

Decentralised hydrogen-battery hybrid energy storage system

Identification of reason for adoption for different entities related to
the pain points & value capture.

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This part focuses on the value proposition and refers to prior identified pain points.

The multilateral presence of the identified problem urges the separation of reasons for adoption relevant and specific to each pain experiencing entity. The adoption as a whole is reliant on a critical adoption mass, which consist of mentioned constituent entities. The nature of cascading pain requires that individual value propositions are constructed so that the adoption, of the concept as a whole, commences as the adoption of a good idea for each entity.

It should be clear, that for those, which are sought for investment purposes, have a very different assumption of value, than those that the project aims to support, due the social enterprise nature of the project.

The cascading pain requires cascading solutions, delivering value. The aggregated values are hypothesised to have a greater value as a whole than the sum of the constituent values to each entity. The Synergistic nature of the method used in the process of value capture should enable and support the hypothesis. Value, itself, in this context refers to the difference between the instances in which the pain exists and in which the pain has been reduced and thus the circumstances of hindrance transformed into productivity.

Identified Entities

Below is a visual representation of the different levels on which entities that experience direct or cascading pain lie. Shaded in blue are those, that have residual interest in the (economic) progression of such areas/communities in question (e.g. SME's that would like to engage in trade with local communities). Those higher-level entities are always made up of individuals, which have individual pains, while collective pains add to those.

A clear example would be, how families suffer as a whole through collective pain, like the inability to have family events or stay in contact with each other when geographically separated, while individual pains add to the overall level by pains like stress, which originate individually. Another example could be how neighboring communities, that are more urban and developed, would like to engage in trade and individuals from those communities, who may have family in more rural communities, experiencing disconnectedness from distance.

Collective pains, such as the consequences of missing utility infrastructure, spread throughout the levels while individual pains, such as the inability to perform any productive task after dusk, are level specific. Thus, as one moves closer to the entities experiencing individual pain points, instead of *collective pain*, one can see how the specificity of the problems increases and thus the specificity of the value proposition in terms of the idea of pain relief.

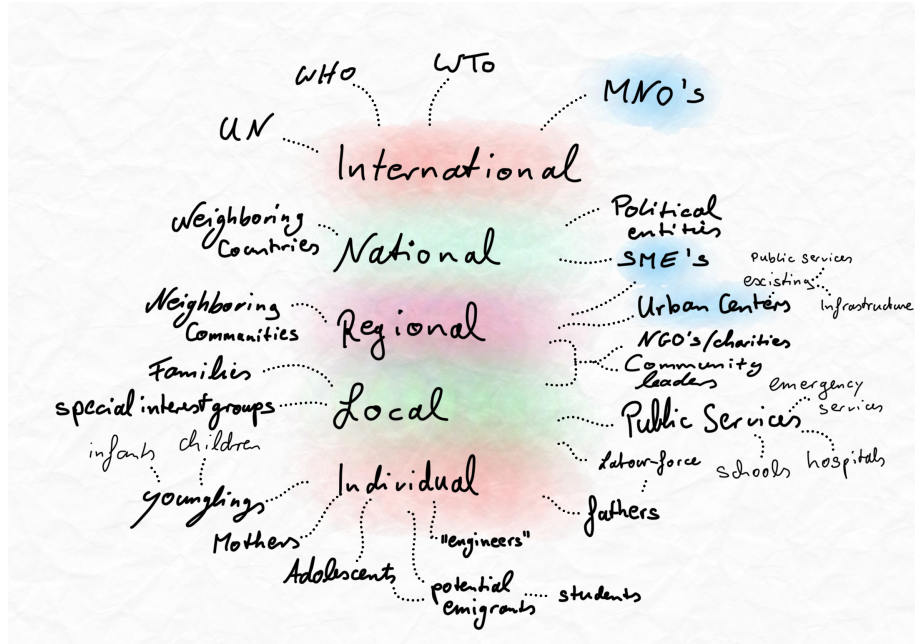


Figure 1: Entities identified on different levels

Value proposition & individual “good ideas”

The *good ideas* and the from them emerging value should be treated level-specific. The value of the good idea may very well be appealing to multiple entities and may be *overarching*. This phenomenon of *overarching* originates from overarching principles, values held close by entities. The good idea itself can create *consequencing* good ideas, which add value to the to be captured value of the high-level good idea.

International level

On the international level, a good idea would constitute to the goals of international entities, like the WTO or MNO's, who are interested in the economic progression. A *good idea* could be the political and/or financial endorsement of the project as a whole. The potential of the introduction of the project has much greater potential in terms of impact at a higher level than on a lower level, considering how the lower level potentials are aggregated in higher levels. Not only do they aggregate, but also synergistically more abstract and different potential values emerge. An example of this is how on an individual level, the further away consequences are much more abstract and intangible compared to a higher level entity's point of view. A south-Sudanian mother would probably not

see how this project could result in the possibility of *product delivery*, compared to a constituent of a political party, aiming at the introduction of a wide-spread product delivery system for the whole of the country.

National level

Similarly, the common goal of those entities identified in this level is the progression and the thus resulting potential value. Political entities could include a significant missing piece of the population into political decisions, instead of solely having the opinion and democratic input of urban areas. Especially relevant at this level and the following regional level are the small to medium size enterprises. Those have a lot of positive power to be engaged, not only in economic terms, but also in the adoption of the project. Their expansion into more rural areas is likely even without this project, but would greatly increase the progression and penetration into more and more rural areas. Considering that the project would unlikely commence in the most extreme rural areas, the relative urban nature of those communities that will have the hydrogen system first, is accompanied by relative higher disposable income, which is the reason for SME's to progress into rural areas. The interest of the project and the interest of SME's (or MNO'S) align and mutually complement each other in terms of needs to be covered prior to the actual localisation in rural areas, which is electricity.

