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Added Value from Industries, Introduced in Villages, Oases and Reclaimed Lands

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Abstract: A considerable portion of the agricultural resources are being treated as valueless waste! This leads to the loss of sustainable resources as a comparative advantage and the associated opportunity of sustainable development. This can be attributed to the narrowness of the angle, by which we are accustomed to view these renewable resources, as well as the absence of the appropriate means to turn this waste to wealth. The first aspect is associated with the level of the R&D activities. The role of the researchers is, proceeding from the understanding and valorization of the traditional technical heritage of use of these resources, to issue a contemporary edition for the use of these resources, to rediscover them as a material base for the satisfaction of human needs: on the local, national and international levels. The second aspect is associated with industry. Industry here is understood in broad terms as these activities, conducted under defined conditions to transform the state, shape or properties of the agricultural resources to satisfy a certain criterion or requirement along a predetermined path of transformation to a final product. Proceeding from this definition industry includes a wide spectrum of activities including: sorting (to various sizes or quality levels), packaging, drying, freezing, pressing, squeezing, filtering, threshing, baling, etc. The above mentioned definition opens several degrees of freedom: in selection of geographical location of industry (e.g., in village, town or city), in site selection on the microscale (e.g., field, field head, house, workshop, industrial premises of various area and infrastructural requirements, manpower involved (e.g., men, women, children), source of power (human labor, sun, wind or water energy, or energy from hydrocarbons, level of technology (manual, mechanized, up to fully automatic processes), and mobility (e.g. stationary or mobile as for example fish processing on board of fishing ships). Industry could also be classified into preparatory processing of a resource and the processes of manufacture of a final product. In the paper the new vision of whole resource use will be illustrated giving different examples. A new perception of resource components will be given to associate them structurally with the performance criteria of different products/services. An integrated approach will be suggested for the industrialization of the rural areas to realize the objective of endogenous sustainable development , as well as a high added value along the value chain: from the field to the market including: selection of industrial projects, their spacial distribution and appropriate technology.

Key words: endogenous development, local communities, added value, industries, renewable material resources, agricultural residues, innovative products, traditional products, whole resource use, technical heritage

1. Introduction

Perhaps until the sixties of the last century the subsistence economy was dominant in most of the villages and the oases in the Arab world. Relying on their culturally-rooted technical heritage, accumulated and self-developed by successive generations, villagers and Bedouins were able to satisfy their basic needs using the locally available resources, most of which were products of agricultural activity [7]. The drastic and abrupt change of the style of life due to the westernization wave propagating in rural and desert areas, as well as the compulsory modernization process, pushed by successive governments and investors has violated the cultural continuity in the Arab region and destroyed the historically-woven symbiotic relations between the villagers/Bedouins and their local contexts

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and resources. Many of these resources, especially the residues of the agricultural resources, became redundant turning to be a burden on the environment and a source of environmental pollution. The most dangerous result of this process is the loss — and perhaps forever — of the unique to each local community traditional knowledge, including the technical heritage that may have been a spring board for the improvement of the means of livelihood of members of these communities. The adoption of the new style of life has unproportionally increased the financial burden on villagers/Bedouins, as compared with the increase of the prices of their agricultural products leading to the threatening of the economic feasibility of the agricultural activity at large.

As far as the drylands are concerned, the above mentioned conditions have been exacerbated by the climate change leading to the decrease of the rate of rain fall by 30%[1], negatively affecting the intensity of plant coverage falling short of satisfying the needs of livestock, which has exceeded the carrying capacity of the rangelands. All these conditions are behind the increase of migration of the youth from villages and desert communities to big cities and abroad in search for better life conditions. This situation poses a serious challenge to development practioners.

