

Satconomy: Basic Concepts and Application

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Introduction

Observe the history of current markets where the participants voluntarily organize into independent entities – business firms, proprietors, corporations, government units, nonprofits, cooperatives, school districts, communities, trusteeships, villages, religious groups and etcetera. Now, what would happen if each entity *independently* issued and managed its own currency brand, instead of the whole market using a handful of currency brands to conduct transactions? Why would an entity want to issue its own currency brand? How would such a system work? Some of the possible issues and answers are presented here as studied within the conceptual framework of satconomy and as demonstrated through prototype implementation examples.

Satconomy is a market framework that is intended to foster a *sustainable diversity of independent currency brands*. This market framework covers both theory and practice. Until that sustainable diversity is attained and observed in real market environments, this framework is only theoretical in nature, even if the assumptions seem logical and consistent with socio-economic observations. Therefore, a diversity of independent currency brands must also be cultivated, sustained and observed in order to *validate* the propositions presented here through the collection of empirical data.

Glossary

Currency – any symbolic notation or concrete object that is *intended* to be used as a generally accepted form of payment for market products

Currency Units – any quantitative measure of economic value that symbolizes contribution and obligation among recipients of credits and debits, respectively; not to be confused with *currency brand*

Currency Brand – a symbolic representation of the issuer of credit-debit pairs; the entity through which economic valuations are made; not to be confused with *currency units*

Independent Currency Brand – an entity or organization that administers its own currency brand and is self-sufficient in its ability to issue, assign and use currency units

Sustainable Diversity – as used in this document, a market ecology that is characterized by a dynamic population of competing and cooperating currency brands, where overall brand demise and consolidation are sufficiently counterbalanced by the creation of new brands and brand spin-off into separate entities

Core Assumption

A sustainable diversity of independent currency brands would lead to a highly robust market economy that promotes self-determination among its participants.

The 'robustness' assumption is analogous to the effect of having more than one stock exchange system - NASDAQ, NYSE, foreign exchanges - and each system having a diversity of stock issuers. Diversity in any context spreads overall risk, while the independence of a brand from another permits the weeding out of an unsustainable entity without necessarily taking other entities down with it. Of course, a diversity of currency brands would be harder to manage by a central authority, but it is also assumed that any entity that wishes to independently issue its own currency would develop the necessary skills to manage its brand. In this decentralized model, incompetent or unpopular currency brands would naturally wither due to lack of public trust and support.

The promotion of self-determination is another assumed benefit from giving any market participant the ability to belong to existing independent currency brands. Similar to garage start-ups that become stock market giants, highly motivated market participants with timely vision and appropriate skills could also create currency brands that eventually receive widespread market support. How this assumption might work in practice is discussed later.

Sustainability Assumptions

The following currency brand sustainability assumptions form the basis for the accounting model of viable independent currency brands:

- 1) **The most sustainable form of currency is ledger based.** Currencies or payments that are tied to physical forms such as tender notes or commodity backing are less flexible and harder to manage. In contrast, ledger-based currencies that are issued and used directly through simple credit-debit notations are much easier to implement and promote.
- 2) **Any organizational entity has the potential to issue and sustain its own independent currency brand.** A currency issuer may take on any structural form as demonstrated by the different types of economic entities such as business firms, sole proprietors, corporations, government units, nonprofits, cooperatives, school districts, communities, trusteeships, religious groups and etcetera. The main challenge is *not* how to arrive at a one-size-fits-all organizational structure, but how to convince an organization, of any form, to commit to issuing its own currency brand.
- 3) **A brand gains widespread trust and sustainable support through the transparency of the organization behind the brand and its effectiveness in fulfilling its mission.** This assumption is related to the standard financial performance reporting of publicly-owned companies. An entity

that exposes itself to diverse elements and the possibility of close scrutiny will be more likely to identify and correct its missteps and to thrive under unpredictable socioeconomic conditions.

