or discover (e.g. change in LD£, shop discount, swap bonus, free reward, stamp collection), it still fostered their good deed by using it.

In general terms, their personal and singular experiences were fully in line with the value proposition of the LD£: having a fun and unique experience in the Lake District on holiday (i.e. collect notes and stamps, hunt rewards and prizes, support community and conservation, discover places and special offers, free for visitors and residents). It should be noted that only one user would prefer a digital rather than a paper scheme, and that only a few traders were unaware of the LD£ acceptance – but too few gave change in LD£.

Following 5 lived experiences of 8 users is necessary for a close analysis of the scheme, but not sufficient enough to assess its overall holistic impacts among stakeholders (such as motivational causes, constraining processes and transforming consequences thanks to a case study and ethnography).

3.4 Empiricism: Case study with quantitative survey, a behaviour and collaboration analysis

Case study is a research approach: a method or technique at the crossroads of quantitative and qualitative study. Case study involves a detailed examination of an object of study, with information-oriented sampling and its contextual conditions (Yin, 2013). It emphasises the role of empirical evidence discovered in experiments to test hypotheses and theories against observations of the natural world, as in empiricism.

After the first and last tourist summer peaks for the LD£ (during August to December 2018 and 2019), 7 quantitative data collections, chronologically hereinbelow, were conducted among 316 stakeholders with 105 close-ended questions (Place, 2021) – with samples distributed equitably between sex, age, and social category. 4 external quantitative data collections were conducted by other researchers among 217 stakeholders with 47 closed-ended questions (Cardiff University, 2019; Zheng, 2019; University of Leeds, 2019).

In 2018, users expected purchase discounts, a detailed map of the scheme, or a convertibility bonus for the currency; and reward or prize money for the passport, as well as increased accessibility, information or promotion. To promote and encourage the scheme (from 15 August 2018 to 31 January 2019), people could receive a free passport and/or a swap bonus of +5% and +11% the year after. However, few people participated in this special offer. Indeed, outlets had a moderate public response or understanding of the currency and the passport due to the cashless society trend even with an optimist attitude and rich display, and it was mostly acquired by well-educated people or the elderly for their grandchildren. These research results prompted a strategic pivot to bring a fun and unique visitor experience through a commercial incentive in 2019.

From now on, spending LD£ was compulsory to collect stamps. This avoided children requesting a passport stamp without a purchase. From May to June 2019, both a sponsored prize draw and a reward competition of collecting 35 stamps in 150 participating businesses were implemented according to their analysed expectations. Analysis showed that users preferred a reward competition with guaranteed gifts, compared to the slim chance of winning a prize draw, and proposing financial benefits rather than family gifts or outdated collectibles. Unfortunately, partnerships with paid accommodations and tourist operators were unsuccessful.

With 0.089 kg of carbon dioxide emission per passenger km in British buses (Carbon Independent, 2019) and with an estimation of 16'648 passenger journeys due to the LD£ (Stagecoach Bus, 2019) for 24.37 km a month, it would represent a total of approximately 723 tonnes of carbon dioxide emission during 20 months. Furthermore, as half of the profit for charities was supposed to benefit the Lake District Foundation, the LD£ would indirectly facilitate the planting of 400 local trees in November 2018 to capture approximately 1'468 tonnes of carbon dioxide (LDF, 2018; Ecometrica 2011). We did not have the exact number of passenger journeys, and the scheme was not profitable for the first and second fiscal years of operation. Consequently, its climate action and ecological footprint mitigation were difficult to assess overall.

Concerning the motivational causes, cashless people were admittedly less keen on using the paper currency. However, neither a future digital currency, nor a financial benefit were the main reasons to eventually or actually use the LD£; the original proposition of local economy and community support as well as a sense of local identity and trustworthy partners being the main causes. A longer visit, living away but working in the Lake District, or the use of other loyalty schemes had similar conversion rate (use/heard ratio). However, these altruistic incentives still needed to become commercial incentives (explained below), especially when looking at the difference between the high concern about localism and the low consideration for the LD£ (coupled with the difference between the incredible surveyed desire to spend or keep LD£ and the disappointing reality of the econometric accounting). Stakeholders would use LD£ if it encouraged the local supply chain, as well as the transparency of its profitability or revenue model and the extension of the expiry date, rather than the implementation of a digital currency.

Regarding the constraints of this process, due to a limited budget and lack of support from traders (despite giving change in LD£), a prize draw (rather than a reward competition) and a swap bonus (rather than a purchase discount) had been proposed to encourage the use of the currency and passports, respectively. This resulted in low public interest. Furthermore, the LD£ was perceived as relevant, but not useful; as reliable and comprehensible, but not convenient.

Concerning the transformative consequences, a great targeting rate (heard/surveyed ratio which was better for residents) and a usual converting rate (use/heard ratio which was slightly better for live swaps, foreigners, visitors, commuters, well-educated and the elderly) proved the success of the marketing strategy with its good understanding rate (understood/heard ratio which was slightly better for visitors) despite a need for improvement regarding accessibility and promotion. Furthermore, the LD£ slightly to moderately influenced stakeholders' awareness about local purchasing or localism and slightly improved local spending for individual buyers and sellers, as well as the discovery of new local shops. Conversely, it neither improved local supply chain nor sustainable transport, and did not provide awareness of crisis resiliency.

Finally, half of surveyed and one-quarter of interviewed stakeholders in 2019 changed their awareness and perception of the LD£ through these data collections.

3.5 Ethnomethodology: Ethnography with qualitative interview, a belief and value analysis

Ethnography is a research approach: a method or technique at the crossroads of qualitative and quantitative systematic studies of cultural phenomena. Ethnography relies on both participant interaction or context observation and interviews or documents analysis (Garfinkel, 1984). It aims to study the production of social order through social interaction, as in ethnomethodology.

From August to December 2018 and 2019 (tourist peaks for the LD£), 7 qualitative data collections were conducted among 240 stakeholders with 27 open-ended questions: 9 outlets' online questionnaires, 100 stakeholders' live surveys, and 40 stakeholders' live interviews for 11h27 of recorded transcription (Place, 2021). The thematic analysis (Guest et al., 2012) was made with 2'193 quotations identified with 201 open codes distributed through 10 categories – plus 6 selective codes from the extra category of Integral theory (Place, 2021).

Key to read the following text:

- the (sub-)categories are underlined;
- the number represented in the squared brackets [№] indicates the number of citations from the qualitative data collections that support the preceding (sub-)category or code;
- the quoted sentences ("") indicates an extracted citation from qualitative data collections that support the preceding code.

Using the AQAL framework of Integral theory [77], we could define Money as a changing rule [23] and an evolutive concept [6] which encourage behaviours [17] and beliefs [12] as well as activate collaborations [11] and values [8] – as an integral object of inquiry or 'Integral money'. To summarise, Money is mostly defined [130] as a "way to purchase" [29], a "transaction mechanism" [15], or "a means of exchange", but also as a compulsory rule to follow [23]. Its influence on society [117] focuses on helping people to survive by meeting basic needs [28] because of its scarcity [18] and addiction [8] creating "social inequalities" [12], and forcing economic growth [12], although it also brings both "happiness" [9] and "lifestyle" [9]. Thus, Money was correctly perceived as a tool of both alienation and emancipation – vice and virtue – like two sides of the same coin.

Concerning the LD£, its objectives [118] were to keep [27] and spend money locally [17] to "stimulate the local economy" [11] and to raise funds for charities [10], but it was aimed at tourists rather than residents [12]. Stakeholders' reasons given to interact with it [249] were not only to support local businesses [34] and good causes [22], but also to promote cultural heritage [15] and to increase turnover [13] – or just to have fun [13]. There was also a desire to engage [11] in conversation [11] by sharing the same values [11], to collect notes and stamps as souvenirs for tourists [24] – seduced by this novelty, which was losing "momentum" [11]. Quite reassuringly, its objectives and reasons, as motivating factors, were fully in line with its stated value proposition.

For their experience [150], apart from some people who "heard about it" [11] and then swapped it [10], to either spend it [11] in participating businesses [14] or to collect notes [3] and stamps [7], stakeholders either promoted it [16] like enthusiasts [24] or cynically criticised it [14] due to its drawbacks [30]. Many good ideas for improvement [801] have been put forward in terms of improvement of incentives, although some of them difficult to implement due to lack of time, financing and volunteers [360]. Stakeholders suggested: more shops included; exciting financial or tangible rewards for the "fun" passport [42]; a ban, a period or a loss on convertibility to limit users or traders to swap back [37] due to the short expiry date "just after Christmas" – thus creating mass withdrawal from outlets causing them to refuse or even close [20]. Residents needed a "real incentive" to spend it [24], for example a gift or discount on purchases, which would increase after completing the passport [22]. In terms of improvement of services [288], "the dilemma between spending to support local businesses or keeping to support local foundations" as a value proposition was "suspicious" because the "unclear revenue model" was based on collectors, rather than spenders by proposing a revenue model based on a subscription from shopkeepers or a transaction fee [52]. This resulted in more people collecting than spending and a decreasing interest after a promising launch [39]. More advertising and proactive shopkeepers for payment and change could have improved promotion [57] with a better "explanation" of the "functioning" [38]. Not forgetting the extension of the networks of outlets [33]; of local independent businesses to retail chains [38]; and to expand it to the whole of Cumbria for those working inside but living outside [18] for improvement of services. In terms of improvement of processes [77], people were concerned about: the misuse of this "ambitious" investment [17] and the lack of transparency regarding profit to charities; the "contradictory proposition" and unfair expiry [12]. It did not pull "communities together" bridging "wealthy" and

"depraved" areas in Cumbria due to a lack of "bottom-up" approach [14] by trying to change people "mindsets" with a "pedagogical" debunking" of "the nature of money" [5]. In terms of improvement of digitalisation [76], "a mix between" paper and digital currency was proposed [21]: a debit or credit card [18], contactless payment [10], or an application for easier payment [12] and accounting [6]. Experienced as an inspiring or constraining process, its improvements were mainly expected at the level of purposeful or commercial incentives. Also, with more currency change, less swap back, a longer expiry date, a more direct donation, an easier localisation, and a better note illustration, it needed: to target residents as much as visitors; to extend the network to retail chains and Cumbria; to include both well-off and precarious stakeholders in a bottom-up approach to pedagogically address their money taboo. This would require more time and resources in order to become sufficiently established, by potentially developing a digital currency or by reconsidering its only income from numismatists.

Its influence [59] was limited because users were already local spenders [14], so they perceived it as a voucher system [12] or just "a gimmick" [14]. Its influence on their relationship to Money [88] has mainly consisted in raising their awareness of money in general [16] and of the cashless society in particular [28], as well as in perceiving this specific local currency as real money [21]. Its achievement [318] was to collect notes [32] and stamps [15], and to raise awareness of monetary economics and localism [21] – even if some of them already knew about local currency [20]. The currency project [27] and design [26] have been well developed [27] and advertised [24], except for the sign on shopfronts [13]. Stakeholders' views on trust [16] and management [15] were mixed, as well as on its usefulness [36] or effectiveness [11], success [22] and impact [24]. Because, it has enhanced tourist visits, encouraged local spending, and promoted the Lake District; but has not changed behaviour due to its drawbacks, annual expiry date or lack of resources. The data collection itself raised their awareness [86] by explaining its functioning [31] about transportation [13] and charities [8]. For its transformative consequences, the concept of local currency and its pedagogical implications had been relatively well understood thanks to a great currency project and design that had promoted the region. Notes were both spent and collected, despite the limitation of the sign on shopfronts and annual expiry date.

After studying the reasons and impacts of the stakeholders' use of a complementary currency compared to conventional money (i.e. consumers and producers, buyers and sellers, users and traders) as well as the ones of the subject of inquiry (i.e. lead author) through his own lived experiences, we can try to analyse the deep roots of consumption or expenditure through the study of the non-use of both currency and money through meditation and fasting.

3.6 Phenomenology: Meditation and fasting, a root of expenditure analysis

Meditation is a research approach: a method or technique at the crossroads of psychology and neurology. Meditation encompasses attention and awareness training to achieve a mentally and emotionally stable state (Walsh and Shapiro, 2006, p. 228-229). It explores the structures of experience of self, as in phenomenology.

I had the opportunity to practice the Vipassana meditation technique – one of the most ancient meditation techniques rediscovered by Siddhartha Gautama – during a residential retreat from 29 January to 09 February 2020 in Dhamma Sukhakari, Suffolk in England (Vipassana Meditation, 2020). From 20 February to 07 March 2020, I carried out 7 confidential written interviews with fellow practitioners asking 9 questions, of which 5 were women and 2 were men with a selected pseudonym – including myself.

According to them, the Vipassana meditation influenced their daily activities and relation to Money, except for one person (Place, 2021). As a result, this meditation technique seems to be relevant to balance not only the craving and aversion of human consumption or production, but also money spending or hoarding as well as earning or giving.

Fasting is a research approach: method or technique at the crossroads of phenomenology and autopoiesis. Fasting refers to both the philosophical study of the structures of experience of self while wilfully refraining from eating, as in phenomenology; and to a system capable of reproducing and maintaining itself through the destruction and construction of cells, as in autopoiesis. It improves alertness, mood and subjective well-being (Fond et al., 2013).

I had the opportunity to follow an introspection through Rational fasting from 26 February to 05 April 2020 (body mass index > 23.97, -20.2 kg weight, -10 cm bust/waist/hip) with nutritional reintegration until 15 May. I mixed three days of dry, water and non-acid fresh fruit juice days, according to Arnold Ehret's method (Bragg and Bragg, 2004), under medical surveillance: with a positive blood test made on 10 March 2020 (i.e. blood pressure, oral

glucose tolerance test, cholesterol test, etc.). I continued with an Intermittent fasting of a meal a day from 24 April to 23 May 2020 (body mass index > 25.25, -1.0 kg weight, -0 cm bust/waist/hip) with nutritional reintegration until 04 June.

According to me, the Rational fasting influenced my daily activities and relation to Money (Place, 2021). As a result, this fasting technique seems to be relevant to not only improve productivity and mood; but also balance immediate basic needs, such as the daily consumption of food (including water) and its related money expenses.

Consequently, some of the roots of over-consumption and unnecessary expenses can be found in both body and mind craving or aversion unbalance – which meditation and fasting can partly resolve. Studying the non-use of conventional money and complementary currency allowed us to better understand the reasons why we spend it to consume (i.e. spending and consumption craving).

4. CONTRIBUTIONS, DISCUSSIONS AND PERSPECTIVES: SIX MIXED METHODS COMPARED AND INTEGRATED

Applying Integral research on the object of inquiry, we found that Money could be defined as an evolutive concept and rule which activates values and collaborations, while encouraging behaviours and beliefs [cf. ethnography]. Stakeholders also clearly defined Money not only as "a means of exchange" and a compulsory rule; but also as a tool that both alienates due to its scarcity or addiction, and emancipates by bringing "happiness" or "lifestyle" [cf. ethnography].

A diverse and wide network [cf. econometric accounting] of trustworthy stakeholders and an altruistic incentive to support local economy, community, and "heritage", while having "fun", "pride" or "conversation", as well as a substantial online and on-site marketing strategy [cf. econometric accounting, case study, ethnography] were necessary. However, it was not sufficient to reach ambitious objectives and become financially viable [cf. econometric accounting] for a lucrative and business-oriented currency project [cf. participatory action research] in comparison to volunteer or subsidised ones [cf. econometric accounting]. This was despite a relevant but "contradictory" value proposition in collecting notes and stamps for tourists rather than local spending for residents [cf. participatory action research, autoethnography, ethnography] and a proven but risky or controversial revenue model [cf. econometric accounting, ethnography] only based on currency leakage. Despite this, one quarter of both traders and users were geared to pay for such service [cf. case study] or were proposing other sources of revenue, such as a subscription from traders or a transaction fee [cf. ethnography]. Shall complementary currencies always adopt a hybrid business model (i.e. entry/exit fee, subscription, commission/transaction fee, leakage, subsidy, volunteering)?

It was successful in targeting potential users online for added convenience [cf. case study], and in integrating more trustworthy partners for further credibility [cf. participatory action research] – though unsuccessfully partnering with paid accommodations and tourist operators and unsuccessful in addressing their real needs. Rather than the questionable geographical or economic extension of its network, these needs included: transparency in business and revenue models, a fair expiry date; a physical detailed map; a more visible sign on shopfronts; a better note design or symbolism; increased advertising and accessibility; direct donations for charity impact; and appealing commercial incentives. These criteria differentiate themselves from conventional money or loyalty schemes [cf. case study, ethnography]. Not addressing these needs resulted in a fall in interest (after its novelty factor and promising launch) especially from the long-standing local spenders and residents not targeted in the collection of "gimmicky" souvenirs or stamps for visitors and children, which created a division between the enthusiasts and the cynics [cf. ethnography]. This was mostly due to a lack of support and promotion from traders from the beginning [cf. participatory action research, ethnography] (who were lacking incentives despite footfall or turnover thanks to the passport) and even prolific swapping back creating mass withdrawal from outlets [cf. ethnography], even if traders used the scheme as much as others but infrequently gave users their change in LD£ [cf. case study, ethnography]. Has it also failed to address the need of shopkeepers who were already earning a substantial income from visitors?

Nevertheless, the amount of LD£ issued was reasonable compared to other complementary currencies, as well as its velocity compared to conventional money [cf. econometric accounting]. Furthermore, the scheme somewhat

improved the awareness of local currency as real money, local purchasing, and the local spending among stakeholders, even if some were already committed to the cause [cf. case study, ethnography]. It did not improve the local supply chain or sustainable transport as originally expected for ecological footprint mitigation [cf. case study]. Even if Money was highly impactful for all stakeholders, the scheme did not improve users' awareness on crisis resiliency but instead revealed their relation to Money [cf. case study, ethnography]. Indeed, by failing to debunk the money myth in a pedagogical way and by not integrating all stakeholders in a bottom-up approach, it somewhat failed to directly address the needs of economic migrants and unprivileged residents [cf. ethnography]. Shall complementary currencies always aim to debunk money with pedagogy?

Even if a future digital currency with a card or application (more user-friendly but less collector-friendly) would improve local supply chain (as expected by all stakeholders) such technological functionality would not be the stakeholders' main reason to use the LD£ [cf. case study, ethnography]. Admittedly, cashless payment was affecting its use; but other competitive loyalty schemes or payment wristbands were not [cf. case study]. Could the rise of a user-friendly digital currency transform the fall of an outdated paper currency during this trend towards both gold rushes and cryptocurrencies? Should they keep the reliable paper support as collectible souvenirs for their revenue model while developing the practical electronic format for contactless payment with card, smartphone, or smartwatch in participating businesses? Shall complementary currencies mutualise their resources to build a common digital technology for a plurality of both system of currency systems (i.e. types of currency systems such as mutual credit, issued currency, cryptocurrency, etc.) and network of currency networks (i.e. interoperability consolidation and clearing house between currency networks)?

Finally, for stakeholders who used the LD£, its achievement, impact, or success, was still moderate or with mixed views [cf. case study, ethnography]. Was the LD£ unsuccessful but still impactful, or vice versa?

Of course, TLCP did not successfully achieve its originally expected goals to be financially viable, and to cover the cost of a limited company, becoming profitable for both investors and charities to support environmental conservation and community support [cf. econometric accounting]. It did not develop a digitally-issued currency and mutual credit to encourage local supply chain [cf. case study] (with its inherent carbon reduction benefits for the food and drink industry within the local hospitality and retail sectors); and to overcome the inconvenience or accessibility (e.g. numerous steps to swap or collect stamps, participating businesses localisation) and trust (e.g. change in LD£, embarrassing transaction) of a paper currency, and thus scale up the project [cf. autoethnography, ethnography]. Regarding the historical and economic context, TLCP took neither the wave of tourism opportunity, nor the era of a cashless society.

However, TLCP successfully validated its assumption of issuing a currency that would be both spent and kept (or collected) to respectively support local economy and community, despite certain dysfunctions in management and trust [cf. econometric accounting, ethnography]. Regarding the regional context, TLCP successfully promoted both culture and landscape, as well as enhanced tourist visits through the meaningful currency design, and the well-developed and advertised currency project [cf. autoethnography, ethnography]. However, it failed to support its conservation through the two charities [cf. econometric accounting].

Of course, LD£ had not been impactful in transforming behaviours and mindsets [cf. ethnography]; or on carbon mitigation through local spending or local supply chain at a macroeconomic level [cf. econometric accounting], or even sustainable transport or tree planting at a microeconomic level [cf. case study].

However, LD£ impacted the awareness level of stakeholders regarding localism and monetary economics, particularly on the cashless society. It impacted their spending in local independent businesses, despite some doubts about its usefulness and convenience [cf. case study, ethnography]. Therefore, it participated in the transition towards low-carbon societies through the self-determined creation of more sustainable communities (cp. Bendell and Greco, 2013). Half the surveyed and one-quarter of interviewed stakeholders in 2019 changed their awareness and perception of the LD£ thanks to the research process itself, which explained its misunderstood functioning and confusing purpose [cf. case study, ethnography].

TLCP freely created and promoted a network of 342 local independent businesses and 28 bureaux de change with events, advertising and merchandising over 20 months. Approximately LD£215'000 was issued between them [cf. econometric accounting]. Thanks to the LD£, several local shops had been somewhat discovered by visitors and residents, and money had been somewhat spent locally. But to do so, this start-up had to not only take an

entrepreneurial risk with an unproven revenue model, but also launch this brand-new concept of a local currency as opposed to a commercial voucher. Finally, TLCP not only proved its revenue model (i.e. currency both spent and kept) but also made the local currency comprehensible by successfully targeting the dual market of local traders (21% conversion rate) and foreign visitors (56% conversion rate) [cf. case study, ethnography]. With a long-term rather than a short-term return on investment pressure, as well as some purposeful or commercial incentives (such as convertibility or transaction commission to incentivise donation, and purchase discount or convertibility bonus to incentivise spending), and with a hybrid revenue model (not only based on currency leakage with a short expiry date [cf. ethnography]), TLCP could become financially viable, successful, and impactful. Particularly after this essential minimum viable product test of 20 months with a view to continuous improvement of this mock-up, pilot, or trial. Did TLCP mostly focus on advertising for its promotion, on extending its network of outlets and traders to gain credibility, instead of reconsidering its revenue model and financial plan by bringing stakeholders together in a bottom-up approach such as traders and investors?

However, constrained by the cost-effectiveness and financial viability of a private company – without volunteers and subsidies – and its revenue model based on collecting rather than spending, TLCP developed a business-oriented strategy and a numismatic currency that focused on visitors and outlets, rather than a stakeholder-oriented strategy and economic currency that focused on residents and traders [cf. participatory action research, ethnography]. This unprecedented top-down approach of a tourist voucher (used as a commercial tool to make money) completely differed from the traditional bottom-up approach of a complementary currency (used as a pedagogical tool to rethink money). TLCP participated in the awareness raising, viewpoint shift and perception transformation of some stakeholders [cf. ethnography]. Neither of these approaches, or the professionalisation of the sector guarantee the expected success (cp. Place, 2011). Could a commercial pitch and a value proposition (such as their story as founders or the purpose of their social enterprise and currency innovation), which address the why of such a scheme, be more effective?

The sense of local identity was a reason to use the LD£ [cf. case study], but not sufficient compared to the Eusko launched on a large existing network of SSE organisations and regional patriotism (Edme-Sanjurjo et al., 2020). Would this be related to the fact that residents only represent 0.2% of yearly visitors in the Lake District?

Finally, the introduction of a new currency in a specific territory and community is already a call for a paradigm shift, arousing the curiosity of all stakeholders around the topic of monetary transition and resiliency. In our specific case, the currency project not only had to create and promote a network of local independent businesses without their support, but also sell the idea of a paper currency in this up-and-coming cashless society, as well as a local currency in a touristic and wealthy place. Quite a challenge, brilliantly met.

In layman's terms, sustainability means the ability to persist. Due to the lack of new financing from the network and the investors, the LD£ did not persist to become successful and to sustain its impacts. Yet some impact has persisted through wider awareness, and even this research can help to identify lessons for other currency projects, while considering the limitations inherent in all data collection and analysis, and in any article as an excerpt and summary of a full research project (Place, 2021).

5. CONCLUSION: A RELATIVE IMPACT AND SUCCESS BUT A PROMISING MODEL

What are the initial conditions which influence the implementation of a local currency in a National Park and World Heritage Site? A substantial tourist influx, seen as both a threat for its unique natural landscape and cultural heritage, and an undeniable financial windfall. This became the main source of its conservation:

- by targeting visitors on the collection of note denominations with iconic leading figures, and the discovery of the passport stamp trail through unique cultural places;
- by differentiating from other digital loyalty schemes with a free paper currency system;
- by using the expiry date regulation and the leakage from existing experiences as a revenue model;
- and by extending the network of trustworthy partners all over to improve credibility and accessibility.

How does one measure the impact of a local currency initiative in rural context impacted by substantial tourist influx? Because Money is interdisciplinary by nature, the impact assessment and improvement of a currency needs to be holistic – meaning beyond macro/micro-economics – on the form and substance (method and theory) or on the style and content (format and findings). Therefore, using an integrative methodological framework – called

Integral Methodological Pluralism – becomes a matter of course as the impact of a currency is plural; neither purely empirical, nor exclusively economical (e.g. local spending for carbon mitigation). By doing so in this research study and paper, we still assessed a relatively significant impact through various perspectives and methodologies. At the crossroads of Integral research, mixed methods, and impact assessment, we are bringing a novel contribution to the field of currency innovation from a scholarly viewpoint by providing a broader investigation of the currency phenomenon. Indeed, each specific research technique brought its respective and complementary perspective for a holistic and integrative impact assessment of the phenomena. Notwithstanding taking the risk to prioritise "span over depth", by skimming through in-depth disciplinary expertise or methodological mastery due to the resource of the research project (i.e. time limitation and team restriction for proficiency acquisition) (Hedlund, 2010, p. 8). By using the AQAL framework of Integral theory, we discovered that Money could be also defined as an integral object of inquiry or 'Integral money' and has been described by stakeholders as both alienating and emancipating.

To what extent does this currency innovation have the potential to become a social and sustainability innovation that supports the local economy and community? Seen as a financially viable project for a social enterprise aiming to reach its tipping point or critical mass after one year with a return on investment after 4 years, no gain was generated for the first and last years of operation. This is quite usual for a start-up lacking workforce, investment, or subsidies, or even motivation to look for it. According to the analysis, stakeholders said that it was a great currency project, design and network, but it was counterbalanced by a confusing value proposition. Impact on local spending or economy was found on a micro level (rather than a macro level) to have raised awareness on localism and monetary economics without direct pedagogy. However, no impact was found on behavioural transformation, on local charity or community, on local supply chain, or on carbon mitigation. LD£ could become a social and sustainability innovation by: providing a unique visitor experience (i.e. meaningful and authentic interactions, fun and pride); promoting the natural landscape and cultural heritage (i.e. passport stamp trail, iconic leading figures); and validating an unprecedented revenue model based on currency leakage. To do so, it would require a bottom-up approach to gain more volunteer workforce or financers, and to convince traders to provide commercial incentives or proactively propose currency change and thus also target residents. It would also require a hybrid business model (such as a subscription from traders, a commission on convertibility, or a transaction fee for charities) to reduce the pressure on short-term cost-effectiveness and financial viability and to avoid the short expiry date. These are the lessons to be learnt from this currency failure.

Thankfully, our data collection was sufficiently combined and mixed to understand and resolve disconfirming or contradictory results from one method to another. Hopefully, our analysis was adequately compared and integrated side by side in a joint display, to provide a merged interpretation and corroborated conclusion. This was done to respect the requirement of both Integral research and mixed methods used for the holistic impact assessment of this specific currency innovation.

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EXPLORING SOCIAL CAPITAL WITHIN DAMIETTA'S FURNITURE INDUSTRY VALUE CHAIN AS A MODE OF COMMUNITY CURRENCY

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ABSTRACT

Social Capital contributes to the development of professions as well as communities, especially in small scale urban settings with a dense interlocking social structure. Within industry-based communities, a strong Social Capital Network acts as a basis for transactions between enterprises, which strongly ties into the drivers that constitute many of today's community/alternative currency initiatives. Furniture enterprises in Damietta form the main economic base of the city, with majority of residents working in furniture-related activities, passing down their businesses through generations. This paper examines the impact of Social Capital on the nature of this industry's value chain and extent of its influence on business patterns and transactions as a driving force towards an unspoken alternative currency. This is achieved though examining Damietta's existing spatial, social and business patterns, which arise and influence the city's socio-economic industry dynamics. The paper aims at provoking arguments on geographical scale and lifestyle patterns being instrumental in the formulation of a local system of transactions based on Social Capital. The paper builds on the work of Putnam, Wallman and Porter, using interviews and GIS spatial mapping to investigate the connection between Social Capital measures (trust, networks and norms), local furniture industry value chain and socio-spatial living and working patterns in Damietta. The results reveal spatial and social connections that exhibit how Social Capital in Damietta's Furniture industry drives an unspoken currency between enterprises in the city.

KEYWORDS

Social Capital, Value Chain, Community Currency, Furniture Industry, MSMEs.

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1. INTRODUCTION

In order to investigate the connections between Social Capital as a driver that brings about a set of dynamics within a small-scale industry-based city, this paper investigates how the furniture industry in Damietta functions within the context of profession-based Social Capital and the effect Social Capital has on the nature of value chain processes and transactions. The complexities that accompany the use of trust, networks and norms (Putnam et al., 1993) as a basis for many business dealings in the dense and enclosed community of Damietta adds a spatial aspect to the socio-economic setting of the city. The argument in this sense transcends economic profit and becomes mapping a specific pattern of living that evolved in the city within the context of socially based business transactions. The location of Damietta as a regional connector between Mediterranean cities and a northern gateway to Egypt was also a strong geographical factor that prompted Damietta's edge in Industry since it's early history as far back as the 7th Century (*AlShayal, 2000*).

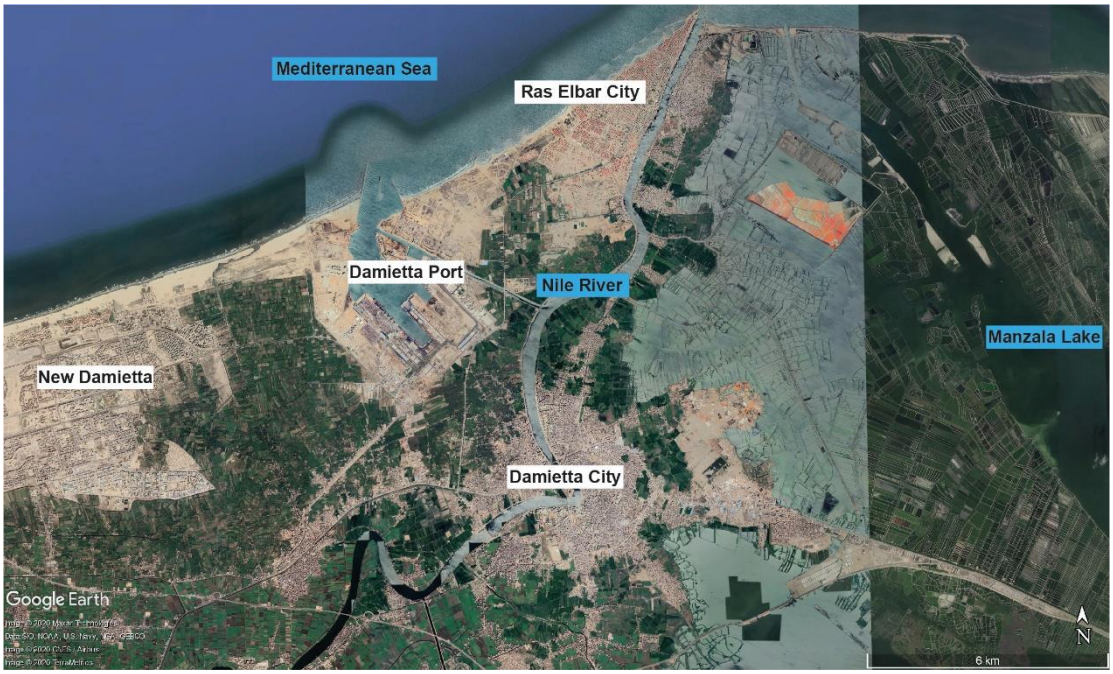


Figure 1. Damietta Region Map: Damietta city's central location and connectivity to the Port and New Damietta city (Source: Google Earth, 2020).

The research builds on the hypothesis that Social Capital is correlated with market control and business success in the industry; enterprises with higher connectedness in terms of trust, network and norms (Putnam et al., 1993) are expected to exhibit higher "control" in the market (*Lin, 2001*). In relation to community structure, its definition of open or closed (Wallman, Vidali, Lo Conte, & Bond, Virginia, 2018) is also a reflection of the nature and magnitude of the implications of densely prevalent dimensions of Social Capital on what could be exhibited as an inherent community currency. The paper foresees that the dynamics of the furniture industry in Damietta would be highly affected by its long-term Social Capital between furniture industry enterprises, resembling an unspoken currency within business transactions. The paper also envisages that within a closed community such as Damietta's, with higher bonds and less bridges or links (*Gittell & Vidal, 1998*; *Hunt, Durham, & Menke, 2015*; *Szreter, 2002*; *Szreter & Woolcock, 2004*), the adoption of Social Capital would give an advantage to the whole furniture industry cluster in the city (*Porter, 1990*), yet it might show negative drawbacks on the status of the industry in the global market (Wallman et al., 2018).

2. BACKGROUND AND THEORETICAL UNDERPINNING

This paper builds on the works of Putnam (1993, 2002), Coleman (1988, 1990), Lin (1999, 2003), Bourdieu (1986), Hunt (*Hunt et al., 2015*) and Burt (1992, 2015) to investigate the theoretical underpinnings that relate to Social Capital in literature. Wallman's model of Social Network Structure (*Wallman et al., 2018*) is also discussed in terms

of understanding the nature of the existing social model in the context of Damietta's furniture industry. The work of Ruddick (Dissaux & Ruddick, 2017; Ruddick, 2015; Ruddick, Richards, & Bendell, 2015) has guided the theoretical base for understanding grassroot economies and Social Capital as an alternative currency, in addition to Porter's Competitive Advantage Theories, which would consider Damietta as an economic cluster (Porter, 1990). The work of Blanc (*2011*) as well as publications by CCIA (Community Currencies in Action) (*2015*) and Grassroots Economics (*2019*) were the base of investigating CCs (community currencies) and their position within the context of the study.

2.1 Grassroot Economics, Competitive Advantage and Community Currency

"Grass-roots Economy – We Work Together" was written on the Bangladesh Business Network (BBN) Committee vouchers (Ruddick et al., 2015), which illustrates the concept of what "grassroot" signifies. Grassroot economies operate on a small scale (formal and informal), giving way to a more sustainable economic pattern that fits smaller societies (Ruddick et al., 2015). Examples from Bangladesh and Kenya have adopted projects that capitalise on small scale economies and introduce the concept of alternative currencies.

The concept of alternative currencies, community currencies or "social money" (as frequently called in Latin-speaking countries) started in the 1980s and evolved in definition and typologies (Blanc, 2011) and the attempt to identify its typologies depended on the type of "project" or context in which the CC arises. **Error! Reference source not found.** shows the types of projects, according to which CCs differ in nature and direction of use, namely: 1) local currencies (territorial projects), 2) community currencies (community projects) and 3) complementary currencies (economic projects). Each scheme proposes a centre of focus around which the CC is generated and used (**Error! Reference source not found.**). However, these typologies are "ideal" (Blanc, 2011) in the sense that they rarely occur in isolation. They frequently overlap and take place within complexities of all three aspects of market, community and space. Hence, Blanc (2011) identified the evolution of complexities of CCs in societies since 1980 including examples such as timebanks and the SOL experience in France.

Circling back to Damietta's furniture industry local enterprises, Social Capital in this context falls under a mostly complementary typology with G4 (a generation of mostly complementary currencies that focus more on the market needs as a driver and builds on partnerships towards economic activities and benefit (Blanc, 2011)) – as in **Error! Reference source not found.** below. The reliability of networks and trusted individuals in business transaction prioritisation is equivalent to (and sometimes more valuable than) skills or monetary assets. Even though Damietta's Social Capital does not satisfy the conditions of a CC as it was not initiated as a model or taken forward by the community or local government, there is a strong alignment between the targets and mechanisms that CC models take forward, and the mechanisms according to which trust and networks work within Damietta's furniture industry.

From the collective city economy perspective, Porter argues that competitive advantage is created and sustained through a highly localised process, where competitive success is a reflection of differences between competitors in culture, economic structure and history among other factors. Within the same line of thought, competitiveness of a cluster first and foremost depends on the capacity of its industry to innovate and upgrade, hence it is achieved through acts of innovation (Porter, 1990). Reflecting on Damietta's market, the inherent identity of the furniture industry and the interconnected social, spatial and economic cycles between the businesses, as well as the cultural correlation between the city and the industry in the wider consumer background in Egypt; are all factors that can be highly utilised as catalysts (as well as assets) for creating a sustainable competitive cluster based on local economies. In Damietta, the culture of spillover and local buzz is inherited through generations of residents working and exchanging knowledge on the "craft" for decades.

Table 1. Ideal types of community currency schemes

Nature of the Project	Space considered	Purpose	Guided Principle	Denomination
Territorial	Geopolitical space (territory politically defined)	Defining, protecting and strengthening a territory	Redistributio n or political control	Local currencies
Community	Social space (pre-existing or ad hoc community)	Defining, protecting and strengthening a community	Reciprocity	Community currencies /
Economic	Economic space (production and exchange)	Protecting, stimulating or orientating the economy	Market	Complementar y currencies

Source: (Blanc, 2011)

Table 2. Ideal type fo community currency schemes

Gene-ration	Significant cases	Currency scheme types	Guiding principle	Content overview
G1	LETS, trueque, CES	Mostly community	Reciprocity first; various distance to market	Inconvertible schemes; quite small openness to external economic activities
G2	Time banks, Accorderie	Community	Reciprocity first; various distance to local governments Market	Inconvertible schemes with time currencies; frequent partnerships, especially with local governments
G3	Ithaca Hour, Regio, Palmas, BerkShares	Local and complementary	Market first; generally distant from local governments	Convertible schemes; local businesses are included; interest of partnerships with local governments
G4	NU, SOL	Mostly complementary	Market first, with links to governments and reciprocity	Complex schemes oriented toward consumer responsibility or / and economic activities re-orientation and other purposes; partnerships are necessary

Source: (*Blanc, 2011*)

2.2 Social Capital as a System

The concept of Social Capital can simply be explained as "investment in social relations with expected returns" (*Lin, 2001*), which is highlighted in various ways in the works of Putnam (1995, 2002), Coleman (1988), Lin (2001) and Hunt (*Hunt et al., 2015*). This implies that engaging in networking interactions produces profits. In other words, Social Capital means/implies/signifies "resources embedded in relationships among actors" (Hauberer, 2011).

Social Capital has evolved as a concept through the works of different theorists. Although Bourdieu's (1986) work includes discussion on cultural capital theory, he also provides a structural view explaining and aggregating Social Capital, one which focuses on the size and volume of the capital possessed by members, and how the interactions of any given members enforce the mutual recognition of those members in the network (*Lin, 2001*). Coleman (1990) stresses trust, norms, sanctions, authority and closure as forms of collective Social Capital, while also emphasizing the individual's use of socio-structural resources in gaining better results (*Lin, 2001*).

Debated issues around Social Capital include relating the aggregation of collective values of economic, political, cultural or social connections/relations, with other collective terms such as trust and norms. Literature includes a display of substitutable terms or measurements that all convey solidarity and social integration with no specificity of each term's place in theory. Lin (1999) argues that Social Capital must be distinguished from collective assets such as culture, norms and trust. It is a relational measure with which other collective assets (such as trust) causally correlate without being defined by one another.

According to Coleman (1990), A fundamental social network consists of two types of elements: 1) The Actors, and 2) The things over which they have control and in which they have interest. The latter can be classified into resources or events according to their characteristics. The relations between actors and resources/events can either be control or interest as earlier mentioned. These relations can be broken down into the dimensions of Social Capital; trust, networks and norms.