A new vision is needed to view the agricultural resource in its integrity including the main and secondary (and even tertiary; I mean the residues of residues!) products. Here science and technology are needed to rediscover the available local resources with the objective of satisfaction of contemporary needs on the local, national and international levels. Viewed from the perspective of the local community, this endeavor may be perceived as a process of revitalization of thinking and imagination of the village/oasis inhabitants leading to the unleashing of their endogenous capabilities and thus helping them to compose a new contemporary edition of their culturally-developed style of life [1]. Within this framework lies a great opportunity for innovation in trying to make full use of the uniqueness each village/oasis possesses: in historical experience, ecological conditions and resource endowment to find out the comparative and competitive advantages each village/oasis has and use them in development. Thus the great diversity the Arab region has: in cultural backgrounds, historical experiences, ecological conditions and resource endowment will serve as an inexhaustible source of innovation in practices of sustainable development.

[1] The presentation of Mrs. Ream El-Razy from Morocco, at *Desert Ecosystem and Livelihoods Knowledge Sharing and Coordination Project* (MENA-DELP, 2nd Regional workshop), best agricultural practices in desert areas, on 4 and 5 May, 2014, Amman-Jordan.

2. We Need A New Vision

2.1 The Localization of Development

The neoliberal capitalist system endeavors to neutralize the factors of production world-wide (e.g., raw materials, labor, capital, etc.) and merge them in huge systems of production (e.g., transnational companies). This leads to the violation of ties of belonging associating people with their local contexts and resources, disabilitating them and turning them to be passive consumers of whatever is offered to them in the international market. Thus whole local cultures are threatened to disappear destroying with them the potentiality of emergence of new alternative models of development. Therefore, efforts should be directed to the localization of development. Thus there is a need to adopt a new approach of planning from below: the grass root level upward. The objective here is to discover, on the local micro level, the comparative and competitive advantages of local communities that may lead to the establishment of innovative production systems with new economic features to satisfy local needs, as well as national and international needs making use of the market niches, opened by the world market.

2.2 Endogenously Initiated Patterns of Development

The endogenously initiated patterns of development

— as opposed to the exogenously imposed pattern of development — mean that the local community acquires the feelings of ownership of the change from the very start: beginning from the ideas. This means the involvement of community members and their taking of responsibility to act. This also opens an inexhaustible source of innovation and guarantees sustainability of development.

2.3 Tailoring of Science and Technology to Serve the Needs of the Local Community

There are no ready available recipes to tailor science and technology to suit the needs of local communities. Each case/local community has its own specificity. This endeavor begins with deep understanding of the socio-cultural and economic conditions of the local community, the traditional knowledge and the technical heritage it has and its ability to absorb and assimilate modern knowledge and techniques. Then comes the stage of selection of the appropriate elements of science and technology and their tuning with the cultural background of the local community. The criterion of success here is: how far the introduced elements of science and technology were properly assimilated by the members of the local community leading to their empowerment and increasing their ability to absorb and assimilate more advanced knowledge and techniques? The results of this creative process may be new merges/syntheses between the traditional knowledge/technical heritage and modern introduced elements of science and technology.

2.4 Multisectoral Model of Thinking from the Developmental Point of View

We have to transcend the unidimensional view of the agricultural production as confined to the sector of agriculture. We need to associate the three economic activities: agriculture, industry and trade on the local level as possible with the objective of the increase of the developmental return along the whole value chain: from the agricultural activity to the selling of the final product. This idea will urge us to search for the comparative and competitive advantages each village/oasis has and study its specificity (e.g. historical experience, cultural background, ecosystem features, etc.) to find out what is unique to it and how this uniqueness can be expressed in a product/service that can be marketed locally, nationally or internationally. This line of thinking will end up by coining trademarks, associated with a wide spectrum of products/services, characterizing each village/oasis.

2.5 The Whole Resource Use

The cash crop ideology is strange to the Egyptian/Arab traditional village. Along history, the cultural traditions have woven symbiotic relations between the villagers/Bedouins and the elements of flora and fauna around them. Fig. 1 Illustrates an example of these relations with the date palm showing that all the products of the resource: primary and secondary were totally made use of: either as a source of income via export or for the satisfaction of the needsof the cultivator [4]. That is why the vocabulary of the village/oasis did not know the term “waste”! Fig. 2 Illustrates a modern edition of the concept of the whole resource use as applied to the date palm. Generally speaking this concept can be applied to villages, oases and reclaimed lands leading to the dissemination of waste-free industrial activities.