Proposed Accounting Model

Based on the sustainability assumptions, the following model of accounting stages is proposed for an independent currency issuer:

- 1) Create Accounts (Organize Brand)
- 2) Create Currency Units (Increase Credit and Debit Limits)
- 3) Assign Currency Units (Allocate Credit or Debit Limits)
- 4) Use Currency Units (Decrease Credit and Debit Limits)
- 5) Publish Results against Periodic Goals/Milestones

The following brief explanations do not adhere to standard accounting terminologies, but later implementation examples should enable a better understanding of the proposed accounting framework. The accounting stages are listed in order of least to most frequent activity and include answers to questions that clarify additional modeling assumptions.

Accounts Creation (Brand Organizing) – A market entity declares its market specialization, mission statements, currency brand, organizational form, periodic goals and milestones, credit recovery mechanism, accounting units and method. At this accounting stage, the entity qualifies its mission, i.e., the market niche it seeks to fill or the perceived needs that it seeks to address.

Why would anyone bother issuing or joining an independent currency brand? With the potential of acting as an independent currency issuer, entities could become more independent of competing market forces and sustain its members through positive public opinion. Market participants, especially those considering career alternatives, are likely to appreciate new models for sustaining a market entity or organization.

Currency Units Creation (Increase Credit and Debit Limits) – Ledger-based currency units are issued as credit-debit pairs. For a given accounting period, the issued credits represent the entity's expense budget to be spent on any work that contributes to its mission. The equivalent amount of debits represents the entity's target revenue, which is the amount of credits it expects to eventually receive from the beneficiaries of its product. This accounting stage could be likened to a publicly-owned company issuing its performance goals or a government unit declaring its budget allocation.

Why should anyone bother declaring quantitative limits? Each entity's self-imposed credit and debit limits are intended to be used as 'performance yard sticks' for the quantitative evaluation of its progress towards its goals. On the bases of its self-determined limits, the sustainability and self-regulating

capacity of an entity could be readily evaluated by informed market participants. These limits cannot be exceeded and thus no 'profits' are targeted or realizable in this accounting model. A highly effective entity could, at most, achieve a 100% periodic cancellation of its debt, and it might be reasonable to assume that a credit recovery rate of 80% would be sufficient to gain public trust. In fact, the publicly acceptable debit cancellation rate might even be lower for certain economic specializations, such as food production and healthcare, which may be described as core components of a sustainable market economy.

Currency Units Assignment (Allocate Credit or Debit Limits) – Credits are assigned by an entity's management based on the recipient's perceived contribution to the entity's goals. Debits are assigned to entity members, such as sales people, or units, such as bursars and stores, that specialize in credit recovery. The limit amounts do not change in the assignment of currency units that have been previously created.

Why not just create currency units directly into accounts, instead of having a separate step for allocating limits or assigning previously issued credits and debits? The assignment of currency is an optional accounting stage that is expected to become standard practice among independent currency brands. It separates the more difficult stage of planning and quantifying longer-term budget considerations from the more frequent step of assigning currency in smaller quantities.

Currency Units Use (Decrease Credit and Debit Limits) – When an entity receives or recovers credits from the market, it uses those credits to cancel an equivalent quantity of debits. For example, a car dealer would use a buyer's credits to cancel part of its self-declared obligation to provide transportation equipment to the market. Another example would be a city government using credits from taxpayers to cancel part of its self-declared obligation to provide public service to its residents. In both examples, the product or service recipient's credit balance would decrease by a corresponding amount. An important aspect of currency use is brand traceability to a particular entity and the acceptance or rejection of credits from that entity based on its reputation.

Why would an entity reject a buyer's credits and lose the opportunity to cancel its debits? Sellers do not have unlimited inventory and should therefore allocate its products responsibly. Ideally, an entity would cater its product towards supporting those entities that sustain a healthy market. Market participants have a direct influence on which brands thrive – i.e., entities whose members are able to use their respective currency brands to conduct market transactions – and which brands fail – i.e., entities whose member are not able to use or redeem their currency brand because of lack of market support. For example, if there is little public support for a market entity such as weapons manufacturers Guns and Landmines Inc., then its members would have a difficult time finding sellers who would accept their currency brand for market transactions. In satconomy, public opinion is expected to have a strong influence on which currency brands thrive and which ones fail.