2.3 Social Capital Dimensions

Social Capital has been studied as a domain and its dimensions have evolved through various researchers' additions over time to include more dimensions and concepts. Building on the works of Putnam (1995, 2002), Coleman (1988), Lin (2001) and Hunt (*Hunt et al., 2015*), a comprehensive assortment of Social Capital factors of measurements have been identified, namely; Social Cohesion, Networks and Norms as the main divisions. Social cohesion includes measures of social solidarity, trust and reciprocity. Networks includes Embedded Resources and Network Locations. Lastly, Norms comprise belief in activities collegiality and agreeing with collective rules. The following diagram illustrates the measurements adopted in the study for evaluating the volume of Social Capital.

Within sociological literature, trust has been identified in one of three ways: as a property of an individual, as a property of social relationships or as a property of the social system based on individual actions of actors (Misztal, 1996). This research focuses on the third perspective which understands trust as a valued public good, sustained by the actions of actors in the society. Putnam's work explains that trust is a fundamental factor for achieving democracy (Putnam et al., 1993) as being part of the Social Capital which is essential for "effective, responsive and representative institutions" (Misztal, 1996; Putnam et al., 1993).

Among the three Social Capital dimensions, networks are the most measurable and tangibly quantitative elements. According to Burt (2000), focusing on network mechanisms that affect Social Capital offers a more transdisciplinary perspective across theory with empirical evidence rather than loosely tied metaphors and indicators used in a number of Social Capital research. The empirical work of Burt (1992, 2000, 2001) and Coleman (1990) investigating Structural Holes Theory versus network closure as Social Capital provides a tangible quantitative base for measuring Social Capital. Burt argues that the two network mechanisms work differently and can bring various additions to the magnitude of Social Capital if utilised collectively within a "more general model of Social Capital" (Burt, 2000).

The concept of a "norm" works quite differently from the other two dimensions. A norm is "a property of the social system, no of an actor within it" (Coleman, 1990). Norms arise from collective individual actions and is usually used within sociological research to investigate and explain individual behaviour. One of the vital questions regarding norms was posed by the work of Durkheim about whether an individual's behaviour is affected by the social system in which they are (Coleman, 1990).

Examining the three dimensions of Social Capital collectively opens up a variety of lines for exploring the nature of Social Capital as a system as well as on the level of individual actions. In the case of the industry-based urban setting of this research, this investigation would be paired with an analysis of the physical space and the spatial factors that assist or hinder Social Capital concentration in the city.

3. DAMIETTA CITY AND ITS FURNITURE INDUSTRY

The Egyptian furniture industry is a well and long-established domain that is linked to geographical advantage with notable access to major markets, reasonably low costs, and highly experienced labour with regard to woodworking skills. The wooden furniture industry in Egypt dates back centuries with mostly distinct styles that incorporate Islamic, British and French elements into the design, as well as part of the sector also producing rather international style designs, specifically located in Damietta as the northern gate of Egypt (*AlShayal, 2000*). Exports in the furniture sector started in the 1960s and 1970s pursuing the Soviet Union and Eastern Europe. By the 1980s, the export

market shifted in Egypt towards Arab countries to respond to the increasing demand for furniture resulting from booming urban growth in the region (International Labour Organization, 2016).

The city of Damietta extends along the Nile and connects to the Mediterranean as well as east and west to the north coast of Egypt. The centre of the old city (**Error! Reference source not found.**) was selected for geospatial analysis in this paper. GIS analysis of the furniture industry distributed is investigated in this research as part of relating the Social Capital and currency element to the distribution and proximity of enterprises, which in this context are identified as mainly mixed-use and commercial building typologies, to one another (Figure 6).

Figure 2. Study area within Damietta city for spatial mapping. This shall include GIS data analysis of furniture industry.

According to the latest Egyptian Census data in 2013, the furniture industry accounts for 2.1% of total production in Egypt, amounting to 13.6 billion EGP in 2016 (International Labour Organization, 2016). Although this figure is relatively small compared to other industries' production, a more significant figure for this research is the number of establishments in the furniture industry, which is by far the highest among all industry sectors. The furniture industry is also among the highest in number of employees in the sector, representing approximately 11% of the employment in the Egyptian manufacturing sector. The highest concentration of furniture industry is in Damietta, Cairo and Sharkeya respectively (International Labour Organization, 2016).

Table 3. Number of establishments and employment by selected sectors, 2013

ISIC Division Code	ISIC Rev 4 Description	Number of Establishments	Shares of total manufacturing (%)	Total Employment	Share of total Employment (%)
10+11	Manufacture of food products and beverages	77,289	20	612,512	25
31	Manufacture of furniture	104,250	27	270,222	11
14	RMG (Manufacturing of wearing apparel)	48,715	13	254,937	11
25	Manufacture of fabricated metal products, except machinery and equipment	53,065	14	184,926	8
13	Manufacture of textiles	10,481	3	184,684	8
23	Manufacture of other non-metallic mineral products	12,587	3	158,275	7
16	Manufacture of wood and of products of wood and cork, except furniture;	38,855	10	98,766	4
24	Manufacture of basic metals	1,518	0	87,650	4
20	Manufacture of chemicals and chemical products	1,903	0	75,846	3
22	Manufacture of rubber and plastics products	3,735	1	54,825	2
	Total Manufacturing	385,578	100	2,416,460	100
	Grand Total	2,410,353		9,351,137	

Source: (International Labour Organization (ILO), 2016, from Census Data 2013)

The dominance of micro and small-sized enterprises in the furniture industry landscape in Egypt is undoubted even with discrepant figures from different data sources (International Labour Organization, 2016). The following table shows not only the dominance of micro and small enterprises, but the notable rise of their numbers between the years 2006 and 2013. Hence, micro, small and medium sized enterprises (MSMEs) in the furniture industry represent 99% of total number of enterprises, with about 95 percent being micro businesses (less than 5 employees). Although this data dating back to 2013 can hardly be used to reflect the numbers today, the ratios they reflect feature undeniable patterns that are most likely still present in 2018 with new values yet to be updated.

Table 4. Distribution of Enterprises in furniture industry as MSMEs categories

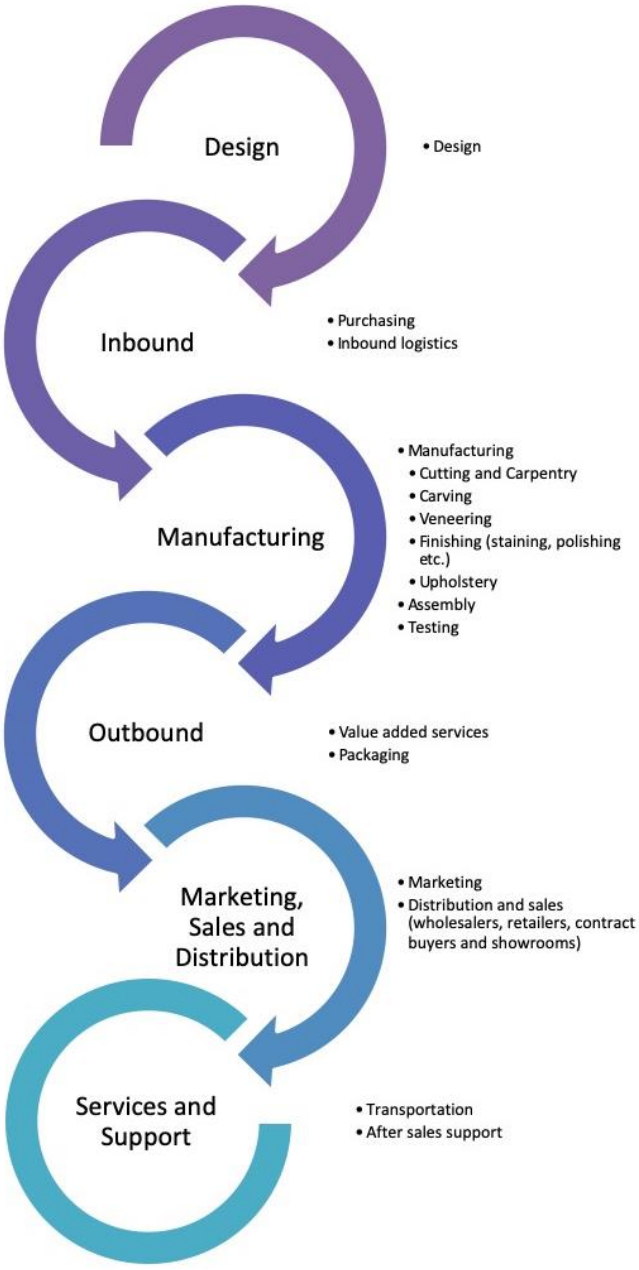
			Less than 5 employees	5-9 employees	10-24 employees	24-49 employees	50+ employees
2006	255,065	89,209	8,729	7,069	285	70	56
2013	270,222	104,250	98,728	5,006	369	56	91

Source: (International Labour Organization (ILO), 2016, from Census Data 2013)

From a socioeconomic perspective, Damietta's economic nature has been always associated with the entrepreneurial essence of its furniture industry. It is a unique context where cluster economies (similar to Sassuola, Italy) has evolved through decades and has been passed down from one generation to the next. Such a mega project outside the city would be drawing out not only the employment pool in the city, but also the income and local investment. Instead of developing the city's economy, the project –in its current form- is offering an autonomous industrial base where Damietta's population shifts to be worker-based rather than owners and entrepreneurs.

According to the International Labour Organization (ILO, 2016), the value chain of the furniture industry includes design, inbound, manufacturing, outbound, marketing and aftersales services. Even though this categorisation is theoretically correct, the way it takes place within the furniture industry in Damietta is quite different and division of labour within different types and sizes of enterprises varies greatly from the theoretical underpinning shown in **Error! Reference source not found.** below. This is further explored through the analysis of this paper in the results and discussions sections, where the value chain patterns within the industry are identified and their relation to Social Capital dimensions examined.

Figure 3. Value Chain of Furniture Industry in Damietta



(Source: International Labour Organization (ILO, 2016)

4. METHODS

This paper focuses on a single case study strategy with its unique set of variables, decisions, processes and relationships investigating Social Capital as a constituent of CC within the small businesses in furniture industry in Damietta. The research proposes a cross-sectional study (Saunders, Lewis, & Thornhill, 2016) of the dynamics of the Social Capital in a Damietta city at the time of the study.

The methods used in the paper comprise semi-structured interviews with furniture enterprise owners to investigate and understand the dynamics of the industry, value chain live-work patterns and the influence of Social Capital within this context. The interviews also explore how Social Capital is manifested within the different "types" and stages along the value chain, and the reflection of the spatial distribution on this manifestation in the compact urban setting of Damietta. The paper also utilised spatial analysis of GIS data of Damietta in order to reflect the socio-economic patterns that arise on the spatial aspect of the industry distribution.

Seven semi-structured Interviews were conducted with furniture business owners of furniture industry workshops in Old and New Damietta cities. The researchers organised and conducted interviews with different enterprise owners until data saturation was achieved (Saunders, Lewis, & Thornhill, 201s6). These interviews targeted two levels of enterprises, namely; large-scale factories/workshops and micro-scale workshops (**Error! Reference source not found.**). Participants were residents of New and Old Damietta, all born and raised in Damietta. As Damietta's community and industry are considered semi-rural, the furniture industry is dominated by male owners, and as such the interviewees were all men. All interviewees were of different age groups ranging from mid-30s young owners to above 60 years old factory owners. All of whom worked within the furniture business most of their lives, whether in this specific enterprise they currently own, or in previous family-owned workshops in Damietta. Researchers also targeted a mixture of highly influential as well as small workshops owners for interviews. This was to ensure different perspectives along the market control spectrum are represented.

Table 5. Interviews division on categories and enterprise activities

Interviewees Enterprise Categories	Number of interviews	Type (Activity) of Enterprises
Large-scale factories/workshops	3	- All processes inhouse enterprise. - Supplementary services enterprise.
Micro-scale workshops	4	- Cutting and carpentry workshop. - Upholstery workshop. - Assembly workshop.

The interview questions primarily targeted issues on trust, network density and norms (as the main measured variables from Putnam's Social Capital Theory), and the magnitude and frequency of their use within business transactions.

Interview questions were framed to tackle the dimensions of Social Capital in a relatable way to interviewees' daily activities and patterns, intrinsically stirring up conversation on the dimensions measured. For example, questions on trust included inquiring about whether they would "feel comfortable working with a new contact who was not referred by a trusted person in the field, and why?". Same pattern was adopted with networks and norms, with questions as direct as inquiring about "the number of contacts" the interviewee works with, alongside indirectly asking interviewees if they have "intertwined types of relations with industry contacts (long term friends or family) and whether they prefer working with such long term contacts, and why?".

Questions were also designed to adapt to the cultural preferences of the interviewees, as well as the delicacy of the issues discussed. For example, the measure of a business's financial success is a difficult issue to ask in order to get viable answers, where participants would not resort to misleading answers.

Interviews were transcribed and analysed using thematic and narrative analysis. The latter tool aided the manifestation of context and socio-spatial narrative into the socio-economic debate about Social Capital, hence challenging free-market-capitalism discourse (Naughton, 2013) that could be argued to be the case in Damietta within this paper's understanding of the city's industry dynamics. Narrative analysis has been used to conclude the patterns of value chain which comprise one of the main findings of this paper. The narratives however cannot be separated from the author/researcher (Boje & Rosile, 2002), which is a bias that the researchers tried to minimise during the analysis through crossing the narratives with the thematic analysis, un-biased literature based.

5. RESULTS AND DISCUSSION

The findings were a result of an overlapped analysis of the previously mentioned methods. There were three main directions adopted in the analysis of the results; 1. Understanding the value chain patterns of the industry as they manifest in Damietta, 2. Understanding the degree of strength of Social Capital within each pattern, and how frequently this is adopted within Damietta's furniture industry in an attempt to explore Social Capital as a factor of CC, and 3. Exploring the spatial dimension of Social Capital within Damietta's city centre area to check for spatial relevance of Social Capital strength vs value chain patterns.

5.1 Value Chain Industry Patterns

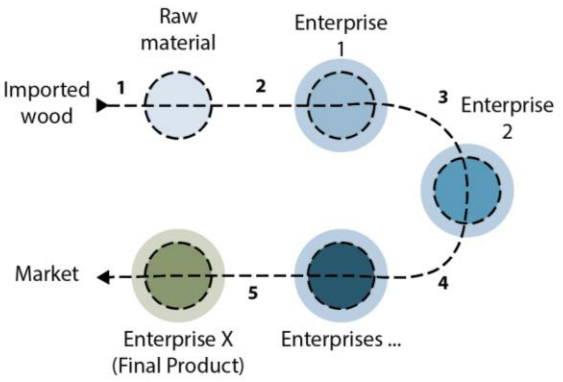
The first output from the analysis was mapping the value chain in Damietta's furniture industry, as well understanding the process through which social actions occur among actors (business owners) along the chain. There are three patterns by which the production process takes place highlighted in Figure 5 - (1)) Enterprise sequential process through which the product is transported from one workshop to the other along the value chain until being finally sold at a gallery (as in Figure 5 - (2)) Product order-based, where one central business owner orders out pieces of the final product (stages) from different trusted partners, given that the final assembly and selling would take place within the central owner's enterprise, and 3) Inhouse process (Figure 5 - (3)), which is only adopted by major enterprises in the market (top category within MSMEs classification), where the whole process takes place within the enterprise without needing partners.

All interviewees have directly or indirectly referred to one or more of the abovementioned patterns, whether it was their own adopted way of work, or their relation to other enterprises in the industry. Some of these mentions of the different types of patterns were clearly raised in statements such as:

> "Within our family, there is a carpenter, an upholsterer and a wood polisher. Whenever one of us receives work, we contact each other for collaborating on it, each in his own workshop. You usually don't want all the family working on the same craft."

> "I only collate the final product in my workshop now. As soon as I receive a furniture order, I have trusted people I know within each craft whom I trust for good quality parts of the furniture, like chair legs, bed headboards… etc."

> "We don't need to outsource anything to other enterprises. We do everything inhouse here in our factory. However, even though I don't need to send out all my work to others, I still send some orders to my friends and contacts from time to time. We don't live alone, and it is important to share resources with others."



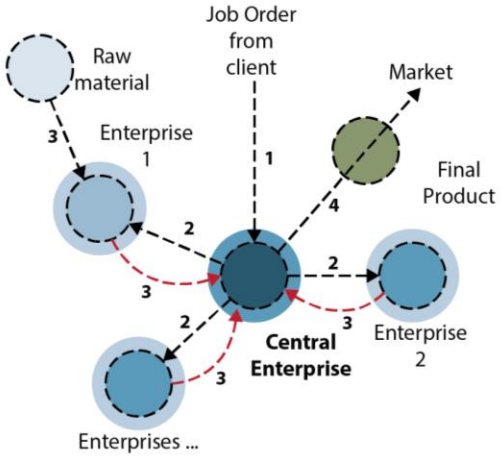
Enterprise Sequential

Product is transported from one workshop to the other along the value chain until being finally sold at a gallery.

Entails urban spatial interaction.

Used in Damietta in some cases. Exerts some Social Capital.

(1)



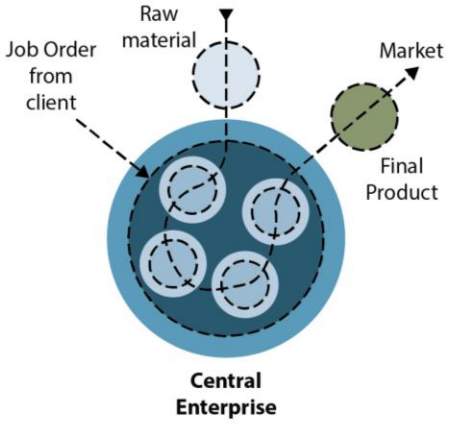
Product Order

One central business owner orders out pieces of the final product (stages) from different trusted partners, given that the final assembly and selling would take place within the central owner's enterprise.

Requires proximity and a dynamic urban spatial interaction.

Most used in Damietta.
Exerts Social Capital as a currency of trust and long term relations.

(2)



Inhouse

Adopted only by major enterprises in the market (top category within MSMEs classification), where the whole process takes place within the enterprise itself without the need of any partners.

Isolated. No spatial interaction.

Used only by major enterprises. Sometimes major enterprises resord to other patterns to keep tradition of Social Capital and relations.

(3)

Figure 4. Patterns of Value chain processes in Damietta's Furniture industry (Source: Author results)

5.2 Social Capital Dimensions within Value Chain Patterns

The second layer of analysis involved exploring the overlap between the unveiled value chain typologies/patterns in Damietta and Social Capital dimensions. Here the paper asks the question of which pattern is most abundantly found in Damietta and which exhibits high magnitudes of trust, networking and norms (**Error! Reference source not found.**). This would be an indicative analysis of whether Social Capital magnitude in Damietta indeed prevails as a significant factor affecting business transactions and hence could contribute as an implicit social currency.

Within the different patterns of production studied here, enterprises exhibit/utilise Social Capital dimension as a currency on various levels. The most prevalent and long-term tradition of Social Capital exchange was always between the first type, enterprise sequential process, where concepts of reciprocity, referral and business intermediaries are highly used between enterprises. One of the interviewees owned a glue factory, which represents

an important supplementary commodity to the value chain, and discussed how his role was not only related to his own business transaction, but to facilitate between carpentry enterprises, galleries and wood suppliers. One of the emphasised ideas mentioned was how the "un-written" contract is to be honoured by all parties within the transactions, including not selling to competitors if an oral bid was placed, for example. The interpretation of time in this last example signifies the importance of trust as a currency, where no monetary exchanges occur in many cases of oral bids, which circles back to the significance of referral and the significance of a trusted word.

Within the second pattern (Figure 5 - 2) (Product order-based), Social Capital appears as assets of the "contracting party" who liaises the different orders with enterprises. In this case, the dimension of networking comes in action where a single business-owner's network substitutes many logistic and monetary transactions with other enterprises along the value chain. Interviews reveal emphasis on having an average of 300 contacts within the city of Damietta in order to properly carry out sustainable business transactions. Within bigger-sized enterprises, these contacts are mainly business acquaintances, while in smaller entities, more family-based contacts are found.

The third typology (Figure 5 - 3) is a rather independent party in the industry, where almost all processes do not involve dealing with other enterprises. However, interviews with large scale business-owners showed that they prefer to mix up their way of work, where they sometimes switch to other processes typologies, as a personal preference, which allows them to be part of a social cohesion approach of "profit and let profit", keeping strong bonds with their trusted neighbours and friends who work in the field.

Skill transfer within the industry in Damietta also happens in a Social Capital related pattern, where the new generations of families are encouraged to step into the business. The use of long-term relations is widely used to access opportunities for work, training and gaining more knowledge in a certain commodity, where people hire or train individuals who were/are referred by trusted contacts. This related to each enterprise trying to secure their "secret recipe" to their product, where they don't just want to hire skilled workers, but rather "trusted" workers who could be taught later on and evolve in terms of skill.

Table 6. - Social Capital dimensions analysis in Value Chain typologies (Source: Author results)

Value chain pattern/typology	Frequency of pattern in Damietta	Social Capital Dimensions		
		Trust	Networking	Norms
1. Enterprise Sequential	Highly abundant	Medium - needed	High - needed	High
2. Product Order	Highly abundant	High - needed	High - needed	High
3. Inhouse	Few large enterprises	Selective (according to owner)	Optional – preferred	High

From examining the overlaps between value chain typologies and Social Capital dimensions within the interview data, it can be deduced that Product Order pattern exhibits the highest Social Capital magnitude, as it requires a high level of trust between the core enterprise and the supplementary ones, as well as high networking capacity in order to hire appropriate skills for the different activities, in addition to the industry norms that are abided by in all patterns within the city. Enterprise Sequential pattern also exhibits high Social Capital, with less need for trust, as enterprises deal primarily with adjacent activities to them along the value chain, with no need for trust within a wider circle.

Since the majority of enterprises in Damietta are MSMEs, they all operate within one of the two primary patterns identified above (Enterprise sequential or Product order). This intrinsically affirms the paper's initial hypothesis on the abundance of Social Capital and its high influence in the market in Damietta, as almost 99% of furniture enterprises in Damietta (**Error! Reference source not found.**) operate within a value chain pattern that incorporates high Social Capital within business transactions.

5.3 Social Capital vs Spatial Distribution

An investigation of spatial distribution of furniture enterprises as well as the urban fabric of the city reveals an abundance of mixed-use entities with clear concentrations of enterprises in certain areas of the city centre (**Error! Reference source not found.**). It is also significant to note the small-scale land plots in the city which reflect on small areas for individual enterprises, as well as a compact street network within the city. As most land plots range between 200-400sqm (**Error! Reference source not found.**) (CAPMAS, 2019), the small scale of enterprises is almost ensured, which reflects on continuous need for the value chain patterns that thrive with higher Social Capital in the specific context of the city of Damietta. These spatial factors contribute to creating a proximal environmental where owners are in constant contact with business partners and potential collaborators, increasing the chances of taking forward product orders and business interactions. Figure 5 below shows how the enterprises utilise the street space as a common "gallery" to showcase their products with proximity that ensures daily social interaction between adjacent workshops.

Figure 5. Example of compact urban fabric with mixed-use typology of the internal streets of Damietta's city centre (source: Author, 2019)

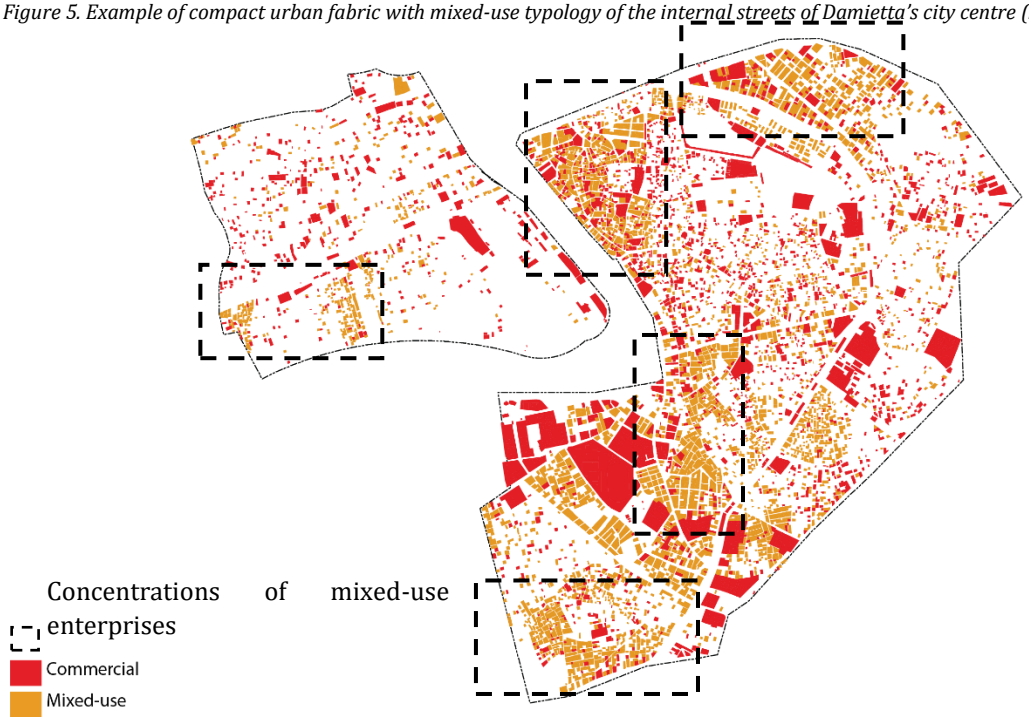


Figure 6. Damietta city map: showing compact urban fabric with abundance of mixed-use typology (residential + furniture workshops) (Data source: CAPMAS, 2019, Map developed by Author)

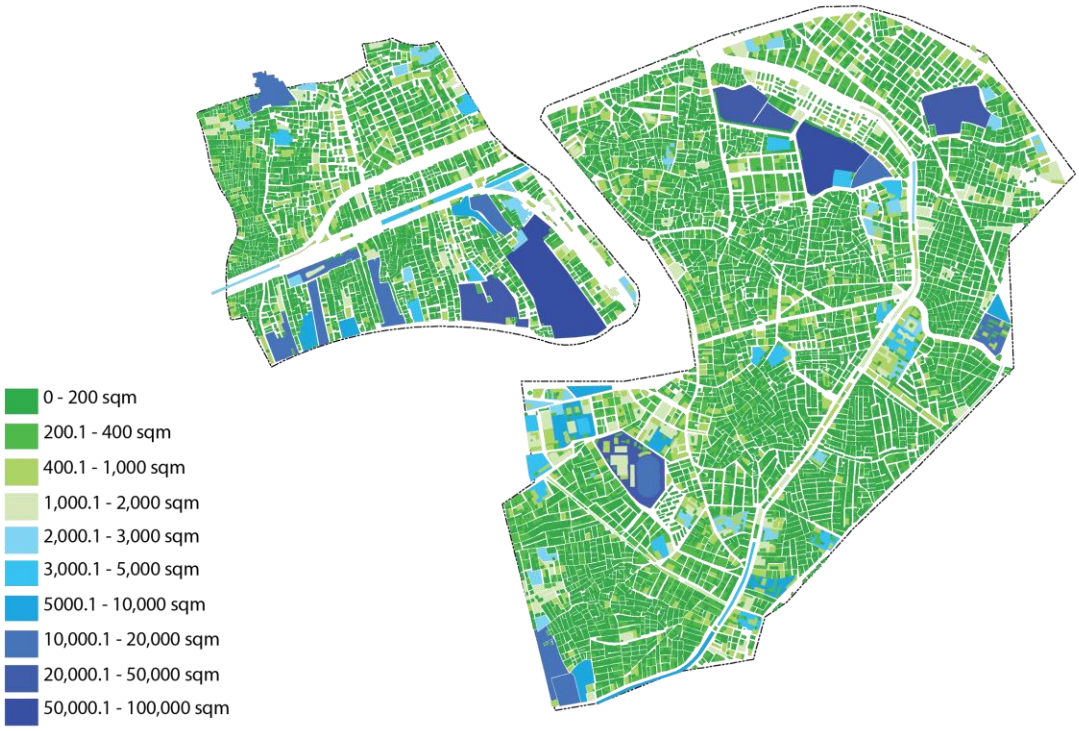


Figure 7. Map of land plot areas in Damietta (Source: CAPMAS, 2019, Map developed by Author)

6. CONCLUSIONS

The primary hypothesis of this research which claims the prevalence of Social Capital agglomeration within the economic cluster of Damietta as a driver and catalyst towards complementary currency has been supported through the data. The findings exhibit evidence of the vitality of trust, networks and norms within the value chain patterns of business interactions between enterprises in the furniture industry, specifically in the case of MSMEs. The closed social network of Damietta (*Wallman et al., 2018*) does support the increase of social bonds between business-owners in the industry, hence revealing higher efficiency of business transactions that skips some logistic guarantees based on predetermined trust and reliability.

The spatially dense urban fabric of the city also suggests a link between proximity and Social Capital, which was also investigated through spatial analysis of the city fabric. Even though this case implies clear industry-related indicators, the potential for generalisation lies in the common factors found in global south cities with local industry concentration, small-scale (MSME-based) economic cluster, and a strong long-term social structure. Through context examination and consideration, the research methodology can be replicated in different contexts for comparable industries; focusing on Global South industries within communities that exhibit strong societal norms and long-term social relations.

Suggested further research could incorporate the investigation of the bridges that link Damietta to the international market, which could also be compared to other cities such as Sassuola or similar examples of industry-based urban contexts, in terms of internal Social Capital versus external links to the global market. Another approach could incorporate a closer focus on the nature of bonds between enterprises in Damietta, capitalising on Burt's work towards investigating the reasons behind the rise or demise of certain relations that highly affect the market. Exploring how to operationalise and numerically quantify the magnitude of Social Capital dimensions within the different value chain patterns could also provide a continuation to the work presented in this paper.

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TAX-CREDIT INSTRUMENTS AS COMPLEMENTARY CURRENCIES: A POLICY PROPOSAL FOR FIGHTING THE AUSTERITY WHILE SAVING THE EURO ZONE

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ABSTRACT

How should progressive governments respond to what seems an endless crisis of the eurozone? Most of the policy debate focuses on two equally bad options: either pursuing the current path in hope to "muddle through" or exiting the eurozone. This paper outlines an alternative strategy where the euro is preserved as the common currency used in everyday life but complemented by national means of payment, a type of quasi-money made up of low-denomination Treasury notes. Backed by future tax revenues, this means of payment would be called the euro-franc, euro-lire, euro-peseta, euro-escudo, etc. It would be kept at parity with the euro but its exchange into euros would be strictly limited and submitted to special conditions. A Member State determined to implement this policy would probably face retaliatory measures from European institutions, but it cannot be expulsed from the eurozone nor from the EU. The outcome of such a confrontation would depend, among other things, on government's ability to win confidence of its population for the plan, to gain popular support in other European countries and to negotiate firmly with the EU institutions. Such a step would be only one element of a broader economic policy package, including tax reform and debt restructuring. But it would be the key element, as it would make it possible to resist creditors' blackmail and stay the course long enough to reconcile the two imperatives of any progressive strategy in Europe today: using national democratic spaces to build a European public space and redirect the European project towards more cooperation and solidarity.

KEYWORDS

Tax-credit money, complementary payment systems, eurozone, austerity policy

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1. INTRODUCTION

Theory of money shows that a currency is much more than a store of value or a means of payment; it as a "social operator" of belonging to a political community (Aglietta 2015). The euro has, until now, failed in that respect. The new currency could have contributed to a stronger European political community through economic and monetary integration, but the way in which it was set up as a pure financial tool led to its failure. As a consequence, the European monetary union aggravates the very geographical imbalances and social inequalities it was supposed to attenuate, and weakens the European political identity it was thought to construct. This in turn undermines its legitimacy, especially in countries with structural deficits (Southern Europe and France) which became prisoners of permanent high unemployment. In result, the looming political or financial crisis threatens to shatter the whole project. The question is how to address that challenge.

The eurozone could of course be made more viable through radical, democratic reforms of the European treaties in a spirit of cooperation and solidarity, through strict regulation of finance, European taxation, budgets voted by a Eurozone Parliament and so on. However, for time being the dominant political forces in Europe have no intention of moving in that direction. As shown by Syriza's failure to challenge EU policies in the case of Greek debt, European political elites prefer to mobilize the power of finance and the straight-jacket of existing treaties, while pursuing the same path as before and opposing any national attempts to find an alternative to the status quo. Democratic political action is still played out, for the most part, at local and national levels with the European public space kept stunted and powerless, with little public scrutiny.

Europe's next financial or political crises will doubtless trigger, each country going at its own pace, new attempts to break free from the stranglehold of the treaties and the ECB. It is therefore vital to prepare now. We should avoid past mistakes and retain lessons from history proving the value of thinking "outside the box".

Clearly, hoping to somehow "muddle through" the crisis is not viable, as the flaws of the eurozone are structural. But neither is leaving the euro and going back to a devalued national currency a good option. Considering how deeply integrated European productive and financial systems are, this could further exacerbate the political instability favorable to authoritarian and xenophobic movements.

How should then progressive governments in Europe respond to this situation? As stated above, simply leaving the euro and opting for a competitive devaluation of the new national currency is in our view not viable. It would amount to a classic mercantilist policy for increasing the exports and reducing the domestic purchasing power by importing inflation; in other words, to an aggressive competitive policy which is unlikely to lead Southern Europe out of austerity.

In addition, solving the euro crisis is not possible without shifting towards a new model of development, which will necessarily have major distributional effects and imply internal political conflicts. Winning the domestic political struggle will require broad support from the population and solid popular back-up in other European countries, including among the middle classes, savers and entrepreneurs, who have – or think they have – something to lose if the eurozone were to collapse.

Most importantly, the construction of Europe as our common political arena is the requisite for going beyond national antagonisms and organizing the social-ecological transition towards a more sustainable society. This transition must be global, it cannot possibly work merely at a national or even regional level. We need a credible European project if we want to have some weight in global power relations with transnational companies, the US and the so-called "emerging" countries. Such a project should emerge from the euro crisis itself, which is a crisis of the neoliberal ideology underpinning the European monetary union in its current form. To say "first let's take refuge behind our national borders, then we'll see on how we can get out" would only pave the way for nationalist forces that would crush any prospect of a democratic European integration.

For all these reasons, leaving the eurozone – which for some legal experts would mean leaving the European Union (Siekmann 2016) – cannot be a legitimate objective nor a prerequisite for change for progressive political movements. Choosing that option amounts to giving up the fight to impose a trans-European political debate over how to redirect the European project. There is also a risk that this option will dissuade the middle classes without satisfying the working classes.

As it is, the euro and its conceptual flaws are creating a de facto solidarity and a common interest among the populations who pay the price of austerity and the growing inequality. This actually includes broad social groups in "core" European countries such as Germany, even though they may not realize it until it is too late. The battle for a new political hegemony cannot be won in any single European country, it has to be waged on the European level. Some of the foremost principles of European construction, such as subsidiarity, are still available to political forces determined to bring this battle to a successful conclusion. However, this means that some Member States must mobilize the political resources which remain at their disposal, such as taxes and economic policies. In this respect, issuing a fiscal currency to complement the euro could be a crucial political tool – though the actual term "currency" should probably be avoided for legal and tactical reasons, as explained below.

1. FISCAL (TAX-CREDIT) COMPLEMENTARY CURRENCY: THE BASIC PRINCIPLES

The challenge then is to use a national political crisis as an opportunity, and to show to voters that it is possible to emerge from austerity and conduct alternative policies without calling into question a priori the unity of the eurozone. Issuing a tax-credit currency by the State in parallel to the euro issued by commercial banks might enable a progressive national government to inject liquidity in an independent, efficient and targeted fashion, thus immediately reducing its floating debt and ultimately its consolidated debt (Coutrot et alii 2015, Kalinowski et alii 2017). Such a currency emission strictly complies with the principle of subsidiarity, as Member States are alone in disposing of their own fiscal power legitimized by an annual vote on the budget by their Parliaments.

This strategy retains then the euro as the common currency of legal tender, but complements it by a national means of payment made up of low-denomination Treasury notes - of 5 to 50 euros - with limited but renewable duration. The complementary currency can also take the form of an electronic currency run by the Treasury or an independent agency using transparent implementation. Backed, like any public debt, by future tax revenues, this instrument of payment would be called the euro-franc, euro-lira, euro-peseta, euro-escudo, etc., and kept at parity with the euro yet not freely convertible and not negotiable on an exchange market.

This new complementary currency can be used to pay a fraction of civil service salaries, welfare benefits and public expenditure, as all these expenses are de facto short-term public debts. In exchange, the State would commit to accepting this currency as payment for taxes, in parity with and as the equivalent of the euro issued by the banking system. It is this guarantee that mainly ensures social acceptance of the complementary currency as a means of payment at national scale and upholds its parity with the euro[i] .

Parity with the euro, guaranteed by the State, is an essential condition in this strategy, for two reasons. Firstly, it will strengthen confidence in the complementary currency and prevent inflationary expectations. Secondly, it is indispensable to convince the populations of Europe that the strategy to reform the euro system is a cooperative one, and makes more difficult tactics such as the one used by the ECB against Greece in June-July 2015, withholding liquidities and strangling the Greek economy. By contrast, creating a convertible complementary currency at risk of immediate devaluation would signal from the outset that an exit is possible. It would trigger negative expectations, then speculation, further devaluation and finally a disordered exit from the eurozone. Indeed, this was the scenario envisaged by the then German Finance Minister Schäuble and the ECB in 2015 with a view to preparing a Grexit (Jennen and Buergin 2015).

2. TWO MAIN PURPOSES

a. A tool for strengthening the local economy and reviving popular consumption

To confront current austerity policies there is an urgent need to issue this type of currency wherever the single currency is leading to recession, mass unemployment, rising social insecurity, the decline of public services and insufficient long-term investment required for the ecological transition. The State could agree to pay-rises (of a uniform amount, for example, 300 euro-pesetas or euro-francs a month) to civil servants and pay its suppliers partly in complementary currency. It would thus inject extra liquidities towards two key policy objectives: helping low wage households and strengthen domestic productivity. As the new complementary currency would not be freely convertible into euros, its emission would favor suppliers who produce locally. The effect of economic regeneration would rapidly reach the private sectors and all wage-earners. A reduced debt would also give the State a renewed investment capacity, especially for the ecological transition.

b. A tool for debt reduction

This policy would reduce public debt and the State's dependence on foreign lenders since, with time, issuing a fiscal credit currency would have a double effect on the dynamics of indebtedness: a direct effect, since the State would cease to incur debt on the financial markets for its floating debt (the debt funding the Treasury cash-flow of a given year), which in turn affects its transformation by consolidation into longer-term debt (Théret 2016); and an indirect effect due to the economic vitality regenerated by the injection of money. Public debt would diminish in relation to GDP as the numerator goes down and the denominator goes up. Moreover, the foreign trade balance would also improve with the reduction of imports and this too would reduce dependence both on international finance and on foreign markets.

3. AN EXPRESSION OF NON-NATIONALIST POPULAR SOVEREIGNTY

On monetary matters, the political and symbolic dimensions are crucial. Issuance of a fiscal credit currency is the equivalent of creating interest-free indebtedness of the State towards the citizens, so that confidence in this type of money would broadly depend on confidence in the government issuing it and in its political project. In this way the violence exercised "from above" through the euro could be opposed by people's trust in "their" fiscal currency. This revival of popular, national and democratic sovereignty would not be to the detriment of the other nations of the European Union but to the advantage of all its peoples, as a proposed alternative path of development to free our societies from financial dominance. The negotiations with the European institutions would obviously be difficult, but they would give time to bring this narrative onto the European public space and wage the struggle for political hegemony.