2.6 Use of the Whole Development Potential of A Resource

The principle of use of the whole development potential means that we are increasing to maximum the whole resource life, leading to the increase to a maximum of the resource use efficiency, which tunes with sustainability. In addition the application of this principle will decrease or eliminate the need for landfills, which again adds to sustainability. Fig. 3 Illustrates the principle of use of the whole development potential, applied to the palm midrib.

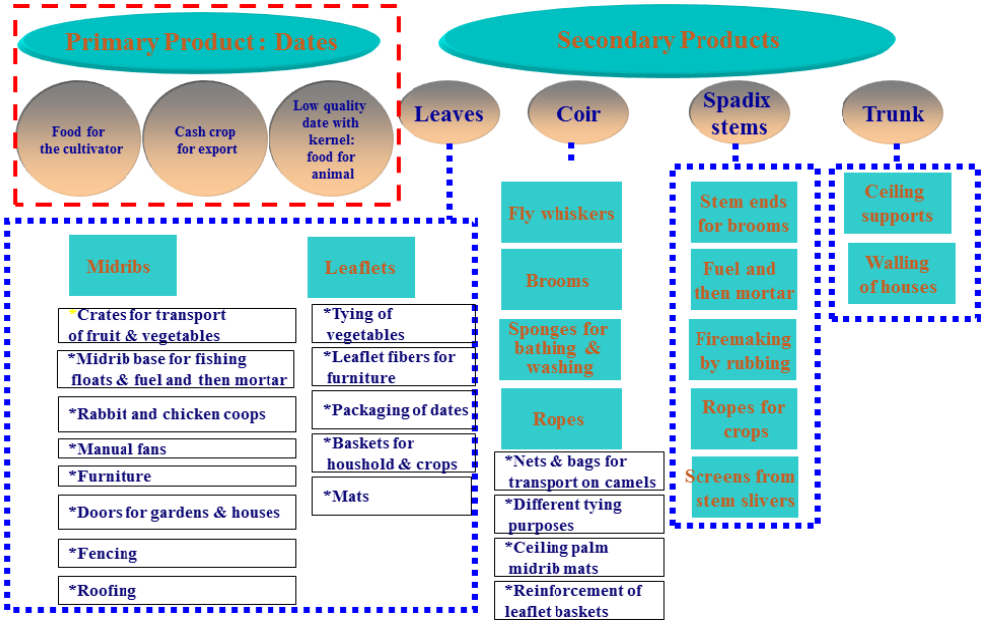

Fig. 1 The date palm: an eloquent example of the whole resource use.

