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FROM TERRITORIAL RESILIENCE TO INDUSTRIAL MOTRICITY AS AN ECONOMIC MODEL FOR THE AFRICAN CONTRYSIDE GROWTH

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Abstract: **This article deals with a case study relating to the capacity for resilience, developed by the indigenous communities of the region of Simba in the territory of Bulungu in the Kwilu, located in the abandoned oil areas formerly exploited by Unilever in Congo. To better support the local growth of villages and promote the efforts of such a multidimensional territorial resilience in developing countries, the study proposes industrial motricity as an economic model likely to strategically play the role of a real tool in the fight against poverty. In view of the local resources available, the study makes some practical proposals on how water, coupled with soft energy, small rural industry and human capital, could suggest not only a few landmarks built on a square symbiotic, but also, provide relevant responses to the socio-economic development problems faced by local communities, thanks to the transformation of local resources from available into finished products with high added value, creating wealth, thus offering employment proximity to young people, and supporting local growth.**

I. WHY REFUSE AFRICA TO INDUSTRIALIZE?

Another time, Helmut Josef Michael Khol [1] said in 1987, "that there can be no question of letting Africa industrialize, that the West no longer lets itself be surprised a second time; Asia faces serious competition today, because the West was distracted by its development.

The Democratic Republic of Congo, like many countries in sub-Saharan Africa, is struggling to optimize their industrialization systems and even those for producing clean energy water.This continental challenge is in itself a complex socio-ecological and economic problem to resolve. The state of affairs in the Democratic Republic of Congo clearly shows that its abundant fresh water resources represent more than 52% of world reserves. Paradoxically, the country experiences an alarming deficit in access to drinking water in the country estimated at 70%, electricity (44%), and that of industrialization at 5.8% [2], despite the abundance and diversity of its natural resources [3].

Faced with this voluntary and deliberate challenge imposed on Africa, the study questioned which local development model would best adapt to the realities experienced in rural areas of the Democratic Republic of Congo?

The atypical case from which community resilience has its origins in the Kwilu region is that of the growth of the palm oil industry [5] which has long had a positive impact at the same time on the economic growth of the Democratic Republic of Congo and on the improvement of the living conditions of local communities served by companies in the sector established since the colonial eraincluding UNILEVER, MADAIL, CCP, CKE, SIEFAC, etc. This community resilience intervened recklessly first during production operations and then, easily after the abandonment of exploitation of the sector by the said companies formerly strongly involved in palm oil production. Community resilience was recorded in the head of the fruit cutters employed for cutting and supplying the factories with raw materials which are palm nuts to profitably extend their income by simultaneously transforming part of the production through artisanal mixing under camouflage.

Affluent community resilience came just after the decline of the modern palm oil industry, which was caused in particular by the diversion of part of the production of palm fruit bunches by fruit cutters working on behalf of the modern companies specializing in the production of palm oil on the one hand, and finally supplemented by the reason for the dilapidated state of the production infrastructures added to the aging of the palm groves whose replanting had not been planned at the time in with a view to guaranteeing the sustainability of the sector[6].

In the spirit of the study currently being carried out, following the resilience experienced in the territory as a major asset in its transition towards local industrialization specific to the community, the transformation of the abundant natural resources available in a combined

Congolese village environment to human capital constitutes in itself an ideal hypothesis seen as the basis for this research question. This possible response to this major challenge, the Industrial Motricity approach applicable in Congolese decentralized territorial entities, is a new strategic tool in the fight against poverty that this study proposes, as a unique and innovative model of economic and social development, reinforcing thus, the financial and fiscal capacities of the 1079 decentralized territorial entities that make up the Democratic Republic, including 33 cities, 311 municipalities, 471 sectors and 244 chiefdoms[4].

Industrial motricity [8] is defined as a set of assets, considered as production factors that a village, a locality or an agglomeration can possess, the creation of which in symbiosis, guarantees to a certain extent, the transformation of available local resources in finished products with high added value, with a view to creating wealth, offering sustainable local jobs and supporting local economic growth, hence the true development of the country from the ground up and the relevance of a model appropriate motricity skills.