Here, it would be useful if a group of countries willing to promote such a policy where to take joint action in an ad hoc coalition. It would no doubt be difficult to mobilize the principle of enhanced cooperation as it requires a unanimous vote within the European Council[ii] . But in practice, it would only take one country to go down that road for the others quickly to follow, so that the procedure would become a common practice shared by a significant number of member States.

4. HISTORICAL ANTECEDENTS

In France, the "Treasury circuit" made it possible to finance post-war reconstruction using similar principles. And in some federations, federated States have already successfully tried out recourse to issuing currencies to complement the federal currency, and this over a long period of time. Thus, we know the conditions required for such experiments to be successful: they must be negotiated upfront with the workers' unions and small business federations, the issuance must be moderate and controlled, and the government must win popular support for the political project underpinning the monetary policy. In fact, the idea of complementary fiscal currency springs not from preconceived theoretical concepts but from historical experiments such as:

- the quasi-monies issued by the Provinces of Argentina between 1984 and 2003, most of which – like the patacon of the Province of Buenos Aires during the 2001-2002 crisis (Théret and Zanabria 2007), or the bocade of the Province of Tucuman which lasted from 1985 to 2003[iii] - met with significant success despite the relative weakness of their fiscal back-up and the macro-economic instability at national federal State level (Théret 2019a).
- the tax anticipation scrips issued in the United States by many major cities during the crisis in the Thirties; and also the currency finance practised in the American colonies – i.e. federated States- in the 18th Century and, in certain specific forms, in the 19th Century.

Furthermore, similar proposals have been lively debated across Europe since the start of the euro crisis, with numerous academic contributions and press articles (Théret 2017). Several fiscal currency mechanisms have been proposed, depending on the national context and the authors of the proposal. The model suggested here is inspired by the mechanism adopted by the Argentine Province of Tucuman, which proved resilient – lasting from 1985 until 2003 – and efficient at reducing public debt and as a contracyclical political tool. To mention only one similar proposal, the Italian scheme for tax credit certificates (TCC) to be distributed as "helicopter money" and linked to a tax debit card is also worth examining, even though its option of making the TTC negotiable in euros on a daily basis does seem rather problematic (Bossone et alii 2015).

5. A UNILATERAL BUT COOPERATIVE PROCESS

The creation of a national fiscal credit currency in complement to the euro avoids the pitfalls of the two usual kinds of proposals for resolving the euro crisis, i.e. sovereignism and Europeanism. The former sacrifices the European project on the altar of a supposed democratic sovereignty at the national level, while the latter (in its different versions, neoliberal or Keynesian – providing, for example, for a system with a common currency accompanied by cooperatively devalued national currencies) in fact sacrifices national democratic choices for an improbable Europe-wide consensus on reform.

This initiative should be obviously only one element of a much broader economic policy including tax reform, debt audit, democratic socialization of banks, etc. But it would be the key element, one that would make it possible to resist creditors' blackmail and stay the course long enough to reconcile the two imperatives of any progressive strategy in Europe today: make use of existing democratic spaces – mainly local and national – and initiate a new European project founded on solidarity. It would give progressive governments time to carry on the European political battle and allow other countries to reach the tipping point and redefine the nature and the contours of the European project.

6. PREPARING FOR THE LEGAL-POLITICAL BATTLE

a. An **unavoidable battle**

The system can be implemented in such a way as not to contradict existing European treaties[iv]. The payment instrument proposed here is to be used strictly for tax and local payments and is not legal tender: it is not money in the legal sense of the term, and its creation does not impinge on the prerogatives of the European Central Bank. Neither would the issuance of fiscal credit notes be inflationary, since any excess would result in their devaluation against the euro rather than by inflation of the general level of prices.

Also, at the legal level, Member States pursuing this policy cannot be expulsed from the eurozone, which has no institutional existence separate from the European Union, nor in expulsion from the latter, this not being provided for in the treaties (Athanassiou 2009, Siekmann 2015). These are crucial points in constructing a power balance that is favorable to governments who want to undertake this kind of innovation.

The example of Greece, despite its very specific character[v], does however suggest that a State which takes the initiative of such an innovation would face retaliatory measures taken by the European institutions, primarily the ECB, in order to force the country either to abandon its project or leave the EU. This battle seems inevitable and therefore should be anticipated. Thus, political parties that might choose this strategy need to prepare in advance – not only to build trust in the fiscal currency, but also to manage a tough legal-political battle against interpretations claiming, obviously with ideological and political motivations, that the initiative would be at variance with the Treaties.

b. Some possible arguments to be developed

In fighting that battle, Member States could recall various impingements and exceptions to the treaties introduced by European institutions since the financial crisis of 2007/08, for instance ad hoc organizations such as the Eurogroup and the European Stability Mechanism (ESM), validated a posteriori by the Court of Justice of the European Union (ECJ). A major precedent could also serve as argument in that debate, namely the use of exceptional powers by the governor of the ECB and "non-conventional" monetary policies, which seem to exceed ECBs mandate and were justified by the "exceptional" situation and the need to "save" the euro. Another possible source of inspiration is the German habit of challenging EU prerogatives by submitting them to the German Federal Constitutional Court.

Preparations should also be made for responding to the legal argument which holds that a fiscal credit currency – even if it is considered as an element of the fiscal policy of the Member States, i.e. a prerogative which, while "coordinated", remains the exclusive, sovereign initiative of the Member States – is prohibited by the CJEU as contradicting the spirit of the European treaties, according to which the Member States create "an ever closer union" (Article 1 of the TEU.)[vi] The challenge would be to explain to European institutions that given the determination of a national government to escape from austerity policies and the liquidity trap at all costs, the system is in fact a

solution for maintaining and even strengthening the Union; the other term of the alternative being not the status quo of the single bank-euro, but the exit from the euro and thus from the Union. After Brexit, if either Portugal or Spain, let alone Italy, were to leave the EU, the effect would be the opposite to moving towards an "ever closer union."

Choosing a proper name for the system is also important to avoid accusations of counterfeiting. It must be made clear that these quasi-currencies (terms used by the IMF and the World Bank in the case of Argentina during the 1980s-90s) are purely tax credit instruments, in fact Treasury notes in bearer form and in small denominations, issued directly to the public in order to serve as payment instruments consistent with a budgetary policy aimed at reducing deficit and debt in euro.

7. CONCLUSION

The exact form of the new system requires careful consideration, since from a legal point of view, depending on the country, it can be easier to issue digital or paper currency. Also the framework of its implementation must be carefully designed as to reduce legal and regulatory constraints – both European and national – that could hamper it and make it ineffective. Clearly the national fiscal currency must have a high degree of autonomy in relation to the current banking system and the financial markets, and must be founded within a restructured Treasury Circuit that can house it[vii]. The simplest solution in an emergency situation is looking for inspiration in experiments that have achieved success and whose implementation does not need a complex infrastructure; this would suggest issuance of paper notes complemented by the creation of Treasury and postal current accounts with debit cards.

In any case, the constraint of the EU law would be neither immediate nor heavy; it could not prevent a determined and duly prepared government from instituting a payment system based on anticipation of tax revenues, as is the case with any government debt. In short, the idea should not be abandoned that due to the current institutional shortcomings of the EU and of the Eurozone, a political and legal space exists within which progressive governments can refuse any blackmail regarding an exit from the euro and the EU, and conduct autonomous national policies that may one day change the balance of power in Europe. A government whose program includes the issuance of a complementary fiscal currency, kept at parity with the euro, should be prepared to fight this battle offensively, and not from a situation of weakness at the legal level. In that regard, to prepare such a strategy of defending the legal nature of a complementary fiscal currency, the political forces proposing it need to be backed by a group of qualified legal experts.

In any case, if an exit from the euro and thus from the EU were finally to become inevitable, it would be less painful with a complementary currency already in place. And above all, at the end of such a political and legal battle, the exit would appear to European public opinion as an unjustified expulsion, a sanction against a courageous government looking for a solution to save the eurozone.

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ENDNOTES

i In practice, this acceptance can also be boosted by issuing notes with a lifespan limited to, say, 2 years and earning interest, but with a zero coupon. On the possible variety of specific forms of fiscal credit currency see Théret (2020).
ii M. Caron brought this point to our attention.
iii Théret (2019b) details the very significant effect on public debt reduction of this fiscal credit currency judiciously named "bono de cancelacion de deuda" (debt cancellation bond). Some explanations of the contexts in which these historical initiatives stopped working can be found in Théret (2019a, 2019b and 2020) for the Argentinian case, and in Gatch (2012) and Grubb (2003, 2005) for the US case.
iv The three French legal scholars, specialized in public finance and monetary issues, that we consulted share this point of view.
v On this specificity that concerns the historical long-term dependency of the Greek State on foreign creditors and the private character of the Central Bank, see respectively Reinhart and Trebesh (2015) and Karatsoris (2015)
vi This point has been stressed by M. Caron.
vii J. Grosdidier and R. Zanolli have emphasized the importance of the accurate institutional design of the complementary currency.

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CHIEMGAUER COMPLEMENTARY CURRENCY – CONCEPT, EFFECTS, AND ECONOMETRIC ANALYSIS

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ABSTRACT

Complementary currencies have a wide variety of currency designs. In practice the goals of a community are in the foreground. The form follows not only the function but also the people and the environment. In the light of objectives currency designs can vary. A "pure model" in the beginning, through socio-economic innovation, evolves into a mix of models to find the best matching for capacities and needs based on available resources. When we have a look into established currency schemes like the Chiemgauer in Bavaria, we discover a strong relationship between the economic, social and cultural situation in a country and the development of a complementary currency. We take a deeper look at statistics and also examine pro- and countercyclical effects of the Chiemgauer based on econometric models. Significant impacts on a local level can be assigned. At the next stage, therefore, pilot projects in cooperation with state institutions seem useful, which can contribute as institutional experiments to the democratisation of the monetary system.

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KEYWORDS

Complementary Currencies, Chiemgauer, Quantity Theory, Vector Error Correction Models (VECM), Countercyclical Effects

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1. CONCEPT OF COMPLEMENTARY CURRENCIES

People starting complementary currency think of money as a tool (Kennedy et al., 2012) and are concerned with problems like unemployment, environmental degradation, poverty, inequality, discrimination and so on (Gelleri, 2020b). There are many theories about money and experts who campaign for the concept of complementary monetary institutions.

Before inventing the Chiemgauer, there was a year-long analysis of many different ideas, not only on local level, but also on proposals for changing money and finance on the national level (Gelleri, 2005, 2009). Back in the 1990s there was only little economic literature on complementary currencies, but some literature on barter systems can be found which describes "special purpose money" (Marin and Schnitzer, 2002; Schneider, 1995). However, the arguments remain purely economic - neglecting the social dimension; e.g. enhancing trade between businesses and subject to high transaction costs within an unstable economic system, as it was the case in Russia and Ukraine in 1997.

A broader perspective came with the turn of millennium with papers and books on "complementary currencies" (Blanc, 1998; Gelleri, 2000; Kennedy and Lietaer, 2004; Lietaer, 1999). Lietaer defines a complementary currency as an agreement within a community to use an additional currency in a way of exchange (Lietaer, 1999: 282), while it is complementary, because it is not meant to replace the national currency system.

An anonymous market cannot solve the emergence of complementary currencies but institutions that are setting the rules and processes of creating this new money (Desan, 2017; Ingham, 2004). They enhance the access to knowledge of needs and capacities and possibilities to match them.

Complementary currencies differ from national currencies; they are not or only partially integrated in the official monetary system and have their own currency name and rules. On the one hand, they/complementary currencies differ from 'competitive currencies'. Competitive currencies were created to pursue separate purposes from societal problems and challenges. These include the emphasis on individual ownership of monetary values, anonymity and profit maximisation. A study of Bitcoin shows that an overwhelming share is owned by a small fraction of people and 46% of the transactions serve criminal activities (Foley et al., 2019: 1800). On the other hand complementary currencies aim to be a useful part of society, by taking care of aspects of society that are neglected by the national monetary system (Gelleri, 2020a). The transitions are fluid when complementary currencies substitute other forms of payment ("compete") or when the unit of account or exchange is organized in the national currencies ("integrate") (Blanc, 2018). To emphasize this aspect, many complementary currencies speak of themselves as community currencies (New Economic Foundation, 2015) or community inclusion currencies (Ruddick, 2020). One of the older existing examples of a "community currency" is the Chiemgauer that belongs to the type of "reserve backed complementary currencies" (Gelleri, 2020b).

2. EXAMPLE OF THE CHIEMGAUER COMMUNITY CURRENCY

Our starting point is in the Southeast of Germany – the Chiemgau region between Munich and Salzburg. The Chiemgauer currency began as a school project in 2002. Six students wanted to experience an alternative form of money in a student's project. An action-oriented approach was applied to generate new experience and knowledge. Students (and teachers) wished to learn what money is all about, what it does and how it changes. For this purpose, a non-profit organization was founded as issuer of the local currency in 2003 (Chiemgauer e. V.). This non-profit-organization is in charge of printing the money, education and research, and recruiting new members. At the same time, when the Chiemgauer was founded, Germany was in a recession and the output gap was about 2 per cent (Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung, 2018). Real wages had fallen and consumer confidence index was quite low (Lange, 2017). Later we will see why this context is typical for certain types of complementary currencies and generally speaking, there has to be a problem that can be solved by the monetary tool.

2.1 Where does the Chiemgauer idea comes from?

The Chiemgauer was not a completely new idea. In Germany there were already two theories the first movement occurred due to the writings of Silvio Gesell who propagated a monetary system with a circulation incentivized by explicit carrying costs, rather than the inflation of a currency issued by a sovereign (Bongartz, 2015). Gesell never

proposed complementary currencies, but people around him like Hans Timm as a co-founder of the WÄRA (Erfurt, Germany) in 1929, pushed for practical examples (Onken, 1997). The issuer of the WÄRA was based in Erfurt, Germany, and provided communities with promissory notes against secured loans. The initiative disseminated in 14 cities in Germany and was prohibited in October 1931 by an emergency decree. The most prominent realization was the "miracle of Wörgl", a little town in Austria that issued its own currency in 1932 on the initiative of its the mayor Michael Unterguggenberger (Broer, 2013).

The second movement are barter and gift systems which go back to ideas of Robert Owen (Polanyi, 2001: 133). The basic idea of socially mediated reciprocity is much older and is subject of research by anthropologists like David Graeber (Graeber, 2011). Today the WIR-bank in Switzerland is the largest complementary currency in the world (Dubois, 2014). It started in 1934 as cooperative. The founders Werner Zimmermann and Paul Enz were inspired by free money experiments of WÄRA and Wörgl but also by German and Scandinavian compensation funds (Hardraht and Godschalk, 2004). By taking a closer look at the WIR-system you can see it is not only a barter system. It evolved to a "mutual credit banking system" with the cooperative bank as central issuer of the WIR-currency. The issuance is quite like the money creation process of a bank, but unlike the Swiss-Franc, which trades on international currency markets, WIR-Francs circulate only within the WIR-sphere. This system combines the internal cohesion of a barter system with the money creation process of a bank. The WIR-cooperative has the legal status of a bank in Switzerland.

Both examples show that money does not come into the world as a "thing" created by "individuals" but as a common agreement of a collective (Zelizer, 1989). The collective wants to solve a basic problem which Jevons called "the double coincidence of wants" (Menger, 2009). When we find gaps between needs and capacities there is a potential for monetary tools to close that gap. To widen the picture, we also must consider aspects like collective goals or ecological resources. Money is a communication medium to mediate between goals, resources, capacities and needs. "Money, whether we look at its origins in a community or its continuous renewal there, appears as an activity designed to organize a material world." (Desan, 2014: 6)

2.2 Solving the magic triangle

The concept of a "magic square" is widely used to express the goals of macro-economic policymaking (Bofinger, 2010; Picek, 2017). The goals are high employment, permanent growth, price stability and a balanced trade volume with foreign countries. Local currencies define their goals within their community. The main objectives of the Chiemgauer organization are regional development, promoting non-profits, increasing the share of 'gift money' (donations), and sustainability. In the case of output gaps and unemployment the local currency should work as a 'lifeboat' (Kennedy et al., 2012). This objective is similar to the macroeconomic objective of high employment and implicitly include the goals of a price-stable currency and a balance with other currency areas. Regional currencies contain these three goals of the magic square on the one hand, but go beyond them with other goals. At the same time, the objective of "permanent growth" is denied, because exponential growth is seen as a conflict over sustainability (Boit and Hodgson, 2018).

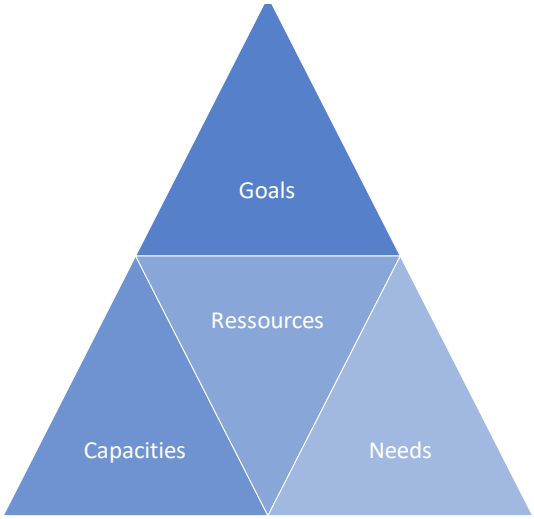
To integrate this conflict into a model, we substitute for the magic square a magical triangle, one that contains the idea of harmonization instead of maximization. We start from resources that the earth provides annually. Then we define the goals that we optimally combine the existing capabilities with the needs (Raworth, 2017). The motto of global thinking and local action can be effectively supported by complementary currencies. In this respect, initiatives such as the Chiemgauer could herald a post-growth society that helps to harmonize planetary boundaries with existing needs and capacities (Paech, 2008).

At the micro level ambitious goals must be transformed into manageable solutions. For the six students in 2002, their main goal was practical: to contribute to a sports hall for the school. Half of the time of gymnastic instruction had been wasted in providing transportation. Many parents and teachers were happy to adopt this goal.

In times of a recession it is often unused capacities that drive the currency innovation. Mutual credit currencies concentrate on matching these capacities to avoid the waste of resources like labor. An example: When person 1 has time, he or she babysits for person 2. Person 2 pays person 1 with one time credit which equals one hour of time. Person 2 can use the time to earn time credits as tutor and so on. This matching is sometimes second-best for the needs of a person or company (Schneider, 1995: 190). But second best is better than no matching at all. The recession in Chiemgau 2002 wasn't very deep but provided arguments for the countercyclical effects of a

complementary currency (Marin and Schnitzer, 2002; Stodder and Lietaer, 2016). In a country like Argentina with a deep recession in 2002, the focus on countercyclical action was absolutely justified (Gomez, 2009). The Credito network was able to help many millions of people secure their livelihood during the collapse of the national currency, the Peso (Colacelli and Blackburn, 2009). There are arguments for establishing complementary currencies in 'good times' as well -- to move the economy toward sustainability, community-building, social justice, resilience and other goals (Lietaer et al., 2012).

Figure 1: Magic economic triangle



Source: Authors' own illustration

The Chiemgauer initiative started with a goal for the school community. Parents and teachers were open for changes in the purchasing behavior (needs) and some small businesses with extra capacity were ready to meet the demand. When capacities are not fully utilized, it makes sense to accept another currency even if transaction costs are higher (Marin and Schnitzer, 2002: 295).

The trust within the school community built up around the Waldorf school enabled the foundation of the Chiemgauer organization. With this background the product of these six students wasn't just a nice piece of paper. It transformed slowly into an accepted institution in the region. In the beginning the trust for the euro system was used as backup. Member businesses had a guarantee that they can change back their Chiemgauer back into euro for 95% of the face value. With the immediate conversion into euro by the students' company, their trust increased. After some time, businesses spent their Chiemgauer again and conversion back to euros became less important. When we look at the proposal of the parallel currency "Ducat" by Hayek we can find some similarities in the process of building trust (Hayek, 1990).

3. THE BASIC MONETARY MODEL OF THE CHIEMGAUER

Today, the Chiemgauer organization is located at Traunstein, Bavaria. Everyone who takes part is member of the Chiemgauer. This basic-democratic approach is a core principle of the project. The members of the organization decide in a democratic process the bylaws and statutes. A board of executive is chosen every two years. Every user of the Chiemgauer has the right to get a vote for the assembly. Members with a vote pay a small annual membership due with extra consideration of small incomes or other reasons so the vote is not dependent on the personal financial situation. The Chiemgauer organization is a limited-liability non-profit set up to organize the distribution of the Chiemgauer. This limited company is democratically controlled by the members of the organization. In addition, there is a data center for local currencies organized as a social cooperative (Regios eG) founded in 2007. The cooperative is also organized based on democratic principles and handles the transactions and accounting of the currency.

The Chiemgauer organizations are owned by the people who use the local currency and only a three-quarter supermajority of single votes would allow the selling to private companies. That's a big difference to private-owned financial service providers or the vast majority of blockchain-currencies which are controlled by the majority of shares. The idea behind is that it doesn't matter if you own one Chiemgauer or 100.000 Chiemgauer, everyone has the same right to speak and to vote. The Chiemgauer is not private property but a common good which is temporarily in the possession of money holders. The "community currency" has to serve both the purpose of the individual possessor and the goals of the community. Therefore, one important principle is that you can possess the Chiemgauer as much as you want but you also have to spend the Chiemgauer within a certain time. Another important principle is that you should spend the Chiemgauer within the community.

3.1 What are the basic rules of the Chiemgauer?

The Chiemgauer organization is obliged to fulfill the aims of the statutes and is not allowed to make profits. Possible surpluses are expended for education, research and development of the Chiemgauer.

The assembly has approved the following basic rules (Chiemgauer e. V., 2012, 2016):

- One Chiemgauer is calculated as one Euro. The relation can be changed in times of high inflation rates of the Euro.
- Businesses have to accept Chiemgauer 1 for 1 in exchange with the Euro. Companies can quote acceptance; e.g., when a heating system is renovated and the payment is done with one quarter in Chiemgauer and three quarters in euro.
- Consumers can exchange euro into Chiemgauer 1 for 1, but they can't change Chiemgauer back into Euro.
- Consumers can choose which non-profit project gets the 3% invoice amount in the Chiemgauer currency. Consumers don't have to pay that 3%.
- Businesses can change Chiemgauer back into euro. There is a charge of 5% plus value added tax (at the time 19 % of the charge) for the exchange – so a total expense of just under 6%. Of that 5%, 3% covers the non-profit project the customer has chosen and 2% is for Chiemgauer expenses. Businesses get an invoice for the 5% plus VAT, but they can deduct the whole amount as a business expense.
- Businesses can also spend their Chiemgauer. All operating expenses can be deducted from income tax and all sales are taxable too. There is no difference in taxation between Euro and Chiemgauer.
- Non-profits get their promotion of 3% in Chiemgauer. They have to spend the Chiemgauer again within the Chiemgauer network. When non-profits have no other possibility, they can choose to accept 2% in Euro as alternative.
- The Chiemgauer has a negative interest rate of 6%. In the electronic version it is calculated daily (6% divided by 365 days = 0.016% per day) but only from the 90th day. The first three months are free. In the paper version of the Chiemgauer stickers are used to prolong the local currency. It costs 3% for half a year.
- The Chiemgauer is valid 3 years after issuance and must be revalued 5 times with 3%. Effective dates are on July 1st and January 1st. The Chiemgauer note below is first valid on November 1st, 2018, the first prolongation had to be on July 1st 2019 and costs three cents. Note that the fee was 8% with quarterly stickers between 2003 and 2015.

When a new Chiemgauer series is printed, the assembly must approve it. So the series itself is a component of the democratic decision-making process.

On the back side of the Chiemgauer is a reference on the statutes of the Chiemgauer organization. It is also clearly stated that non-members have no legal demands against the Chiemgauer organization simply by owning a Chiemgauer. Participants in the Chiemgauer describe themselves as equal but with differences in knowledge and activity (Thiel, 2011: 200). It shows that the Chiemgauer isn't just a means of exchange or neutral medium of communication but a context-sensitive and living collective convention. Trust in the institution is crucial for the participants. Trust is built at different levels: The rule to bind the Chiemgauer on the Euro is the first level. It helps transmit the trust in the Euro into the Chiemgauer system. Reports in media, personal relationships and cooperation with well-known institutions like banks and local authorities establish a second solid level of trust (Thiel, 2011: 277).

Figure 2: Chiemgauer note, © Chiemgauer e. V.

Source: Authors' own illustration

3.2 Chiemgauer in practice

The structure is the framework wherein people can interact with each other and build more trust with each other. The Chiemgauer circle begins with a loan in Chiemgauer or an exchange from Euro into Chiemgauer. More frequent is the exchange transition. In the beginning a local branch of the Waldorf school spread the word with the promise that 3% of every purchase go to the school. Students, parents and teachers were motivated to take part. Other projects followed and did the same. Every person who wants to use Chiemgauer must register. The projects distribute the registration forms. After one week the newly-registered person gets a membership card (Regiocard).

With the Regiocard you can pay directly at participating businesses. The payment procedure is like a credit or debit card payment with PIN-identification. The Chiemgauer software recognizes if the user has a Chiemgauer account or a Euro account. Consumers normally have Euro accounts. With payment the exchange from Euro to Chiemgauer happens automatically. The business gets Chiemgauer on its Chiemgauer account. With the payment procedure 3% of the amount is credited for the non-profit project chosen by the customer.

The principle of the cash Chiemgauer is similar: You go to an issuing office and demand, e.g., one hundred Chiemgauer. The payment procedure is the same as with an electronic payment. The Chiemgauer amount is typed into the card device, the user enters the PIN, one hundred Chiemgauer are handed out, and that amount is withdrawn from the account of the user. The denominations are 1, 2, 5, 10, 20 and 50 Chiemgauer.

The Chiemgauer software automatically withdraws Euro from consumers and Chiemgauer from other Chiemgauer businesses. In case of an exchange from Euro into Chiemgauer 3% of the amount is registered for the project. The user goes shopping with the 100 Chiemgauer. When the amount is 30.54 Euro the user pays 30 Chiemgauer and 54 Cent in Euro. Businesses are not obliged to give exchange in Euro but in practice many are tolerant and handle Chiemgauer like Euro.

Businesses can deposit cash Chiemgauer into their Chiemgauer accounts. They only have to go to one of the 25 issuing offices to cash in the Chiemgauer amount. There are no costs for the Chiemgauer deposit. Only if the Chiemgauer are exchanged back into Euro, the regional contribution rate of 5% plus VAT is due. For 100 Chiemgauer a business gets 94.05 Euro. 3 Euro go to the project, 2 Euro are for operating expenses and 0.95 Euro are paid to the tax office (value added tax). These costs are the incentive for acceptance locations not to change back. The better the logic of the system is understood, the lower are the transactions costs. Businesses spend about two third of their Chiemgauer income again (Christ, 2014: 52). 54% of businesses doesn't convert any Chiemgauer into Euro (Ziegler, 2009: 44).

We can recognize a bonus-malus-system: 3% bonus for a project when you change Euro into the local currency and a handicap of 5% when you change Chiemgauer into Euro. This generates an attraction of funds for the region. Non-profit-organizations (NPO) are the biggest winners in the system with an accumulated benefit of about 740,000 euro through 2020, from which the sports hall of the Waldorf school Prien has received more than 55.000 euro

already. The NPOs receive the benefits (3%) in the Chiemgauer currency and they spend it again in the local business cycle. Since businesses re-spend two third**s** of their Chiemgauer (Christ, 2014: 52), the benefits refinance themselves completely assuming that the gross margin of enterprises is one third. The non-profit-organizations produce common goods like education, social and environmental care, cultural enrichment and research. These public goods are the basis for social life and also the economy. Both consumers and entrepreneurs see the Chiemgauer as a tool for a positive impact on the society (Christ, 2014: 55; Meßenzehl, 2005: 83).

Another important component of the Chiemgauer is the circulation incentive which is also discussed as theory of negative interest (Grasselli and Lipton, 2019; Kimball and Agarwal, 2019). Cash Chiemgauer are only valid for half a year but you can prolong the period for another half a year when you buy a sticker which costs 3% of the nominal value of the Chiemgauer. If it is July 1 and you have a 10-Chiemgauer-note which is only valid through June 30th , you can buy a sticker for 30 Cents and stick it onto the note. Then you can spend the Chiemgauer until December 31st.

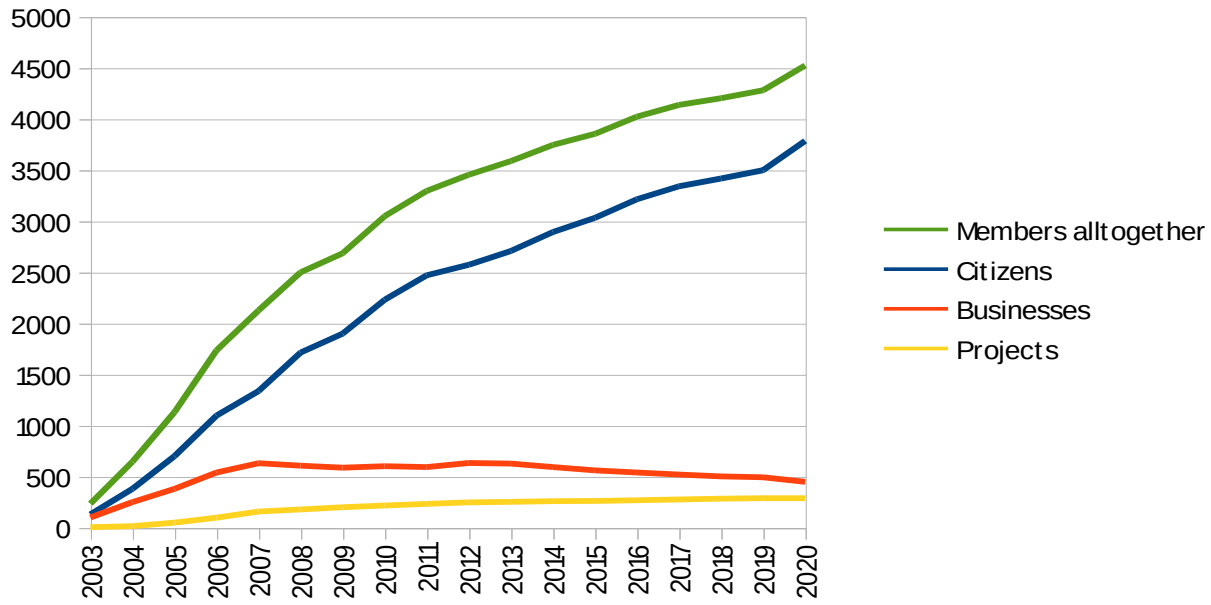
Businesses accept the Chiemgauer up to the last day. If they have a Chiemgauer account, they can deposit the Chiemgauer up to two weeks after expiry. The circulation incentive is applied on the Chiemgauer account too but only after the 90th day. The calculation of the negative interest rate works with the first-in-first-out-principle. The oldest desposits are substracted from the sum of the incoming amounts of the last 90 days. The negative interest is only calculated on the residual amount. This pragmatic approach lowers the negative interest cost for the users while reaching the goal of a steady velocity of money.

4. CHIEMGAUER DEVELOPMENT IN FIGURES

The development of the Chiemgauer is emphasized by the number of people using the local currency.

Figure 4 shows a steady upward trend in the number of members and a slight drop in businesses. The decline with businesses is part of a bigger global trend, between 2005 and 2019 the market share of owner-based non-food businesses has halved (Handelsverband Deutschland e. V., 2020).

Figure 3: Number of Members of the Chiemgauer association



Source: Authors' own calculations

After 16 years the Chiemgauer has reached a significant level of members in the region. People using Chiemgauer are not looking for the cheapest price or low quality. They want to promote the region and non-profit-organizations. They confirm that they consume with more awareness for the region and have found new shops in the regions (Meßenzehl, 2005: 79). Consumers see in regional money a tool to do something positive for the region and to help guide its development (Meßenzehl, 2005: 84).

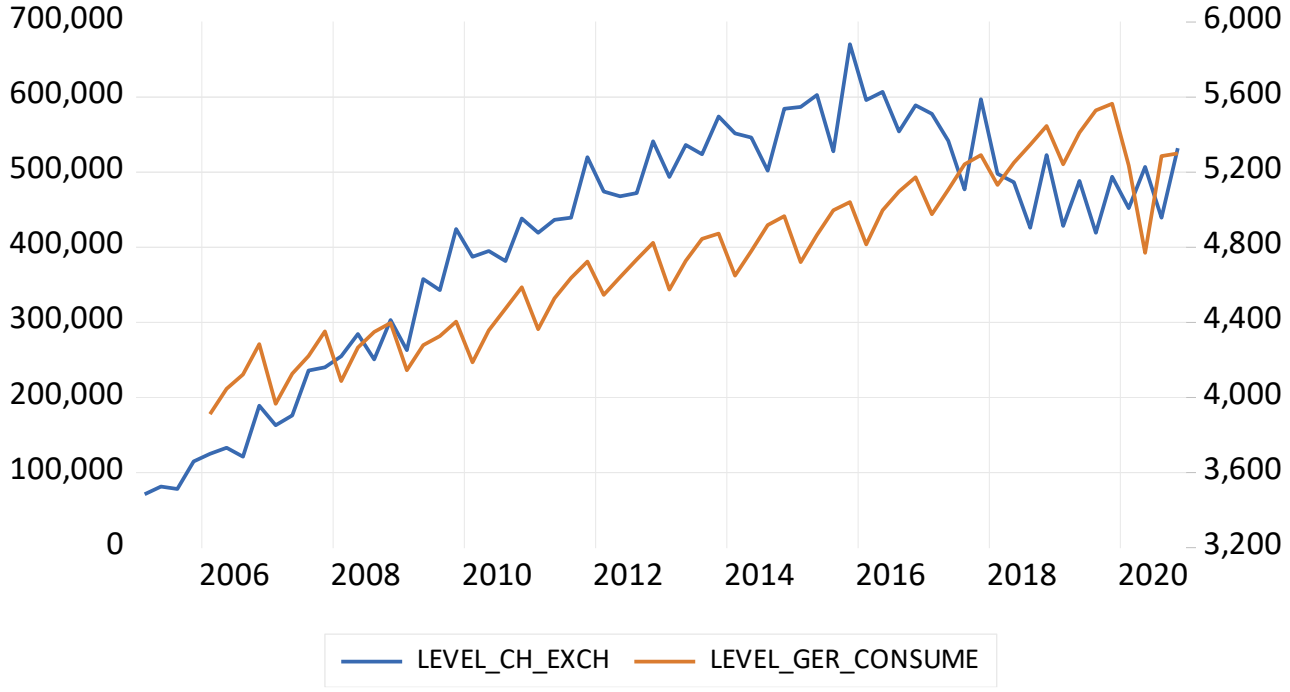
Three quarters of users find that the Chiemgauer is easy to use and see no additional effort in the Chiemgauer (Meßenzehl, 2005: 81). 70% of users feel more enjoyment when they shop and 81 per cent of users like the circulation incentive of the Chiemgauer (Meßenzehl, 2005: 75).

Women make 70% of the total exchange of Euro in Chiemgauer. This figure is not uncommon because the proportion of women in consumer spending is about 70% in Germany too (Silverstein and Sayre, 2009).

4.1 Economic data 2003 to 2020

For a reserve-backed currency it is vital to motivate people to exchange as much as possible into the complementary currency. The activity of consumers can be measured by their willingness to exchange the national currency Euro into Chiemgauer.

Figure 4: Exchange from Euro into Chiemgauer and average consumer spending in Germany



Source: Authors' own calculations

The figure above shows the quarterly amount of exchange in euro on the left side and the average quarterly consumer expenses per person in euro on the right side. We can see a high correlation between the consumer expenses and the exchange into Chiemgauer. The higher the consumer expenses are the higher the exchange from Euro into Chiemgauer. The growth rates of the quarterly exchange was quite strong for the first thirteen years of existence of the Chiemgauer. Then there was a decline in 2017 with a stagnation for three years.

In 2020 there was a break with consumer expenses caused by a lockdown to prevent further cases of Covid-19. The Chiemgauer exchange increased at the same time by six per cent. A spread can also be discovered between 2008 and 2010 when exchange increased more than in the long-term trend. It seems that the Chiemgauer is linked with the long-term development of the economy and responses counter-cyclical to economic crisis in the short run. One reason can be found in the incentive to spend the Chiemgauer again which has a strong impact on the frequency of changing hands that can be thought of as the "velocity" of money (Wicksell, 1898: 46).

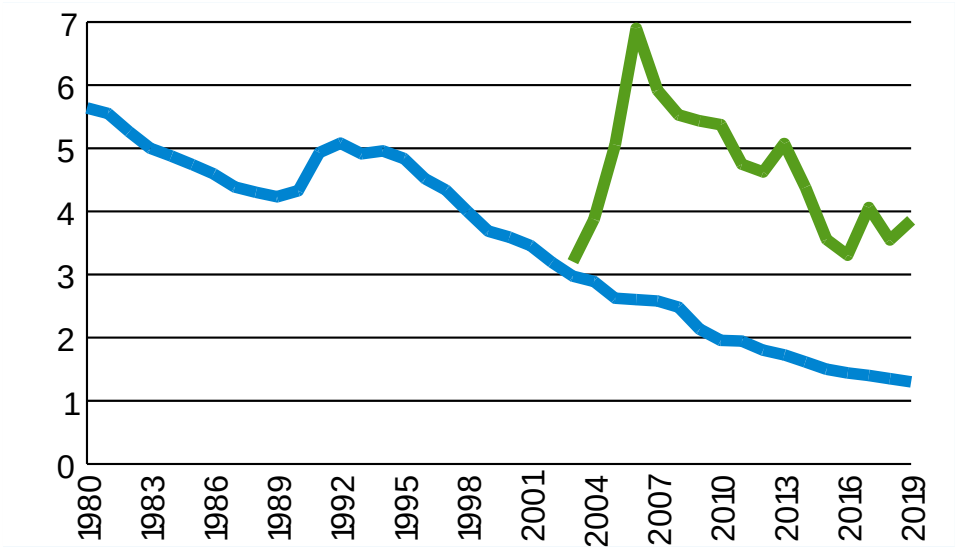
4.2 Quantity theory and velocity of money

The velocity is calculated with total sales divided by money supply. Fisher refers to it with his formula of the quantity theory: M x V = T x P (Fisher, 1922), that means that the velocity (V) times money (M) results into the transactions

(T) measured by prices (P). This is equivalent to the turnover approach (Friedman, 1987). His quantity theory is also used for the national economy with M x V = Q x P where Q is GDP. We have to distinguish V_Q from V_T and make sure that we keep V_Q or V_T with its appropriate factor.

The regional value added of the Chiemgauer is determined on the basis of the total sales, which is corrected by a value-added factor. Sales in Germany are more than two times gross domestic product (Destatis, 2020). At each value-added level, this method deducts purchased goods from turnover. The gross domestic product summarizes the value added shares. At Chiemgauer, we use the same factor to move from total sales to Chiemgauer "gross domestic product" (Q). For the amount of money we add the cash Chiemgauer and the digital Chiemgauer in circulation. These two amounts are comparable to the sum of cash Euro and Euro on current accounts due daily. With these kind of data we can give a picture of the "real economy". There is also a "financial economy" with turnover for assets and rights and we could also consider a "black economy". Keynes distinguished between the speculative and precautionary motivations for money demand, but we focus on his third motive, the transaction side (Davidson, 1990).

Figure 5: Velocity of the Chiemgauer (green) and the Euro (blue)



Source: Authors' own calculations

The figure shows the annual velocity of the euro since 1980 and the annual velocity of the Chiemgauer since 2003. Chiemgauer changed hands four times per year in 2019. While the velocity of the Euro has been steadily decreasing for years, the Chiemgauer remains at a high level. The Chiemgauer circulates more than three times faster than the euro. Given a certain quantity of goods, let's say 100 pieces for one euro each, you can achieve the goal by issuing 25 Chiemgauer that circulate four times or by issuing 75 euro that circulate only 1.33 times.