Publication of Results Toward Periodic Goals/Milestones (Reconcile Currency Activity) – In order for an entity to gain widespread trust and support from the market, it needs to open its books and activities to

public scrutiny. A seller may refuse to accept any currency brand that represents an entity with a poorly conceived specialization. Even if the entity's mission is viewed favorably by the public, it must still prove to the market that it is meeting its self-declared goals using acceptable strategy and activities.

The concept of dynamically evaluated currency brands is similar to the analysis of stock prices that fluctuate according to a company's perceived market potential and financial performance. However, it is important to note that in satconomy, currency brands are evaluated in order to arrive at an *absolute* 'yes or no' acceptability rating, *not* relative pricing. In other words, the aim is *not* to influence exchange rates or to convince sellers to provide more units of product for less credit. A reputable currency brand does *not* necessarily translate into a quantitative increase in purchasing power of a particular product, but instead translates into a *qualitative* increase in product choices. The more sellers there are who accept an entity's currency brand in exchange for their products, the more diverse the product options are for that entity's members.

Why bother managing a brand, tracking accounts and publishing results? In this proposed accounting model, the price for having the ability to issue or 'print' one's own brand of 'money' comes to this: act like a publicly-accountable market entity in terms of commitment to vision, mission performance, providing regular updates and disclosing relevant information to the public. Through sustainable market support, an entity and its members become self-sufficient within its declared currency limits.

General Requirements for Implementation

Regardless of the form and strategy used in implementing satconomy, the following short list of common requirements is expected to be observed in practice:

- 1) **A participating market entity must have a self-determined obligation to provide products – goods and/or services – to the market.** The entity's obligation is declared as mission statements and fulfilled as a matter of market *specialization*. This implementation requirement does not mandate a particular specialization for any entity. It is simply hoped that a diversity of specialized entities would naturally and spontaneously arise to address an ongoing diversity of market needs, basically similar to what is currently observed when, for example, businesses are founded or nonprofits are established. The main difference from the current scenario is the additional expectation that each market entity would also strive to independently issue its own currency brand.
- 2) **The accounting system used by an independent currency issuer must be auditable by the currency lifecycle of currency unit creation, assignment and use.** The ledger-based currency lifecycle is explained within the Proposed Accounting Model section of this document.
- 3) **Member(s) of an entity must have access to a recording medium.** The recording medium should permit the accurate documentation of all economic activity that a market entity engages in. The recording medium could be paper-based or electronic; many different types of recording media may co-exist within a given market. Any recording protocol may be used and designed as a separate system from the publishing protocol described in the next requirement. The documentation of economic activity includes organizational accounting of work performed and completed market transactions.
- 4) **Market participants must have access to a publishing medium.** The publishing medium should provide market participants independent access to timely and accurate information about market entities. The publishing medium could be paper-based or electronic, offline or online, real-time or periodical, or a combination of all of these. As with the recording medium, different types of publishing media may serve a given market. The primary emphasis should be on information accessibility and accuracy, followed by the 'efficiency' of the publishing medium.

Two implementation examples are provided to illustrate system designs that could potentially satisfy the preceding requirements.

Implementation Example 1: Web-Based Framework

Overview

This implementation example is intended for market participants who have regular online access to the web. An interactive demonstration is available under construction at <http://tyaga.org/demo.php>. The example is primarily based on tyaga.org. In order to make the examples easier to follow, I'll skip most of the historical context and concentrate on the practical results of the implementation experience.

Brand Organizing

At the beginning of 2008, tyaga.org was established with the primary intention of developing it into an independent currency brand. Within a few months of founding, it was decided to assimilate two pre-existing brands as 'divisions' under tyaga.org: Technical Digest Services (TDS), a Washington State sole proprietorship that specializes in providing technical writing services to the biopharmaceutical industry, and satconomy.org, a blog dedicated to communicating concepts relevant to the cultivation of markets with a diversity of independent currency brands.