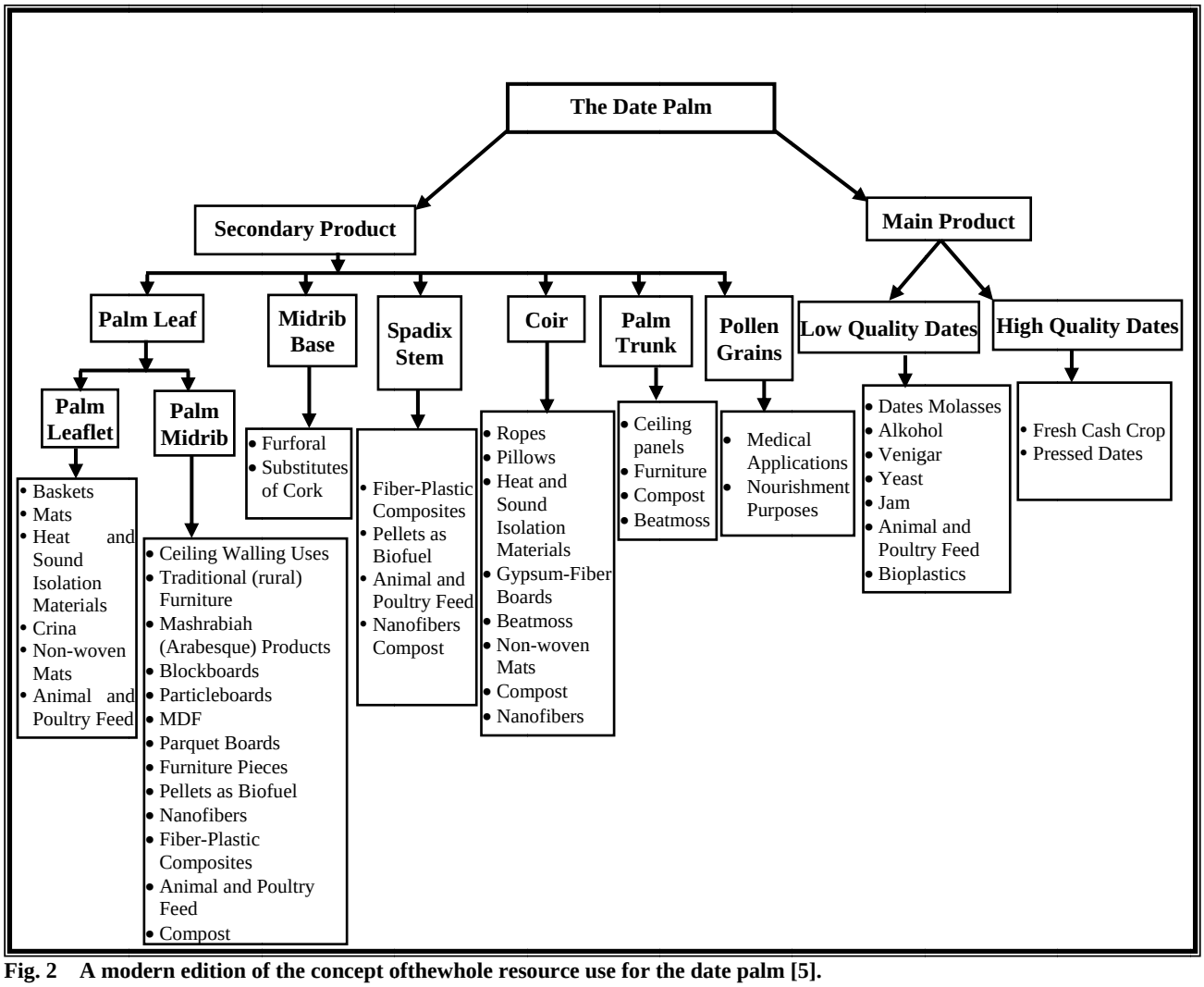

Fig. 2 A modern edition of the concept ofthewhole resource use for the date palm [5].

2.7 Opportunities of Innovation Hidden Behind the Agricultural (Plant) Resources

The first interface of innovationlies between our perception of the structural properties (on the macro and micro levels), physical and mechanical properties, chemical composition, etc. and the performance criteria of service or a product, needed on the local (beginning from the village), national and international levels [3]. The innovative product of this interface is new ideas of services or products, associated with the use of agricultural resources.The second interface of innovationlies between theidea of the new service or product and the socio-cultural context, where it is being produced. The innovative product of this interface is a new technology, appropriate for the concerned socio-cultural context [2]. The appropriate technology is that technology thatcould be easily assimilated by the local community; strengthening its structure and enabling the local community to modify it and innovate new technologies.