National currencies in the industrialized world have a problem of decreasing velocity over time (de la Rosa and Stodder, 2015). A sharp drop in velocity can lead to a recession and/or deflation. States and central banks try to prevent recessions by increasing the amount of money. The velocity of money, however, is not controlled by a central bank. The focus on controlling only the amount of money has many side-effects which could be prevented, if we could also control the velocity of money (Rogoff, 2017). Side-effects are strong increases of money supply for speculative purposes, the increase of demand for assets like company shares and land and also an increasing inequality in the population because the additional money is concentrated in the hands of the top one per cent of wealthy people (Colciago et al., 2018: 3). By contrast, a high and stable velocity decreases the need for additional money printing or additional government debt (Gelleri, 2008: 8).

The central bank argues that it is no problem to anticipate the decreasing velocity of money. They increase the money volume by ten per cent a year and take into account the growth rate, the decreasing velocity and the goal of two per cent inflation. A drop of velocity of four per cent, a growth rate of three per cent and an inflation rate of two per cent needs an increase of nine per cent of the money volume. The interest rate is reduced to a level that the goal

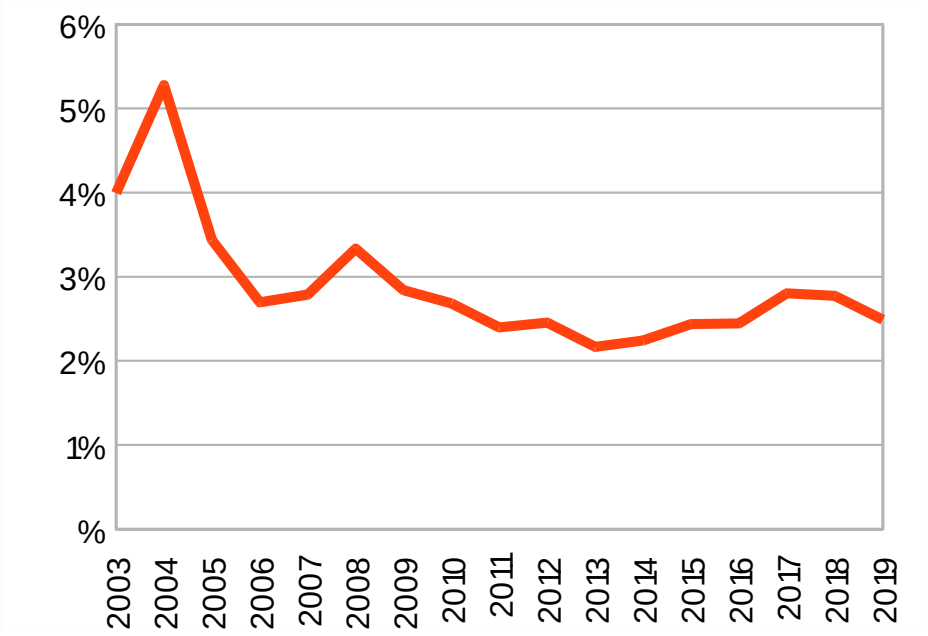
of two per cent inflation is achieved in the end. One problem is that the central bank doesn't know in advance the growth rate and the decline in velocity. Therefore modelling of the future with anticipating forecasting variables are very important (Fritsche, 1999). Great problems for the economy rise when forecasts don't work like in the financial crises or with the Covid-pandemic. But even before there are structural breaks in velocity of the euro which lead to recessions (Beyer, 2009). The idea only to control the money supply (Friedman, 1987: 31) fails because of these uncertainties (Wray, 2018: 18).

The Chiemgauer uses a circulation incentive to stabilize the velocity of money. This reduces the uncertainty. Recessions could be less deep if their causes were merely monetary. But even in the case of external shocks caused by a pandemic in 2020, the mechanism of carrying costs on money can help the economic recovery to take place much faster, because people are immediately in the starting blocks to spend their aging money (Keynes, 2013: 357). It has countercyclical behaviour in the macroeconomic environment. Businesses tend to use the Chiemgauer more within the network in times of recessions and crisis. The circulation incentive keeps the dynamics of the Chiemgauer system running, without the members being much bothered by the rule themselves (Meßenzehl, 2005: 75; Ziegler, 2009: 52).

4.3 Costs and money-multiplier

The speed of circulation also plays a major role when it comes to the costs for companies. The higher the velocity within the network, the lower the cost.

Figure 6: Average costs as percentage from sales



Source: Authors' own calculations

The average cost was at 4% of sales in the beginning. Over time, the percentage costs fell to 2.5%. The level of costs depends mainly on the transfer of regional money in the regional economic cycle. The larger the network, the easier it is to use the currency. Businesses have also learned over time to handle the Chiemgauer more easily (learning-curve effects) and have found more possibilities to spend (increasing returns to scale). Both result in an increasing money-multiplier which is calculated as turnover in Chiemgauer divided by the exchange from euro into Chiemgauer:

Figure 7: Money-multiplier of Chiemgauer (Chiemgauer-turnover / Chiemgauer-exchange)

Source: Authors' own calculations

5. ECONOMETRIC ANALYSIS OF CHIEMGAUER CURRENCY

So far, we have looked at developments in isolation. In the next step, we analyze the Chiemgauer in its relation to macroeconomic variables. Following on from the analysis of the complementary currency WIR (Stodder and Lietaer, 2016), we assume a monetary production function and examine to what extent the macroeconomic influence has on the events of the Chiemgauer and whether the cycles have any effects in connection with it (Stodder, 2009).

A simple comparison between the velocity of the euro and the Chiemgauer already provided the first indications that there are significant differences. With an econometric analysis, the connections between the Chiemgauer network and its surroundings can be better checked.

5.1 Concept of Vector Error Correction Models (VECM)

With the help of a regression analysis, we try to explore the relationships between two or more time series. This attempts to bridge the gap between theory and a model to the real world (Auer and Rottmann, 2020: 416). Methodologically, Vector Error Correction Models (VECM) have proven their worth in econometrics (Engle and Granger, 1987; Sargan, 1958). They allow not only a long-term but also a short-term analysis of the correlations. In the long-term relationship, the variables are used in their original form ("level data"). For the short-term relationships, the first derivatives of the variables are used ("first Difference").

The basic form of a general vector error correction model is as follows:

$$\Delta Y_t = \varphi z_{t-1} + \sum_{i=1}^{n} \beta_i \, \Delta y_{t-i} + \sum_{i=1}^{n} \delta_i \, \Delta x_{t-i} + \propto_0 + \partial_1 t + u_t$$

The first term for each period (t) consists of a cointegration regression equation z, which refers to the previous period, the discharges of y delayed by n months, the discharges of x delayed by n months and, depending on the model, a drift (∝-0.) and trend component (t). U represents a residual interference term. The cointegration regression z represents the linear combination of X and Y. The model only works when φ on the cointegration equation (CE) is negative. CE is defined as:

$$z_{t-1} = y_{t-i} - \beta_0 - \beta_1 x_{t-1} - \partial_2 t$$

If the model is completely in equilibrium in the long term, z assumes a value of zero. Assuming that is true, the long-term relationship can then be expressed as follows:

$$y_{t-i} = \beta_1 x_{t-1} + \beta_0 + \partial_2 t$$

5.2 Relation between Chiemgauer network and economic environment

Before developing an econometric model, it makes sense to illustrate the intuitive contexts:

Figure 8: Relations between Chiemgauer-system and GDP and unemployment

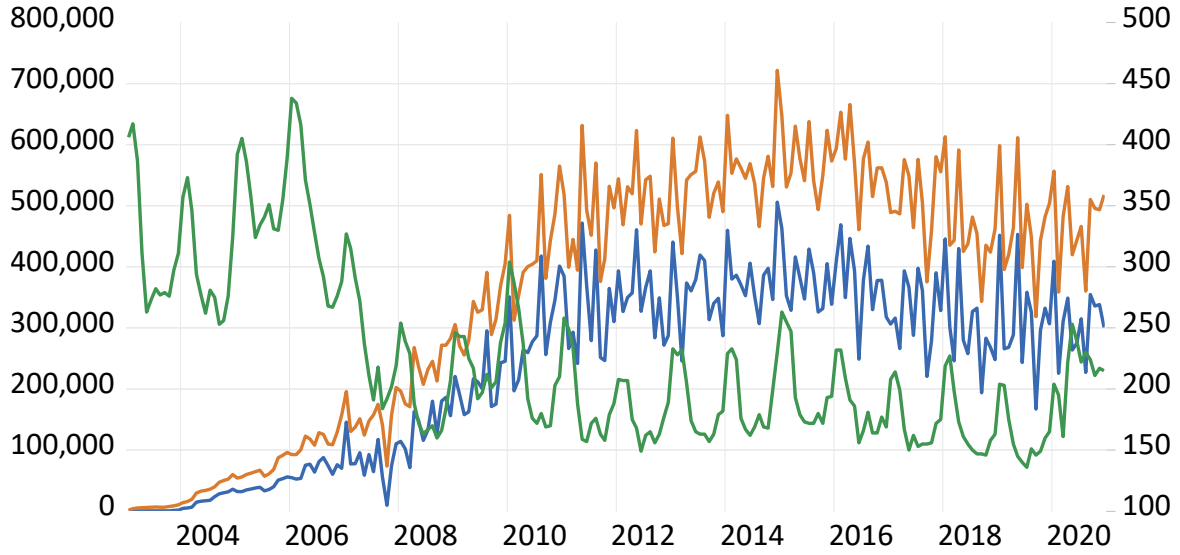
Source: Authors' own calculations

The chain of action distinguishes between macroeconomic and regional economic variables (blue) on the one hand and variables belonging to the Chiemgauer network (green). Suspected correlations with the national or regional context are marked with orange-yellow arrows. In the case of reserve-backed complementary currencies, it is likely that the exchange in a regional currency will increase with increasing income and the gross domestic product (GDP). We assume with figure 7 that exchange increases with disposable income. If there is an exchange of euros in Chiemgauer, the Chiemgauer money supply increases. If the Chiemgauer remain in circulation, the money supply continues to increase and Chiemgauer turnover is generated. There are two types of Chiemgauer turnover, first, the expenses of consumers, and second, transactions between businesses. Turnover transform to incomes in the value chain and in turn, lead to consumer spending, much of it in Chiemgauer. The link to the Chiemgauer network has a self-reinforcing effect, which has an impact on the Chiemgauer money supply, the Chiemgauer circulation and other Chiemgauer incomes. If income effects could be demonstrated, the next question would be whether they have an impact on employment into the local unemployment statistics. In Wörgl this effect was immediate because the municipality had directly hired the unemployed and paid them out in the local currency. Indirect effects were described similar to the Chiemgauer circle with consumer spending and business to business turnover. The effect for the first year on the unemployment level was guessed with 11 to 16% (Ottacher, 2007: 61).

6. EFFECT OF THE CHIEMGAUER ON LOCAL UNEMPLOYMENT

A Vector Error Correction Model of the Chiemgauer with regional unemployment shows the problem that the impact is obvious but with a weak statistical significance. The focus on the local level increases the impact. Because the Chiemgauer was started at Prien at lake Chiemsee the turnover is applied on the unemployment number of Prien. First we have a look at the original data (or "level data") in a graphical form:

Figure 9: Level of Chiemgaure turnover (orange), B2B turnover (blue) and unemployment Prien at lake Chiemsee (green)



Source: Authors' own calculations

The absolute unemployment figures for Prien at lake Chiemsee (in short "UE_RO_PRIEN") on the right-hand side are shown starting with 406 unemployed people in January 2003. The Chiemgauer sales ("CH_TURN") are visible on the left axis. In addition to the total sales of the Chiemgauer, the sales between the Chiemgauer companies ("CH_TURN_B2B") are presented. Model development has shown that the turnover of companies adjusted for the Chiemgauer exchange is more closely related to unemployment than to total turnover. This can be explained by the fact that the Chiemgauer exchange only causes a one-time turn of the euro in the region. This is compared to gift vouchers that are immediately exchanged back. The special feature of the regional currency, however, is that there is a follow-up turnover between companies and this share is more relevant for increasing employment. This discussion is further deepened and begins with the presentation of the more significant model between the Chiemgauer business to business (B2B) turnover and the unemployment rate in Prien.

Chiemgauer sales appear to be an inverse pattern compared to the unemployment rate. The first phase of rising sales is linked to falling unemployment in Prien. From 2010, the movements will be transferred to a parallel and almost stationary course. The very low level of unemployment is combined with a slight decline in Chiemgauer sales between 2017 and 2019. In 2020, there is a peculiarity that both the number of unemployed and turnover will increase. The graphic connections show a diverse interplay in different phases, so it is interesting to see what an advanced econometric model looks like.

7. STEPS TO PREPARE THE REGRESSION MODEL

To find out what model fits to the both time series, there are different tests to find out the best parameters (Engle and Granger, 1987). A test of the optimal lag lengths shows a clear signal at 15 lags. A Johansen test shows a quadratic model as the optimum according to the Akaike information criterion (Akaike, 1974), but in practice simple or linear models should be preferred due to the ambiguous interpretation (Johansen, 1991: 1561). A model with a linear deterministic trend and intercept has the second best result in the Akaike information criterion. The cointegration equation in this model contains both an intercept and a trend component and the error correction equation contains only an intercept component. Therefore, this should be taken into account in the unit root test for the logarithmic original form (Maddala and Kim, 2010). The null hypothesis of the Johansen-test that there is no or only one cointegration is clearly rejected after the trace and max self-test (5% level). The test procedures indicate two cointegrating equations, on the one hand with the unemployment rate in Prien and on the other hand with the Chiemgauer company turnover as a dependent variable.

Unit root tests are necessary to avoid spurious regressions (Granger and Newbold, 1974). There are different test methods for unit root testing (Im et al., 2003; Kwiatkowski et al., 1992). A cointegration is possible when the time series have unit roots for the original data and when they are stationary for the first differences (Wooldridge, 2013: 632). A unit root testing procedure based on three test methods approves that the time series can be used for further

modelling (Im et al., 2003; Kwiatkowski et al., 1992; Maddala and Wu, 1999). Next, the direction of the context is checked with the help of a Granger causality test:

Pairwise Granger Causality Tests; Sample: 2003M01 2020M12 with 15 lags

Null Hypothesis:	Obs	F-Statistic	Prob.
LN_CH_TURN_B2B does not Granger Cause LN_UE_RO_PRIEN	201	2.42916	0.0031
LN_UE_RO_PRIEN does not Granger Cause LN_CH_TURN_B2B		1.92197	0.0240

The test shows a unique two-way determination of the variables with significance-levels below 5% and for the effect on unemployment even below 1%. This fits with the Johansen test, which indicates the presence of two cointegration equations.

7.1 Result of the VECM between Chiemgauer and local unemployment

Based on the consistency of the tests, a vector error correction model with a lag length of 15 is created based on a linear deterministic model with time trend and intercept:

Cointegrating Equation:

LN_UE_RO_PRIEN(-1)	Equals (=)
Constant	8.672328
LN_CH_TURN_B2B(-1)	-0.261996
	[-6.81365]***
TREND	-0.001212
	[-2.38832]**

	D(LN_UE_RO_PRIEN)	D(LN_CH_TURN_B2B)
Coefficients on Error from	-0.157067	-0.857404
Cointegrating Equation:	[-3.24460]***	[-4.57243]***

Coefficients on Lags of Significant 1st Differences:

D(LN_UE_RO_PRIEN(-4))		0.742386
		[2.59375]**
D(LN_UE_RO_PRIEN(-5))		1.081155
		[3.69292]***
D(LN_UE_RO_PRIEN(-6))		0.764383
		[2.54306]**
D(LN_UE_RO_PRIEN(-7))		0.619427
		[2.24660]**
D(LN_UE_RO_PRIEN(-9))	-0.145298	
	[-2.01746]**	
D(LN_UE_RO_PRIEN(-11))	0.158176	
	[2.23907]**	
D(LN_UE_RO_PRIEN(-12))	0.572292	0.707004

	[7.98170]***	[2.54558]**
D(LN_UE_RO_PRIEN(-14))	0.145299	1.051743
	[1.74548]*	[3.26173]***
D(LN_CH_TURN_B2B(-1))		-0.48154
		[-6.40683]***
D(LN_CH_TURN_B2B(-2))		-0.556822
		[-6.96101]***
D(LN_CH_TURN_B2B(-3))		-0.187912
		[-2.17383]**
D(LN_CH_TURN_B2B(-4))	-0.050797	-0.235483
	[-2.40225]**	[-2.87493]***
D(LN_CH_TURN_B2B(-8))	-0.036776	
	[-1.76613]*	
D(LN_CH_TURN_B2B(-10))		-0.153255
		[-1.99911]**
CONSTANT		0.064817
		[2.94926]***
R-squared	0.627889	0.535178
Adj. R-squared	0.559225	0.449407
F-statistic	9.144445	6.239623
Log likelihood	279.6497	8.813373
Akaike AIC	-2.476497	0.231866
Schwarz SC	-1.948766	0.759597

To determine the critical values for the t-statistics(shown in square brackets), the first thing to do is to calculate the degrees of freedom resulting from the difference between the observations and the coefficients used: Degrees of freedom = 200 - 67 = 133.

To interpret the above regression, the first cointegrating equation can be considered the long-term relationship between B2B turnover and unemployment in Prien. The negative sign on the coefficient for Turnover shows that its growth tends to reduce regional Unemployment, and the negative sign for the coefficient on the trend indicates that this Unemployment has also tended to fall, independently of Turnover.

Looking at the coefficients on the error term from the cointegrating equation, we see that they are both negative. That is to say, when one of these two variables gets so large as to increase the error term in the long-term relationship between unemployment and Chiemgauer turnover, then the size of that variable should be reduced. This is as we would expect from a stable "error correction" relationship. Let us now examine the significance of these coefficients.

Hamilton (Hamilton, 1994) notes that the standard critical values for t-values are +/- 1.96 at a 5% significance level and a value of +/- 1.645 at 10%. But he estimates the specific critical values for the coefficient of this error correction term are -3.42 (5% level) and -3.13 (10% level). The cointegration equation for the unemployment rate in Prien as a dependent variable reaches a 10% significance level with a t-value of -3.24. For Chiemgauer company turnover, the t-value exceeds 5% significance at -4.57.

Looking at the coefficients on the first difference terms above, we have only included those that are statistically significant – that is to say, by the standard 'p-value,' their chances of having occurred strictly by random variation (and not showing a long-term structural relationship) is less than 10% (indicated by one star,*), 5% (two stars, **), or 1% (three stars, ***). That is to say, when this p-value is low (and the T-statistic high), we can reject the null or maintained hypothesis that there is no real underlying relationship with the p-value as the small probability that we are wrong to do so.

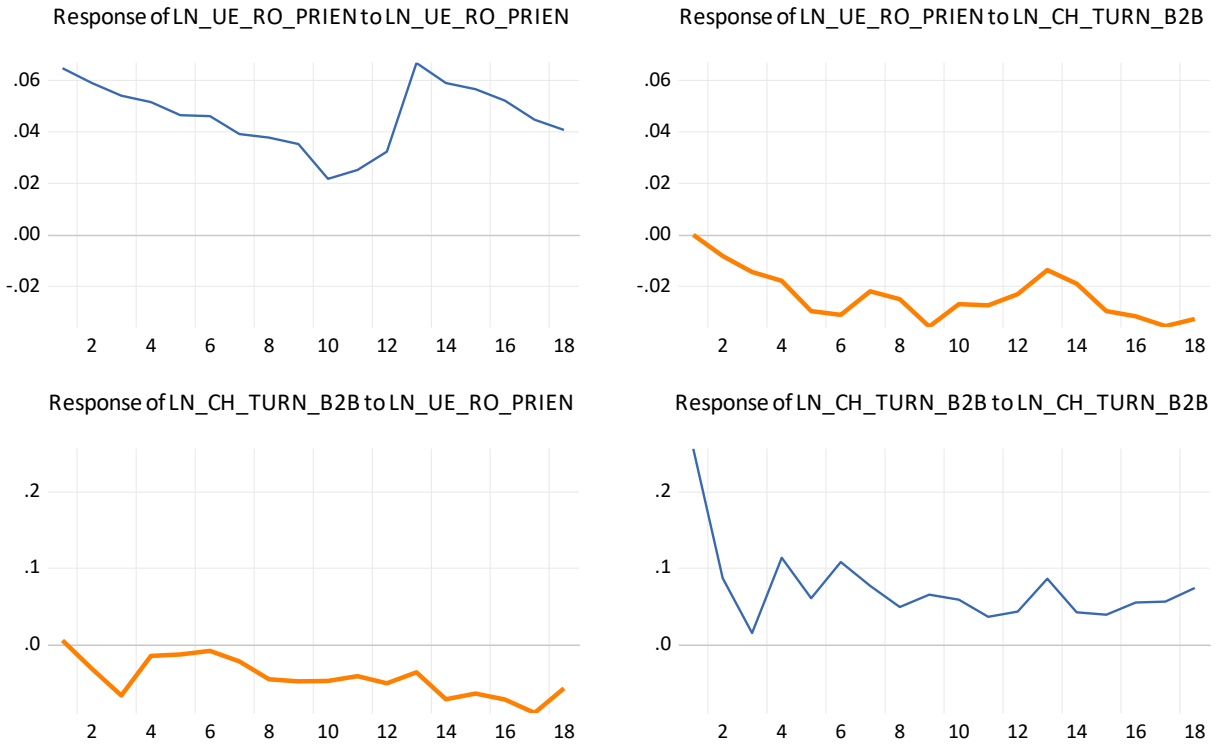
Now we can examine these coefficients on the first differenced terms at various lags, from 1 to 15 months before the current observation. Here we see that, in contrast to the stable long-term or 'secular' relationship between turnover and unemployment, we have a counter-cyclical or stabilizing relationship between short-term disturbances. In the 2nd column of the above table we see that an increase in unemployment 4, 5, 6, 7, 12, or 14 months ago tends to significantly boost B2B Turnover for the current month. This is counter-cyclical because such B2B activity is increasing when the regional economy itself is declining, as shown by higher unemployment.

In the 1st column we see that a rise in B2B turnover 4 or 7 months ago has the effect of reducing Unemployment in the current month, and significantly so. An increase in B2B turnover in Chiemgauer from rising unemployment would be important in itself, even if it did not have any effect on counteracting that unemployment. That is because it would allow businesses and consumers an alternative means of meeting their needs, even in a downturn when supplies of ordinary currency are tight. But of course if the increased B2B turnover in Chiemgauer can actually reduce unemployment, that is better still and that is what these results indicate.

7.2 Interpreting reaction graphs and further model checks

The reaction graphs, in combination with the vector error correction model, help to interpret the results:

Figure 10: Response to Cholesky Innovations



Source: Authors' own calculations

Unsurprisingly, the effect of a variable's past on the present declines over time. Past unemployment in Prien has a positive effect on the current unemployment rate in recurring rhythms. In terms of Chiemgauer B2B turnover, the first month has the strongest impact on current sales, followed by uniform positive correlations. At the bottom left, an increase in the number of unemployed in Prien is followed by a decrease in Chiemgauer company turnover. In the error correction equation, however, countercyclical behavior occurs mainly in the short and medium term. In particular, increases in unemployment between four and seven months are significantly negatively correlated with

sales. If the number of unemployed rise, a few months later, Chiemgauer B2B turnover will also rise, which, through its negative correlation with the number of unemployed (graphic at the top right), helps to stabilize the situation.

The presentation of the long-term cointegration equation helps to further interpret the correlations with the unemployment rate:

LN_UE_RO_PRIEN = -0.262 x LN_CH_TURN_B2B(-1) - 0.001212x @TREND(03M01) + 8.672328

The number of unemployed in the market village of Prien is influenced by the Chiemgauer company turnover in such a way that an increase in turnover leads to a falling number of unemployed. The relationship is significant over the observation period. The long-term impulse effect is 26.2%. This means that an increase in sales by one percentage point will lead to a 0.26 percent reduction in the number of unemployed. The trend component enhances the effect, but the drift component (8.67) damps the effect and show that a certain level of turnover is needed for these effects to occur. In the first year of issuance the exchange was 68.000 Chiemgauer and only another 7.000 Chiemgauer were spent again by businesses. Therefore the founding year unlikely played a role. As sales however reached the six-digit range they are likely to have had an impact in the market village as early as 2004.

The Granger test for the original data has shown bidirectional Granger causality before. When we repeat the test for the differentiated error correction regression, we also see a two-way causality with significance levels of 5.93 per cent for the unemployment as dependent variable and 0.18 per cent for the Chiemgauer B2B turnover as dependent variable. For the unemployment rate in Prien, the significance level is as high as for the cointegration equation at a 10% level. The precedent set by the number of unemployed is even clearer for Chiemgauer business turnover.

To be sure that the model is solid another three tests were done which will be described only in short: Regressions shouldn't be autocorrelated (Granger and Newbold, 1974: 117) and the variance of the error term should be identical (Auer and Rottmann, 2020: 447). The model should be also structurally constant (Barnard, 1959: 241). For the autocorrelation we used a test method developed by Breusch and Godfrey (Auer and Rottmann, 2020: 599). Another test for homoscedasticity was done with methods after Breusch, Pagan and Godfrey and after White (Wooldridge, 2013: 279). All tests approved that the model is robust and structurally constant.

7.3 Countercyclical effects of the Chiemgauer

The model shows that the Chiemgauer-turnover between businesses had a significant impact on the local unemployment number of Prien. An absolute comparison shows that the Chiemgauer contributed to decrease in the number of unemployed by 3% between 2003 and 2020. Very similar effects could be replicated for the city of Traunstein with a decrease of 3.2% over the last 16 years. These effects were without any subsidy from the local authority. The effect could be much higher when fiscal policy on the local level would be combined with the multiplier effect of the Chiemgauer.

An interesting finding was that the share of turnover between companies is more countercyclical than the turnover generated by consumers. This B2B component appears to be very similar to turnover in mutual credit systems. Therefore it is very important that regional currencies backed with national currency have a high monetary multiplier in terms of exchange. This result may be compared to the strong countercyclical effects found for turnover of the Swiss WIR ((Stodder, 2009; Stodder and Lietaer, 2016), since its turnover is also predominantly B2B.

8. CONCLUSION AND FURTHER QUESTIONS

The velocity of the Chiemgauer has become stable over the last ten years. Increasing the money supply, and yet still having a stable money multiplier in the economy, is something a central banker could only dream of. Normally you have to balance the money supply, because the velocity decreases every year and by stabilizing the velocity you can concentrate on the control of the money supply. This state is based on a hard rule: a negative interest rate on both the digital and cash Chiemgauer.

The Chiemgauer example shows the countercyclical effects in times of crisis. A close historic example can be seen in Wörgl. With the investment in public goods and the acceptance of local taxes, the adoption of local currencies speeded up in the Great Depression in the 1930s (Fisher et al., 1933).

To address the challenges after the 2020 recession national or regional governments can support complementary currencies through fiscal or monetary policy. The Wörgl currency was supported by the government of that Austrian city in 1932 to encourage regional development (Broer, 2013). Today some complementary currencies are funded by local authorites. In 2020 the city of Charlesroi, Belgium, issued four million euro to citizens to strengthen local business cycles (Gelleri, 2021). In the city of Mumbuca in Brazil monthly social benefits are even paid in the regional currency of Palmas in cooperation with an officially registered payment service provider (Faria et al., 2020). In Barcelona, Spain, a part of social benefits were paid with the local currency REC. The design, operation and evaluation was paid by the European Union and the city of Barcelona (Martín Belmonte, 2019). All currencies belong to the type of reserve-backed currencies (Gelleri, 2020b). In most cases the reserve in national currency was paid in advance by government agencies but there are also cases where they only guaranteed for the redemption. The latter are indeterminate liabilities which could be seen as fiscal instruments that broaden the fiscal financial scope (Menéndez and Goldoni, 2019).

The econometric analysis of the Chiemgauer underlines the enormous importance of the local money multiplier of public expenditure. If it is possible to raise local circulation to a significant level, the fiscal impulse will have an even stronger effect.

The Chiemgauer experience may also hold lessons for the rise of Central Bank Digital Currencies, or CBDCs, much-studied by leading central banks (Mancini-Griffoli et al., 2018). A handful of central banks are running or have completed pilot-projects (Auer et al., 2020: 7). Our initial judgement is that CBDCs in the conventional sense won't show the counter-cyclical effects of the Chiemgauer or WIR.

The primary reason is that a CBDC isn't meant to form a "secondary" or complementary currency like the Chiemgauer or WIR in the "real economy". This "second best" character may be crucial to their counter-cyclical functioning (Stodder, Lietaer, 2016). A CBDC as normally understood is rather meant to substitute for ordinary national currency, and indeed, to be preferable for many purposes like the function as store of value (Bofinger and Haas, 2020: 42).

On the other side a CBDC issued by central banks could also be re-imagined as counter-cyclical payment systems on a regional or national level (Gelleri, 2019; Hockett, 2020). If the central bank would be working together with government entities and the civil society, complementary currencies could be tailored for societal goals and at the same time they would remain integrated in the monetary system of the state. The fact complementary currencies are not only tolerated but officially supported was reflected in a law in France on the solidarity sector, which was officially enshrined in law in 2014 (Blanc and Fare, 2019; OECD/European Union, 2017). Anyone who thinks of the future of money can see in these developments first signs of a redesign of the monetary system, which contains more resilient, pluralistic and democratic components than it does today.

The rule of law in dealing with complementary currencies depends very much on societies' assessment of the concrete benefits they can bring. But they can only prove successful if they are allowed to scale up in settings of regional cooperation. The more possible it is to examine the mechanisms of action, the greater the willingness to integrate the approach into the political economy. On the way we should use more institutional experiments to learn what complementary currency designs are effective in solving societal challenges like climate change, unemployment and inequality (Feichtner, 2020).

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RETHINKING THE SIGNIFICANCE OF REGIONAL CURRENCIES: THE CASE OF THE CHIEMGAUER

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ABSTRACT

The target of our analysis is the Chiemgauer, a German regional currency. This paper discusses notable aspects of Rudolf Steiner's theory of money that have not yet been discussed widely in the research on regional currencies. The objectives and structure of the Chiemgauer is examined in Section 3. Following Steiner's views on currency, Section 4 considers the merits and demerits for consumers, stores, and groups such as nonprofit organizations that are the recipients of its benefits and then revisits the significance of regional currencies. This paper makes a distinctive academic contribution by clarifying the new significance taken on by regional currencies based on Steiner's discussions, particularly those on gifting.

The first distinctive system design characteristic of the Chiemgauer is its relevance in the gifting process, even for those with few assets. Second, the Chiemgauer makes it easy to make voluntary gifting. Third, a system designed so that the ones actually giving the gifts are stores, and not consumers, enables the direct usage of the economic value created by the currency's lending characteristics through the currency's gifting characteristics. Skillfully incorporating gifting into the currency's design makes it easier to ensure qualitative development in the region. The Chiemgauer incorporates the above ideas that go beyond increasing the velocity of currency circulation (Gesell's idea of currency demurrage).

KEYWORDS

Chiemgauer, R. Steiner, Three Functions of Money, Aging of Money, Gifting, Qualitative Development

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1. INTRODUCTION

The labor certificates introduced in Wörgl in 1932 and the Sardex, currently spreading rapidly in Italy, are typical of regional currencies; they do not function as legal currency and are readily accepted in regions with rising unemployment because of a poor economy. However, unemployment around Lake Chiemsee, near Munich, is low, depriving the Chiemgauer of favorable conditions for its spread. Despite this, the number of stores and farms that accept the Chiemgauer (hereafter referred to as "stores") grew from 100 in 2003 to 561 in 2015, with consumers growing from 130 to 3,100. The volume of transactions on Euro-Chiemgauer exchanges increased from 68,286 to 2,363,590 Euros in the same period, and they continue to grow (Chiemgauer website). This paper examines the Chiemgauer as an important case of a regional currency accepted in a region where the issues of legal currencies are not prevalent.

Discussions on complementary currencies are making progress in Europe because of the influence of Bernard Lietaer's works (Lietaer 1999; Lietaer et al. 2012). In other words, the idea is that legal currencies can be viewed as positive (yang); regional currencies complementary to legal currencies can be seen as negative (yin); and multiple currencies can be used to achieve a sustainable society. The Chiemgauer, a regional currency used in Germany and the subject of this paper's analysis, is one such complementary currency [i].

The most distinctive characteristic of the Chiemgauer from an institutional perspective is its use of negative interest rates. The labor certificates of Wörgl, which drew on the thinking of Silvio Gesell, are a famous example of a currency with demurrage. While Chiemgauer is undoubtedly inspired by Gesell, the more essential aspects of system design are infused with Rudolf Steiner's ideas [ii]. In 2003, Christian Gelleri, the central figure behind the creation of the Chiemgauer, wrote, "Steiner also points out that ensuring the circulation of money alone is not sufficient, but that a holistic concept of money must be developed. For him, the gift of money is the key to spiritual innovation. Education, in particular, is dependent on gifts, which can ultimately only come about through economic life. The Chiemgauer-regional-Team has built such a gifting component into the system without the consumer having to pay more" (Gelleri 2003, p.432).

If the Chiemgauer incorporates only Gesell's thinking, there is no reason for it to expand in the area around Munich, where a legal currency is in use. The author believes that the Chiemgauer has succeeded because Steiner's thinking was incorporated into the Chiemgauer's design.

This paper outlines notable aspects of Steiner's theory of money that have not been discussed widely in the research on regional currencies (Section 2). It then examines the objectives and structure of the Chiemgauer in Section 3. Following Steiner's views on money, Section 4 considers the merits and demerits for consumers, stores, and groups such as nonprofit organizations (NPOs) that are recipients of potential benefits and then revisits the significance of regional currencies. This paper makes an important academic contribution by clarifying the new significance of regional currencies based on Steiner's discussions (particularly on gifting).

2. STEINER'S THEORY OF MONEY

2.1 Three Functions of Money

Steiner's principal insight regarding money was the idea that it is used for the varied functions of exchange, lending, and gifting depending on the situation. Steiner emphasizes the importance of consciously recognizing the different functions of money when we use it. He explains as follows: "As exchange money, money is given a certain value. As gifting money, money will be deprived of all of the value it had as exchange money. Lending money exists in-between the two forms of money, making the transfer. Lending money will eventually be used up as gifting money." (Steiner 1996, p.177).

The exchange function of money (i.e., exchange money or purchase money) comes into play when people buy things out of necessity. According to Steiner, this function simply facilitates exchange and does not create any sort of new value in society, unlike the case of lending money or gifting money. With money acting as an agent, commodity trading becomes much easier compared to a barter system. In the economic process as a whole, however, this function of exchange is not a source of new value creation (i.e., economic value or spiritual values, which are discussed later).

This function of exchange enables people to buy things in exchange for money; in other words, it directly or indirectly affects human beings and the environment (Mees 1991, pp.4-5). As globalization and the division of labor progress, covering up the effect of market mediation, it becomes more difficult to observe individual activities. Furthermore, purchasing, for example, products that have become cheaper because of the exploitation of humans or the environment (e.g., coffee beans and bananas cultivated in plantations) can result in the acceptance of such exploitative behavior. Conversely, purchasing products that are made with ethical considerations for humans and the environment (e.g., fair-trade products and organic agricultural products) will support considerate behavior. Although the exchange function does not create new values, it works to discourage or promote past behaviors.

The lending function comes into play when people lend money to others (i.e., lending money or loan money). In Japan, money that will not be used for some time is deposited in banks, and it is lent out entirely on the basis of the bank's decisions. Many people are not conscious of this, but the money deposited in banks does not wait there until someone withdraws it. It is lent out to various businesses, including ones that are not beneficial to humans and the environment; thus, bank mediation results in a covering-up effect. The main profits of ordinary commercial banks arise from the difference (i.e., profit margins) of interest rates on loans and deposits (i.e., borrowing). Therefore, with consideration of the risk of not being able to recover a loan, banks aim to also maximize their profits; in the case of banks whose ownership is determined by shares, the shareholders affect their decisions. When loans are being made, there is no consideration for whether they are extended to businesses that are beneficial to humanity and society. The main interest of the depositors, in general, also lies in increasing their own interest gains. This creates a structure where neither the depositor nor the bank is responsible to other people and the wider society.

Steiner did not see this lending function as a negative quality; rather, he focused on the positive aspects of the lending function. According to Steiner, the arrival of money created the possibility of capital formation by enabling people with money to invest and by creating the possibility of securing capital for people who had nothing but "talent" that creates economic value (Steiner 1996, p.59).

In a healthy economy, when people with poor ability to create economic value have money, the money flows toward the talented, which is caused by the difference in people's aptitudes (Steiner 1996, pp.60-61). The borrower returns the principal with interest, which is paid from a part of the new economic value created (Mees 1991, p.24). In the economic process as a whole, Steiner thinks that money's lending function allows the creation of new economic value; that is, it is the source of gifting money at the same time. Therefore, banks are seen as institutions that help create new economic value, which is equated to gifting money.

The gifting function comes into play when money is given to others (i.e., gifting money). While for the giver the gifting function opposes the exchange function, the receiver uses the exchange function of money to fulfill his/her necessities.

Gifting is based on free will, and nothing is sought in return. This frees the receiver from economic restrictions, enabling them to participate in various spiritual activities (e.g., education, art, culture, and religion).

According to Steiner, this gifting function is essential in creating new social value because it allows people to engage in new activities freed from past obligations. Steiner says that people who live free-spirited lives are mere consumers of the past; however, they are very productive for the future, albeit indirectly. Free-spirited people use their talents to help create a better society (including its economic aspects) by providing others with spirit and more flexible ways of thinking (Steiner 1996, pp.86-87).

This does not mean that gifting that is not based on free will is unnecessary, as in the case of reallocation of wealth by taxation, for example. However, because this takes place through the government, there is the issue of the non-transparency of the decision-making process pertaining to where the gifted money goes (i.e., where subsidies are given and the covering-up effect of government mediation). Therefore, this has created a problem for the government with regard to ensuring more subsidies to schools that provide better education (Mees 1991, p.3). Furthermore, when the giver attempts to decide the ways in which the money is used in advance, gifting involves more restrictions. For example, when parents tell their children that they will pay their school fees only if they choose to become a doctor, the parents are trying to fulfill their own wishes through gifting. This is "deceitful gifting" and is closer to the exchange function rather than the gifting function (Valdinoci 2012, pp.20-21).

Moreover, the unique significance of gifting has been diminished by people trying to examine it using the lens of exchange (Vaughan 2011, pp.12-19). The act of parents giving money to their child includes an element of not asking

for anything in return. Therefore, this gifting should be regarded as voluntary, although only partially so. Nonetheless, some have considered this act as an investment toward profits returned to parents by their child in the future, a duty in the give-and-take relationship or a way to cumulate symbolic capital beyond logic and economic interests (i.e., to buffer one's own reputation and eminence). These cases can hardly be regarded as voluntary gifting based on free will.

Steiner focused on voluntary gifting. He insisted that the more the gifting is based on free will and the lesser anything is asked in return, the more beneficial it will be for society as a whole. Steiner's biggest achievement may have been the fact that he looked at gifting from the perspective of it being beneficial to society rather than questioning whether voluntary gifting existed at all.

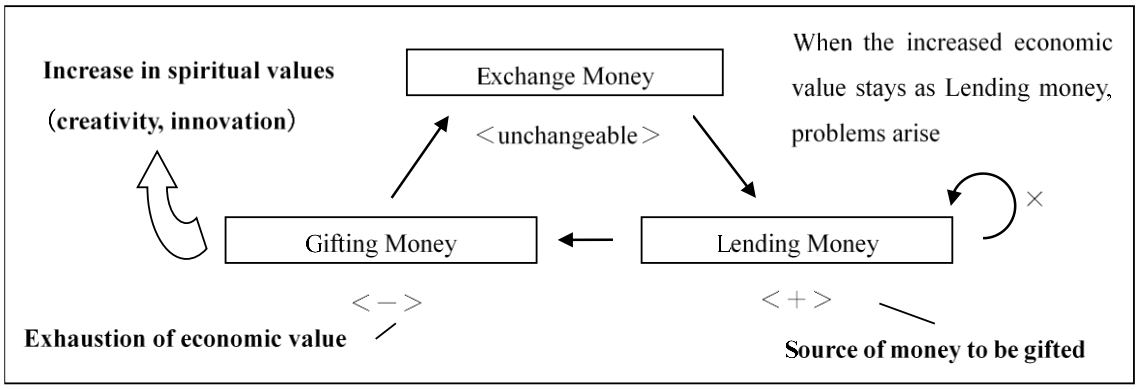
Apart from encouraging creativity in society, the gifting function has another important role: to use up newly created economic value. Steiner points out that even if new economic value is created through the lending function, if it just circulates within the area of lending, the economic process will be interfered with. For example, we can think of a situation in which speculative money flows into properties and shares (e.g., the bubble economy before Lehman Brothers collapsed). As people increasingly attempt to increase the value of their own assets, the resulting detrimental effects will also increase.