After some deliberation, the tyaga.org entity mission statement was formulated as follows:

Market Specialization: Using currently available technology, develop a means and system for reporting and understanding complex information such as those arising from fields like biopharmaceutical manufacturing and financial accounting

After deciding on the currency brand and mission, tyaga.org was conceptually structured as a sole proprietorship. This enables quick decision making and builds upon the already existing structure of TDS.

For the credit recovery mechanism, I will have two paths for credit inflow which will be used for cancelling my self-declared debt to the market. The traditional path involves selling technical writing services to biotech and other technology companies, with the default use of US\$ for transactions. The alternative path will involve asking for online payments or donations from independent currency issuers for all other work spent on non-US\$ activities, such as writing this document, developing demonstration web applications and specific technical writing services performed in exchange for credits of independent currency brands.

For the accounts, I set up the Main Expense and Main Revenue accounts, which I will use for issuing currency, i.e., the periodic credit and debit budget limits, respectively. I also set up TDS Expense and TDS Revenue accounts, in order to clearly outline my commitment to both traditional and alternative currency recovery paths. Lastly, I created business and personal accounts for tax-accounting purposes.

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Create Currency Units (Increase Credit and Debit Limits)

I decided to create currency on a quarterly basis. Newly created credits accrue in the Main Expense account, and the equivalent debits accrue in the Main Revenue account. The process of creating currency may be viewed as increasing my total expense and total revenue budgets by the same amount. As part of this process, I also publish my quarterly objectives, goals and/or milestones. For example, my revised quarterly goals for 2Q 2008 include:

Develop an online currency unit conversion tool to help readers in the evaluation of tyaga.org's market performance.

Using an object-oriented programming approach, develop an online accounting system for a sole-proprietorship type entity.

Continue providing technical writing services through the TDS brand.

I created 480 hours of credits and debits for use towards all work spent in achieving the above quarterly goals.

Assign Currency Units (Allocate Credit or Debit Limits)

For the debit limit allocation in 2Q 2008, I estimated that approximately of 30 credit-hrs/week should be recoverable as either US\$ or hours through TDS. Another 10-credit hrs/wk inflow should be recoverable through alternative currency brands. Based on these preliminary estimates, the actual assigned debit quantity of 316 hours was allocated to the TDS Revenue account from the Main Revenue account. The remaining 164 debit-hrs, held in the Main Revenue account, was assigned to indicate the budgeted amount for donations received through independent currency brands.

For the credit assignment, I decided on allocating credits on a monthly frequency, much like paying wages on a periodic basis. For the respective months of April, May and June 2008, I have assigned 64, 152 and 100 hours from the Main Expense account to the TDS Expense account based on work performed for Bayer. The remaining 164 debit-hrs in the Main Expense account will indicate the budgeted amount for purchase transactions with independent currency brands.

Use Currency Units (Decrease Credit and Debit Limits)

There are two ways to use currency: internal use within an entity and external use between two entities. Intraentity use decreases the credit and debit limits of an entity by the same amount. For example, at the end of the year 2008, I intend to cancel equivalent amounts of *unused* credits and debits for the year 2008; the unused credit or debit balance that I am not able to cancel will then be carried forward to the year 2009. From my viewpoint, the intraentity use of currency renders most of the associated

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accounting effort a waste of time, since this type of use does not impact the market in general and therefore the information from statically-bounded currency use is not likely to gain much interest outside of that entity.

The real strength of a satonomy market lies on its emphasis in facilitating interentity currency use. Interentity currency use should decrease, by equivalent amounts, the overall credit limit of one entity and the debit limit of the co-transactor entity. For example, if the hypothetical entity ABC brand donates 10 credit-hrs to tyaga.org, then ABC's total usable credits would decrease by ten credit-hours and tyaga.org's debit limits would also decrease by 10 credit hours. Another example is the TDS work hours that are paid for by Bayer: for each currency unit that Bayer pays TDS, Bayer's spendable limit decreases at the same time that TDS' limit for cancellable debit decreases.

The tracking of paired credit outflow-inflow permits the periodic reconciliation of currency use between entities, as discussed in the next step.