II. SYMBIOTIC ECONOMY AND COMMUNITY RESILIENCE

The theoretical framework [9] serving as the basis for this study is made up of two theories including the theory of the symbiotic economy and that of community resilience. The symbiotic economy is a radically new economic theory, developed by DELANOY [10], which maintains that the symbiotic economy is capable of allowing human beings and ecosystems to live in harmony.

For the first time, this theory offers in itself a synthesis between numerous techniques and research brought to light in recent years: permaculture, circular economy, economy of functionality, peer-to-peer sharing, social and solidarity economy, complementary currencies… By combining the benefits of each of them and finding the common principle, it achieves breathtaking results. In many areas we could reduce our use of materials by more than 90% while redeveloping the productive capacities of the territories. We could replace the use of metal and ores with plants and thus avoid sending human beings down the mines. We could create cities that are self-sufficient in water, energy and fresh food, combining forest buildings and filtering gardens, digital cities and winter gardens, bicycle highways and self-built vehicles, agriculture and local manufacturing. Ultimately, the symbiotic economy relies on the symbiosis between human intelligence, the power of natural ecosystems and the technosphere. For Jacquard and Arthus-Bertrand [8] by finding the right balance between the three, it is possible to produce without exhausting resources, but by regenerating them.

This theory of the symbiotic economy, expression of a certain economic circularity [11] in the context of this study, is associated with Cyrulnik's theory of resilience. The author asserts that the primary goal of community resilience is to identify and develop individual and community strengths and establish the processes that underpin the factors that promote resilience. The definition of resilience proposed by Cyrulnik comes from the fields of agronomy and geography [12]. A soil is said to be resilient when, after a flood or a fire, it begins to live again.

The fauna and flora will be different than before the disaster, but life is starting again. On a human level, resilience occurs when a person pursues different development after an ordeal.

This is the example of two people who lose a loved one in a road accident. After a few months, the first gradually regains a taste for life, while mourning her grief.

The second continually replays events in her head and struggles to complete her daily tasks. Both people's lives are changed forever. However, the journey of the first continues to unfold, like the plant that grows through the asphalt.

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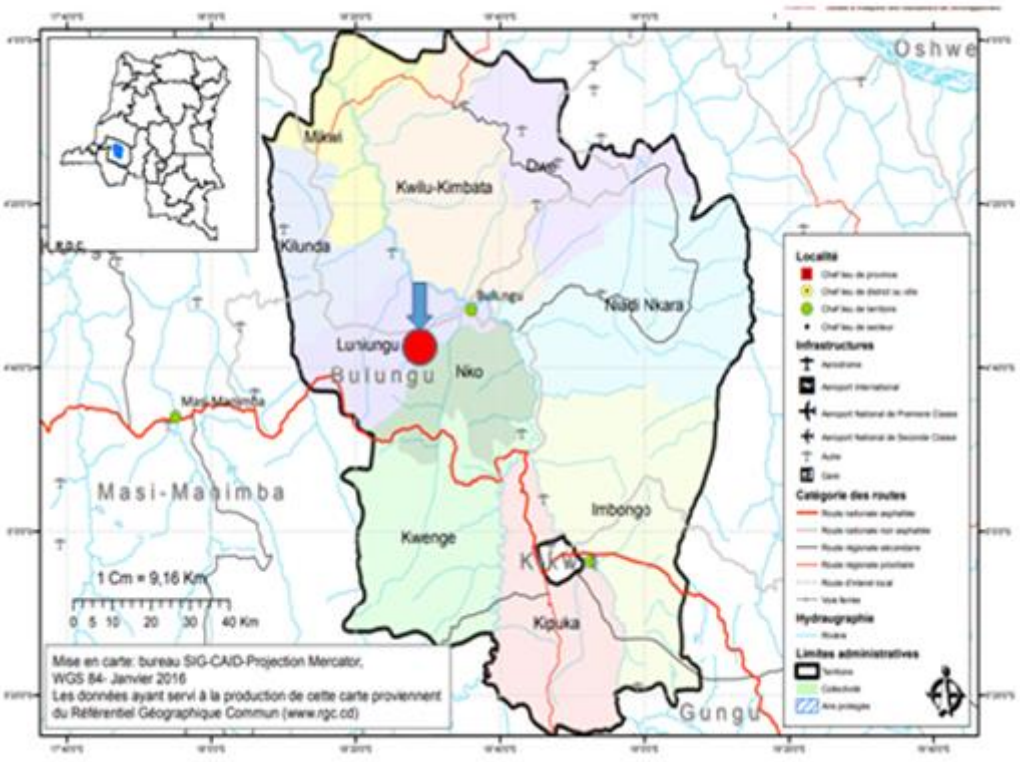