To prevent this, it is necessary to consciously use the gifting function because it uses up economic value while depriving money of authority and also brings creativity into society through innovation. When money circulates in this way, economic processes function in a healthy manner (Figure 1).

According to Steiner's vision of social development, economic processes must not be aimed solely at unlimited economic growth. His ultimate goal was not to increase the lending of money so as to increase economic value rapidly. In his view, lending money is necessary insofar as it becomes the source of gifting money; further, an overabundance of lending money in society also creates a problem.

Using Steiner's expression, money is just like blood. When it clogs at one place and that part swells up without money. In a healthy economy, the economic value added through lending is used up by gifting; thus, economic value will not fluctuate by and large. Instead, the people who have received gifts, as a result of the circulation of money, will provide products and services to enrich society albeit in a non-economical manner.

Figure 1. Change in money forms in a healthy economy and the increase and decrease of economic value Source: Created by the author. Note: The figures in < > indicate the increase/decrease of economic value.



The image of social development associated with Steiner's thoughts on money is that of a society that is enriched in terms of education, culture, art, etc. as a result of increase in economic value (i.e., the society is enriched by an increase in spiritual values). In such a society, unlike the trend in contemporary society, people are not be judged by the amount of money they are capable of making. Those who are talented at creating economic value focus on using their abilities to the maximum, while those who have a talent for spiritual activities can focus on maximizing their talents in their own fields. What matters here is not who is superior but whether each individual is able to utilize his/her own abilities to the fullest. Money, thus, becomes an important tool for each individual to exercise his/her abilities.

2.2 Aging of Money

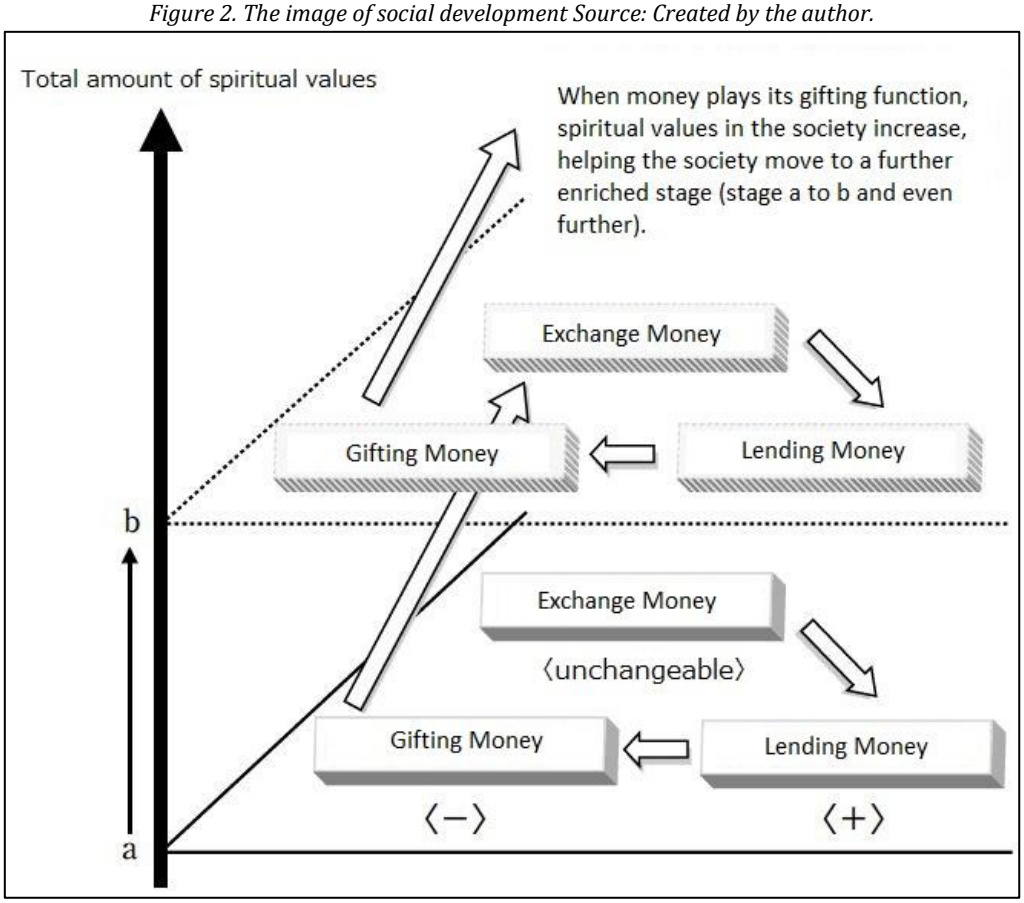
As is the case with human beings, anything that lives will eventually disappear after being created. Even industrial products deteriorate with time. However, money never dies; instead, it only appears to grow.

The idea of ensuring the continuous growth of the scale of our economic activity every year is deeply rooted in our culture. We believe that everything is well as long as economic activity is growing and that something bad will happen when it stops growing or shows negative figures. Originally, economic activity mainly dealt with agricultural and industrial products, both of which deteriorate eventually. As is clearly seen in human life, anything that is alive cannot continue to grow forever. However, when products are exchanged for money, when money is being saved, or when money itself is treated as a product, the economy is prevented from scaling down. Steiner and Rolf Kerler thought that it was unnatural for the scale of economic activity to continue to grow [iii].

What we see today around the world is a situation where people search for new investment targets backed by egoism, and money gets accumulated in society without being able to disappear.

According to Kerler, looking back through history, humans had been aware of methods to prevent economic value from increasing excessively (Kerler 2014, pp.59-60). First, during times of inflation, when there is an oversupply of money in relation to the supply of products, the value of money itself is depreciated. Second, when a bubble economy triggered by real estate and share speculation bursts, it is a sudden loss of economic value accumulated in society as a whole. However, rapid inflation including hyperinflation or the bursting of a bubble economy is not ideal methods as they bring about an enormous degree of social turmoil. Third, during past times, Jewish people used the Jubilee Year (the year of amnesty) method, wherein amnesty was given to all debts incurred till that date. The Jubilee Year was established to help strengthen communal solidarity and to close the gaps of inequality between people. Steiner's proposal, however, is to consciously aging money and to let it die through the function of gifting (Figure 1).

Figure 2. The image of social development Source: Created by the author.



Note: The figures in < > indicate the increase/decrease of economic value.

When money's function moves from exchange toward lending, economic value starts to grow. This added economic value eventually disappears through the gifting function. The recipients of gifts will buy everyday goods with the given money, using its exchange function. To simplify this process, Figure 1 shows it as "exchange–lending–gifting–exchange," indicating that the economic value of money grows, dies, and goes back to where it originated. Looking at it from another perspective, exchanging relates to what was made in the past on the basis of one's talent; lending relates to what is currently being made on the basis of one's talent; and gifting relates to what will be made in the future on the basis of one's talent.

When this process is working well, the recipients of gifts will bring about innovation in society by exercising their abilities and helping humanity; thus, society progresses to higher levels. Charting this out, it looks as if the process of "exchange–lending–gifting–exchange" goes upward in a spiral (Figure 2).

Gifting is the most important part of this process as it is related to both the death and the birth of money. As already mentioned earlier, when the economy is forced to grow indefinitely, various problems occur. Steiner's idea is to have the image that initiate a life cycle for money and to consciously promote gifting so as to solve this problem [iv].

3. CHIEMGAUER

The Chiemgauer is a German regional currency that was introduced in 2002. It has paper denominations of 1, 2, 5, 10, 20, and 50. An electronic currency, the eChiemgauer, was recently introduced by local banks. The currency is in use by approximately 500,000 people living within 50 kilometers of the Chiemsee area, which is about 80 kilometers from Munich.

3.1 Concerns and Objectives

In a 2009 paper, Gelleri explored currency-related issues. According to Gelleri, in 2007, only 1.2% of foreign currency assets were required for international trade in goods and services while the remaining 98.8% was not being used for goods and services. Currency used for speculation is supplied in massive quantities by central banks.

The circulation velocity of currencies has continued to drop since the 1970s. To counteract this, the central banks of each country have increased the supply of currency, thinking that if, for example, circulation velocity dropped by 2%, economic activity could be maintained with a 2% increase in supply. However, the circulation velocity of currency continues to decline faster than the supply of currency. This is because the increase in currency supply is not for the real economy; it goes underground for use in speculation. Gelleri concluded that the real economy is currently being manipulated by the financial economy.

Another purpose for introducing the Chiemgauer was for raising funds to build a gymnasium at the Steiner school at which Gelleri worked. The school was disadvantaged in its receipt of subsidies from the national government and considered ways to raise continuous funds. The Chiemgauer was a regional currency that originated from a need for donations.

To deal with the issues of creating a currency, Gelleri created an administrative bureau within his school and asked students if they wanted to introduce a regional currency. Six students responded to his invitation and began work on the project to implement the Chiemgauer.

At first, the group discussed ideas and concepts and then began a market survey. They talked to people in stores, teachers, and their parents about their plan. The idea was to connect the school and local stores to work in collaboration. During discussions, it was discovered that they must provide benefits to each participating group. In other words, stores needed improving sales and schools needed fundraising and citizens needed the motivation of participation in the use of the regional currency.

3.2 Structure of the Currency

In introducing a regional currency, the most important aspect is having a clear vision for matters like participant benefits, circulation range, convertibility to-and-from legal currency (and conversion fees, if allowed), interest rates, and sustainability of operations. Conversion fees must be set high. In the case of the Chiemgauer, fees amount to 5%, and only stores can make exchanges. Of that, 3% is donated to NPOs, and the rest goes to the cost of running the administrative office. If conversion fees are low, the regional currency would quickly be exchanged for legal

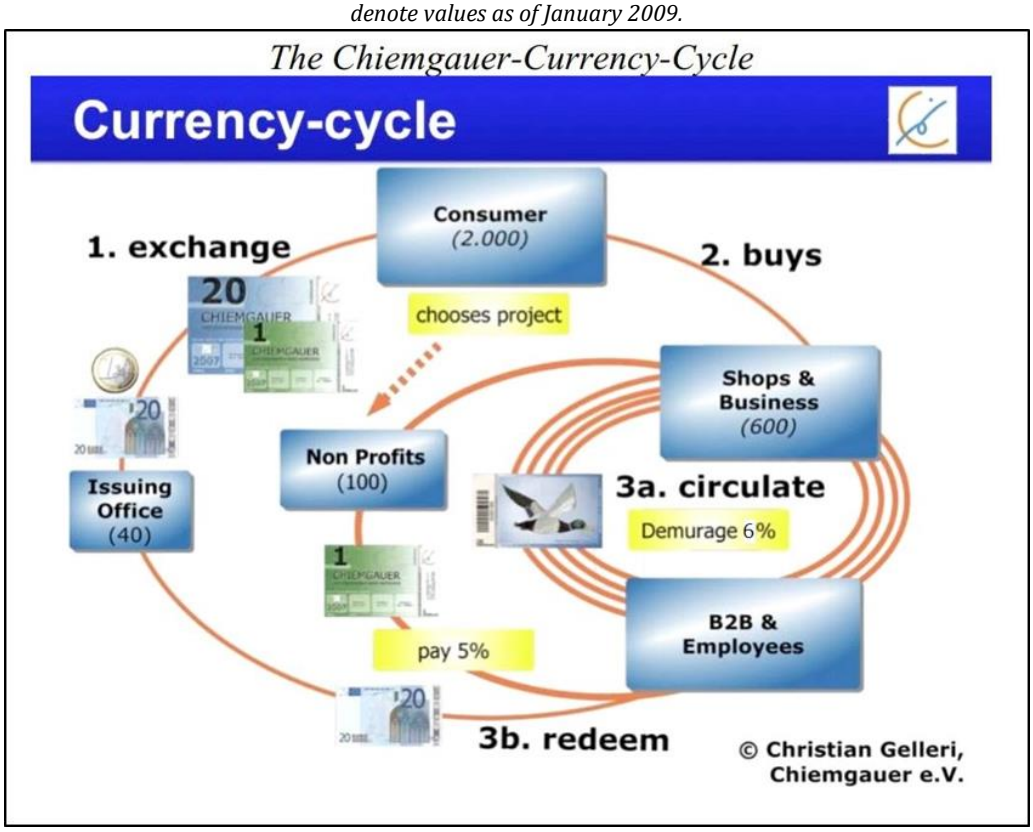
currencies, and the Chiemgauer would not circulate within the region. While conversion is possible, an appropriate level of cost is levied when allowing for exchange.

When exchanging a legal currency for a regional currency, there are no discounts (i.e., one Euro equals one Chiemgauer). However, those that exchange the Chiemgauer can donate 3% of the amount exchanged at a store to a local NPO of their choice (Figure 3).

The Chiemgauer was designed by Gelleri to increase circulation velocity without increasing currency supply. In other words, borrowing the idea of currency demurrage, the currency was designed for demurrage of 2% quarterly (currently two times per year); the annual rate was initially 8%, but it is now 6%, with stamp fees going to administrative expenses, including currency issuance expenses. Because the currency loses value over time, it is not used for hoarding or speculation.

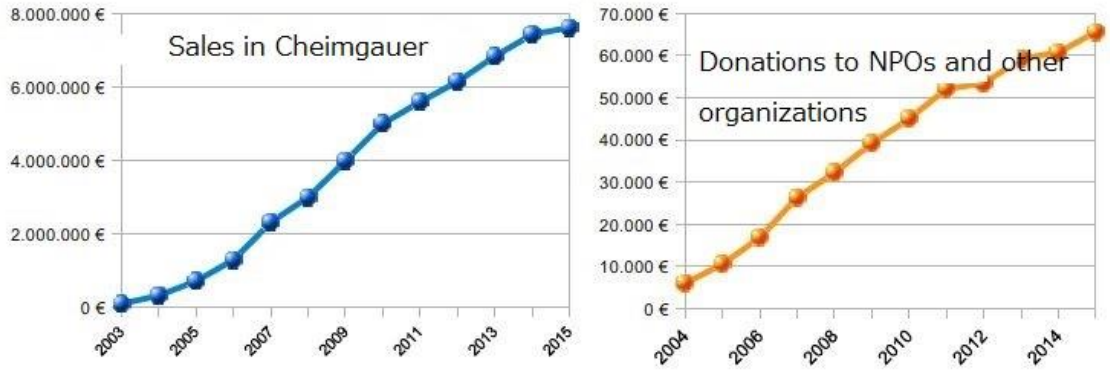
The introduction of the Chiemgauer has revitalized the regional economy, and the consumption of local agricultural goods has increased as a result. Local NPOs have also become more active. Local goods are used, and the burden on the environment is reduced. People have come to depend less on legal currency, with its many problems, across the board.

Figure 3. Structure of the Chiemgauer Source: Created by the author based on Gelleri's work (2009). Note: Figures in parentheses denote values as of January 2009.



Approximately 2,360,000 Chiemgauer were exchanged for Euros in 2015, and the sales of all stores was more than 7,600,000 Chiemgauer, with an increased figure of over 65,000 Chiemgauer donated to NPOs (Figure 4).

Figure 4. Sales in Chiemgauer and donations to NPOs and other organizations



Source: Created by the author based on the Chiemgauer website.

4. SIGNIFICANCE FOR CONSUMERS, DONATION-RECEIVING ORGANIZATIONS, AND STORES

The previous sections examined Steiner's views on money and the structure of the Chiemgauer. In this section, the merits and demerits have been considered for the main agents that deal with the Chiemgauer, that is, consumers and organizations (i.e., those receiving donations and stores), with a particular focus on the element of gifting.

4.1 Consumers

Regional currencies that are usable only in specific regions are not particularly convenient for consumers except at that point in time. In addition, the longer it is held, the Chiemgauer encounters demurrage. For the Chiemgauer to be broadly accepted, it had to have benefits for consumers.

One merit of the Chiemgauer is that it contributes to local economic activity. As will be noted in the section on stores, the Chiemgauer is advantageous to small stores in particular. In addition, because of currency demurrage, circulation velocity has increased to 4.33, versus 1.50 for the Euro in 2015 (Chiemgauer website). Using the Chiemgauer, a central bank can invigorate the regional economy without increasing the supply of currency, and the currency being used will at the very least not be directly employed for speculation. The Chiemgauer can be converted to Euros at stores with an additional fee of 5%; the fee is used for the community, bringing benefits to the region where the conversion is made. For consumers seeking to avoid their currency being used for speculation and desiring to contribute to the local real economy, the Chiemgauer has desirable characteristics.

Another benefit, which is related to gifting, is unique to the Chiemgauer compared to other regional currencies. When consumers exchange the Chiemgauer for Euros, they can specify a local NPO, to which 3% of the amount exchanged is donated. Furthermore, the cost of the donation is not borne by the consumer but rather by the store because it is paid by the store as a conversion fee. Consumers choose the organization to which they wish to donate, but the fact that they do not bear the financial burden of donations sets the Chiemgauer decidedly apart from legal currency.

Approximately 2,360,000 Euros worth of Chiemgauer were exchanged in 2015, of which approximately 2,270,000 were converted to Euros (Chiemgauer website). Based on that number, it can be seen that after being circulated a number of times, most Chiemgauer were converted to Euros. Thus, 3% of the amount consumers exchanged went to aid socially beneficial projects.

Unlike legal currency, the Chiemgauer was designed to be a currency with characteristics that allow for gifting within a particular system, although not for gifting in conventional forms. In other words, even individuals with few assets can easily become involved in the gifting process just by using Chiemgauer. In addition, the currency is structured in such a way that individuals giving gifts bear no burden, thus significantly weakening the authority that comes from gifting. This is extremely important when one considers the unit of the region and will be explained further in the following section. Because individuals choose where their donations must go, they are incentivized to find out about and take an interest in local NPOs and other organizations.

For consumers, the Chiemgauer is advantageous in that there is no possibility of them being conned into accepting it when using legal currency. Consumers simply exchange and use Chiemgauer when shopping locally, and there is no need for them to pay a stamp fee (i.e., holding tax) if they act rationally. While there are some demerits to using the currency, for instance, only being able to use it locally and the time involved in exchanging it, the use of the Chiemgauer contributes to the local economy and assists NPOs, making the system design greatly beneficial to the consumers.

4.2 Donation-Receiving Organizations

According to Steiner, NPOs and other local organizations that receive donations are extraordinarily important agents that have the capability to bring entirely new initiatives within their community (e.g., education, art, etc.). For these organizations, the Chiemgauer is superior, not simply because they receive donations because of its use. Because these organizations receive funding from donors with weakened authority and there are no limitations as to how funds must be used, they can accept funds unconditionally, practically as gifting money, in the form that Steiner thought was most useful for society overall. Thus, there is an increased likelihood that these donations will bring about creativity and innovation in society.

These organizations receive funds that might not have been available if only legal currencies flowed into them; thus, just as for consumers, the benefits of the Chiemgauer are substantial for the organizations that receive donations.

Donations are made to 200–250 organizations each year, including the Steiner school, soccer clubs, environmental protection groups, and the Chiemgauer administration bureau (Chiemgauer e.V. 2018).

4.3 Stores

While there are major benefits to using the Chiemgauer for consumers and organizations that receive donations, the value to stores, which pay a "holding tax," appears to be low. Even if stores accept the Chiemgauer, the currency experiences demurrage of 6% annually, making it better to use the currency before the demurrage occurs. Thus, although the currency does have circulation velocity and invigorates the local economy, from the perspective of individual stores, the limited number of Chiemgauer payees and the demurrage of the currency are major demerits. The Chiemgauer's acceptance and functioning depends on the stores that participate in its use.

Stores that accept the Chiemgauer have, since 2006, increased to approximately 600 in number. These include many types of stores, such as cafés, bakeries, natural foods stores, hotels, restaurants, farms, household goods shops, bike shops, furniture makers, sporting goods stores, electronics stores, real-estate agencies, etc. (Chiemgauer e.V. 2018). Based on the interviews conducted by the Chiemgauer Administrative Bureau on February 27, 2019, most participating stores are small, with two to three employees.

Let us consider the reasons why stores, primarily smaller ones, use the Chiemgauer. Corporate activities are generally thought to be undertaken to achieve profit. Assuming this to be the case, using the Chiemgauer rather than the Euro must increase profit. Gelleri explains using detailed figures that the circulation velocity of currency rises with sales, and profits ought to increase through the use of the Chiemgauer, even after subtracting currency demurrage (Gelleri 2005). However, do stores choose to use the Chiemgauer for increased profits?

The Chiemgauer experiences demurrage when hoarded. Conversion to the Euro is allowed; while individuals are not disadvantaged by not using all of their Chiemgauer within the region, a 5% fee is incurred during conversion. In other words, if an individual wants to invest currency earned within the region outside of it, he/she must be able to generate a profit that is greater than the exchange fee. Thus, the Chiemgauer is not a good fit for stores that want to expand outside of their area. Growth principles were clearly ignored in the Chiemgauer's system design, in contrast with legal currencies that strive for ease of use for expansion-minded companies.

Because the Chiemgauer has demurrage and conversion fees, stores try to use it as much as possible. Gelleri observes eating and drinking establishments as well as small organic farmers benefit greatly from it. The Chiemgauer has provided opportunities for people who previously paid no attention to food-growing areas to find out about local foods, and as people choose local foods, even at somewhat higher costs, it is possible to reduce food travel distance. Thus, the principles of sustainability and regional circulation are fundamental to the Chiemgauer. It is not beneficial for stores looking to grow, but it is an important currency for stores that wish to have ongoing, stable operations in the region.

5. CONCLUSION

In the light of the discussion in Section 4, let us analyze how Steiner's thinking was incorporated into the design of the Chiemgauer. The most crucial point here is that the Chiemgauer was designed so that conversion fees (or money generated from the currency's demurrage) was channeled into gifting. I can therefore say that the Chiemgauer is a combination of Gesell's idea of currency demurrage and Steiner's ideas.

The first distinctive system design characteristic of the Chiemgauer is its relevance in the gifting process, even for those with few assets and those in a position to receive gifts (for example, students). This is possible because such gifts are paid with the conversion fees borne by the stores, although consumers designate the recipients. Steiner believed that while problems would crop up because less economic value would be used up by gifting than by increasing economic value, involving more consumers in the gifting process would be the first step to overcoming such problems. Moreover, choosing the recipient would give consumers an awareness of gifting. This strongly supports Steiner's idea that awareness of the Chiemgauer's currency characteristics, especially the currency's gifting characteristic, is essential.

Second, the Chiemgauer makes it easy to make voluntary gifting. This is possible because the system is designed so that the entity designating the recipient (the consumer) is different from the entity that pays the gift (the store). Usually, it is difficult for an entity that receives a gift to disregard the wishes (authority) of the giver. The Chiemgauer, however, avoids the manifestation of such authority, as the Chiemgauer creates a situation wherein NPOs and others can easily receive voluntary gifting that are considered most useful for society.

Third, a system designed so that the ones actually giving the gifts are stores, and not consumers, enables the direct usage of the economic value created by the currency's lending characteristics through the currency's gifting characteristics. Moreover, because the Chiemgauer was designed in a way that would benefit local eating and drinking establishments and small-scale organic farmers, the stores are in effect creating economic value by paying these gifts. Skillfully incorporating gifting into the currency's design makes it easier to ensure qualitative development in the region.

In summary, stores generate a certain level of profit through economic activities, a portion of which goes to Chiemgauer operations as stamp fees, and those fees are also used for gifting when currency conversions are made. In comparing practical outcomes to Steiner's views on money, it is observed that the Chiemgauer is a currency that grows through its lending characteristics but diminishes through its gifting characteristics and that it has a system design that enhances the quality of the region.

The Chiemgauer incorporates the above ideas that go beyond increasing the velocity of currency circulation. If this was not the case, as I stated at the beginning, use of the Chiemgauer would not have spread in the area near Munich. The new meaning of this regional currency sprang up from Steiner's views on money.

There is no doubt that modern currency systems have contributed to industrial progress. However, if we hope to pursue economic activities that take the environment and ecosystems into consideration, then social issues must not be addressed only with currencies that are advantageous to companies that solely prioritize profit and economic growth. In contrast to modern currency systems with centralized management designed for mass production that is advantageous to large firms, from a system design perspective, the Chiemgauer is a currency that has democratic management aimed toward qualitative development, sustainability, and smaller stores. With continuing urbanization and the decline of rural areas, regional revitalization is an important area of concern, but there is a need to think of regional development with priorities other than the pursuit of private profit or economic growth, and finding a currency to meet these concerns is desirable.

The Chiemgauer readily circulates regionally once it leaves a person's hands, and it cannot be used easily in ways that users do not approve of. In this way, it is much like a fair-trade product designed to control growth and protect the environment and ecosystems. It not only has a role in revitalizing slumping economies but also has shown that a currency designed by citizens themselves can be accepted by those in areas with healthy economies and can contribute to the qualitative development and sustainability of society.

Now in relation to currency design, though consumers determine where all their donations from the 3% exchange fees for Chiemgauer must go, a system can also be designed to give 2% to consumers and 1% to stores. In that way,

stores can use the donations for groups they personally support when making exchanges, thus perhaps making the adoption of the currency more worthwhile for the stores.

The aforementioned 1% can also be used to nurture regional industry. For example, if there are no breweries that accept Chiemgauer, currency will flow outside the region when a consumer tries to purchase beer, unless there is funding that could be used to develop a brewery. A brewery that accepts the Chiemgauer could lead to an increase in the local production of barley and hops. Using 1% of fees to support new businesses to enable consumers to purchase within the region rather than outside of it could make fee payment more meaningful for stores.

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ENDNOTES

[i] In this paper, a local currency means a currency that circulates in a particular area that is relatively small (e.g., a single town), a regional currency means a currency that circulates in a wider area (e.g., several towns), and a community currency means a currency that circulates among people who share common interests or concerns without geographical limitations. At the same time, a complementary currency is based on its relationship with the legal currency and hence is used to complement the legal currency and bring about social and economic balance. By these definitions, the Chiemgauer can be considered a regional currency tied to the idea of a complementary currency.

[ii] Silvio Gesell, like Steiner, was aware of the problem that arises because of the value hoarding function of currency. Gesell thought that this function was the cause of interest and economic downturns and proposed the countermeasure of currency demurrage to ensure that holding on to currency meant a loss of value. The greatest difference between Gesell and Steiner was in their thought on capital. Steiner believed that the lending function of money was the source of gifting money, while Gesell thought that the exchange function played the biggest role on currency. Thus, Gesell's countermeasure has only been viewed from the perspective of maximizing the exchange function (Benedikter 2011, p.70).

[iii] Kerler is one of the founding members of GLS Bank and has long been involved in bank operations.

[iv] Chapter 14 of Steiner (1996) states, "The coins issued today will be stamped with the future year along with the effective date. Until that future date, money increases in value and decreases in value after that date." From this statement and a similar statement made in Chapter 12, it seems that Steiner's idea of an aging currency resembles Gesell's idea of currency demurrage. However, as is stated repeatedly in this chapter, an aging currency seems to be a conceptual image of Steiner. In other words, in this author's opinion, the value of a coin does not actually fluctuate but is a metaphor that conjures up an image of a currency's life cycle. Latrille explains an aging currency in the same way (Latrille 1985, pp.185-187), and during an interview, Kerler observed that he could not see any potential use for an aging currency in the literal sense of the term (Dohmen 2011, p.40). In addition, according to Suhr, while Gesell's idea of currency demurrage envisioned a fee to be levied by the authorities, Steiner's aging currency envisioned aging to occur "a natural way" (Suhr 1988, p.6).

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PROSPECTS OF IMPLEMENTATION OF COMPLEMENTARY CURRENCIES AT THE MUNICIPAL LEVEL BY DATASET OF ECONOMICAL AGENTS BANKING TRANSACTIONS

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ABSTRACT

The main goal of the research is to determine prospects of complementary currencies implementation at municipal level. The researching object is a small city. For reaching a goal of the research it was necessary to solve following tasks: to determine the causes of closed networks formation, to analyze networks as well as to calculate the possible economic effect of implementation. The main precondition to implementation is the presence of networks of closed transactions when the groups of economic agents are joining to clusters and exchanging goods and means of calculation inside the system. The algorithm in python was created to find such networks. The searching result consists of 17 closed networks and 102 organizations. The Social Network Analysis system of metrics was used to analyze discovered networks. In comparison process with Bernoulli random graph was found that the networks aren't random and further searching/research is needed. The analysis process of dynamics of forming networks discovered that the maxim value of metric in the first and second periods and the peak of participant's number is in the third week. The process of economic effect calculations demonstrates that the turnover 2705 million rubles can free 7,42 million through the complimentary currencies implementations.

KEYWORDS

Alternative currency, Social Network Analysis, Local payment systems, Experimental economic models, Bernoulli random graph.

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1. INTRODUCTION

Since the last two decades the researchers have been paying more and more attention to network aspect of social and economic systems. According to one of the main researchers in this area, Manuel Castells, networking is at the forefront of the modern economic society (Castels 1996). The developing nature of telecommunications area enables the selection of contractors and suppliers by entrepreneurs throughout the world. They are able to exchange goods and transact with thousands of potential clients from every country – a well as adapt their products and make product diversification based on individual client's needs. One of the most important and actual steps in process of researching the network societies is researching entrepreneurial network societies which are formed by permanent or temporary basis. Entrepreneurial cooperation in economic networks is a natural economic process. The diversity of entrepreneurial relations is considered within the conception of economic cooperation (Gnyawali 2009).

Cooperation is a neologism which means a phenomenon named as cooperative competition. Cooperation is synthesis of cooperativeness and competition which illustrates a natural form of mutual activity.

Another additional aspect in cooperation is deep-rooted ties (Uzzi 1996) at the markets with market competition.

There are several reasons to cause the cooperation as economic phenomenon.

Firstly, it is specific for the beginning of business. This step assumes the gradual extensive scaling up of a new business. The business develops from the regional level to the federal. The way to accelerate new business to scale is to form clusters. The entrepreneurs can unite organizations to the chain of added value production «Money-goods-money'» (by K. Marks) or as the end user of services.

The second cause is economic instability and other external changes which can destabilize the system (i.e. changes of laws, changes in consumers condition and etc.). These changes are catalyst when the system is trying to find new point of optimum. The cooperation of entrepreneurs (economic agents) takes place in the market if each of them produce the unique goods or services. The problems of regulation instability of the economy for each level was researched by American researcher W. Leontief who was dedicated to solve the problem in his main work «Economics «Input-Output» (Leontief, 1990) in year 1996. The inter-industry linkages were investigated in that work. Leontief thought that all the economy represents the systems of horizontal and vertical connections and the logic of this process can help to regulate economic balance. The linear differential equations and mathematical methods were created in researching process. The instruments allow to analyze the current condition of economic and to model the different scenarios of improvement (Cicishvili 1995). The «Input-Output» methodology and their practical application brought a Nobel Prize for the progress in economics in 1973.

The entrepreneurs can cooperate in networks for personal satisfaction (Mc Millan 1986) and not only for value-added production. It creates the local market in the certain territory. The example is small villages with one thousand citizens. The cooperation there is the regulator of goods flow.

There are three main forms of local industrial cooperation: clustering (Porter 1990), entrepreneurial networks (Mc Millan 1986) and barter network (Birch 1998).

The main form of cooperation is entrepreneurial networks when each participant becomes the contractor to others. A certain group of agents which don't link, participate in the chain of additional value «money-goods-money». All kinds of joint entrepreneurial activities assume goods or facilities exchange in process of relationship.

The situation of economic instability leads to decentralization of enterprise actives that creates a competitive advantage. The part of industrial capacity follows to outsourcing organizations which can maintain the production capacity and reduce costs by the scale effect. The decentralization of enterprise activities can help in the initial stages of a new business.

Goods and facilities can be different: energy, material, human, information, financial and other resources. The financial flows are arising between organizations which circulate between agents on regular basis. The part of financial flows doesn't go beyond the closed circuit. Only the value in amount is changed.

Financial networks as social-economic complex was researched on by the American scientist, mathematician and founder of cybernetics N. Winner at the 60th years of last century. Winner considers that complexity as a «black

box» and the control system was considered as an outside observer (Ulianova 2011). The managing of such systems is an important part of region economic welfares by Winner.

The systems of closed circuits are great opportunity to free the money for additional investments by the regional turnover in region. The same idea in scientific works was expressed by F. A. Khayek in (Khayek, 1996). The two main ways to do it: the creation of clearing center which will do the offset of transactions or complementary currency implementation which can become tickets, coupons or electronic forms of non-cash payment.

The main goal of the research is to identify complementary currencies implementation potential at the municipality level.

2. DATA DESCRIPTION AND NETWORKS SEARCHING

The dataset to process closed transactions was collected from real banking transactions for the period of one month. It consists of data from three bank branches in a small town of the largest bank in Russia. The sample includes 15 thousand transactions between 2394 companies.

The closed transactions query algorithm was written in Python language. It constructs the matrix of economical communications between agents and excluding agents which are not involved in networks.

For the graph construction and further analysis, the matrix of properties and directions is created (Berg 2015).

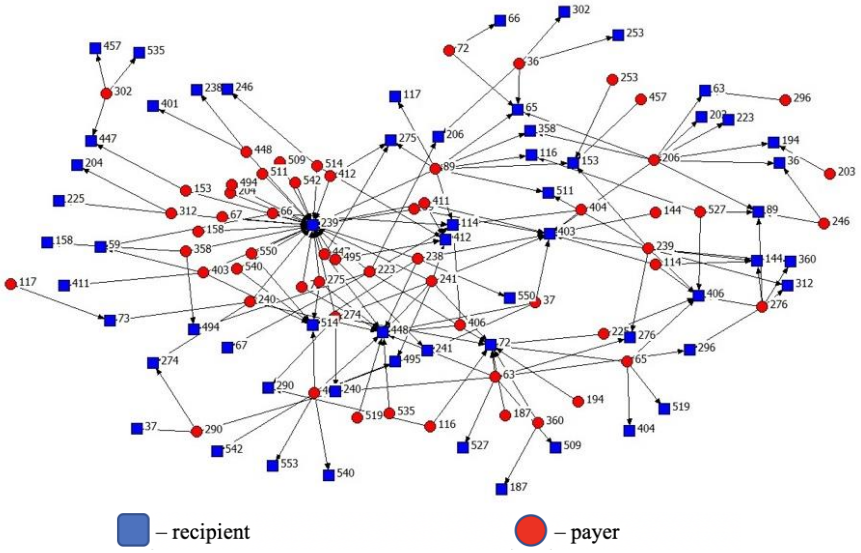
The process of projecting and building of result model, it was discovered that the transactions contained 17 closed networks which consist of 102 companies in closed outline and 1205 companies with outside directed transactions. The economical industries are widespread, and they cover the following industries:

1. wholesale;
2. production of dry mixes;
3. residential property leasing;
4. publication of books;
5. trucking industry;
6. telecommunications, etc.

The networks covered 67 economic industries in general. This means that the majority of citizens' needs can be covered beginning from FMCG to residential property leasing.

The largest network, which was found consists of 59 companies. The graph of this network is shown in Figure 1.

Figure 1 The largest graph based on banking transactions



The unique organizations were identified by the numbers on graph. For example, the 63 number represents organizations of wholesale trade of construction materials, 72 – salesman of paints and varnishes, 144 – car dealer, etc.

The blue colored nodes do not transfer transactions to the next agents, they only get or send it back. The red colored nodes are transitive. They get and send transactions through themselves.

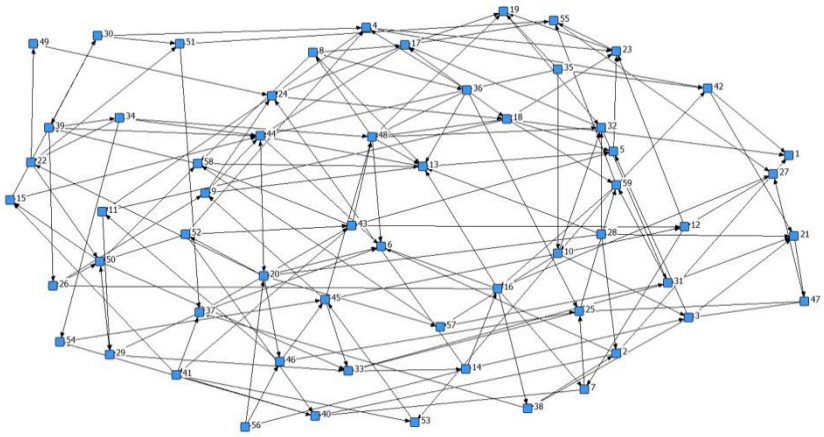
The graph shows the «celebrity» nodes which are actively participating in flows, e.g.:
72 – wholesale trade of paints and varnishes company;
239 – Water collection, treatment and distribution company;
403 – production of electrical works company, etc.

3. BERNOULLI GRAPH COMPARISON

The tasks of this research include comparison analysis between real transactions graph and the other one which is random constructed. The main question of this task is «Does the real transactions graph looks like the random one? ». For the solution of this task random Bernoulli graph was used.

The Bernoulli graph was constructed with the same parameters as one of the networks with 59 agents (i.e. the same count of agents and the same average count of connections). The result of modelling is in figure 2.

Figure 2 The Bernoulli random graph



The main difference between graphs is in transitive nodes. In Bernoulli graph all kind of nodes acts as intermediary and send transactions to the next actor. For deep structure analysis the following parameters based on Social Network Analysis (Wassermann 1994; Gradoselskaya 2004) were used. The parameters are listed in Table 1.

Table 1 Social Network Analysis Integral Parameters

Parameter	Formula	Explanation
D	$D = \max_{i,j=1,..,n}(d(n_i, n_j)),$	$d(n_i, n_j)$ – the shortest (geodesic) path n_i – agent i; n_j – agent j
Re	$Re = \frac{\sum L_p}{\sum L},$	L – dyadic tie L_p – reciprocated dyadic tie
Tr	$Tr = \frac{N_t}{N_d},$	N_t – number of non-vacuous transitive ordered triples N_d – number of triples in which ties go from agent n_i to agent n_j and from agent n_j to agent n_k
CC	$CC = \frac{1}{N}\sum_{i=1}^{N} C_i,$	C_i – density of the i-th agent's neighborhood

IDCenz	$\frac{\sum_{i=1}^{n}(IDC^* - IDC_i)}{\max_{i,j=1,..,n}\sum_{i=1}^{n}(IDC^* - IDC_i)}$,	IDC^* – in-degree centrality of the most central agent IDC_i – in-degree centrality of the i-th agent
ODCenz	$\frac{\sum_{i=1}^{n}(ODC^* - ODC_i)}{\max_{i,j=1,..,n}\sum_{i=1}^{n}(ODC^* - ODC_i)}$,	ODC^* – out-degree centrality of the most central agent ODC_i – out-degree centrality of the i-th agent
BCenz	$\frac{\sum_{i=1}^{n}(BC^* - BC_i)}{\max_{i,j=1,..,n}\sum_{i=1}^{n}(BC^* - BC_i)}$,	BC^* – betweenness centrality of the most central agent BC_i – betweenness centrality of the i-th agent

The method of characterization of the network integral parameters is based on four group types: ego network (neighborhood) properties, dyadic parameters, single actor parameters and the whole network parameters. Calculations were performed according to common formulas (Newman 2003; Costa 2007), see Table 1.

The main parameters of network by SNA methodology include diameter, the coefficient of transitivity, the number of nodes and ties, density, clustering coefficient and Freemans indexes of centralization (In-degree centralization, out-degree centralization). The formulas of index calculation are available in Table 1.