Publish Results toward Periodic Goals/Milestones (Reconcile Currency Activity)

For ledger-based currency systems, the accuracy of accounted information is of primary importance. If tyaga.org publishes that it was able to cancel X hours of its accrued debits, there must be a publicly available report of the reciprocal credit cancellation by other entities. For example, if tyaga.org reported 10 credit-hrs of inflow from ABC brand, then ABC must also publish a 10 credit-hour outflow to tyaga.org. This peer-to-peer verification of generalized transaction records is expected to be a core information system requirement in a satonomy market, as most of the predicted market performance evaluation parameters will be based on calculations of periodic inflows and outflows.

One of the current difficulties with peer-to-peer reconciliation is that not all entities publish its generalized transaction records. So even if I have a check stub to show that Bayer has paid me for 100 hours of work, Bayer does not independently publish its currency inflow and outflow by co-transactor entity. Readers are currently not able to simply click on Bayer's and other co-transactor sites to independently verify that my published inflow and outflow are accurate. A possible online framework to address this problem is discussed as part of the web application details.

If transacting entities each use different currency units, problems might arise if floating exchange rates are used, since published information would then have to include the exchange rate that was used at the time a particular transaction was conducted. Over time, interentity reconciliation of transaction records would become increasingly more confusing as floating exchange rates fluctuate. A simple solution is to use *common reporting units* when publishing inflows and outflows. A common reporting unit would have to be strictly defined in order to function as a reliable, easily understood and universally accessible standard reference for individual measurement of market value. While there may be more than a few possibilities for a common reporting unit, an example that satisfies the preceding functional requirements is the unit of *hours*.

Still another issue with published results is Error 404, or broken links due to URL sites that are not longer active. Even if entity ABC published that it had an outflow of 10 units to tyaga.org, the ABC site could get permanently shut down in the future. If that was to happen, tyaga.org is back to not having a simple link that leads readers to a simple process for verifying its published results. A possible solution, also discussed later, is the establishment of 'Reporters'. Reporter entities specialize in the guaranteed and persistent publication of the verified inflow-outflow reports of member entities, with functions similar to those of stock exchange systems such as NYSE and NASDAQ that publish the market performance of member companies.

Online Reconciliation Application Details

A simple application could simply use a blog and manual verification of published transaction records. For example, if entity ABC donated 10 credit hours to tyaga.org, anyone could check the ABC website and see if it has published that transacted amount and recipient. Once the inflow transaction information is publicly verifiable, I could confidently adjust tyaga.org's inflow balance and provide an ongoing quantitative measure of how tyaga.org is able to perform its market specialization.

For entities that have low transaction volumes, a blog post might be adequate for periodic publication and manual verification of ledger entries. For larger transaction volumes, I have been developing examples for a web-based querying protocol that automates the verification and processing of published transaction records. I call this simple protocol Peer-to-Peer Reconciliation of Open Web Ledgers, or Prowl. Prowl is intended to work through HTTP Get using the following query string format to verify of a transacted amount:

URL appended by "?to= or from=entity_id)&digest=unique_transaction_identifier";

Follow this link to see an example of the web query result:

<http://tyaga.org/ledger.php?from=bayer.com&digest=41175eb48446be91edf7eb5546d1e34388738896>

Four basic features of the Prowl protocol are:

- 1) Prowl is intended to be independent of the server engine and application module that is used to return the query results. Prowl is a high-level, declarative protocol above the HTTP application layer. As long as a web platform could deliver the requested query result, Prowl does not care whether a windows or Linux-based server is used, or whether the data is retrieved from a file-based or relational database system, or whether the application module language used is Perl, PHP, Python, Ruby, etc. The only absolute requirement for an application platform to satisfy the basic Prowl protocol is this: given the above HTTP GET query string, the transacted amount must be automatically retrieved and returned by the web server.