Fig.1. Study environnent

III. WHY MAKE THE INDUSTRIAL MOTRICITY CHOICE ON THE RURAL REGION OF SIMBA?

This social survey[13] carried out in the last quarter of 2021, focused on the rural area of Simba, a locality in the Luniungu sector in the territory of Bulungu in the province of Kwiluin the Democratic Republic of Congo, with the aim of analyze the skill of resilience mastered by the local community, as well as the conditions for deploying the motricity approach[12] for the promotion of local village industry.

The study deployed methodological triangulation[14] including (i) descriptive[15] and inductive method, to study the facts regarding the elements of community resilience in villages that played a crucial role in the functioning of the industry oil mill[15] from the colonial era[16] until the period of its decline; (ii) the historical method[17] to understand the history not only of the actors of resilience anchored in the territory[18]under study, but also of local resources that can serve as raw materials for the industry.

Armed with an interview guide [19]developed and tested before the survey, installed for three days on the Simba motricity site, then seven days in Kisia and eighteen in Tango, all of these last two localities having housed two power plants oil production, surrounded by natural palm groves and modern oil palm plantations [20], we personally met a convenience sample of indigenous inhabitants of the study area. That is 34 individuals in total, including 12 in the Simba village, 15 in Kisia and 20 in Tango.

To the responses of the people who participated in the various focus group meetings, we associated our own observations, based on the use of five thematic guides (devoted to the skill of local actors active in the artisanal production of oil fruit of the moulding of the resilience, the availability of raw materials for the future palm oil industry[21], and the analysis of production factors that can guarantee the emergence of the local industry in a motricity-driven approach in a vision of sustainable development. The following selection criteria dictated the inclusion or not of a participant in the focus group meetings: (i) being part of the village community where the group meeting is organized, whether either in Simba, Tango or Kisia (ii) be interested and available at the time of the group meeting and (iii) undertake an income-generating activity in the oil sector (trade, production, transport) for which, the actor has decision-making power.

These group meetings lasted approximately one and a half to two hours. The data from the focus group sessions were entered and analysed in order to obtain an inclusive set of information focused on the productive capacity of the indigenous people after the closure of the oil mills that operated in the past in the Simba region.

Subsequently, interviews with stakeholders other than palm oil producers-suppliers were also conducted with the aim of

validating and enriching the data collected from them. Qualitative data was entered on a computer using Sphinx plus2 software.
The interviews provided a better understanding of the Congolese entrepreneur's social self-innovation [22] (AIS) and provided certain explanations for the differences observed between the three groups following the analysis of the questionnaire data.

IV. FIGHTING POVERTY IN THE DEMOCRATIC REPUBLIC OF CONGO

The study reveals that at a time when the Democratic Republic of Congo had just committed itself at the highest level of the State to the fight against poverty with its local program for the 145 territories of the country, the motricity model proposes itself to contribute significantly to this challenge relating to sustainable industrial emergence in village environments, on the one hand, and to enable rural and peri-urban Congolese communities to create enormous employment opportunities and to supply villages with water and energy autonomously, without resorting to other energy-intensive technologies. In addition, the proposed model is likely to apply an ecological efficiency factor which would not only promote green technologies and sustainable industrialization, but would make water and energy supply, hygiene and sanitation systems truly resilient and efficient, within criticality limits.
Certainly, the deployment of this motricity-driven economic model would require the networking of multidisciplinary actors and partners, and would make it possible to improve the design and governance of both sustainable and integrated systems of drinking water, electrification and of industrialization.
All thus based on this typically systemic model characterized by a co-creation approach [23] based on endogenous knowledge[24], the control of criticality and eco-efficiency[25] considered to be the capacity to offer goods and services at competitive prices that meet the needs of people and provide them with quality of life, while progressively reducing environmental impacts and the quantity of natural resources necessary throughout the life cycle of the products to ultimately achieve a level that is in harmony with what the planet can sustainably support.