Diameter (D) is the largest geodesic path between agents in the network. Geodesic path (or the shortest path) is the number of nodes which is placed between the farthest agents in the network (Costa 2007). The diameter shows the scale of network.

The network clustering coefficient (CC) demonstrates the average value of ego-networks density to each agent (Hanneman 2005). The coefficient reflects the degree of network connectivity (Phan 2017).

The coefficient of transitivity (Tr) is usually used to analyze the ability of agent's bandwidth. The triad becomes transitive when the condition holds true: there are directs from A to B and from B to C it means that B is a transitive triad between A and C ("friend of mine friend is my friend"). There are two ways to calculate the transitivity coefficient:

- To count transitive triads / count triads, which are not including the third connection (from A to C);
- To count transitive triads / count all triads in network.

A lot of researchers reason that transitivity is the basis of network equilibrium existence (Faust 2006). It is «natural» for all kind of networks. The transitivity reflects the potential to bandwidth growth.

Coefficient of reciprocity (Re) is another important coefficient in SNA systems. It is calculated as a stake of connected pairs of agents (dyads) which have connection between each other. The nodes without connections are not included in the calculation.

The centrality coefficient is used to determine the direction of network. Centrality is determining the uneven distribution of connections between agents. There are a lot of centrality coefficients. Three of each will be used in that research.

The number of connections which go out from network is named Out-degree centrality. On the other hand, the number that goes in is named In-degree Centrality by degree.

Betweenness centrality, which is sometimes named as intermediary, determines the shortest path between network agents. It shows that a system could be controlled from the outstide and connections could be ended too (Marsden 1990).

In the researching process three types of centrality: in-degree (ODCenz), out-degree (ODCenz) and betweenness (BCenz) were used. The values of these parameters are estimated by Freeman's indexes. Each of the indexes illustrates the variety of individual type of centrality index. To estimate the network centralization one must find the most central actor C*, take its centrality score and subtract the centrality score of each other actor from it, add up the differences: $\Sigma(C^*-C_i)$, then divide this by what this sum would be under the largest possible centralization ($\text{Max}\ \Sigma(C^*-C_i)$).

The integral parameters of SNA don't consider the quantitative network characteristics. It gives the opportunity to make a comparison between real and random graphs without distortion of general picture.

The comparison of parameters between real transactions and random Bernoulli graph is shown in Table 2.

Table 2 Social Network Analysis Integral Parameters

Parameter	Transactions network (59)	Bernoulli random graph
D	18	10
Re	0,025	0,013
Tr	0,126	0,048
CC	0,454	0,182
IDCenz	0,414	0,077
ODCenz	0,108	0,075
BCenz	0,23	0,106

A range of conclusions can be made after analyzing of the graphs' integral parameters.

Firstly, the levels of parameters such as diameter (D), coefficient of reciprocity (Re) and Transitivity coefficient (Tr) should be noted. The value in real transactions graph is more than 2 times larger than in random graph. The fact shows that the real network is more compact, the nodes have more transitive properties (more transactions for each network agents) and also transactions go back more often (reciprocity).

The In-degree Centrality indicator (IDCenz) takes the value bigger for 4 times than the same indicator in random graph. The fact illustrates that the real transactions network direct transaction toward «celebrity » nodes more often.

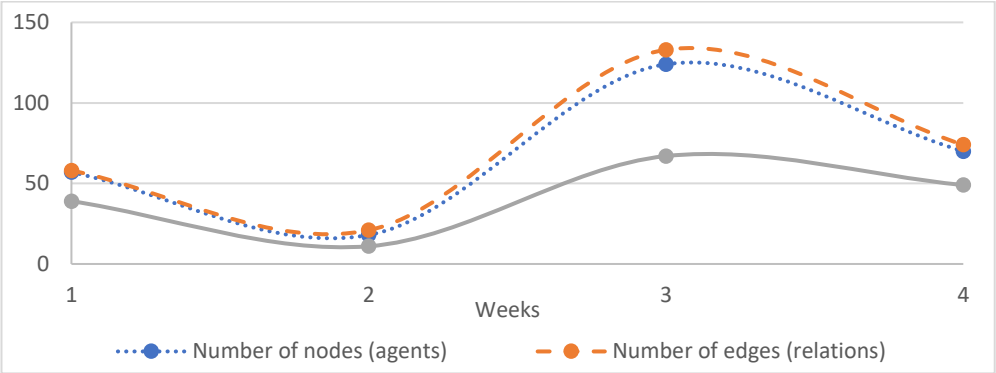
The result of index analysis shows that the real transaction network doesn't have the same or similar parameters with Bernoulli graph which was constructed with the same parameters. The real graph doesn't random. It includes agents which are connected by economic relations and the network needs further researching.

4. THE ANALYSIS OF TRANSACTIONS STRUCTURE DYNAMICS

The second task of the article is to analyze the dynamics of closed contours networks structure. The dataset covers the period of 1 month. The data was divided into 4 equal intervals, 1-week each. The analysis of shorter intervals will allow the most perspective parts of the period from the point of SNA network characteristics.

At the result of algorithm process, the 22 networks were received which include 250 unique economic agents in 134 economic industries. The dynamics of quantitate parameters is demonstrated in figure 3.

Figure 3 The dynamics of changing quantitative parameters in weekly cut



The result of analysis shows that the largest volume of connections and agents falls in the second part of month, for the third week.

Social Network Analysis also includes the quantitative systems of metrics. The 4 periods of month allow to do that research in contrast to random Bernoulli graph which does not have quantitative parameters such as network turnover and the volume of average transaction.

The SNA quantitative metrics represented by parameters:

- Nn - number of nodes (agents, actors);
- Ne - number of edges (relations, communications, ties);
- D - density is simply the proportion of all possible ties that are actually present, $D = \frac{Ne}{Nn*(Nn-1)}$;
- Sum - total amount of transactions/payments (in rubles);
- AvrCost - average cost of transaction in rubles, $AvrCost = \frac{Sum}{Ne}$;
- Ng - number of different types of goods and services produced and consumed in the network;
- Var - variety of products of network, $Var = \frac{Ng}{Nn}$.

The result of parameters calculation shows at the 3d table.

Table 3 Social Network Analysis Quantitative Parameters

Parameter	1st week	2nd week	3d week	4th week
Nn	57	18	124	70
Ne	58	21	133	74
D	0,0182	0,0686	0,0087	0,0153
Sum	42194,49	4401,44	14619,44	29029,41
AvrCost	727,49	209,59	109,92	392,29
Ng	39	11	67	49
Var	0,68	0,61	0,54	0,7

Quantitative parameters demonstrate significant superiority of the 3rd period in number of agents and connections. Despite this, the total turnover doesn't depend on number of agents. The maximum value of the sum is in the 1st week. The sum of turnover and average cost suggest that the main payments are falling on 1st week. The other periods are covered by standard operation activity. The thesis confirms by the 3rd and 4th weeks when the number of agents and connections takes the maximum value, but the sum of turnover and average costs reduce.

The density (D) coefficient at the 3rd week demonstrates the least result it can mean that the direction of transactions only to one side. There is no active exchange of goods and facilities between agents as in the 2nd week.

Quantitative analysis allows to make the conclusion that the maximal turnover of network provides number of relations between agents (Ne) and Density (D) but not the number of agents (Nn). That conclusion is demonstrated in the 1st period.

The conclusions based on quantitative parameters are not enough. The further steps are necessary in analysis of integral parameters SNA. The indexes were calculated and it is shown in the 4th table.

Table 4 Social Network Analysis Integral Parameters

Parameter	1st week	2nd week	3d week	4th week
D	4	3	4	3
Re	0,76	0,446	0,144	0

Tr	0,054	0,04	0,014	0
CC	0,018	0	0	0,014
IDCenz	0,036	0,0588	0,0159	0,0141
ODCenz	0,3087	0,5571	0,4667	0,4552
BCenz	0,013	0,078	0,0045	0,0054

The diameter of networks takes the low value. The fact demonstrates that the perimeter of network is small and distance between the farthest agents between 3 and 4 agents.

The low level of Transitivity coefficient demonstrates that there are few agents which make transactions to the other agents. The coefficient takes the value of zero at the 4th week that demonstrates the full absence of transitive nodes.

The biggest level of reciprocity coefficient (Re) is at the 1st week. The conclusion can be made that this time contains the largest number of mutual exchange when the transaction goes from agent A to agent B and returns. The 4th week demonstrates a one-sided direction of transactions, there are not transitive nodes and eventually the reciprocity coefficient becomes zero because all transactions are going toward one side.

The result of decomposed period analysis when one month was divided into 4 periods demonstrates that the reduction of period raises the out-degree centrality coefficient. Reduction of the period reduces the number of transitive nodes, the other transactions with the same agents can get into the late period of time.

The result of comparison analysis between 4 weeks allows to make a conclusion that the 1st week is the most effective in terms of quantitative parameters. The week reaches the most effectiveness and the sum of turnover and average cost become maximum. Certainly, the maximum number of agents is at the 3rd week but there are only one-side transactions which don't allow to raise the turnover.

The 1st week of the month is the most prospective to complementary currencies implementation. The conclusion is confirmed by integral indexes of SNA. The week demonstrates the lowest level of out-degree centrality, this fact provides the largest turnover inside the network. The coefficient of reciprocity also demonstrates the most active return of transactions.

In the process of 4 weeks analysis there is reduction of nodes in networks. The larger period analysis (e.g. 1 month) shows that the mutual turnover between agents can be not only in one-week period. Agents can perform two transactions per month but in the different weeks.

The economic agents can have transactions in different periods of time and the number of payments can be different too, but short period analysis won't detect it. The large period analysis shows that the organizations in municipal unity is closer than it can seem.

5. ECONOMIC EFFECT

For this research, the network of 12000 transactions for 1-month interval was analyzed. The general turnover of the network amounted to 2705 million rubles.

The 17 networks which were constructed from economical transactions cover the turnover equal to 260 million rubles. The sum is 9,6% from the general turnover between organizations. It is worth noting that the sample doesn't cover a lot of transactions. There are only few transactions from 4 bank branches in the same bank. There are different commercial banks in the city and the citizens participate in turnover too.

260 million rubles can be free from complementary currencies implementation. But we need to calculate the volume of money supply for regional economic maintenance. Calculating the value can be done through the formula 1:

$$M = \frac{\sum Tr*12}{V}, \qquad (1)$$

where $\sum Tr$ – all network transactions sum,

12 – number of months per year,

V – turnover ratio.

The average coefficient of turnover ratio in Russia economy is 5. The money supply calculation result is 624 million rubles. We assume that the municipal money is borrowed for banking percent/interest (процент банка?). The average rate of banking percent/interest, by the information by Central Bank, is 14.27% per year. The monthly percent/interest for 624 million rubles debt for 10 years will be 7,42 million rubles per month.

The complementary currencies implementation in closed transactions networks can free this sum for further investment.

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MERIT SIGNAL – THE ÉMINENCE GRISE OF ECONOMIC SYSTEMS

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ABSTRACT

A number of economists, including Smith, Veblen, Keynes and others believed that status seeking plays dominant role in motivation to work. Contemporary research supports the notion and finds that people generally desire status not as a means, but as a goal in itself. Evidence further suggests, that the proportion of resources used for status signaling is commensurate with one's income level. Referring to the global phenomenon of volunteering and evidence from fields like anthropology or labor economics, we argue that as equally effective motivators as status can be signals mediated by non-pecuniary awards, like verbal praise, impact indices in the academic domain, or reputation scores on the internet. Based on these observations, we propose a new type of dual work reward, where the motivationally salient psychological signal - the "merit" reward - is separated from the exchange value reward, has its value determined by the market and is granted in a symbolic, non-tradable form. The exchange value reward is commensurate with actual effort, measured in units of labor time. We claim that an economic system with such remuneration mechanism can be both efficiency improving and instituted bottom-up.

KEYWORDS

SDT, merit, signaling, economic system, status, volunteering

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1. PROLOGUE

The "volunteer economy[i]," according to estimates by Salamon et al., (2011) has more than a billion participants globally, who generate over a trillion USD of economic value annually. In spite of its size and the benefits it brings to its participants and consumers, no economic models have to date satisfactorily explained this phenomenon[ii]. Consequently, policy makers, or designers of community economic systems might be missing important insights that could be instrumental to achieving their particular goals. This paper proposes an economic framework, built on a key feature of volunteer economy - the fact that volunteers produce economic value without expecting exchange value reward for their effort.

The paper is organized in the following way. First, we provide an overview of the Self-determination Theory - a modern psychological framework of well-being and motivation. Next, the research results of crowding effects of reward are discussed and the concept of the "merit signal/reward" introduced. Evidence of the merit signal salinity for motivation is then presented, originating in the field of labor economics and the status-related research. In the following chapters, mechanism of the proposed economic system and an experiment testing its basic features are described. A short excursion into the deep history of our species follows and the paper is concluded with comparison of Merit economy to other economic systems.

2. THE PSYCHOLOGY OF MOTIVATION

According to Self-determination theory (SDT) - a psychological model concerning human motivation and behavior - all humans share three innate psychological needs, fulfillment of which strengthen self-motivation and well-being. They are the need for autonomy (self-determination), competence (mastery) and relatedness to other people. SDT also recognizes, that the basic needs are fulfilled through effort driven by motivation, which comes in two forms: intrinsic, defined as the "…propensity of people to take interest in their inner and outer worlds in an attempt to engage, interact, master, and understand…" (Ryan and Deci, 2019, pp 114) and extrinsic that "…concerns all activities aimed at achieving outcomes separable from the behavior itself…" (ibid, pp 120). From the definitions follows that intrinsic motivation will lead to a stronger and more immediate satisfaction of the basic needs than the later. The level of satisfaction of the basic needs associated with extrinsically motivated work is predicted by the theory to depend on the degree to which the activity is internalized, or "integrated" by the worker (Ryan and Deci, 2000).

Since its beginnings in the 1970s (Ryan and Deci, 2019, pp 114), researchers successfully applied the theory to explain effects of various types of reward on motivation and worker productivity in diverse organizational contexts. One of the more notable applications of SDT was providing explanation for a class of phenomena, now well evidenced by a number of studies (Frey and Jegen, 2001, pp 590), where task, or performance-contingent material incentives are found to decrease the level of engagement of intrinsically motivated workers (Deci et al., 1999, pp 628). This "crowding-out" behavioral pattern defies expectation of the standard economic theory, which predicts that workers should increase effort when the supply of reward is increased (Frey and Jegen, 2001). SDT explains the behavior by pointing out that material reward lowers perception of autonomy of the rewarded, who consequently reduce effort (Deci et al., 2017, pp 33). On the other hand, grants of informational positive feedback, like a score indicating worker performance against the average were found increasing - or "crowding-in" - engagement (Deci et al., 1999, pp 629).

Existence of the crowding effects described above suggest that work reward in general can have two functions. The more familiar one allows rewards to be exchanged for goods, or services. Examples include money, precious stones, or equities. The other function is a signaling one, as the character, amount, or the presence of a reward may convey information supporting, or suppressing the recipient's feeling of competence, autonomy or relatedness (Deci et al., 1999). Examples of rewards

endowed predominantly with the signaling function are verbal praise, awards, diplomas, or "likes" and other reputation rating mechanisms on the internet (see for example, stackoverflow, 2019, makeuseof, 2019). If reward is observable publicly, the signal it conveys can affect also the observers, who may respond in a number of ways, including attempting to imitate the behavior that lead to the reward (Henrich and Gil-White, 2001), developing deference/disrespect toward the recipient, or increasing own work effort (Clark et al., 2010). We call this function the "merit signal" of reward. The second inference that can be made from the existence of the crowding phenomena is that for purely intrinsically motivated workers, it is the merit signal of reward that drives motivation to increase engagement level and not its exchange value.

However, as Ryan and Deci (2000, pp 71) point out, "…much of what people do is not, strictly speaking, intrinsically motivated, especially after early childhood when the freedom to be intrinsically motivated is increasingly curtailed by social pressures to do activities that are not interesting…". This reality is reflected also in the standard economic models, which predict that in general, workers do respond to material incentives with greater effort. Yet, not all extrinsically motivated cases are equal, and SDT recognizes a spectrum of extrinsic motivation types that differ in the degree of autonomy afforded to a person. On the lower end, the individuals are the least autonomous and "perceive their behavior as being directly controlled by others, often through rewards and threats" (Deci et al., 2017, pp 21). On the high end of the autonomy spectrum "…people have a full sense that the behavior is an integral part of who they are, that it emanates from their sense of self and is thus self-determined" (Gagné and Deci, 2005, pp 335). Consequently, the most autonomous type of extrinsic motivation is theorized to share many aspects of intrinsic motivation and to deliver also similar effects, including improved well-being and increased work engagement. Implicitly, workers with this type of motivation should respond with more engagement to the merit signal of reward than to its exchange value, similar to the intrinsically motivated ones.

3. MERIT SIGNAL AS A DIRECT MOTIVATOR

One group of workers who respond more to the merit signal than the exchange value of reward are research scientists, who seem to trade better pay for more work autonomy and freedom (Stern, 2004). According to the Nature magazine's annual Satisfaction in science report, 68% of scientists report satisfaction with their carrier, regardless of working longer hours and receiving markedly lower pay than their industry colleagues or other professionals with similar level of education (Woolston, 2018). Lower preference for exchange value of income than its merit signal can be found also among some wealthy entrepreneurs (Loudenback, 2018). For example, Carlos Sims, Warren Buffett, or the late founder of IKEA Ingvar Kamprad (Martin, 2018) are known for their relatively frugal lifestyles, which leaves interest in the merit signaling aspect of reward as the most likely source of their motivation.

Examples of "frugal" billionaires like these might be attributed to individual preferences, but research suggest that the psychological effect of the merit signal of income on motivation is universal. Based on laboratory experiments and analysis of the British Household Panel Survey, DeVoe et al. (2013) found that workers perceive money earned from own labor as more valuable than money gained from other sources like rents or lottery winnings and that money from own labor increases effort to earn even more of it. The authors attribute their findings to the competence signaling aspect of the reward. Another facet of the signaling function of reward is a worker's relative position in income hierarchy. When Walmart raised the company minimum wage in 2015, the long-time employees who have been paid that hourly wage already protested, regardless of the fact that the exchange value of their income has not changed (Pettypiece, 2015). Similar reaction had some workers of Gravity Inc. - a Seattle payment processor - after management raised salaries across the board to USD 70,000 (Hinsliff, 2018). Sensitivity to the psychological signal of relative income had been studied and confirmed also by Clark et al. (2010). The merit signaling aspect of reward for

worker performance was the subject of research by other scholars, resulting in recommendations to organizations to take this function of reward into consideration, when designing incentive programs (Frey, 2007, Stajkovic and Luthans, 2001, Mickel and Barron, 2008).

4. STATUS SEEKING

Regardless of extensive evidence about the merit signal as a direct motivator, there is no doubt that majority of global population work primarily to generate income for its exchange value. Yet, signaling concerns are manifested also in the way people spend their earnings, in particular when these are used to advertise status. The more extreme forms of the behavior were described by Thorstein Veblen (1899), who coined the terms "conspicuous consumption," and "conspicuous leisure," to denote lavish spending on goods and services, or ability to spend time in leisurely activities in order to signal wealth. More recently this subject has been receiving renewed interest from economists as a part of broader shift in the field, directed toward more realism in description of the model economic agent (Akerlof, 1984, pp 3). The focus of these efforts is revision of the agent's utility function, by including "relative" components, reflecting concern for economic situation of others (König and Lausen, 2017, Postlewaite, 1998, Heffetz and Frank, 2010, Clark et al., 2008).

Heffetz and Frank (2010, pp 5) identified three characteristics of status as salient: positionality, desirability and non-tradability. Positionality reflects the universal human propensity to create ranks, based on a variety of parameters, including behavioral styles or personal characteristics. A defining attribute of positionality is that increasing status by one person comes only at the cost to the status of others. The second characteristics of status is its desirability, with two possible candidates for its source (ibid, pp 8):

- people might seek status as a tool for acquiring goods and services,
- status might be desired for its competence signaling function.

While both reasons are likely, and in many cases occur at the same time, the fundamentality of the SDT-identified basic needs and their "non-material" character dictate that eventually - even under the scenario A - most resources acquired will be ultimately used to address a person's psychological needs. Propensity of people to use own resources to gain status is a widespread phenomenon (for example Swedroe, 2019) and was also studied and confirmed experimentally (Huberman et al., 2004, Ball et al., 2001). Huberman et al. (ibid) also found the source of desire for status to fit the signaling (B) option. Signaling concerns emerge as the most plausible source of status desirability also from the orthodox economic model modified by a utility function with status-indicating relative arguments.

> "…with a utility function that has both a (standard) absolute and a relative consumption components and is — as is standardly assumed — concave in absolute consumption, the marginal utility from additional consumption through the absolute term approaches zero as income rises. The relative component hence becomes increasingly important as income rises. Status seeking, on this view, becomes increasingly important with economic growth… (Heffetz and Frank 2010, pp 26)"

As the quote above implies, the higher a person is on the income ladder, the greater portion of her income should be invested into status signaling. A study of spending habits of 480 American households using data from Consumer Expenditure Survey found that visible goods - a proxy for status-broadcasting positional goods (Hirsch, 2005) - are indeed consumed predominantly by the wealthy (Heffetz, 2007, pp 18). The economic impact of status-seeking can be illustrated on charitable giving - a category of expenditures, dominated by grants from the wealthy (Auten et al., 1997). This activity - also called "conspicuous compassion" (West, 2004) - contributed $410.02

billion in 2017 (2.1% of GDP) to US charitable organizations and has been growing on average by $8.94 billion for the past 40 years ("Giving Statistics," 2018).

5. THE HYPOTHESIS

In the preceding paragraphs we discussed the most significant areas of research, concerning psychological effects of reward on supply of labor, in diverse situations and organizational contexts. Next, we will proceed to confront the evidence and arguments presented so far, with the founding theses of this paper:

1. A work reward in general, has two functions:
    a. conveys information about a person's competence and relatability to others. This is the merit signal of reward,
    b. provides means that can be exchanged for goods and services. This is the exchange value of reward.
2. Once a person's physiological needs are addressed, maximizing the merit signal plays dominant role in their motivation. The motivation is direct, when work effort is driven by the size or presence of the merit signal of reward, or indirect, when work effort is driven by desire to acquire the exchange value to be used as an instrument for boosting status - a form of merit signal.

Based on the extensive evidence from research into the "crowding phenomena," for people intrinsically motivated, both of our theses are true. Intrinsically motivated person chooses to engage in activity, because the act fulfills her need for autonomy, competence, or relatedness. She welcomes a merit reward, if it signals her competence and will also accept reward that can be exchanged for goods and services, if its grant does not interfere with her feeling of autonomy. Extrinsically motivated individuals may behave in a way similar to the one typical for intrinsically motivated ones, if they perceive the activity they perform as highly autonomous. To a great degree, they respond with greater effort to the merit signal than to the exchange value of the reward. As we slide on the autonomy scale down, the directly experienced merit signal of reward as a source of motivation is weakening and the exchange value of reward as a motivator becomes dominant. The exchange value of reward is used to address initially the individual's physiological needs, until a point is reached, when these are mostly satiated. The extensive status-related literature informs us, that with income increasing, a large portion of it is used to improve one's social status. In effect, that portion of income is transformed into merit signal through purchase of positional goods. The second founding thesis therefore still holds also for the extrinsically motivated workers, to a degree that is determined by the portion of income used for merit signaling. The size of that portion of income is unknown, albeit the cited research (Heffetz, 2007, pp 18), as well as a qualitative model with utility function containing relative arguments for status suggests that status signaling is the dominant concern for the highest income workers (Heffetz and Frank 2010, pp 26).

Several researchers pointed out that status seeking through conspicuous consumption generates economic inefficiency and negative externalities that leave everybody worse off (König and Lausen, 2017, Heffetz and Frank, 2010). The situation was illustratively described in a paper by Hopkins and Kornienko (2004) in the following way:

> "…everyone increases conspicuous consumption in order to improve status, but any gain in status is cancelled out by the similarly increased expenditure of others. Such an economy can be described as a Lewis Carroll "Red Queen" economy, in which "it takes all the running you can do to keep in the same place…."

Status seeking is therefore a zero-sum game, similar to Prisoner's Dilemma, where defection of a player results in an inefficient equilibrium (goods or services are over-consumed). Consequently, Heffetz and Frank (2010, pp 7) suggest that a theoretical possibility exists for Pareto improvement.

A number of policies was proposed, including public provision of private goods (Koenig-Robert and Pearson, 2019) or imposing tax on positional consumption (Layard, 2006, Frank, 1985, Boskin and Sheshinski, 1978). However, if the founding theses of our proposal are valid, any redistribution attempts of already earned reward will be necessarily seen as lowering one's merit signal and therefore resisted. A more navigable path for resolving the described inefficiencies could be to minimize the opportunity for individuals to use resources to acquire status. This can be accomplished by instituting an economic system (the "System", or "Merit economy"), with the following basic functions:

1. the System rewards every hour of labor time of any agent with equal amount of exchange value (the Currency) and does so before the market value of the labor output is determined,
2. agents can sell their labor, or its product, for any amount of their choosing that market can bear,
3. buyers make payments for labor or the purchased goods and services to the System, not the seller,
4. the System assigns to the seller a non-transferable score, equal in size to the sale price. This is the motivationally salient merit signal portion of the seller's reward,
5. the System destroys the Currency received from the buyer,
6. the Currency held by the agents can be exchanged for national currencies at market-determined rates.

The System is envisioned to be implemented as a computer algorithm, where both functions of reward - the Currency, carrying the exchange value, as well as the merit signaling score - exist in digital form only. The most important feature of the proposal is that the exchange value is granted separately from the merit signal of reward. This allows virtually equal distribution of exchange value among the economy actors, while the merit signal of reward is determined by the market and as such is granted unequally. As a consequence, accumulation of excessive exchange value by individuals is severely constrained and therefore its use for status signaling is significantly suppressed. At the same time, the competitive environment and market-determined prices, typical for a market economy are maintained in the System.

6. EXPERIMENTAL EVIDENCE

During the winter season of 2017-18, an experiment was performed on an outdoors recreation web site (cross-country skiing), to make qualitative evaluation of the main tenets of the System. The site receives around 40 000 visitors per season and the most popular crowdsourced section of the site is typically produced by around 150 users. Before and after the experiment, the site content was accessible to all visitors, without pay. During the experiment, the content creators were given the choice to lock their new post and make it accessible only by paying points. A flat points reward was granted to the content creators for posting and points could be also purchased with euros. This arrangement ensured that the content creators had enough points to read other contributors' posts, while the non-contributors faced a choice to start contributing in order to earn points, or to purchase them if they wanted to consume the locked content. Two types of non-monetary rewards had always existed in the site in the form of star rating the consumers could assign to the individual content, and a number was also visible on individual posts, indicating the number of reads. The effect of these arrangements was, that during the experimental season, the number of contributors doubled (from 150 to 300), the frequent contributors who provided content in the preceding and following seasons continued to participate, and 130 users spent close to 600 euros purchasing points. The number of registered users also doubled to around 1 200. The following season, after the site returned to the non-experimental state, the number of posts, visitors and registered users also returned to the pre-experiment levels.

The results suggest that introduction of "money" (points) into the site did not suppress intrinsic motivation of the "old time" contributors, confirming the SDT predictions. Instead, the locked content motivated a new group of contributors, who were consumers-only before and after the end of the experimental season. Additionally, the new currency naturally gained an exchange rate against the national currency. As a reaction to the experiment results, an actual implementation of Merit economy called NEO is being developed, that implements and extends the rules of Merit economy. The economic engine is available for use also in third-party projects (Zatko, 2018).

7. EVIDENCE FROM OUR PAST - THE HUNTER-GATHERERS

A potentially more substantial confirmation of the notion that a long-term stable implementation of the System is viable can be found in our history, in the socio-economic arrangement of hunter-gatherers that governed lives of hominids and modern humans for most of the past two million years (Hawkes et al., 2018, Lee and Daly, 2002, Hayden, 2001). These people lived in small, strictly egalitarian bands of around 30 people and everything they had, including food, tools and other property was shared equally (Marlowe, 2005). The resource sharing and the egalitarian character behavioral pattens attracted considerable attention from researchers, as they defy expectations of the standard economic model and represent a discontinuity in the evolution of our species' social arrangements (Pennisi, 2014, pp 824). A comprehensive account of the later characteristics can be found in the study by Boehm, (1993) who argues that social equality was achieved by a process called reverse dominance hierarchy, where the "leaders" are controlled by the group members. According to the author, the process is rooted in an individual's dislike of being dominated - a manifestation of our basic need for autonomy. The natural differences in preferences for domination and other features that typically lead to creation of hierarchies, were suppressed by "intentional leveling" - a mechanism which includes criticism, ridicule, leaving, disobedience, or execution (ibid, pp 228).

The resource sharing behavioral pattern is most apparent in the way food is acquired and distributed among the band members and as a result, management of this resource attracted the most attention from researchers. Schematically, the pattern can be described in the following way: in a band of hunter-gatherers, small animals and starchy foods like tubers or fruit are supplied by women, whereas men provide more valuable food resources like wild honey or meat of larger animals. Once collected, the food is brought to a central place - typically the camp - where it is portioned and distributed to the band members. The feature of the pattern most surprising to a western observer is that the most productive food providers do not receive the largest shares and usually are not even the ones who perform the portioning, or distribution. At the first sight, this scheme seems to violate one of the basic principles guiding social cohesion, that acts of giving must be at some point reciprocated (Gouldner, 1960). To explain this paradox, a number of hypotheses were put forward, which can be synthesized into four most important ones: kin selection, tolerated scrounging, reciprocal altruism, and costly signaling (Gurven, 2004). The first two concern primarily the question of who gets how much and why, whereas the third and fourth provide explanations for why exceptional producers exert a seemingly unreciprocated effort. The reciprocal altruism hypothesis was found inadequate to explain the asymmetry in sharing, as it is unable to explain the fact that often the exceptional hunters' productivity is not possible to reciprocate in kind (Winterhalder, 2001, pp 9). The costly signaling hypothesis, first formulated by Hawkes et al. (1993) explains the paradox by balancing the asymmetric flow of food toward the group provided by the hunter by a counterflow of social attention and mating benefits he receives in return. While objections were brought up against significance of the biological fitness-related benefits (Gurven and Hill, 2007), presence of the attention and reputation-related benefits is finding more support (Stibbard-Hawkes, 2019). A very likely source of the hunter's motivation is the feeling of competence he experiences after a successful hunt. After all, hunting is practiced also today, because it is often perceived by the hunters as thrilling (Daigle et al., 2002, pp 11). Gurven (2004, pp 254) reports that women-foragers overproduced as well, only to give the surplus away. This behavior can be explained within the framework of the

reciprocal altruism hypothesis, but can also be seen as an activity directed toward addressing the psychological need for relatedness (Lawler et al., 1995).

The pattern of food sharing among hunter-gatherers illustrates that an economic system can persist for long time period even if resources are distributed equally, if a mechanism exists that balances the one-directional flow from the overproducer to the group by a counterflow of benefits flowing in the opposite direction. The benefits do not have to be in-kind; they can instead address some of the higher echelons of the individual's hierarchy of needs (Maslow, 1954).

For reasons that remain disputed (Hayden, 2001, Arnold, 1996, Paynter, 1989), the system started to break down some 15,000 years ago, when humans begun to create permanent settlements. A plausible scenario how the process might have unfolded was suggested by Hayden (2001), who places the transformation into physical locations, rich with natural resources. Abundance of food freed people to devote time to activities other than food production, like creation of art and invention of new technologies. However, a negative side-effect of these developments was that the environmental pressures responsible for existence of the social leveling mechanism that kept opportunistic individuals from dominating, disappeared as well. Consequently, the opportunists started to accumulate resources (food, land, domestic animals…) and used them to acquire objects signaling status - the "prestige items". These were in turn used for brokering social relationships, controlling others through indebtedness or for acquiring other desirable items and services (ibid, pp 255). The coveted honest signals of competence and prestige that before were communicated by verbal praise and non-verbal clues, are now attached to physical objects like the prestige items and later positional goods and money. Increasing one's status thus became possible by simply accumulating material objects. However, by transferring ownership of the object away from its creator, the character of the signal is changing; it no longer signifies the effort, skill or talent of the creator, instead it conveys only the new owner's ability to marshal resources[iii]. The consequences are twofold:

a. social learners (Henrich and Gil-White, 2001) - instinctively reacting to the status signal as a marker of evolutionary beneficial behaviors - are learning a skill that again only perpetuates the quest for status. In effect, effort is directed away from addressing deficiencies in fulfillment of one's fundamental needs for autonomy, competence or relatedness, toward more often than not, wasteful goals (see the "Red queen effect" mentioned earlier),
b. the resources accumulated by the status seeking individuals create artificial scarcity and lead to economic inequality.

8. MERIT ECONOMY AND OTHER ECONOMIC SYSTEMS COMPARED

8.1 Capitalist market economy

In this system, the amount of money – the most common type of work reward – is a measure of its exchange value, but serves also as a merit signal. As argued above, the exchange value of money is commonly used to gain status – a form of merit signal. The two functions of reward are thus inseparably bound in the monetary reward, with the consequence that even workers who would supply labor for just the merit reward, receive exchange value reward as well. If we further consider that for-innovation-important personal characteristics and luck are scarce within population, only a small group of people ends up attracting most exchange value available in the economy. These inequalities are multiplied by other factors (Piketty and Goldhammer, 2014), ultimately resulting in unfair[iv] and destabilizing distribution of exchange value.

The second major problem of capitalist market system is its inability to supply optimal amount of money into the economy, as evidenced by the periodic occurrences of financial crises. This occurs regardless of the existence of a diversity of institutional arrangements and mechanisms, designed to thwart such events.

The Merit economy solves the first problem by separating the exchange value of reward from its merit signal. In particular, the exchange value reward is granted for effort, measured in units of labor time and is thus independent of (orthogonal to) the market value of the created good or service. By virtue of the majority of people working similarly long work days, this guarantees virtual equality in income. The income equality in turn also ensures impossibility to purchase status, as it can emerge only when material differences exist between individuals. At the same time, motivation of workers in Merit economy to supply labor should be at least as strong as in the capitalist market economy, as the merit reward received for selling one's output is market determined.

The second problem of the capitalist market economy is addressed in the Merit economy by implementing an endogenous money creation and destruction mechanism. Whenever a worker reports labor, a fixed number of monetary units is created by the system, commensurate with the number of hours worked. The money is rewarded to the worker once their report gets verified by a group of system-selected verifiers. The money does not circulate, instead it is destroyed (converted to the merit signal reward respectively), whenever its holder makes a purchase. These arrangements, together with transparency provided by the system (actors can see all balances and transaction details of other actors), should be sufficient to maintain balance between money creation and destruction, without the need for external regulation.

8.2 Time Banking systems

In Time banking systems, money has typically the form of credit, issued by the seller/producer of a product or service to the consumer. This contrasts with money creation in the Merit economy, where the money is not a form of credit, but a reward for work already performed. As such, Merit economy can be implemented without the necessity to exogenously set any credit levels. Another difference between Time banking and Merit economy is, that the currency of the former lacks the merit signal (for example, a heart surgeon receives the same monetary reward for an hour of work as a gardener for cutting grass). This is also the most likely cause of problems with scaling Time banking projects beyond a relatively small number of participants and generally the reason for the short life span of such initiatives (see for example Shih et al., 2015).

8.3 Mutual credit systems

Merit economy offers several advantages when compared to mutual credit systems (MCS). First, money in the MCSs "bundle" the merit signal together with exchange value, similar to the capitalist economic system. On the one hand, this is an advantage against Time banking, as reflected in the longevity and other parameters of real-world MCS projects. At the same time however, as argued above, this bundling is the primary cause of emergence of income inequality. The second disadvantage of MCSs is the very mechanism of money creation. Issuing credit requires trust, which necessitates maintenance and occasional defection costs that need to be carried by the economy participants. Lastly, only marketable work can typically back credit issuance in MCS, implying that the economy does not offer a way to “naturally” set monetary rewards for non-marketable activities, like science or art creation, as these typically do not have immediate market value.

8.4 Cryptocurrencies

The Merit economy carries some similarities with cryptocurrencies (CC), like Bitcoin. Both are digital-only, trustless systems, that "mint" exchange value endogenously, relying on the proof of work

in the CC, and proof of labor in the Merit economy cases. One difference is that in the former the work is wasteful, whereas in the later it is intended to be useful. Another difference is that tokens (the money in CCs) are not removed from circulation and there is generally an arbitrary, algorithmically set upper limit of tokens that is possible to ever mint in the system. The CC token market value must therefore be derived artificially by some ad-hoc mechanism, or by financial markets from scarcity programmed into the token creation mechanism.

9. SUMMARY

The main argument of this paper is that work reward in general can not only be exchanged for goods and services (has exchange value), but also provides - directly or indirectly - information about the recipient's social status, or their personal characteristics like competence and relatability (the merit signal). We claim that the later function is the source of motivation to supply labor, and consequently - by virtue of being tied to the exchange value of reward - also the source of economic inequality in the capitalist system. Salinity of the merit signal for motivation to supply labor is predicated by the founding tenets of the self-determination theory (SDT), according to which people instinctively seek fulfillment of their psychological needs for autonomy, competence and relatedness and that this instinct drives their motivation. An implication of the theory is that once a person fulfills her basic physiological needs, she uses the available resources for increasing her status, or fulfilling her higher-level psychological needs identified by the SDT. The presented arguments are confronted with experimental, theoretical and real-world evidence, originating in a diversity of sources:

- the psychological literature concerning crowding phenomena,
- the economic research about status seeking,
- own experiment,
- research results from anthropology, concerning the economic arrangement of hunter-gatherers.

Based on the presented arguments, we propose that an economic system ("Merit economy"), with a specially designed dual reward mechanism can be instituted that eliminates certain inefficiencies of the mainstream economic system. The first of the two rewards carries the motivationally salient, non-tradable merit signal in the form of numeric score, equal to the market-determined price of a worker's labor, or of the product produced. The reward is a reflection of the worker's competence and skills, similar to the numerical metrics used to measure impact of scientific output (Pan and Fortunato, 2015), or to the reputation-like scores, users can earn on various internet platforms (see for example, stackoverflow, 2019, makeuseof, 2019). The second reward is commensurate with the number of hours worked and is granted before the price of the labor or its output is known (determined by the market). Given that there are 24 hours in a day, the daily income an individual can earn has an upper limit and consequently the possibility to use income as a status signal greatly is suppressed. Thus, the economy constantly distributes the economic product virtually equally, while maintaining the dynamic character of a market economy.

The set of benefits an economic system with the described dual reward mechanism can deliver, depends on the choice of additional functions that complete the ones described in the paper. For example, the instance of Merit economy called Neo (Zatko, 2017) does not specify any built-in constrains on what activities are "work" and therefore any actually performed activity that can be purchased/rewarded within the economy can receive both types of reward. This choice extends the benefit of the virtually equal distribution of economic product by granting agents a total freedom in choosing the activity, they might want to engage in. This is a necessary condition for fulfilling the SDT-identified basic human need for autonomy, as well as for a person to feel intrinsically motivated - the highest and most powerful form of human motivation. The focus of our proposal on delivering economic system that addresses the fundamental human desire for self-determination should bring

other benefits that will become clear over time - if real-world implementations confirm viability of the arguments expressed in the paper.

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Endnotes

[i] Whenever mentioning volunteers, we mean all types of public goods providers, including Free and Open Source Software developers, or participants on crowdsourced projects like Wikipedia ("Wikipedia," n.d.), OpenStreetMap ("OpenStreetMap," n.d.) and others.

[ii] A sizable body of research exists concerning volunteering, including works that claim to explain particular types of volunteering, within the conceptual framework of neoclassical economics (see for example Lerner and Tirole, 2003, Katz and Rosenberg, 2005).

[iii] The situation has an analogy in the role of neurotransmitters like dopamine or endorphine in the brain. They are normally released as a reward for evolutionary beneficial activity like exercise, but it can also be elevated artificially, by using psychotropic substances (NIDA, 2017).