- 2) The Prowl protocol does not care about what the requesting IP/client application does with the returned information. Most likely, it would be used in a cron job that automatically initiates the debiting or crediting of internal accounts within the requesting entity's accounting system. A reader may also use the Prowl query results for manual transaction record processing.
- 3) The Prowl protocol does not care about how the transaction id is generated, or even if the id uniqueness extends to every conceivable set of recorded market transactions. The only assumed uniqueness requirement is that *between two* particular entities, the transaction id could distinguish between different transaction instances even if the date, amount and participant account numbers are all the same. Tyaga.org uses a sha-1 digest to uniquely identify individual transactions, but other types of identification might also be generated and used as needed. As a transaction identifier, the sha-1 hash digest of the transaction record offers two advantages: (a) the digest helps maintain account information privacy in a transaction record query, and (b) since a sha-1 digest value is most likely to be unique for a given sequence of data values in a specific transaction record, the digest could also help correct any inconsistency between corresponding interentity records for the same transaction; in such a case, only one version of a transaction record is expected to be digested into a given sha-1 value.

A proposed standard data sequence for the sha-1 hashing is the space separated values for date, instance, amount, from_account, to_account, amount and units. This data sequence may be more easily referred to as the DIFTAU standard.

- 4) The Prowl query string format may be extended in the future to allow the use of other field names. The example above happens to return a transacted amount that is retrieved through a unique identifier and the corresponding transacting entity, with its transaction role already indicated by the choice of the field name (to or from).

Database Application Details

The application behind the web-based framework is essentially open web ledger software. The ledger is 'open' in the sense that transaction amounts between entities are auditable by the public. To protect privacy, individual account numbers in a transaction do not have to be publicly viewable; those details are reserved for private viewing between the transacting entities in case the reconciliation process needs troubleshooting.

As mentioned earlier, accounting/transaction data may be stored in a file-based or relational database system. I decided to use an Apache-MySQL-PHP platform. The apache configuration's allow_url_fopen field is set to 'ON' to permit automated reconciliation of web ledger entries between sites.

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The MySQL database has the following core tables: User, Ledger, Positive (Account), Negative (Account) and Tally. The most important attributes are:

User: user_no, username, password, account_no

Ledger: entry_no, date, instance, from_acct, to_acct, amount, units, digest (sha-1), recorder, verifier, transaction_code [adhoc internal codes are okay, such as *cc* (create currency), *ac* (assign credits), *ad* (assign debits), *iu* (internal use), *xc* (external credit use), *xd* (external debit use)]

Positive: This table represents expense accounts which accrue internal credits and has a positive balance. The most important attributes are: acct_no, acct_name, units, available (balance), copy (for transaction processing), entry_no (for transaction processing)

Negative: This table represents revenue accounts which accrue internal debits and has a negative balance. However, the negative balance in this custom application is tracked as a *magnitude*; the negative sign is not used. The most important attributes are: acct_no, acct_name, units, available (balance), copy (for transaction processing), entry_no (for transaction processing)

Tally: This table represents the cumulative currency activity of an entity. The most important attributes are tally period, units, issued, intrause, outflow, inflow.

Ext_Brands: This table represents currency brands that have been assigned a status for the purpose of evaluating whether or not tyaga.org may conduct transactions with the listed transaction. The assigned status may be 'pending', 'approved' or 'denied' separately for inflow and outflow transactions. The most important attributes are entity_id, status, prowl (for an application to determine whether automatic reconciliation between entities is possible), outflow, inflow (for tallying currency flow by brand instead of accounting period).

Accounts and Transaction Processing Details

My accounts and transaction processing system is intended to be used in a sole-proprietorship type market entity. The process applications are more or less similar to other accounting systems that are available through the open-source community, with the main exception that tyaga.org's system is intended to be publicly auditable over the web. Since June of 2008, I have started to transition to object-oriented programming while still using the PHP module within apache. The oop source code for the web applications that I have written is available only upon request at this time, although an older procedural based version is available at <http://tyaga.org/downloads>. Once I have more experience with the applications, I intend to publish the code.

Work In Progress

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Implementation Example 2: Print-Based Framework

Overview:

Local markets, student hubs

Offline environment

Widespread Adoption Strategy

Store-and-forward assumptions: bandwidth is expensive, but there are gateways that have fixed cost, use physically mobile connectivity such as cell phones, simple wireless memory device such as RF cards

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