4.1. Involvement of resilient village communities

The resilient village communities, potential suppliers of raw materials for power generation, were listed and grouped by region subject to study, while tracing their sectors of belonging, the villages concerned and their numbers.
The members of these communities in terms of residence live in localities surrounding the potential site of Simba over an average distance not exceeding 100 kilometers. These members are the vast majority of former oil mill workers or their family members having assumed one of the functions in former oil farms, whether fruit cutters, factory employees, road workers and many others categories**.**

Table 1. Places of origin of palm oil produced in the Simba region

Nr	PLACES OF ORIGINS			Number
	Region	**Municipality**	**Villages**	
1	KISIA	Luniungu	Nsombo, Molembe Kisapemba, Kiyoko Kingunzi, Mubu Mbanzadibundu, Kiyoko Kingombe; Kikasamweni Kisapembe, Molembe Dondo,Kiwunga, Kina Mundonda, Miwazi, Kibwari, Kinimi, Kipwala Kiyakalamba,Ngamba Babakasa, Yendji, Ngueshi Mufete, Bengi, Kimbuku Mbanzatambu, Kiwutu Centre bongo, Miwaji Mbelo, Kindongo, Ngombe Kisamba, Majorité, Kipashi Yungukipotshi, Kingungu Yungumalalu,	42
	TANGO RIVE		Bitindala, Belwisima, Kinzamba, Kikongo Tango,	

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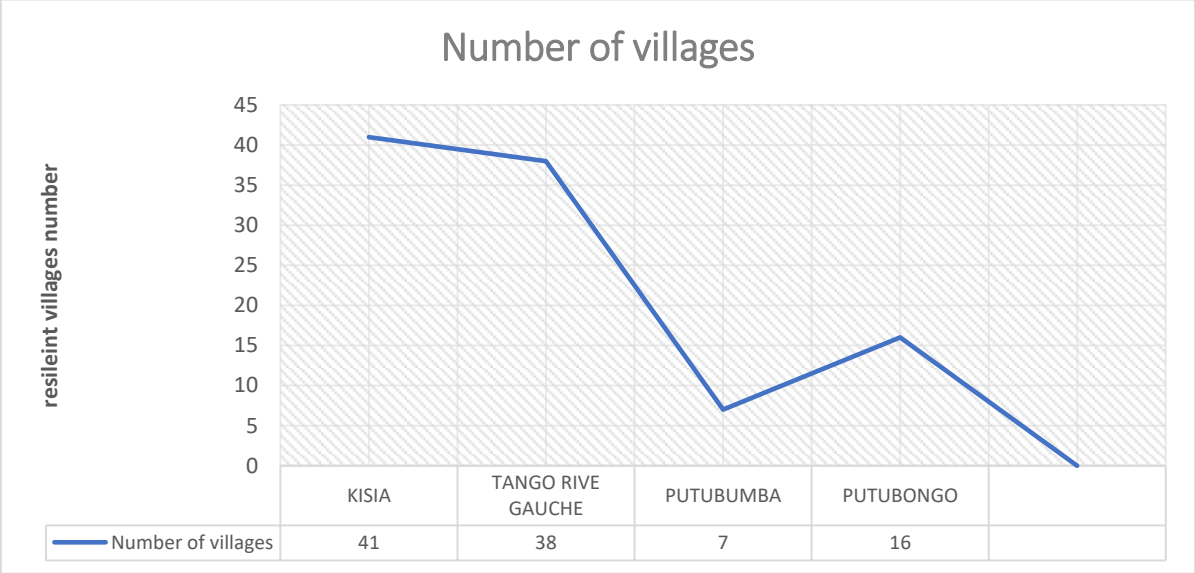
2	GAUCHE	Luniungu	Milundu, Kiyaka	7
3	KKONGO TASAMBA		Bwatundu, Kimwengi Milundu, Kiyaka poste, Kimpwanga, Wamba Zaba, Makoso, Lemfu Kialu, Mabimba, Mushe Mayumbu, Bwatundu Miyita, Miwanji, Baba Kazamba, Kingengi, Nzamba, Muloji, Ndala Dunga village, Vunda Dunga poste, Kingongu Kimboko, Misengi, Songo Paroissemisengi, Kibangu Ngonji, Lungama Camp milundu Mundonda, Kiyaka village	36
4	PUTUBUMBA	Luniungu	Belmiese, Tatu, KikusuPunza,Kimbanda,	5
5	PUTUBONGO	Kilunda	Manie, Lemfu, Kingwadi, Konda, Kipakasa, Baba, Kindambi, Manie, Kingwadi, Konda, Kipakasa,Kindambi, Sinanzandi, Kilunda, Kingala, Kimanu,Manga,Kikoshi	18

Figure 2: Distribution of palm oïl producing villages by site



Of the 111 villages surrounding this Simba site, the site with the most villages is that of Kisia with 41 villages followed by Tango with 38 villages, Putubongo with 16 villages and finally Putubumba with 7 villages.