[iv] "Fair" understood here in terms of the Rawls' difference principle (Rawls, 1999)

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REVITALIZING LOCAL COMMUNITIES THROUGH REGIONAL CURRENCIES USING GIS: A CASE STUDY IN KASAMA AND KESENNUMA IN JAPAN

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ABSTRACT

In Japan as well as in many developed countries, population is decreasing and ageing is progressing simultaneously. Under these circumstances, it is vital for the younger generation to get to know more about the area where they live and work in, so that they can take part in reactivating their areas. Toward this reactivation, regional currency can play an important role in attracting the younger generation to learn how to revitalize their communities. In realizing this goal, GIS (Geographic Information Systems) has great potential as an educational tool for analyzing the geographic facets of the regional currency circulating in the region, and for making reactivation plans for the region. This paper first describes the present situation of regional currencies in Kasama and Kesennuma in Japan. Second, the paper demonstrates a GIS application to improve the accessibility to the terminals in Kasama, at which people exchange points to coupons. Third, the paper provides an educational material for exercising the most basic GIS operations for beginners, that is, how to acquire location data and how to represent the resulting location data on a map using Google My Maps.

KEY WORDS

Revitalizing community, Educational material, GIS (geographic information systems), Kernel density estimation, Voronoi diagram

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1. INTRODUCTION

Japan has a long history of regional currency, which worked as an important lubricant of economic activities of local corporations and institutions until the 19th century. For example, *Hansatsu* was issued by a number of local governing bodies in the Edo era 1603-1868 (Nohmura 2016). According to Hayashi (2012), in the 2000s, many types of regional currencies were created, which amounted to a few hundreds, and issued by non-profit organizations, private corporations, chambers of commerce, local governments, and councils. Nishibe (2013) clarifies that the aims of regional currencies are firstly to activate local economies, and secondly to revitalize local communities by way of regional exchanges of economic value and communication within local areas. Contrary to the expectation of people in local communities, most of these regional currencies have faded away over the years.

Quite recently, however, the second aim i.e., revitalization of local communities by way of regional currency, is attracting attention once more in Japan as one of the possible triggers to create and vitalize communities in local areas near big cities as well as in disaster recovering areas. In this situation, it is vital for the young generation to get to know more about the area where they live and work in, so that they take part in reactivating their areas. Toward this reactivation, as pointed by Nishibe (2013), regional currency plays an important role and it is hoped that young people learn how to revitalize their communities by way of regional currency. To realize this hope, GIS provides a good educational tool for surveying the current situation of regional currency in local communities and for making revitalization plans.

This paper consists of five sections including this introductory section. The following second section describes the current situation of regional currencies called KapoCa, Crewship and Reneria, in three local communities in Kasama and Kesennuma. In the third section, the paper demonstrates a GIS application for the improvement of accessibility to the terminals in Kasama where people exchange their regional currency points to coupons to use. In the fourth section, educational material for exercising the most basic GIS operations for beginners is provided. The paper closes with concluding remarks in the last section.

2. THREE REGIONAL CURRENCIES: KAPOCA, CREWSHIP AND RENERIA

2.1 KapoCa of Kasama City

Regional currencies are issued and used in various types and in diverse areas throughout the world. Timebanking UK, which celebrated its 20th anniversary in September 2018, is one of the most successful examples. Fureai Kippu of Japan also attracted great attention internationally in the 1990s, but its activities have somewhat faded away, partially due to changes in society (Hayashi 2012). There are few regional currencies that are surviving the undergoing worldwide societal changes over the years, and we can note that regional currencies are vulnerable to institutional changes of the society, making differences in stableness and continuality.

Like Timebanking and Fureai Kippu, KapoCa of Kasama City aspires to encourage vibrant activities of human resources of the residents of Kasama City in Ibaraki Prefecture.

From an overview of regional currencies in Ibaraki Prefecture, which are listed in Table 1, we chose KapoCa of Kasama City. Starting from the website and related documents, we made an appointment to interview the issuer and administrator. Citizens Activities Department of Kasama City is in charge of KapoCa and the manager provided us with informative presentation with reference materials. As shown in Table 2, KapoCa incorporates a point system; points are issued to local volunteer groups and activity groups in Kasama City, and points can be used in certain shops and exchanged to services the city provides, such as a rental mini-bus.

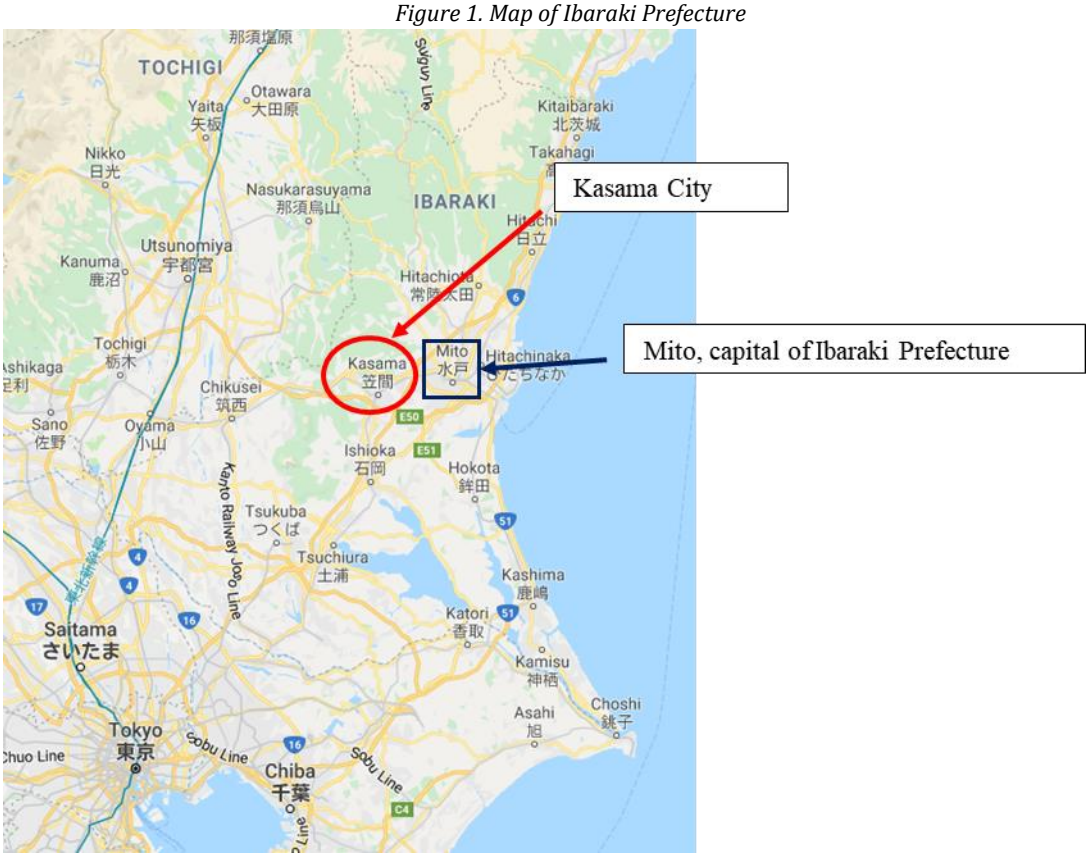
Table 1. Regional Currencies of Ibaraki Prefecture – City and Name of Currency

	City	Name of Currency	Issuer
1	Mito	Wa (Ring)	NPO Yawaragi since 2002
2	Mito	-	NPO Idaten
3	Tsuchiura	Kirara	NPO Community Building Bus Tsuchiura since 2005
4	Ishioka Yago	Satonowa	Satonowa Office since September 2016
5	Ryugasaki	Com	NPO Ibaraki Minami Seikatsusha Net since 2003
6	Hitachi Ohta	Green	Green Furusato Promotion Institute since 2004
7	Kasama	KapoCa	Citizen's Activities Department, Kasama City since 2011
8	Tsukuba	Gamar	Industry and Tourism Department, Tsukuba City since 2002
9	Tsukuba	Kusa no Neco2 Chip	Community Building Town Meeting
10	Tsukuba	-	Tsukuba Wellness Research, Tsukuba City since 2005
11	Tsukuba	Maisu	Hojo Community Building Promotion since 2009
12	Yawahara	Wara	Nishinodai Eco Money Institute since 2005

Source: List of All Regional Currencies http://cc-pr.net/list/ (2019/05/07)

The city of Kasama has 240.40 square kilometers in area, and is located in the west of Mito City, capital of Ibaraki Prefecture which is on the south side of Fukushima Prefecture (Figure 1). Kasama City has a population of 74,673 as of April 2019, which has decreased by 6.7% in 10 years, from 80,066 of April 2009. The area is known for producing quality chestnuts *kuri* and pottery called *Kasama-yaki*.

Figure 1. Map of Ibaraki Prefecture

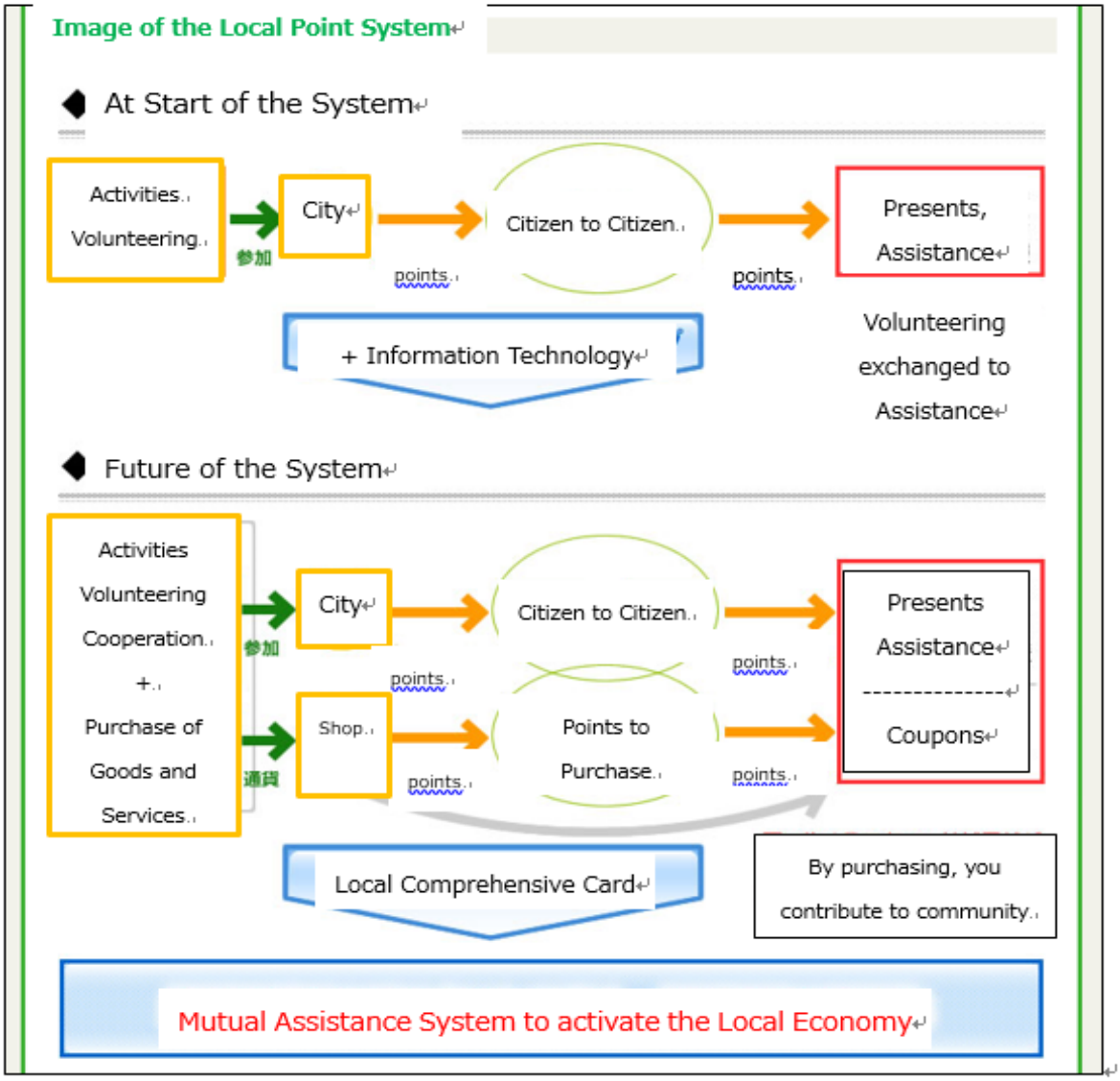


With the progress of ageing and depopulation, Kasama City introduced this point system in order to find human resources and have them participate in local activities to solve local tasks. The primary aim of KapoCa was to secure and develop human resources in the area, with the leadership of the local authority, supported by the government.

With a test period of one year, the point card system was first implemented with paper point cards, and was then transferred to IC (Integrated Circuit) cards, followed by the creation of the KapoCa portal site. In April 2015, the system started to work with Kapo Coupon which can be exchanged to 14 different kinds of goods. Tablet terminals are now placed in 18 locations within Kasama City to indicate the menu for exchanging points to coupons. Figure 2 shows how KapoCa works as a mutual assistance system to activate the local economy.

In short, KapoCa is a regional exchange system introduced by the Kasama City, to activate citizens' activities, unearth human resources, and assist citizens' regional activities continuously, with the aim of building a community of collaboration. As a wide variety of activities are operated in many fields and operating bodies, 1 point is provided to one activity at a time, to make the system simple. For example, activities include holding square-step dance events, cleaning up at festivals on disaster prevention, holding courses on speaking style, etc. As an exception, 5 points are provided to speakers giving seminars. Health-related activities are attracting about half of the total participation, with 30 percent in volunteer groups delivering meals, and 20 percent in environmental activities.

Figure 2. Image of KapoCa System Source: Kasama City website

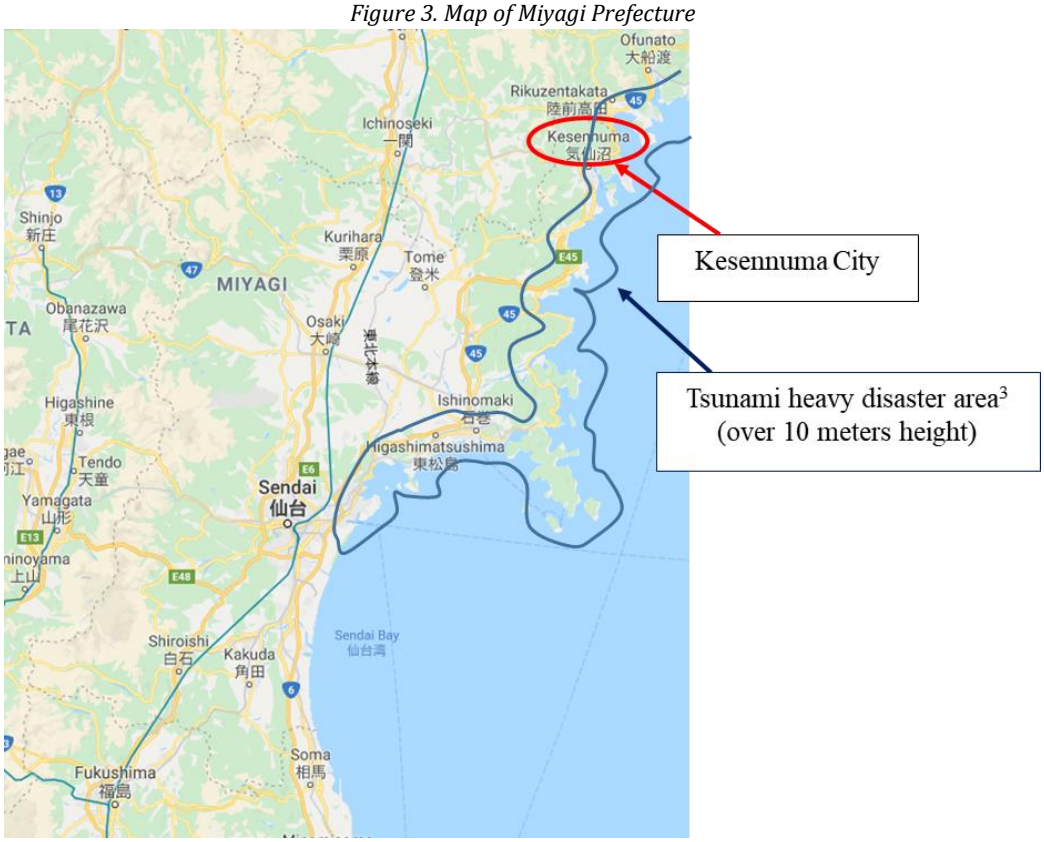


https://www.city.kasama.lg.jp/kapoca/sys_about/index.html (2019/03/12) translated by author

2.2 Reneria and Crewship of Kesennuma

One of the objectives of regional currency is to revitalize the local communities in areas recovering from disasters. To examine such a case, we looked into Reneria and Crewship currencies in Kesennuma City in Miyagi Prefecture. Kesennuma is located at the far north coast, south of Iwate Prefecture, with the area of 332.44 square kilometers (Figure 3). Kesennuma was heavily damaged by the tsunami caused by the Great East Japan Earthquake of 2011[1], which resulted in over 1,400 deaths/missing persons and over 15,000 houses destroyed. Population of Kesennuma City has been decreasing rapidly from its peak of 75,298 in 2009, to 64,352 of March 2018[2]. The decrease of population is 14.5 per cent in 9 years, far severer than that of Kasama City.

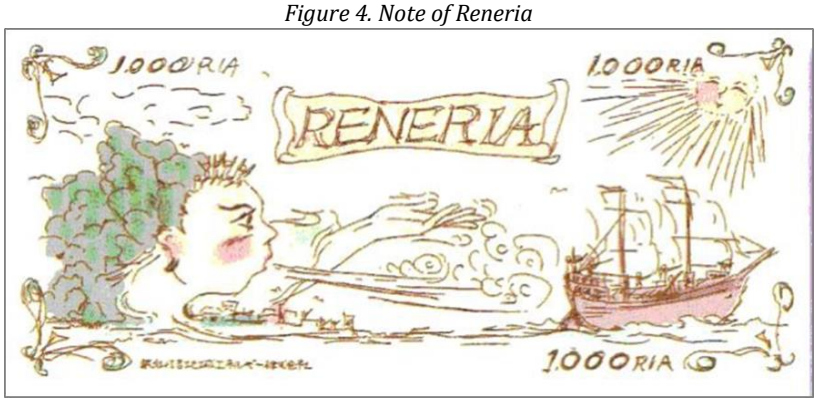
Figure 3. Map of Miyagi Prefecture



Kesennuma is one of the areas in desperate need of community revitalization for the residents and activation of local economies. Both Reneria and Crewship are regional currencies that were introduced after the tsunami destruction to assist the revival of the region. They both can be used to buy goods in stores, however, the concepts behind them differ largely.

In contrast to Crewship which aims to attract incoming tourists from outside the region, Reneria has the primary purpose of incorporating nature to the exchange system. It seeks to sustain the natural environment by circulating resources from ocean and mountains to food, starting with woody biomass operation. The name of Reneria comes from 'Re' meaning regeneration, 'ene' meaning energy, and 'ria' is a coined word from the Rias coast, designed by Hiroyasu Yamauchi of Slow-Food Kesennuma (Figure 4).

Figure 4. Note of Reneria



Source: Website of Kesennuma Regional Energy Development Corporation (Kesennuma Chiiki Energy Kaihatsu) http://chiiki-energy.co.jp/business/reneri

From the reconstruction after the tsunami of 2011, the initiator of the currency, Masaki Takahashi[3], considered that energy should be diversified to protect the region in disasters, and that it would be sustainable if energy were to be generated within the region. As Kesennuma has forest resources around the area, the idea of issuing a regional currency as an exchange to wood chips came up. Kesennuma is a Slow-food City and with the cooperation of the Slow-food Association, 50 percent of the consideration to the wood chips produced in the area for biomass energy generation is paid by Reneria to the owners of the forest lands (Figure 5).

Reneria is issued by Kesennnuma Regional Energy Development Co., Ltd. (Kesennuma Chiiki Energy Kaihatsu), with a validity of six months, and 1 note of 1000 Reneria can be used for 1000 yen in affiliated establishments in Kesennuma. If used within the validity period, it can be used multiple times, by writing the name of the store or the individual on the back of the note.

Figure 5. Circulation of Energy to Food Source: Website of Kesennuma Regional Energy Development Corporation (Kesennuma Chiiki Energy Kaihatsu) http://chiiki-energy.co.jp/business/reneria (2019/03/12) translated by author

On the other hand, Crewship issues Crew Cards to the residents and visitors of the city, whom Kesennuma refers to as "passengers." It is a point system administrated by Kesennuma Tourism & Convention Association[4] and can be used in the establishments in Kesennuma and related Internet shopping sites. The Crew Card was primarily created as a step of regional management through tourism, based on the concept of the DMO (Destination, Marketing Management, and Organization combined) system to collaborate client needs and management point of view.

In the Second Comprehensive Plan of Kesennuma City, it is the primary aim to increase purchases and consumption within the city, enlarging the financial circulation in the area, to construct an earning system under the "Local First" policy for strengthening the local economy. The actual target of the city is to raise the regional economic circulation rate[5] from 33.7 percent in 2013 to the pre-earthquake level of 80 percent by 2020. Under this target, Crewship aims to construct a stable client database for marketing to promote sales of local merchandise.

2.3 Comparison of the three regional currencies

To summarize the different aims of the three currencies: the primary aim of Kasama City's KapoCa is to support citizens' activities; Reneria of Kesennuma was introduced after the tsunami destruction, to make a circulation from energy to food for the sustainability of the region, and Crewship strives to activate the local economy through tourism.

We compare the three on eight major factors which are 1) area; 2) issuer/administrator; 3) aim; 4) number of members; 5) start date; 6) number of establishments; 7) validity; and 8) possibility of exchange, as listed in Table 2.

Table 2. Regional Currencies Researched

	KapoCa	Reneria	Crewship
Area	Kasama City, Ibaraki Prefecture	Kesennuma City, Miyagi Prefecture	Kesennuma City, Miyagi Prefecture
Issuer / Administrator	Citizens Activities Dept., Kasama city / Social welfare council	Kesennuma Regional Energy Development Co. Ltd. / Kesennuma Shokai	Kesennuma Tourism Promotion Organization / Simons Co. Ltd.
Aim	Mutual support	Sustainable society	Earning from DMO tourism with local management
Members	3,520 citizens (Sep. 2018)	Mountain owners, citizens Members undisclosed	17,068 volunteers, tourists and citizens
Started	April 2013	April 2012	April 2017
Number of Establishments	22 (facilities & stores)	Over 140 stores	73 stores & 1500 internet stores
Validity	2 years	6 months	December of each year
Exchange	1 activity = 1 point Not exchangeable to cash	1000 rea = 1000 yen	1 point = 100 yen

Source: Information from each regional currency obtained through interviews.

Each regional currency has its own characteristics that contribute to community-building, with its original form and philosophy as shown in Table 2. Among the three, we chose to further investigate KapoCa of Kasama City to continue our discussion of revitalizing the community using regional currency.

3. RELOCATION OF KAPOCA TERMINALS IN KASAMA TO IMPROVE ACCESSIBILITY

As mentioned in the introduction, GIS is useful for analyzing geographic facets of local communities and for making a revitalization plan based on the analysis. This section shows an example of such a use of GIS. Stated explicitly, this section proposes a relocation plan for improving accessibility to point-coupon exchange tablet equipments called “KapoCa Terminal” in Kasama. This relocation has potential to increase the number of KapoCa users, and consequently supports to revitalize Kasama City by increasing the usage of the regional currency.

To solve this relocation problem, because people access to terminals on a road network, the shortest path distance on a road network is assumed, in place of Euclid path distance on a plane. Fortunately,

GIS-based toolbox for spatial analysis on a road network, called SANET, is freely available for research purposes.

3.1 The current location of KapoCa terminals in Kasama

KapoCa terminal is a computer tablet equipment by which points are exchanged to coupons by selecting an option from the menu. In 2018, eighteen terminals were located in Kasama, and their addresses are tabulated in Table 3. Three of them are located in the Kasama city hall building. Therefore, Table 3 has sixteen different addresses to terminals at which people visit and exchange points to coupons in their daily life.

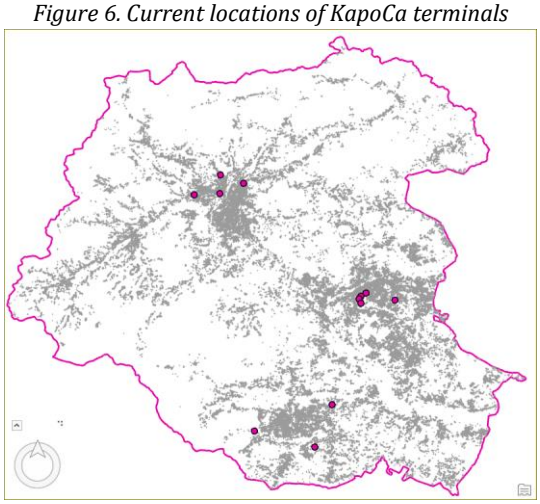
Table 3. Address list of KapoCa Terminals in Kasama

No.	端末設置場所 Building name	住所 Address
1	本所　市民活動課 City hall	笠間市中央三丁目2番1号
2	本所　健康増進課 City hall	笠間市中央三丁目2番1号
3	本所　高齢福祉課 City Hall	笠間市中央三丁目2番1号
4	支所　笠間地域課 Kasama local center	笠間市石井717番地
5	支所　岩間地域課 Iwama local center	笠間市下郷5140番地
6	社協　友部支所 Tomobe local center	笠間市美原三丁目2番11号
7	社協　笠間支所 Kasama center	笠間市石井717番地
8	福祉センターいわま Iwama center	笠間市泉159番地
9	友部保健センター Tomobe health center	笠間市美原三丁目2番11号
10	笠間保健センター Kasama health center	笠間市笠間230番地
11	岩間保健センター Iwama health center	笠間市下郷5139番地1
12	市立病院 Municipal hospital	笠間市中央一丁目2番24号
13	消防本部　警防課 Main fire department	笠間市箱田2564番地
14	友部消防署 Tomobe fire department	笠間市中央三丁目3番1号
15	岩間消防署 Iwama fire department	笠間市市野谷1542番地18
16	笠間図書館 Kasama library	笠間市石井2023番地1
17	友部図書館 Tomobe library	笠間市平町2084番地
18	岩間図書館 Iwama library	笠間市下郷5140番地

Column of address

As the road distance to the nearest terminal becomes closer to user's house, the user is likely to be more interested in KapoCa and wishes to get more points. Currently, the locations of terminals are limited to public facilities such as the city hall, fire departments, libraries, community centers and public health centers as shown in Figure 6.

Figure 6. Current locations of KapoCa terminals



This limitation produces inconvenient access to KapoCa Terminals for the residents of Kasama. Therefore, our aim is to find the effective locations for KapoCa Terminals that would reduce the travel distance of people from their houses to their nearest terminals. This type of location problem is often discussed in operation researches (OR) known as the location optimization or relocation problem. This section tries to solve the relocation problem using GIS.

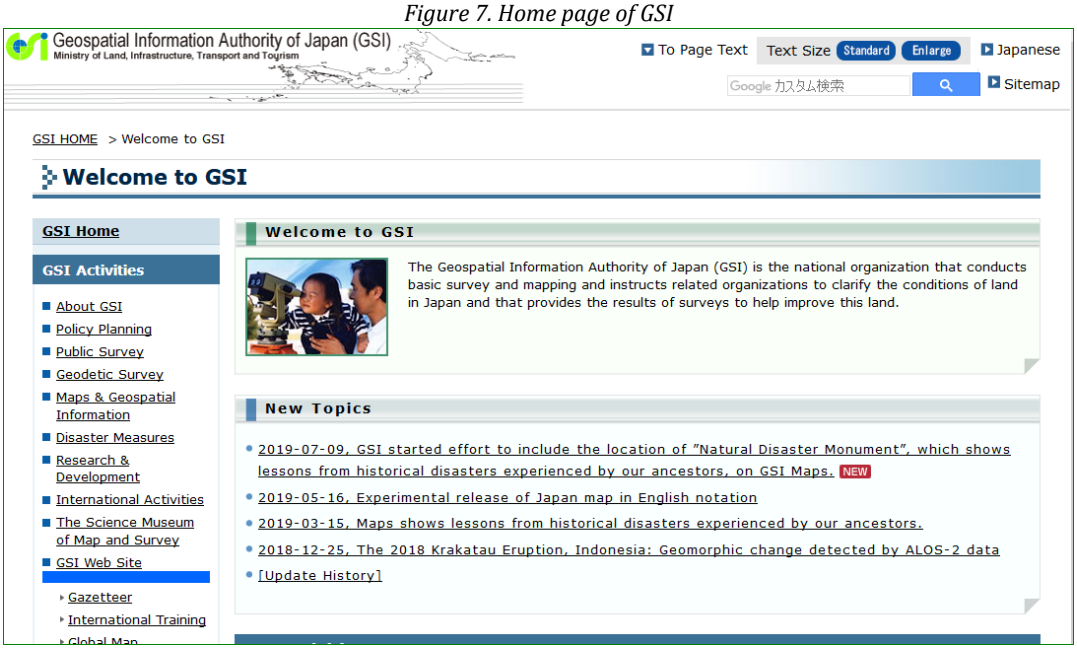
3.2 Distribution of people in Kasama City

To solve the above relocation problem, the first step is to know the distribution of buildings (the origins of people to their destinations, i.e., KapoCa Terminals) in Kasama. One might consider GIS census data, but the spatial unit of the census data available in Japan is a grid cell whose smallest size is 125 meters. Within a 125 m cell, there are over a hundred houses on average in Japan. Therefore, to measure the accessibly from one's house to the nearest terminal, building data are more precise than the grid-cell population data.

GIS Basic Map Data

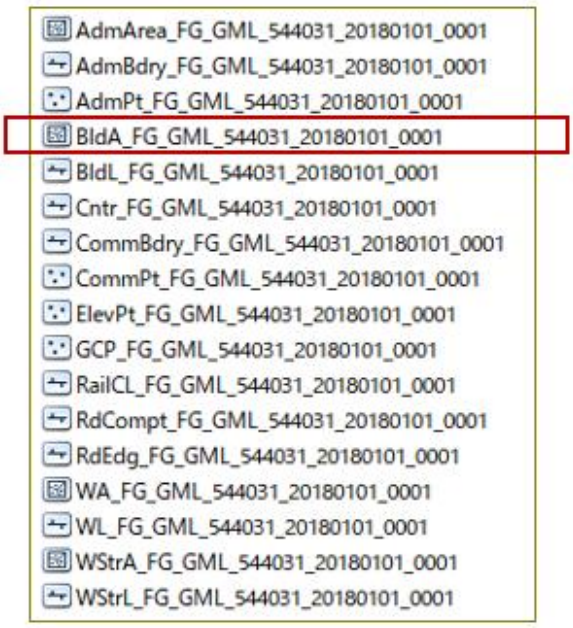
Geospatial Information Authority of Japan provides GIS Basic Map Data covering all Japan. The data are downloadable from the website: https://www.gsi.go.jp/ENGLISH/index.html.

Figure 7. Home page of GSI



Having successfully downloaded a zipped GIS Base Map Data file of a target area, the next step is to convert this GML format file to shape files using a conversion tool with GIS software. The converted data consist of seventeen shape files (Figure 8), one of which is the building polygon data.

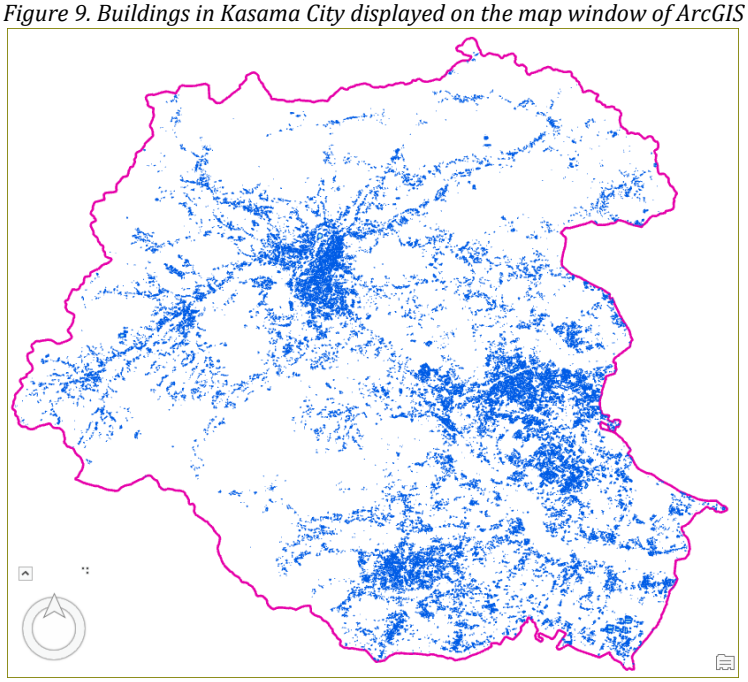
Figure 8. Seventeen shape files of GIS Base Map Information of GSI



Acquisition of building data in Kasama

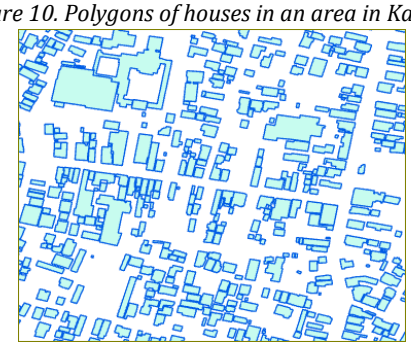
Figure 9 shows the distribution of buildings in Kasama City displayed on the map window of the GIS software; ArcGIS.

Figure 9. Buildings in Kasama City displayed on the map window of ArcGIS



As you enlarge the map in Figure 9, detailed shapes of houses become noticeable as polygons shown in Figure 10. There are 77,070 polygons in Kasama City.

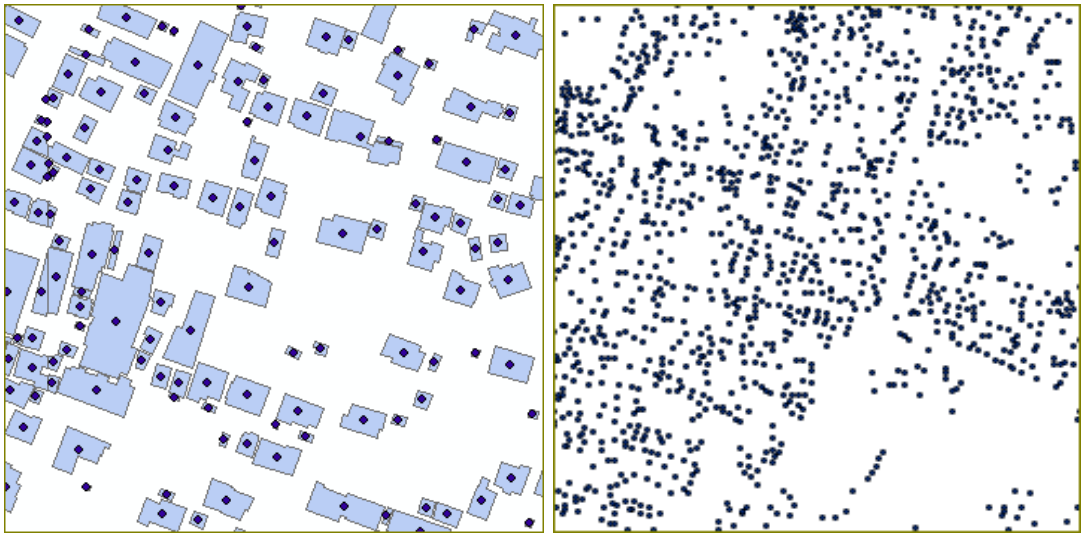
Figure 10. Polygons of houses in an area in Kasama



Generation of centers of house polygons

To obtain the density of houses over Kasama City, we represent a house polygon by its gravity center. The gravity center of a house is obtained from a tool in the geometry toolbox of the software. The result is shown in Figure 11.

Figure 11. Polygons of houses with their centers (left) and the distribution of the centers (right)



3.3 Kernel density estimation and the visualization of the resulting density in 3D

The next step is to estimate the density of houses by the Kernel density method. The result may be represented by contour lines in a 2 dimensional space shown in Figure 12 (high density areas are indicated by dark orange in color, whereas low density areas in white), or it may be represented by a solid model in a 3 dimensional space shown in Figure 13. These figures are obtained using a tool in ArcGIS Toolbox and with ArcScene application.