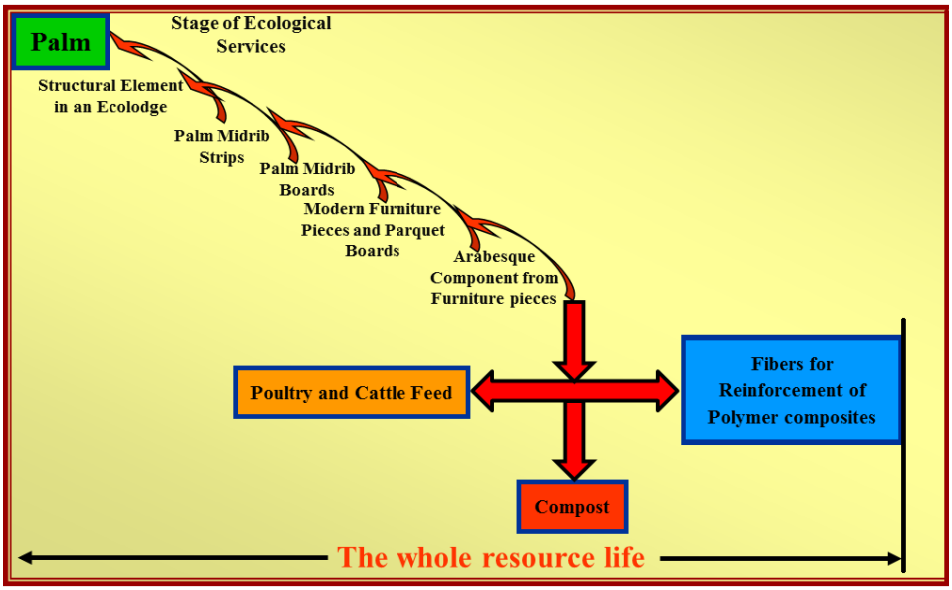

Fig. 3 The principle of use of the whole development potential applied to the palm midrib.

2.8 Meaning of Industry

Let us adopt a generic understanding of industry as an activity, conducted under predetermined conditions, to transform the state, shape or properties of an agricultural resource to satisfy certain criteria or requirements along their path of transformation to final products. Thus understood industry may include:

- Sorting (to various sizes or qualities)
- Air Drying
- Pressing
- Freezing
- Baling
- Washing (e.g., by water)
- Polishing
- Retting
- Filtering
- Squeezing
- Threshing

This wide definition of industry opens the potentiality — when needed — to separate the different stages of preparation of the agricultural resources with the purpose of use of comparative advantages a village or an oasis context may have in locating industrial activities in:

- Field
- Field head
- Fruit gardens
- House courtyard
- SMEs and large industrial establishments

3. Approach of Industrialization

3.1 Priority for Remote Villages and Oases

Here it is assumed that the more remote the location of the village/oasis is the higher chance it was not distorted by the process of westernization and compulsory modernization. This means that the identity and specificity of the local community is still preserved. This may be reflected in authentic traditional knowledge and technical heritage, as well as vital relations with local resources. Thus remote villages and oases offer chances for developing new endogenously formulated models of modernization enjoying cultural continuity and relating the past heritage with future examples of sustainable development.

3.2 Industry Should Go to People

Contrary to what has happened during the industrial revolution in the eighteenth century in the West industry will go to people in the villages and oases. First of all the industrial activities/establishments should be in harmony: ecologically and socially with the village and oasis contexts.It is expected that the strong socio-cultural networks of the village/oasis (e.g. nuclear and extended families, neighborhood relations, tribal relations, etc.) may lead to innovative forms of industrial relations as compared with those prevailing in modern cities. This suggests the need to search for alternatives of location of industrial activities in the fields and fruit gardens, public spaces in villages/oases, as well as houses (e.g. courtyards). Within this context, home industrial production may provide a strong comparative advantage in the economic sense (decrease of the cost of overheads and infrastructural needs, saving of time of commuting to work and back to home, etc.). In addition, the location of industry at home will facilitate the permeation of the culture of industry to the members of the local community via the strong family and tribal relations, as well as neighborhood networks in the village/oasis.