4.2. Apply the industrial motricity skills square

Water, alternative energies, soft industry and human capital, are the four main components which underlie the very basis of the motricity approach proposed by this study of symbiotic combinations of the model, and this, in a vision of sustainable development.

Placing human capital at the center of the problem of socio-economic development of the Democratic Republic, this choice of components is justified by the fact that water, this 21st century gold that some prestigiously call blue gold, has become over the course of the last 30 years an international issue.

Thus, access to drinking water has become in recent years a global problem, around which the international community

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and countries are mobilizing. With regard to alternative energies, the right to clean energy is today inseparable from other fundamental human rights, because energy is a sine qua non condition for economic and social development, but also for improvement of the living conditions of citizens.

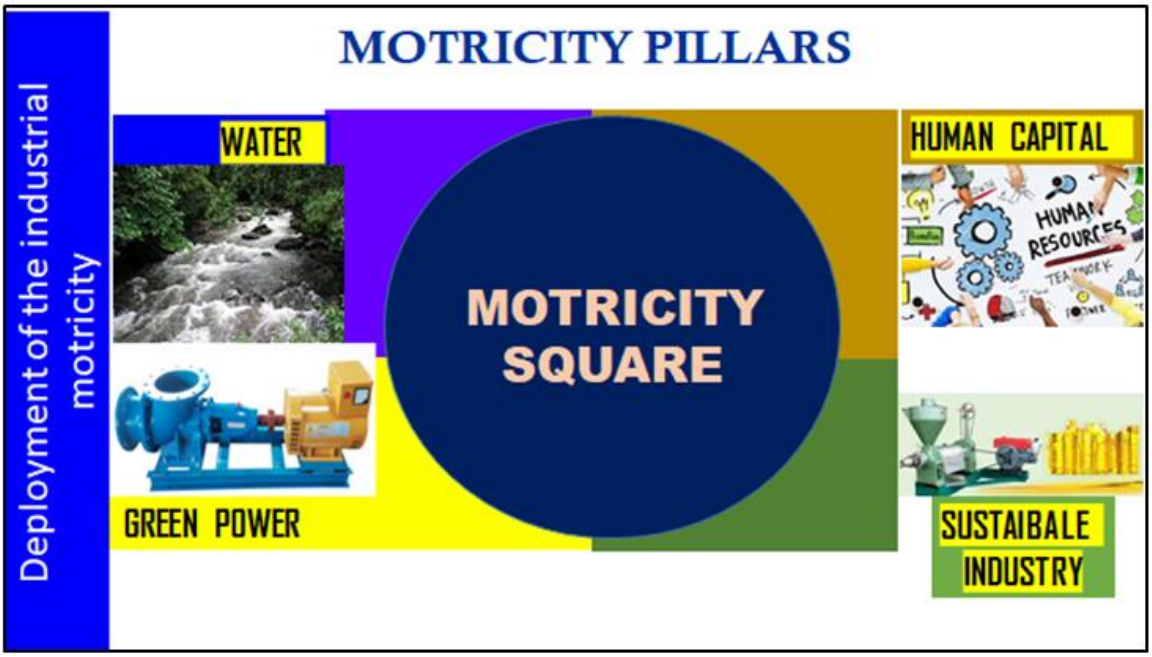

Figure 3: Square of industrial motricity

Moreover, the symbiotic economy[26] , as a response to the current ecological emergency, is an economy which is truly opposed to the classic so-called linear economy model (extract => produce => consume => throw away). The symbiotic economy constitutes a completely new way of living that is inclusive and supports the planet and all its inhabitants in a context of economic change in a transforming world.