Regional level

On a regional level there are more specific *good ideas*, not only support but more specific action can be taken. The problem itself becomes more tangible and specific at this level. The cascading pain becomes more similar and similar, the closer to the individual level and thus the identification with the problem itself. Many entities on the regional level also exist in some form on the local level, like charities that aim at delivering hands-on aid. Such hands-on aid could come, specific to this project, in the form of educational programs, which can be paired with the education required for the continuous operation of the hydrogen energy storage systems, like maintenance or the identification of problems with the system. Community leaders are present at a communal level, as well as on a regional level. These *elders* / head of communities have the same problems and pain experience but can deliver very distinct individual support. A *good idea* to adapt could be the public endorsement within the communities and spark of interest for programs brought by said charities. Other than that, they would be the first concrete point of contact for the installation of the hydrogen systems and are therefore vital cooperators. When considering cascading potential value one sees, that the widespread adoption of digital technologies will be slow, due to the critical mass required for adoption, centralised approaches can be used to increase adoption rate. A specific example could be the installation of a commonly owned and operated connected device. Such could come in the

form of a internet connected or knowledge filled computer (could also be used as a centralised bulletin board) located in regional *relative urban* centers to be accessed by surrounding local communities. In the beginning, communally accessed computer systems function the same as communally accessed energy storage systems. Not every single individual requires possession for this (or any) project to be adopted or to progress effectively.

The adoption of the hydrogen system will as the above mentioned introduction of digital technology be slow. Again, regional centers could be the pioneering entities to implement the system, demonstrating its usefulness to more local level entities, who may not see the direct connection between the system and the from it originating potential value. A regionally centralised hydrogen system would be bigger than those in local levels, but simultaneously would have more force behind its support or restraint. **Tokenisation** should be at the core of the project, allowing communities to own their energy systems partially and thus control it. A PAYG (pay as you go) financing system coupled with leasing, through aggregation (communal ownership) would be a very good idea for this systems adoption.

Smart contracts can be used to balance the electric load indifferences between local communities. A shortage of electricity in one local village could be covered by a surplus in another village in proximity or a more urban community with greater energy production/storage abilities. The automatisisation of such processes reliefs much labour from individuals and addresses one of the potential arising problems from the project, as every *good idea* and project will not only have positive outcomes, but also additional considerations to be made.

Local level

The closest to the individual level, the entities here are easiest for the identification of individuals within. Families are made up of very easy to identify individuals. At this point, we also have those entities that deliver any kind of service/value directly to individuals and thus their relation and mutual benefit is clearer as in higher-levels. The labour force of villages would be very much interested in the increase in productivity levels, which can be clearly communicated in specific changes that enable such increase. The introduction of electricity opens many productivity enhancing aspects and the benefits from the project as a whole are clear to an entity like the workforce in this context. Public services in the regions in question are much less effective and efficient than in urban areas, due to the tools and potential possible to use. Their aspiration towards becoming more like their more urban counterparts will support the adoption of the project and at this point the overlapping of values and interests becomes clear.

Individual level

Mothers, *younglings*, adolescents, students, potential emigrants are dominant entities to consider, as they are the constituent elements that make up higher level entities. These constituent entities have the most specific value propositions and henceforth the highest amount of potential value to be captured. In comparison to the international level, the pure count of values to be captured is much greater, due to the cascading effect of the root-cause and thus cascading potential. A potential emigrating *tech savvy* student/adolescent would adopt a *good idea* of maintaining the hydrogen systems as it would be a reason not to emigrate, by brining most reasons for emigration with it in form of consequences (cascading potential value). The project as a whole would provide electricity, which would ultimately enable the introduction of digital communication and research tools enabling local education and progression. A lot of the value comes in the form of time savings, that are created by inefficiencies. Such inefficiencies could be need of having to purchase food much more frequent due to the lack of refrigeration or the need of having to cook every day instead of preparing meals. The introduction of *online-shopping* in African countries has already happened, in urban areas, rural areas could also be expanded to, as soon as the ability for those individuals in rural communities happens, to order online *at all*. Such undertaking requires access to online markets, which requires digital *portals* like phones, which require electricity to be continuously charged. A practical example is **Jumia**, a local online market enterprise. Jumia could then sell items like diapers to mothers, which would normally walk long distances (due to missing infrastructure) to more urban centers in which goods like these can be bought. The potential for individuals to use *Jumia* is immense and is a clear cascading potential value to be captured. Many individuals may not see the direct link between the project, the *good idea* and the from it coming value. Thus, higher-level entities, who have more aggregated considerative/brain-power, are those to *explain* / bring closer the potential of the idea to individuals. From this consideration it can be seen how the introduction of the idea could have self-expanding interest/support. The value identified in higher-levels will cascade down to lower-levels. The cascading effect is not only a direct transportation of the idea and potential value, but is also similar to the *leverage effect* the closer to the individual, as more specific potential value can be captured there.

Conclusion

Commencement and continuous implementation of this project and/or related or cascading values can only occur when a multilateral consensus on the adoption of the project is reached. Individuals, entities that are made up of them, as well as communities, interest groups up to governments need to be united in terms of wanting the project to be adopted. To enable such behaviour, the value that is gained from the implementation of this project needs to be clearly

communicated to each entity. To do so, it has been concluded, that multilateral value propositions need to be created addressing each entities pain points. Only then, a project, as great as it is, will be adopted without restrain and resistive forces. Especially in polarised circumstances, as they are in sub-Saharan countries, the unification of adoption or the lack there of can mean fail or success.

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