3.3 Building of Personal Skills

The main thrust of industrialization of the village/oasis should be the building of personal skills in manual and semi-manual (partially mechanized) crafts. This will facilitate the dissemination of industry via training apart from the level of literacy (e.g., the level of literacy is very low, especially among women in villages of Upper Egypt). Besides, the building of personal skills satisfies the criterion of sustainability in providing labor opportunities. It has been proven from field studies that it is possible to easily shift from one industrial activity to another in the same realm of craft. In Damietta governorate, for example, the same families have shifted from hand weaving to mechanized weaving of bed sheets and covers. In Kafr El-Dawar, the same families manufacturing irrigating wheels (Sakia) from local timber resources have shifted to the manufacture of window frames and doors from imported European pine. The traditional axe and plough smithes of Kafr El-Dawar have also shifted to the manufacture of modern ploughing tools and agricultural machines. This necessitates:

- Giving due care to strengthen the value of love of work: not only for earning a living, but also as a mean of self-expression. Care should be also given to inculcate the value of doing work with passion and drive to do it very well.
- Giving due care to the carriers of traditional knowledge and technical heritage (men and women) as national treasures and mentors to train young generations. Invaluable, mostly oral, experiences in different fields of industrial expertise are subject to be lost, and perhaps forever, with the negligence, and eventually the death, of those distinguished artisans.

4. Opportunities Industrialization Offers

4.1 Traditional Products

There are many traditional products that are unique to so many villages and oases in the Arab region. These products are being manufactured from natural, specific

to each location, materials, i.e., they are green products. Besides, they have strong cultural expressiveness, i.e.,they carry cultural motifs of expression. These products composed in the past: elements of the traditional style life of many villages/oases. Due to the drastic change of the style of life, the local demand on these products is quickly decreasing leading to the loss of jobs, neglect of the unutilized resources, and most dangerously, the disappearance of the associated traditional knowledge and technical heritage. Here lies a big opportunity to open new markets for these products: internationally to satisfy the needs of green consumers world-wide, and nationally to support eco-tourism within the blossoming movement of establishment of ecolodges. Within this framework, it is necessary to modify the designs of traditional products, design new products and train the artisans to manufacture them setting new quality standards to suit the new consumers. The palm leaves baskets may serve as an example.

4.2 Locally Available Neglected Resources

There are a lot of neglected resources, which may not present a threat to the environment, but they could present a material base for so many industrial activities that may provide sustainable labor opportunities to the members of local communities; in the villages/oases, as well as towns and cities. Hereafter are examples of these resources.

4.2.1 Sheep Wool

It is estimated that 1 sheep renders within its life span ~ 15 kg of wool[2]. This resource could be a spring board for the dissemination of the spinning and weaving industry to produce a wide variety of wool products and thus providing additional income to support rangeland economic activity. Similarly the camel and goat hair could be a material base for industrial activities to be disseminated in rangeland areas. It is estimated that a camel and goat render a quantity of 41 and 9 Kg of hair[3] within their life span respectively.

4.2.2 Cattle Bones

The specific weight % of bones of the cattle being slautered[4] could be estimated as follows:

Sheep	Camel	Buffalo	Cow
25%	20-22%	20%	18%

These resources may represent a material base of a wide spectrum of industrial activities that could be disseminated in villages and oases to produce different products ranging from bracelets, necklaces, paper cutters, small souvenirs, up to animal glue.

4.2.3 Date Kernels

The date kernels represent ~12% of the total weight of date[5].This resource could be used in the manufacture of different products ranging from rosaries (praising beads), palm kernel oil up to animal and poultry feed.

4.3 Huge Quantities of Agricultural Residues

Huge quantities of agricultural residues are seasonally available [6]. Their presence in the fields, or near-by locations, is associated with the hazards of infestation by insects, their open-field burning leading to the pollution of the environment, as well as the loss of fertile land they occupy. Examples of the annually available quantities of these residues are given below[6] in tons per hectare:

Rice straw	Maize stalks	Sorghum stalks	Cotton stalks
4.84	4.84	4.62	3.584

These resources could be a sustainable material base for the establishment of industrial projects, such as:

- Compost.
- Animal and poultry feed.
- Composition panels (e.g., Particle-boards and MDF).