For the country, for the territory, it is a question of deploying a new operating model of an economy, based on the principle of "closing the life cycle" of products, services, waste, materials, water and energy. The symbiotic economy designates an economic concept which is part of the framework of sustainable development, and whose objective is to produce goods and services while limiting the consumption and waste of raw materials, water and sources of energy.

This motricity approach, by bringing its four areas of intervention into symbiosis, would rightly contribute to the economic growth of the country through the establishment of industrial motricity centers capable of guaranteeing both the energy empowerment of communities, the industrialization on a rural scale, supply and employment.

Also, this beneficial symbiosis in addition to its ripple effect in the sectors of ecotourism, crafts, agriculture and livestock, commerce, communication and transport routes, its deliverables of the motricity model would particularly avoid the populations benefiting from the actions undertaken , diseases, to these same populations, would reduce health care costs for the state and individuals, encourage effective democracy at the rural level and also avoid risky investments in the water sector, energy and small industry.

4.3. How to deploy the motricity square?

The deployment of the motricity square is characterized through different complementary symbiotic combinations. To bring to life the square of industrial mobility illustrated above (figure3), which the model proposes involving water, energy, small industry as well as human capital, it is possible thanks to this research carried out in the sector, to make a significant contribution to the account of water as one of the driving components. It is a frugal innovation that is the "blue pump" [20], thus constituting a catalytic element, capable of revolutionizing the water supply sector.

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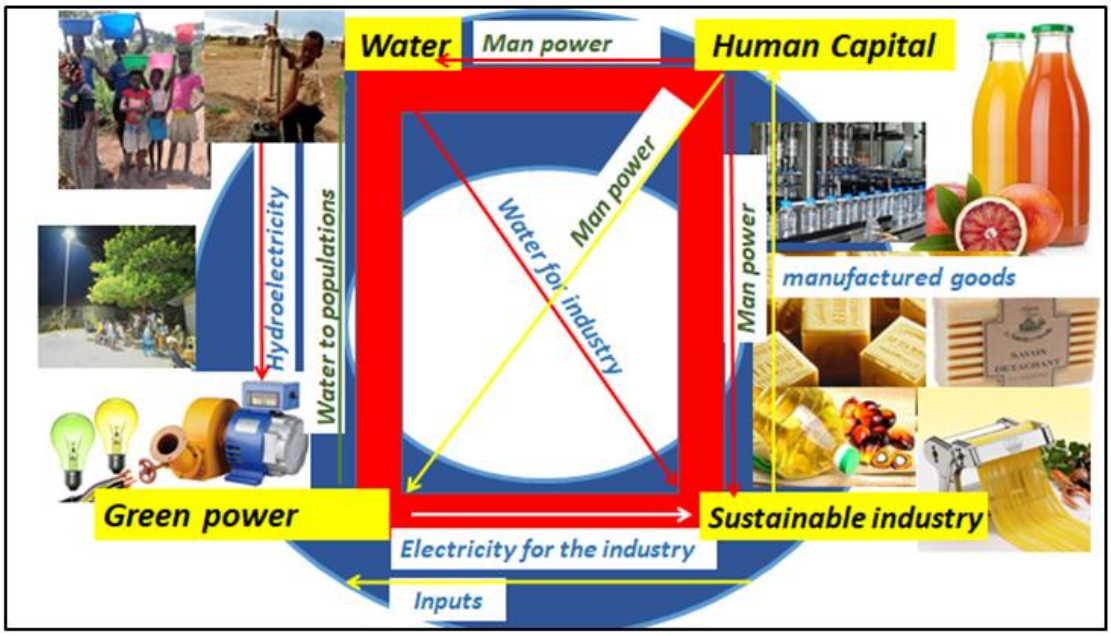

Figure 4: Motricity symbiotic relationships

This innovative pump is a perpetual motion device inspired by a manual hydraulic pump. This device, very suitable for rural areas, was successfully tested in the field in the DRC at the initiative of the anti-poverty unit of the Presidency of the Democratic Republic of Congo with the technical collaboration of the UNESCO Office in Kinshasa.

On a practical level, this blue pump makes the water supply system resilient within criticality limits and, it is potentially applicable in agriculture, water supply for human consumption, animal husbandry and industry even in areas with mountainous terrain. The newly developed blue pump appears to be one of the best solutions to water supply problems in target areas, as it can produce hydrodynamic force in low areas to provide water with a large flow rate in mountainous areas.

