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Concept for sustainability: Model in search for a better harmony between resources utilization and nature

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Abstract
The praxis of Resources utilization Concept has traditionally been oriented to the performance of better products, low cost series, efficiency of production and high profits overall. However, the concept process is not always focused on minimizing the negative effects of the production line on nature and human society. In this way, the concept of sustainability can be used as a policy guide to achieve our needs without compromising the ability for future generations to achieve their own needs. Sustainability can be defined as the tendency of ecosystems to dynamically balance their consumption patterns of matter and energy, and evolve to a point where life itself can continue. The main contribution of this paper is to present a theoretical model of eco-oriented concept as a dashboard for conception and decision makers to follow in the search for a better harmony between the resources utilization plants and the limits of nature.

Keywords: resources, utilization, concept, sustainability, nature

1. Introduction
The world is heading for an "ecological credit crunch" far worse than the current financial crisis because humans are over-using the natural resources of the planet. The problem is also getting worse as populations and consumption keep growing faster than technology finds new ways of expanding what can be produced from the natural world. According to Rizal [1, 2], the Resources utilization Concept can be defined as a set of decisions aimed to solve specific requirements of a product and/or a process (i.e. service), which are usually related to manufacturing, distributing, marketing, consuming and using an object. In this way, the concept process has traditionally been oriented to the performance of better products, low cost series, efficiency of production and high profits overall. As a result, the goal of the designer's work is to define appropriate materials, improving projects and its phases and making the use of the products safer and better.
The main role of the conceptor is, so, to develop integrated solutions in order to achieve both creative and technical aspects of quality, focusing on ergonomics, usability, product's performance, material and energy optimization and improvements on the production itself, converging to a 'materialization of a proposal' [2, 3, 4]. In this way, the conceptor can be placed as an interface between producers and consumers, technique and environment, culture and products or services. Consequently, the work of conceptors influences the whole life cycle of matters and, especially, the way people live.
Originally, the resources utilization concept process was strongly oriented to the market needs, solving constructive problems, trying to achieve high profits and acceptance overall. However, a closer look at the end of production line, especially in resources utilization plants, gives us the idea of conceptors as mere "mass makers". A lack between theoretical foundations and current practices is clearly identified when the analyzed approach is based on new trends, such as eco-oriented concept [1]. This approach shows that the resources utilization concept is not always focused on reduction, recycling and reuse of materials and energy in order to minimize the negative effects of the production on nature and human society. The relationship between natural systems and human beings, particularly represented by culture, technology and economy together, are recognized as very complex subjects of research and can not be easily reached within the traditional model of making goods and services [1, 3, 4].
From the environment perspective, the concept methodologies and rules have to be changed as soon as possible in order to achieve both society needs and preservation of nature. According to the United Nations Conference on Development and Environment, held in Rio de Janeiro, in 1992, it is necessary that a new model of development considers the conservation of nature and the rational reuse of natural resources as a main principle, trying to achieve the needs of the present without compromising the ability for future generations to achieve their own needs [5, 6]. This vision reveals the imperative necessity of redefinition in production models and more conscious-ness on impacts of the resources utilization processes, especially in the social, environmental and economical aspects. Besides, new trends and procedures have to be introduced in search for a dynamic balance between use and preservation of natural resources, i.e., sustainability [6]. This concept comes into scene as a policy guide for conceptors and decision makers to follow in order to minimize the negative environmental and social impacts of industry and economic activities as a whole.
Sustainability can be defined as the tendency of ecosystems to dynamically balance their consumption patterns of matter and energy, and evolve to a point where life itself can continue. From this point of view, our methods in producing goods and services must consider the whole life cycle of products not only from "cradle to grave" but from "cradle to cradle". This means that methods of production should consider all impacts of the production line, from extraction of materials in natura, to the use of necessary mass and energy to produce, and the alternatives taken into account in order to minimize wastes during the distribution phase [5, 6]. At the end, the focus may be set on the use and discard of objects for disassemble, their recycling and adequating deposition back to nature. When possible, the materials may be put back

to production line, starting a second product life cycle.

2. Trends in search for sustainability

The means by which the human society can deliberately and rationally approach and maintain a desirable carrying capacity, based on continued economic, cultural and technological evolution was defined by Rizal [1, 2, 6] as a new trend of research called Resources utilization Ecology. This method can be seen as a theoretical background to conceptors in search for sustainable practices. According to the authors [1, 6, 7], a full consideration of Resources utilization Ecology must include the scope of economic activity and consumer behavior, once they both impact natural systems in different scales. Within the resources utilization ecology, two important methodologies can be identified as evolutionary approaches for the concept process:

a. Concept for Environment; and
b. Concept for Sustainability.