[2] Field study conducted by the author.

[3] Field study conducted by the author.

[4] Field study conducted by the author.

[5] Field study conducted by the author.

[6] El-Mously H.I.,A Study on the Utilization of Agricultural Residues in the Near East Region for Sustainable Development. WHO regional office in Cairo, 2002.

5. A Roadmap for Industrial Development

Hereafter is a roadmap for industrial development.

(1) Project predesign.

(2) Selection of the site for the execution of the pilot project.

(3) Project prefeasibility study.

(4) Exploratory/semi-industrial experiments.

(5) Final project design.

(6) Final technical and economic feasibility study.

(7) Industrial project marketing.

(8) Execution of the pilot project.

(9) Evaluation of the project and redesign.

(10) Project up scaling: technical and economic feasibility study.

(11) Project up scaling: execution.

(12) Project up scaling: follow-up and evaluation.

6. Examples of Projects

6.1 Executed Projects

Table 1 illustrates the industrial projects executed in the period extending from 1992 to 2016.

Table 1 List of the industrial projects executed in the period extending from 1992 to 2016.

No.	Project Name	Geographical Location	Source of funding	Duration
1	Establishment of the first of its kind factory for the manufacture of blockboards from date palm leaves' midribs.	El-Kharga city, the New Valley governorate	GTZ	The factory has been erected and opened on 27/10/1993
2	Manufacture of furniture for 150 community schools in Asiut, Sohag and Kena governorates from date palm midrib blockboards in collaboration with UNICEF	Asiut, Sohag and Kena governorates	UNICEF	1995
3	Establishment of a training centre for training of villagers in El-Dakhla oases on the manufacture of Mashrabiah (Arabesque) items from date palm leaves' midrib.	El-Dakhla oases	GTZ	The Centre has been opened on 1995
4	Investigation of the possibility of use of cotton stalks in particleboard production		Regional councils for Research and extension	1998-1999
5	Dissemination of Mashrabiah (Arabesque) industries in the villages of El-Fayoum governorate relying on the date palm midribs as an industrial material	Al- Aalaam village, El-Fayoum governorate	CARE International	Dec., 2002
6	Manufacture of fig jam from priceless figs	Shammas village, Sidi Barrani, Marsa Matrouh governorate	UNDP in Egypt	2006-2007
7	Manufacture of untraditional cattle fodder from agricultural residues	Kafr El- Arab, Faraskour, Damietta governorate	Dana Gas company	2008-2009
8	Manufacture of untraditional cattle fodder from agricultural residues	Ezbet El-Haga Ratiba, Meniet El-Nasr, Dakhalia governorate	Dana Gas company	2009-2011
9	Dissemination of industries relying on the use of date palm secondary products (parquet and blockboards from palm midribs: exploratory phase)	El-Kayat village, Menia governorate	Masr El-Kheir	November, 2010 – October 2012
10	Project of dissemination of micro industrial project relying on palm leaflets and midribs	Beer El-Abd villages, North Sinai governorate	The society of Experts in Science and Technology	2011-2012
11	Manufacture of organic compost from the products of prunning of date and dome palms as well as mango trees, Faris village, Kom-Ombo province, Aswan governorate	Faris village, Kom-Ombo province, Aswan governorate	Dana Gas company	21/3/2010– 31/3/2013
12	Manufacture of parquet and furniture pieces from palm midribs: exploratory phase	El-Kayat village, Menia governorate	Global Environment Fund	2/2013- 4/ 2014
13	Dissemination of industries relying on the use of date palm secondary products (parquet, furniture and Crina from palm midribs): Pilot phase	El-Kayat village, Menia governorate	Swedish International Development Cooperation Agency (Sida) andThe Japanese Embassy	7/2015-31/12/ 2016

6.2 Suggested Industrial Projects

Table 2 illustrates a summary of industrial projects, suggested by the author in 2009 to the Ministry of International Cooperation within its endeavors to support the victims of mines in the North West Coast Region.