This pump operates curiously, without resorting to the consumption of electricity, fuel, or the use of a motricity or other traditional energy sources. This device is easy to install, pollution-free and maintenance-free. It operates 24 hours a day, seven days a week, in areas rich in water resources. In terms of technical configurations, the blue pump consists of four essential metal parts, including an air chamber, a tri-bridled base, a valve head and a gauged supply pipe. Thanks to its performance, the device uses a natural phenomenon of producing kinetic energy based on Joules' law which involves two parameters, including the speed of the water expressed in meters per second as well as the mass of the water expressed in Kg. This physical combination makes it possible to pump up to 200 cubic meters of water per day, up to an altitude of 100 meters. With a simple property and possible local and easy manufacturing, the blue pump offers a lifetime service guarantee of at least 50 years. In addition, once coupled into a hydroelectric generator, this hydraulic device it can be used in certain places also for the production of electricity via an upwelling of water, depending on the topographical configuration of the terrain, and play an equally significant role in the process of industrialization of rural areas, neighbouring the center of industrial mobility.

4.4. What deliverables come from the industrial motricity skills approach?

In addition to the industrial mobility centers to be created at the level of potential sites located within the decentralized territorial entities themselves, playing the role of a very important tool supporting growth, as a provider of wealth and opportunities sustainable local jobs. As this is an eco-conceptual model characterizing the eco-efficiency [20] of sustainable production systems, whether those relating to water, electricity or industry, it is supplemented by two other tools management of the sustainability of integrated production systems, in particular the eco-efficiency index and the criticality metric.

The two tools provide support not only for research but also for local development, by studying the criticality of existing production systems, to identify possible deficiencies and propose corrective measures to producers, and also by studying the eco-efficiency index of any new production system to be put in place, to warn investors of the risk of meaningless, economical and unsustainable investments.

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V. CONDITIONS FOR DEPLOYMENT OF THE MOTRICITY APPROACH AND GOVERNANCE OF INDUSTRIAL MOTRICITY CENTERS

The deployment of the motricity-driven approach involves the installation of industrial motricity centers (IMC) in localities with very strong industrial motricity skills, located within decentralized territorial entities.

These motricity centers are deployed by integrating in a symbiotic way, and in most cases, the production of water, the production of electricity based on renewable energies, and small sustainable rural industry in the villages where the basic natural conditions are met, in terms of availability of rivers without waterfalls, streams with waterfalls, sun, biogas or wind for energy production, willingness of the local population to provide labour , and the availability of raw materials to be transformed into finished products with high added value.

As for the management strategy of established industrial mobility centers, after a one-year period of support and consolidation, these centers are transferred to public companies owned by territorial entities, private companies owned by independent investors or NGOs, or even local mixed economy companies, in which decentralized territorial entities will be able to take shares in their capital.

VI. USEFUL EXPERTISE FOR SUPPORTING RESILIENCE THROUGH INDUSTRIAL MOTRICITY SKILLS

The deployment of the industrial motricity model in decentralized territorial entities undoubtedly requires from the actors, expertise for the benefit of these entities focused essentially on three distinct axes, including (i) technical support for these entities to conduct feasibility studies and project execution, ensure the installation of motricity skills centers and their management during the transitional period, and train the human capital employed at the centers; (ii) their legal support for the creation and legalization of companies to take ownership of the industrial mobility centers thus created at the end of the transitional period; (iii) their financial support in mobilizing financial resources from partners interested in the motricity-driven approach.

VII. CONCLUSION

This two-dimensional discussion was initially organized around the initial hypothesis according to which the valorisation of the abundant natural resources available in Congolese village environments combined with human capital would constitute the response indicated to the main questioning of this research on what type of local development model in rural Congolese areas. The second dimension of this discussion very clearly positions this study with regard to the scientific theories mobilized upstream and which served as a basis for this research.

Speaking of the initial hypothesis, this is certainly validated since the region of Simba, thanks to these abundant natural resources, is the one which presents the possibility of developing greater commercial added value since the local material that is crude palm oil, produced abundantly by farmers residing in the villages surrounding the Simba site, and transformed into different finished products.