Figure 12. Density of houses in Kasama estimated by the Kernel density estimation method

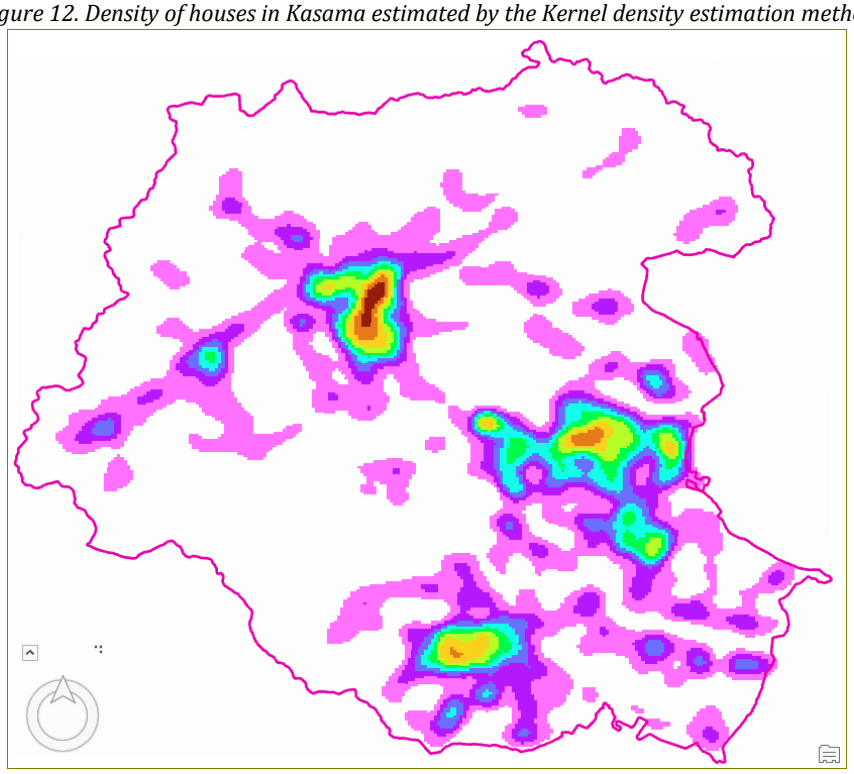
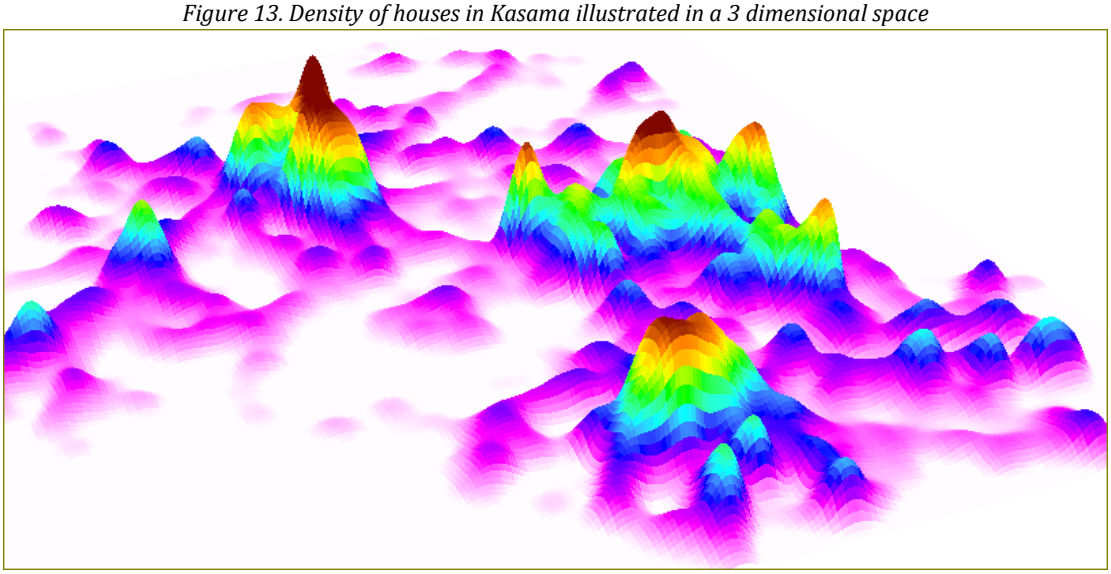
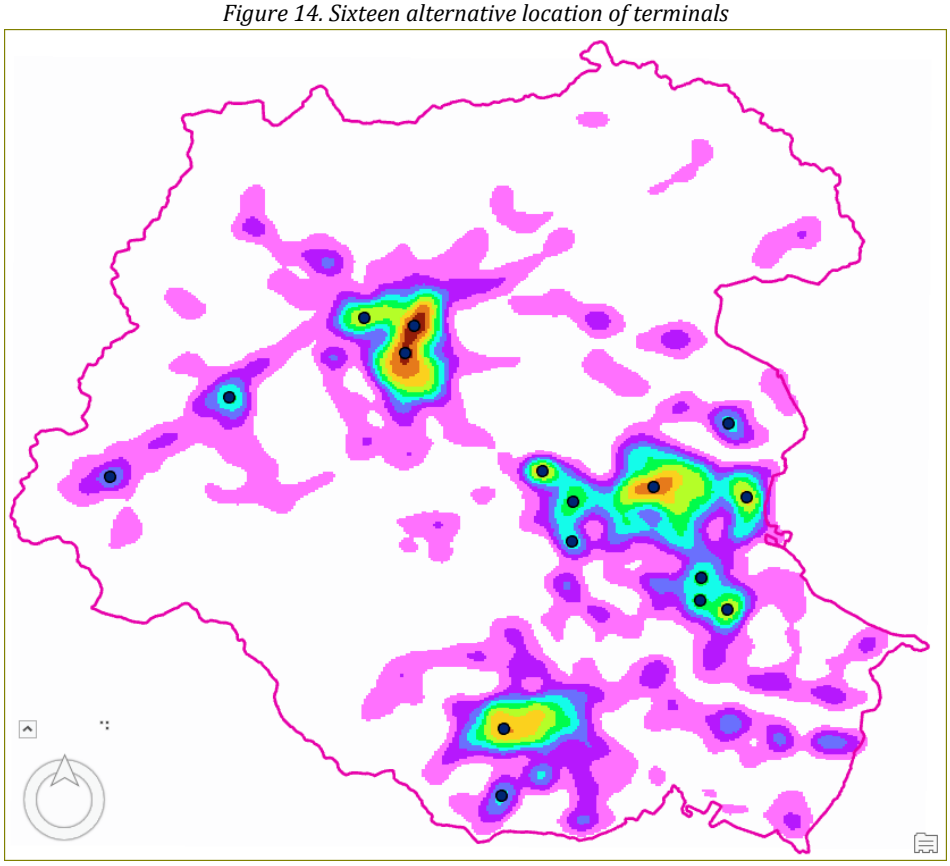


Figure 13. Density of houses in Kasama illustrated in a 3 dimensional space



Figures 12 and 13 indicate sixteen distinct peaks which are indicated by the black circles in Figure 14.

Figure 14. Sixteen alternative location of terminals



The areas around the peaks (distinctively high density points) are the places where the density of population is high. Comparison between Figure 14 with Figure 6 suggests that the current location of KapoCa Terminals can be reconsidered. If KapoCa Terminals are placed on the peaks, residents' accessibility would increase. Therefore, one of the appropriate location strategies would be to relocate the sixteen existing KapoCa terminals to the peaks indicated by the black circles in Figure 14.

3.4 Service areas of KapoCa terminals estimated by the network Voronoi diagram

Given the sixteen alternative locations of KapoCa Terminals shown in Figure 14, the next step is to estimate the service area of each KapoCa Terminal under the assumption that people choose the nearest terminal from their houses with respect to road distance (not Euclid distance). The subareas of sixteen KapoCa Terminals are computed by the network Voronoi diagram on a road network.

Road network

To compute the service area under the assumption that people visit the nearest terminal through a road network requires road network data consisting of nodes and links with their topology. Such road network data in Japan are available from the Sumitomo Electric Company (Sumiden). Figure 15 shows the road network in Kasama provided by Sumiden. As is seen in an enlarged network in Figure 16, the data consist of a link (the blue line segment) with its end nodes.

Figure 15. Sumiden road network and sixteen locations of terminals

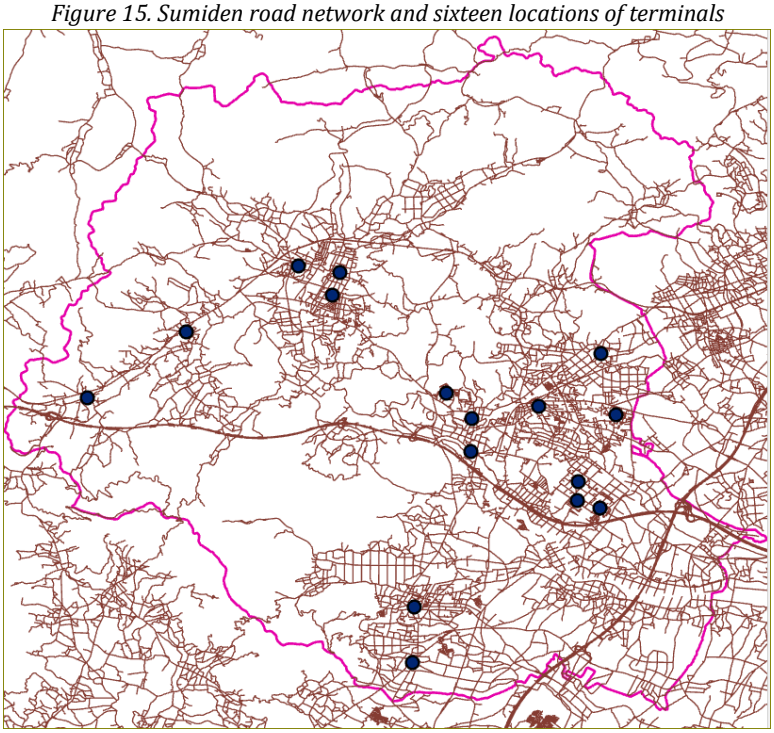
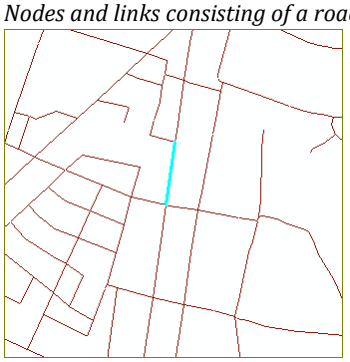


Figure 16. Nodes and links consisting of a road network

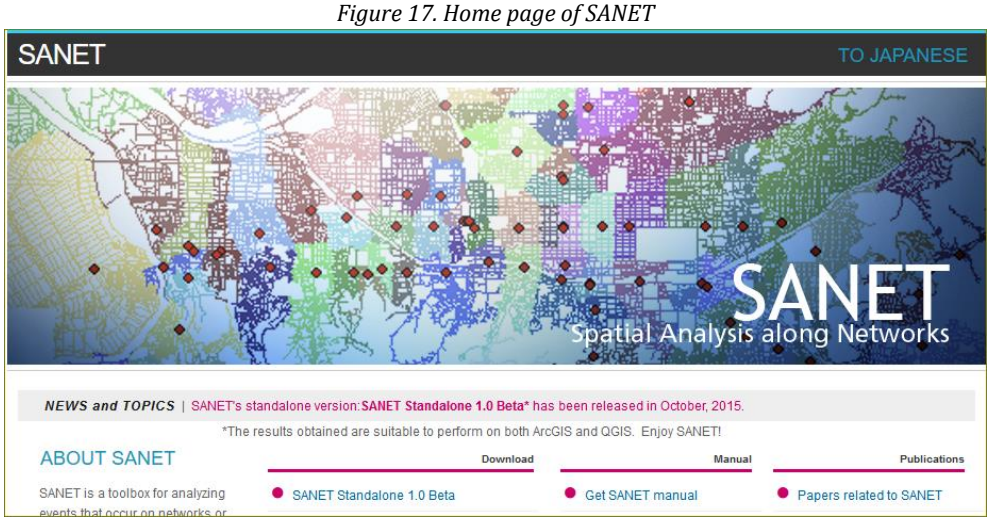


Construction of the network Voronoi diagram representing service areas of terminals

The next step is to construct the network Voronoi diagram of the sixteen KapoCa Terminals using a tool in SANET[7] (a software package for analyzing events that occur on or alongside of a network), which is freely available for university researchers from the following site:

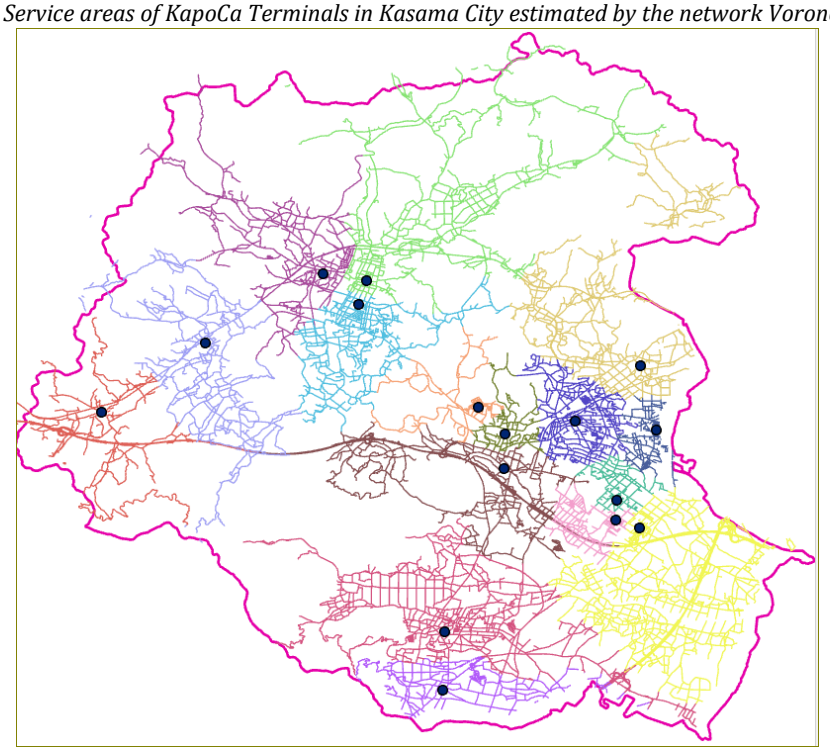
http://sanet.csis.u-tokyo.ac.jp/

Figure 17. Home page of SANET



The software package of the network Voronoi diagram in SANET produces two shape files: the file of line segments (links) and that of points (nodes of the links). Figure 18 shows the network Voronoi diagram in Kasama City obtained from the AcsID attribute in the line segment shape file.

Figure 18. Service areas of KapoCa Terminals in Kasama City estimated by the network Voronoi diagram



In Figure 18, the sixteen service areas of KapoCa Terminals are indicated by different colors of the road segments. The accessibility to KapoCa Terminals is improved. It is expected that these alternative locations will revitalize local communities to a certain extent.

4. EDUCATIONAL MATERIALS: INTRODUCTORY EXERCISES OF THE MOST BASIC GIS OPERATIONS

In order to revitalize a region, it is vital for us to understand the geographical circumstances of socio-economic activities, housing, facilities, infrastructures and environments across the region. For this purpose, GIS is a good tool for acquiring, managing and analyzing the above geographical information; it is also a good tool for planning as shown in Section 3 and for communicating the resulting analyses and plans with residents of the region. Nowadays, GIS is becoming a common tool for the younger generation. In fact, a new course curriculum of "comprehensive geography" is planned to be a compulsory subject in high schools in Japan from 2022, and GIS will be taught in this subject. Regional currency would be one of the most attractive and useful materials for this GIS education.

Motivated by the introduction of GIS to high school classes, this section provides an educational material for exercising the most basic GIS operations for beginners, that is, how to acquire location data, and how to visualize the acquired location data on a map.

The exercise is explained step by step with an actual example of KapoCa Terminals in Kasama. Section 4.1 instructs how to obtain the location data of KapoCa Terminals, and Section 4.2 explains how to create the map of KapoCa Terminals with Google My Maps.

4.1 Acquisition of latitude and longitude data from address[8]

There are two ways to acquire latitude and longitude data, i.e., one from address and one from Google Maps, which are explained in the following two sub-sections.

Acquisition of latitude and longitude data using a geocoding system

GIS data are a set of data consisting of location data and attribute data. When the location data are given by a list of addresses of facilities (or more broadly entities), an address is converted to its latitude and longitude by a geocoding system.

Geocoding services are usually received from the website either of governments, institutions or universities. In Japan, for example, the Address Matching System (geocoding system) managed by the Center for Spatial Information Science (CSIS) at the University of Tokyo is available free of charge. Using this geocoding system, for instance, the addresses of stores that accept regional currency, that of KapoCa Terminals, that of houses of regional currency users are converted into latitude and longitude data.

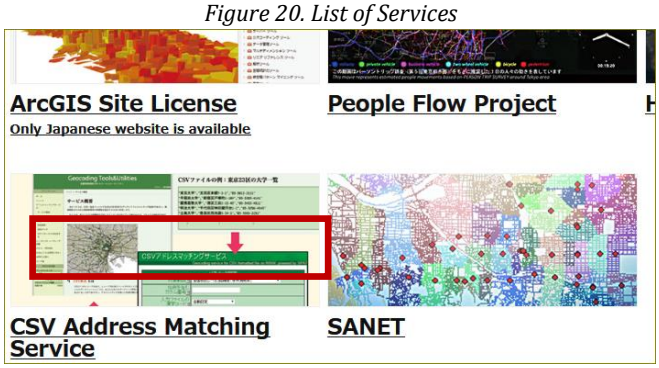
The addresses of KapoCa Terminals in Kasama are listed in Table 3. In the following, the procedure for converting these address data to latitude and longitude data is described step by step.

Step1. Visit the website of the Center for Spatial Information Science (CSIS) at the University of Tokyo. http://www.csis.u-tokyo.ac.jp/

Figure 19. Website of CSIS

Step2. Click 'Service' and select 'CSV Address Matching Service'

Figure 20. List of Services

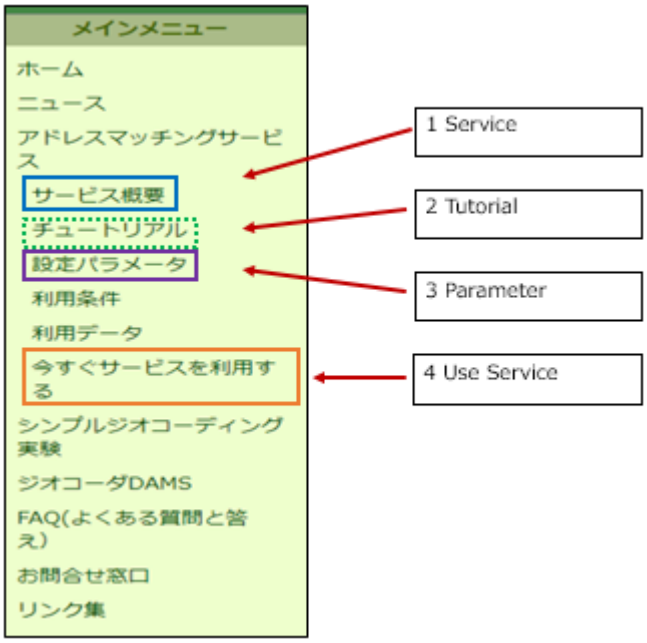


Step3. 'Geocoding Tools & Utilities' page appears showing the menu on the left side frame in Japanese.

Figure 21. Geocoding Tools & Utilities

If your file is an Excel file, save the file as a csv file. Click on 'Address Matching Service' indicated by the square frame in Figure 8. Then Figure 22 will appear.

Figure 22. Address Matching Service Page



By clicking the dotted frame (2 Tutorial) in Figure 22, you can download a tutorial that explains the geocoding system and csv format. In the tutorial, you will find how to set and prepare a *.csv file along with instructions for sending your file to the system and getting the converted file back from the system.

Step4. To start using the service

Click “want to use the tool right now” indicated by the largest frame (4 Use Service) in Figure 22 and move to the next page to start the service.

Figure 23. Parameter setting

Since the addresses of terminals are listed in column three in the KapoCa data file (see Table 3), input 3 in “column number of address” indicated by the top large frame. Next, select the file in your PC to submit. After selecting your file, click the bottom frame to submit. Instantly, the transferred file with

geocoded data added will be back in the download folder of your PC. Open the file, and you will find the file as in Table 4.

Table 4. File Returned from the Address Matching System

No.	端末設置場所 Building name	住所 Address	X	Y
1	本所　市民活動課 City hall	笠間市中央三丁目2番1号	140.30739	36.34223
2	本所　健康増進課 City hall	笠間市中央三丁目2番1号	140.30739	36.34223
3	本所　高齢福祉課 City Hall	笠間市中央三丁目2番1号	140.30739	36.34223
4	支所　笠間地域課 Kasama local center	笠間市石井717番地	140.24062	36.38284
5	支所　岩間地域課 Iwama local center	笠間市下郷5140番地	140.29578	36.29886
6	社協　友部支所 Tomobe local center	笠間市美原三丁目2番11号	140.321	36.34059
7	社協　笠間支所 Kasama center	笠間市石井717番地	140.24062	36.38284
8	福祉センターいわま Iwama center	笠間市泉159番地	140.26457	36.28811
9	友部保健センター Tomobe health center	笠間市美原三丁目2番11号	140.321	36.34059
10	笠間保健センター Kasama health center	笠間市笠間230番地	140.26028	36.38743
11	岩間保健センター Iwama health center	笠間市下郷5139番地1	140.29578	36.29879
12	市立病院 Municipal hospital	笠間市中央一丁目2番24号	140.30933	36.34347
13	消防本部　警防課 Main fire department	笠間市箱田2564番地	140.25098	36.3908
14	友部消防署 Tomobe fire department	笠間市中央三丁目3番1号	140.30647	36.34115
15	岩間消防署 Iwama fire department	笠間市市野谷1542番地18	140.28874	36.2818
16	笠間図書館 Kasama library	笠間市石井2023番地1	140.25075	36.38331
17	友部図書館 Tomobe library	笠間市平町2084番地	140.3074	36.33942
18	岩間図書館 Iwama library	笠間市下郷5140番地	140.29578	36.29886

In the converted file you have downloaded, you will find five new columns which are added by the Address Matching System. Among them, the Column X is for longitude data X and Y for latitude Y of the geographic locations of KapoCa Terminals.

Acquire latitude-longitude data on the Google Maps

When you are not able to access any geocoding systems easily, there is an alternative convenient way of getting latitude and longitude data. If your computer is connected to the Internet, you can find a set of latitude and longitude data on Google Maps. In the following, the procedure is explained in steps with an example of Kasama Inari Shrine.

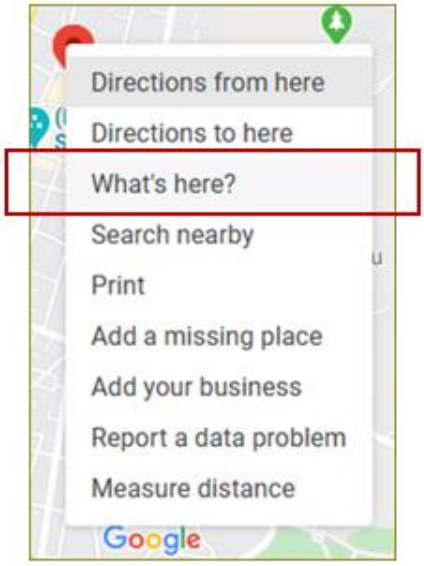
Step1. Access Google Maps

Find Kasama Inari Shrine on the Google Maps indicated with a red marker.

Figure 24. Kasama Inari Shrine

Step2. Right click the red marker and let a pull-down menu show up.

Figure 25. Pull-down Menu of Kasama Inari Shrine



Step3. By clicking "What's here?," you will find a set of latitude and longitude data of KasamInari Shrine shown at the bottom of the map as in Figure 26.

Figure 26. Latitude and longitude data

Step4. In the same way, you can, for example, make a list of location data of shops in Kasama City that accept coupons.

Step5. Save the location data you have collected in a *.csv file with your text editor for mapping.

4.2 Creating 'Regional Currency Map' with Google My Maps

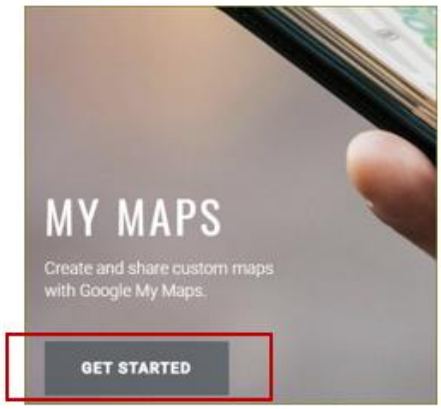
Having obtained longitude-latitude data, this subsection shows the procedure for making 'KapoCa Map' with Google My Maps.

Step1. Access Google My Maps.

https://www.google.co.jp/intl/en/maps/about/mymaps/

Step2. Click "GET STARTED."

Figure 27. Google My Maps



Step3. Click "+ CREATE A NEW MAP" shown in Figure 28. Then Figure 29 will appear.

Figure 28. Create a new map

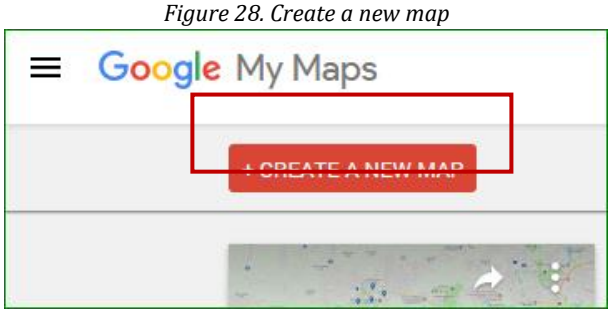
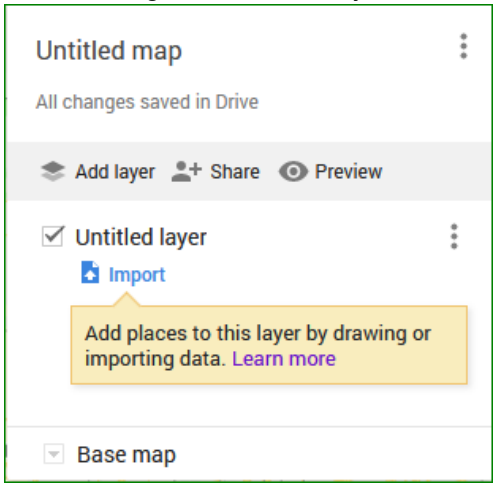
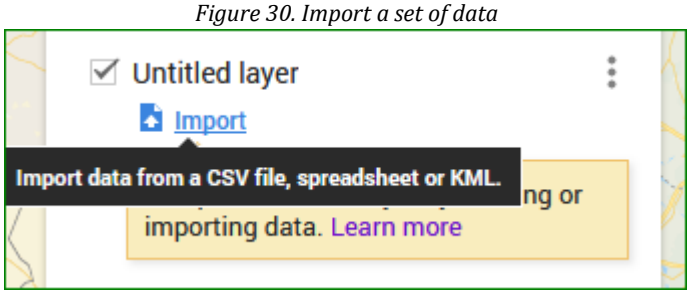


Figure 29. Untitled map



Step4. Click 'import' in Figure30 to proceed to importing the data of KapoCa Terminals which you have collected.

Figure 30. Import a set of data



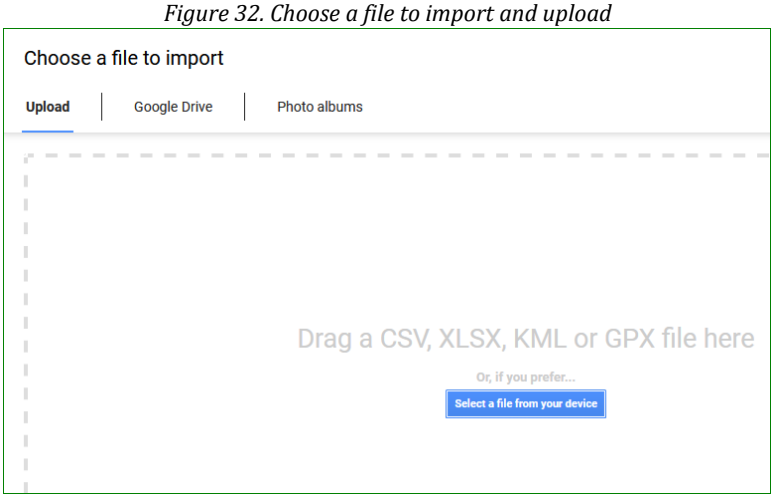
Below is the location data of KapoCa Terminals in *.csv file to import.

Figure 31. CSV file of location data of KapoCa terminals

```
No.,端末設置場所 Building name,住所 Address,X,Y
1,本所　市民活動課 City hall,笠間市中央三丁目2番1号,140.30739,36.34223
2,本所　健康増進課 City hall,笠間市中央三丁目2番1号,140.30739,36.34223
3,本所　高齢福祉課 City Hall,笠間市中央三丁目2番1号,140.30739,36.34223
4,支所　笠間地域課 Kasama local center,笠間市石井717番地,140.24062,36.38284
5,支所　岩間地域課 Iwama local center,笠間市下郷5140番地,140.29578,36.29886
6,社協　友部支所 Tomobe local center,笠間市美原三丁目2番11号,140.321,36.34059
7,社協　笠間支所 Kasama center,笠間市石井717番地,140.24062,36.38284
8,福祉センターいわま Iwama center,笠間市泉159番地,140.26457,36.28811
9,友部保健センター Tomobe health center,笠間市美原三丁目2番11号,140.321,36.34059
10,笠間保健センター Kasama health center,笠間市笠間230番地,140.26028,36.38743
11,岩間保健センター Iwama health center,笠間市下郷5139番地1,140.29578,36.29879
12,市立病院 Municipal hospital,笠間市中央一丁目2番24号,140.30933,36.34347
13,消防本部　警防課 Main fire department,笠間市箱田2564番地,140.25098,36.3908
14,友部消防署 Tomobe fire department,笠間市中央三丁目3番1号,140.30647,36.34115
15,岩間消防署 Iwama fire department,笠間市市野谷1542番地18,140.28874,36.2818
16,笠間図書館 Kasama library,笠間市石井2023番地1,140.25075,36.38331
17,友部図書館 Tomobe library,笠間市平町2084番地,140.3074,36.33942
18,岩間図書館 Iwama library,笠間市下郷5140番地,140.29578,36.29886
```

Drag and drop above KapoCa Terminal csv file from your PC onto the frame shown in Figure 32.

Figure 32. Choose a file to import and upload



Once you have finished dragging and dropping your file, you are asked to tell which column indicates the location of a place.

Step5. Choose the column of longitude and latitude respectively in your file. Namely, X axis for longitude and Y axis for latitude.

Figure 33. Columns to choose

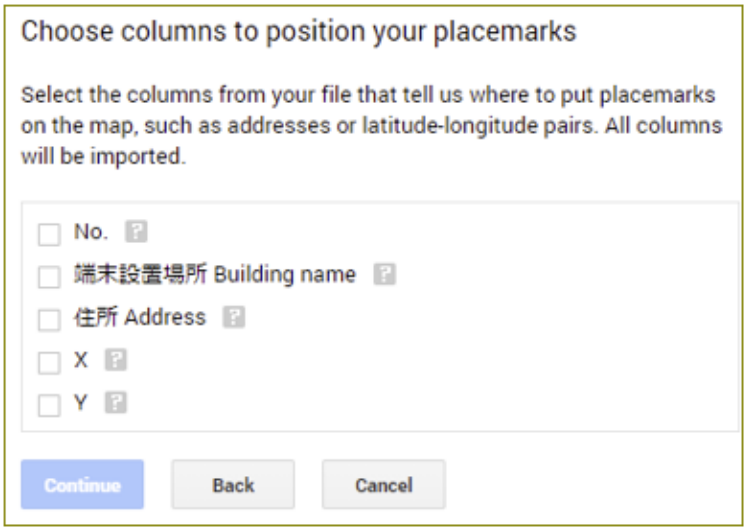


Figure 34. X for Longitude column

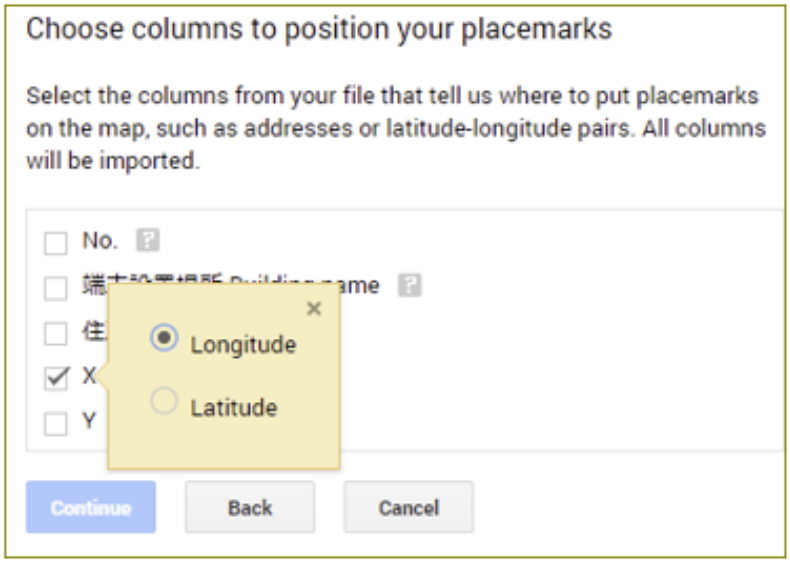
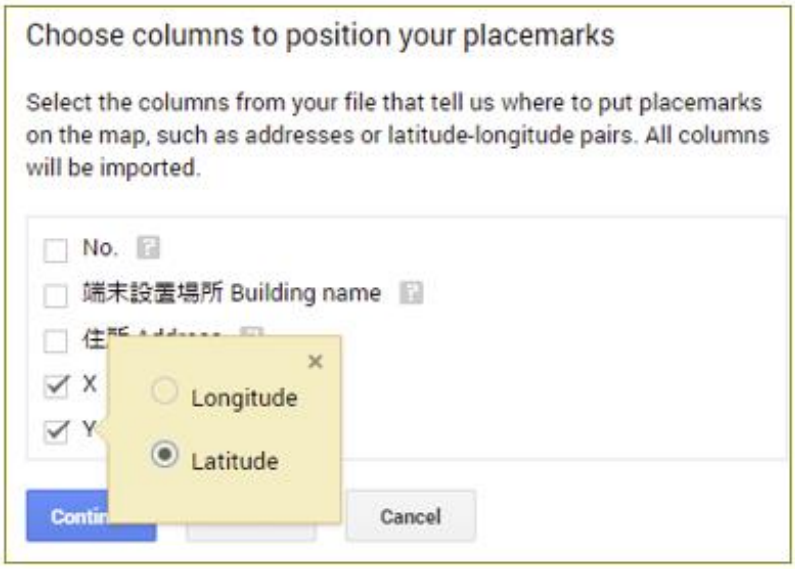


Figure 35. Y for Latitude column

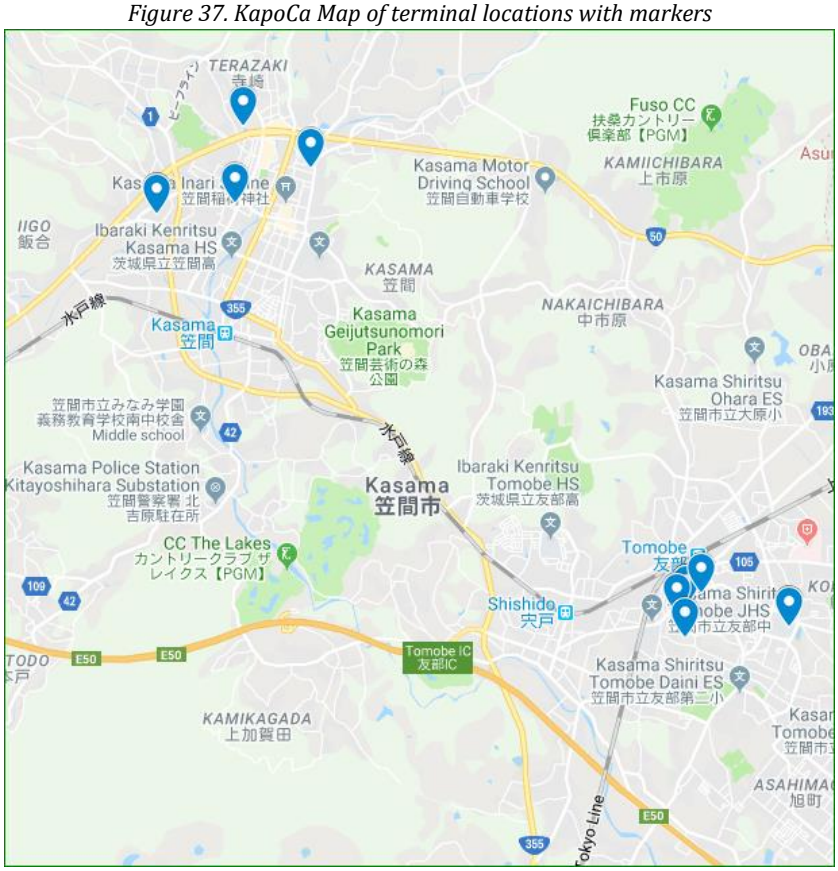


Step6. Press "Continue" to upload the data to create a map.

Figure 36. Terminal Location

Having picked a column to use as the title for the placemarks, click the "Finish" button and uploading begins. Wait until the markers for the terminals are indicated on your My Maps as shown in Figure 36. If done correctly, your KapoCa Map regional currency map is successfully created.

Figure 37. KapoCa Map of terminal locations with markers

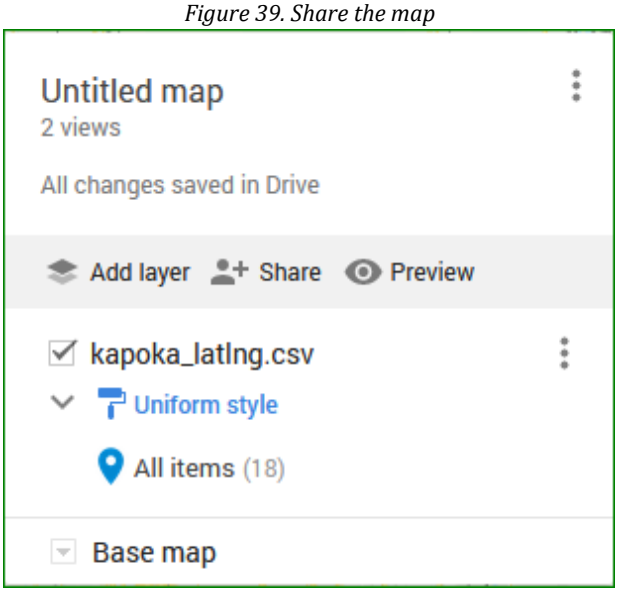


With a click on a marker, you will see the attributes of the KapoCa Terminal.

Figure 38. A marker with the attributes

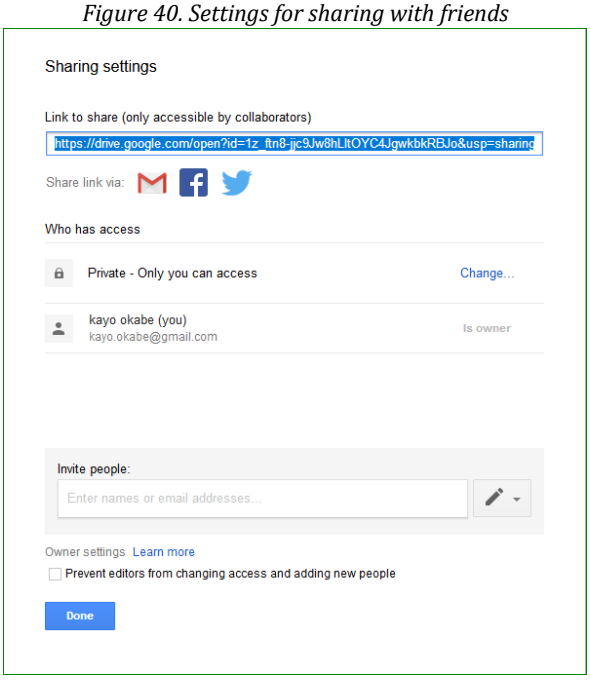
Step7. Share the Regional Currency Map with your friends.

Figure 39. Share the map



Put a name on your map, click "Share" button. You are ready to share the map with your friends and local people who use regional currency by e-mailing the URL indicated as in Figure 40.

Figure 40. Settings for sharing with friends



5. CONCLUSION

Vulnerability of many regional currencies in some part, was due to its limitation of geographical spread and marketing aspect, relying on the participants' voluntary work for diffusion. In the case of KapoCa, the local government of Kasama launched the point-coupon exchange system to revitalize community activities by searching and encouraging key persons and groups to activate the local community. However, KapoCa is still relying much on voluntary work of community leaders in diffusing the regional currency system. On the other hand, Crewship, which is comparatively

successful in gaining individual members, has weakness in gaining service establishments accepting Crew Card. Reneria, which has such concrete philosophy of circulating energy to regional products, also faces difficulty in gaining service establishments from a marketing aspect.

Not only to overcome these weaknesses of regional currencies but also to enlarge their capacities, this paper demonstrated that use of GIS would have a large potential to actually visualize and propose strategic approaches for possible developments. As a result, people from every field, from local governments and schools to real estate agencies and bakeries, are able to view the spread of the regional currency and consider it for their own purposes. Our GIS application to KapoCa Terminals in Kasama showed a possible answer to this task.

Another purpose of introducing GIS to the discussion of regional currency is for the younger generation to be more interested in regional currency and thus deepen their geographical acknowledgement of the area through creating 'regional currency maps' with GIS.

Thus, by creating digital maps and analyzing areas spatially with GIS, we can show the actual spread of regional currencies visually, and propose steps toward further diffusion and development of communities.

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ENDNOTES

[1] Kesennuma City experienced magnitude 9.0 on 11 March 2011. Evacuees counted 20,086 persons, and 80.8% of business establishments and 83.5% of employees were affected.

[2] Kesennuma City website:

https://www.kesennuma.miyagi.jp/sec/s021/010/020/090-4/20190307164424.html (2019/05/22)

[3] Maps of tsunami flooded areas are downloadable from GSI website:

https://www.gsi.go.jp/kikaku/kikaku40017.html

[4] Mr. Takahashi is the president of Kesennuma Regional Energy Development Co., Ltd.

[5] Kesennuma Tourism & Convention Association is run by Kesennuma Tourism Strategy Bureau which was established together by Kesennuma City, tourism and economic bodies, with the city mayor as the representative.

[6] Economic circulation rate is calculated by dividing production (value-added price) by distribution (income) to indicate the independence of the regional economy.

[7] SANET is a free software of GIS tools which researchers and university students are using in more than 50 countries in the world. http://www.csis.u-tokyo.ac.jp/

[8] Address in Japan is usually described as name of town and block name, which is an alternative to the street name in other countries.