Table 2 A summary of industrial projects, suggested by the author in 2009 to the Ministry of International Cooperation within its endeavors to support the victims of mines in the North West Coast Region.

No.	Project title	location	Investment cost, L.E.	Number of labor opportunities
1	Fig jam	SidiBarrani villages	810000	30
2	Barqee wool blankets	Marsa-Matruh villages	310000	20
3	Pickled olive	Siwa Oasis	495000	30
4	High quality virgin olive oil	The whole North-West Coast Region	1000000	30
5	Mashrabiah (Arabesque)product from products of pruning of fig and olive trees	Sidi Abdel Rahman	75000	10
6	Preparation of sheep and goat skins for tanning	The whole North-West Coast Region	1111500	40
7	Sheep and goat tannary		5900000	20
Total			**9701500**	**180**

7. A Suggested Strategy to Support Industrial Development in villages, Oases and Reclaimed lands

(1) Launching of projects: on the regional and international levels for sharing of information and coordination in the area of development of SMEs, based on the agricultural resources as a base material for industrial activities.

(2) Launching — on the regional level — of research projects on the industrial use of renewable resources, as a spring board for establishment of joint industrial projects.

(3) Support of establishment — on the national level — of NGOs in rangelands to support the rational management of rangelands, dissemination of industrial projects to improve the added value of agricultural resources, as well as the marketing of products.

(4) Establishment — on the level of each governorate — of a fund for support of local industrial projects to be financed by levies put on every hectare of cultivated land to support these industries withstand the pressures of globalization.

(5) Launching of national programmes for:

- Recording and preservation of traditional knowledge and technical heritage, associated with the use and manufacture of agricultural resources.
- Building of preferential systems on the level of governorates to support products, locally manufactured from agricultural resources.
- Establishment of permanent exhibitions to be put on the path of tourist movement with the purpose of helping the local artisans and investors market their products.
- Support of applied research on the manufacture of innovative products from agricultural resources.
- Support of pilot industrial projects of manufacture of new products from agricultural resources.
- Development of the curricula of the existing technical school and colleges (and the establishment of new ones) with the purpose of tuning the content of technical education and its profiling to suit the needs of development of each governorate. This tuning and profiling process should be built on the deep understanding of the comparative and competitive advantages each governorate has in the manufacture of distinguished products.

- Establishment of technology incubators on the governorate level to search for the local entrepreneurs and support them in acquiring organizational skills, as well as new technologies to produce innovative products from agricultural resources.
- Support of participation in international fairs with the purpose of helping local producers market their products making use of the opportunities offered to them via niches for their products in the international market.

References

[1] El-Mously and Others, Potentialities of development of small-scale industries, *Conference of Horizons of Development of El-Fayoum Governorate*, El-Fayoum, 7-10 March, 1990.

[2] H. I. El-Mously, Principal investigator, project of study of utilization of palm midribs as an industrial material, final report, Academy of Scientific Research and Technology, Cairo, 1991-1993.

[3] H. I. El-Mously, M. A. Zamzam and N. H. Ibrahim, Mechanical properties of date palm leaves' midrib (DPLM) in relation to its utilization as a substitute for solid wood, A poster presented in the IUFRO World Congress, Tampere, Finland, 6-12 August, 1995.

[4] H. M. Fathi, M. S. Al-kahtani and Y. A. Wali, *Planting of Palms and Production of Date in the Arab and Islamic World*, Ain Shams Publishing House, Cairo, 1971.

[5] Samir Yousef and Others, Factory of Blockboards from Palm Midribs in El-Kharga City, New valley Governorate, A Study Presented to the Social Fund, June, 1995.

[6] A. E. Samir. Quality and quantity of plant agricultural residues in Egypt and means of its utilization, A study presented to the Arab Organization of Agricultural Development (AOAD), University of Arab Countries, 1997.

[7] Utilization of Residues of Date Palms in the Near East Region, FAO, UNESCO Office, Cairo, 1997.