This oil of vegetable origin can be profitably transformed into soaps and edible oil for cooking. With regard to the theoretical contributions on resilience, the sustainability of such an enterprise is already guaranteed thanks to the community resilience developed, thus perpetuating a permanent and continuous production of palm oil by the indigenous people, in the majority, by those who worked for the old oil mills formerly operated by the UNILEVER group[27] since before the country's independence on June 30, 1960, until its decline around two decades ago.

The viability[28] as well as the sustainability[29] of this project are not justified only from an economic angle with the transformation of high value-added products, but to this angle we also add abundance as well as capacity increased tacit renewal of the natural palm groves surrounding the villages in the project area, the availability of local labour with unique expertise in the artisanal production of palm oil. The main demographic, economic, social and cultural factors are acquired.

In terms of population, more than a million households live in the peripheral area of the Project operating site; this economic aggregate [30] constitutes in itself a guaranteed market for Simba's products.

Suppliers of the main raw material are represented by the multitude of independent artisanal oil producers living in the project area, distributors and traders supplying wholesalers as well as retailers who in turn make the products available to consumers in turn. grouped into managements, constitute all the main players in this agro-industrial project in the SIMBA village. Moreover, government regulations are more than favourable, not only in the rapid registration of entrepreneurial initiatives with the Single Window, but also in the liberalization of the private sector and the encouragement of access to financing offered by the banking sector and industrial.

Moreover, in addition to the positive repercussions of the strength of resilience acquired in the oil sector, the theory of the symbiotic economy, for its part, fits well and truly with the pillars of the motor square sparking the growth of small industry at the same time. On a rural scale, this brings together water, green energy [31], small industry as well as the human capital of the region. This is how bringing these determinants together not only in a vision of sustainable development but also in an approach of positive complementarity, brings to the purely endogenous development of the Simba region, a jolt guaranteeing an industrial momentum thus modelled in the inside the square of industrial motor skills proposed as part of this study,

This study of the motor potential, its materialization in favour of the Simba site, is subject to four symbiotic elements including the water of the Luniungu river, its hydroelectric potential thanks to its large waterfalls, palm oils produced abundantly and in a manner continues locally as a raw material thanks to the skill of community resilience, positions itself as a primordial determinant in the promotion of light industry on a rural scale. This development is thus characterized by an industrial motor approach, certainly with great commercial added value since the local material which is crude palm oil produced abundantly by the farmers residing in the villages surrounding the Simba site, is profitably transformed into soaps and edible oil for cooking. The sustainability of this potential is already guaranteed thanks to the community resilience developed, sustaining permanent and continuous production of palm oil by the indigenous people, those who worked for the old oil mills formerly operated by the UNILEVER group since before the independence of the 60s, until their decline in the 90s. The viability as well as the sustainability of this industrial potential transformable into a project are not justified only from an economic angle with the transformation of products with high added value, but from this angle also adds the abundance as well as the increased capacity for tacit renewal of the natural palm groves surrounding the villages in the project area, the availability of local labour with unique expertise in the artisanal production of Palm oil. The main demographic, economic, social and cultural factors are acquired. In terms of population, around two million households live in the peripheral zone of the Project operating site; this economic aggregate [32] constitutes in itself a guaranteed market for SIMBA products. Suppliers of the main raw material are represented by the multitude of independent artisanal oil producers living in the project area. When the actual value of SIMBA's potential is assessed, there will undoubtedly be distributors who are traders supplying wholesalers as well as retailers who in turn will make products from Simba available to consumers who are in turn grouped into managements. All these stakeholders will constitute all the main players in this SIMBA agro-industrial project. Also, it should be noted that government regulations are more than favorable, not only in the expeditious registration of entrepreneurial initiatives with the Single Window, but also in the liberalization of the private sector and the encouragement of access to financing offered by the banking and industrial sector. Regarding SIMBA's future market opportunities, the vast market for its potential products is segmented in this two-dimensional manner. On the one hand, there are village households in the territories of Bulungu and Masi-Manimba with respectively a population of 1,571,503 inhabitants in Masi-Manimba and 1,256,663 in Bulungu, grouped into a set of 1800 localities; and the distributors serving wholesale and retail traders are permanently based in the towns of Kikwit, Gungu, Idiofa, Tshikapa, Masi-Manimba, and Bulungu.

Competing interests

The Author is the General Director of The Research Center for industrial Motricity and Territory Resilience-CREMIT

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