2.1 Concept for Environment

The Concept for Environment (CFE) methodology plays a very important role when associated to sustainable production models, considering the product development as an integrated system where every decision influences the whole process and results in different impacts on the environment. The CFE can be defined as a process of concept that takes into account the environmental performance (i.e. producing without damaging) of products from the very beginning of the project, focusing on optimization of mass and energy flows during the life cycle of matters and especially characterizing an efficient use of materials, techniques and manufacturing procedures in order to achieve the goals of the market and at the same time minimizing the negative residues and damages on human society and nature as well. The CFE consists basically on technological innovations and methodological proceedings that are aimed to help the conceptors and decision makers to produce goods and services economically viable and ecologically friendly. The Figure 1 shows The net result is that a re-enforcing cycle is set trapping more and more of the rural population in poverty, food insecurity and in the degradation of natural resources (see Figure 1).

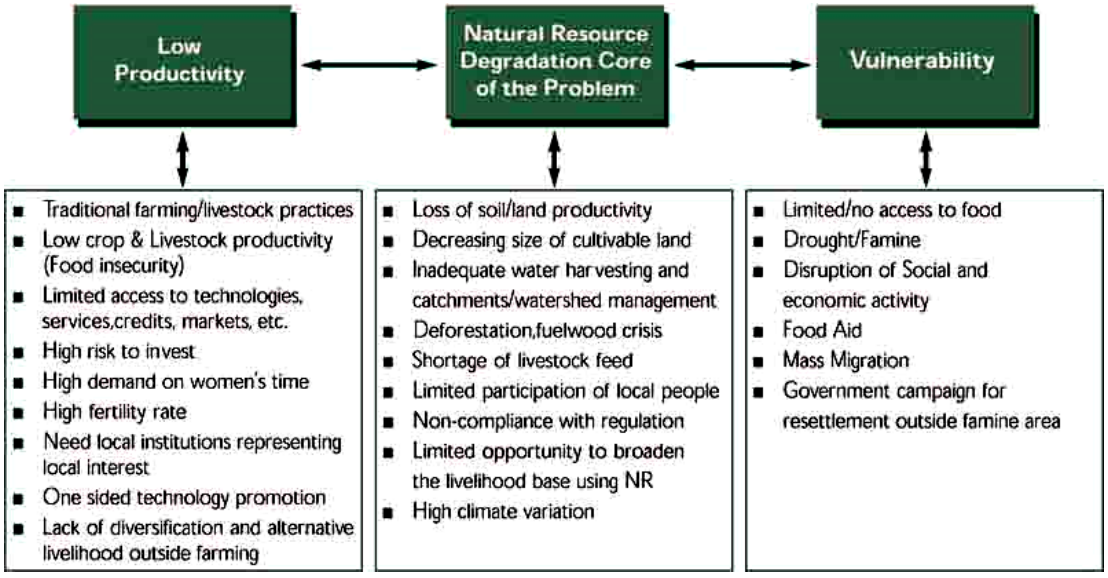

Fig 1: Poverty, Food Insecurity and Natural Resources Degradation Trap [8]

Thus, improving the natural resources base is central to any effort to arrest this "vicious cycle" and improve the productivity of small-scale farmers, who constitute the largest group of people below the poverty line. The current extension programme, however, relies on the "intensified package approach" and is primarily focused on accelerating production, using fertilizer and improved seed, irrespective of farmers capacity and agro-ecological zones. This has been unprofitable to farmers and inadequate to address the core of the problems faced by most resource-poor farmers as shown in Figure 1. In order to address this, it is vital to go beyond narrow technical treatment of specific sectoral areas and adopt a broader thematic framework (that cuts across various disciplines) that would bring the integration of key sectors to generate a positive synergy to reverse the downward spiral.

According to Baek et.al. [9] and [10], there are three phases on the CFE process: (1) inventory analysis, (2) impact analysis, and (3) improvement analysis. At first, the detailing of product needs and characteristics is done, identifying the environmental aspects that can make the product greener or not. During this phase, several tests must be done in order to verify mass and energy flows, material quality and production conformities that effectively contribute to a greater environmental performance. Second, the impact analysis process is proceeded, when the data are aggregated in eco-indicators (i.e. information systems with certain data that allow the decision makers to act in conformity with sustainable practices) that face the possible consequences of the process outside the resources utilization plant, especially those related to society and nature. At last, the improvement analysis process is done, when the conceptors and decision makers elect priorities and necessary changes in order to perform low costs, concept innovation and eco-friendly improvements overall. Previous explanation shows a check list of CFE presented by [10] based on preliminary studies of [9].

2.2 Concept for Sustainability

According to [10] and [11], the concept of Concept for Sustainability (CFS) is strongly related to the capacity of promoting production systems that can respond to some social and environmental requirements in their products using

as less natural resources as possible, in comparison to the current patterns. In these terms, the conceptors and decision makers have to coordinate every product, service and communication that can contribute to clarify the concept alternatives and technical solutions in order to attend social and cultural innovations. The method also considers the life cycle of matters and its impacts on human and natural systems, but assumes that new behavior patterns are taking place over the market in a point that consumers demand from producers much more conformity with environmentally sustainable, socially acceptable and culturally attractively ideas.

The CFS is aimed to offer efficiency to the concept process, focusing on reduction of materials, choosing the right and eco-friendly source of energy, optimizing and giving more lastingness capacity for products and especially concepting disassemble facilities from the very beginning of the project. [10, 11] have presented four important phases to implement the CFS: (1) reconcept, (2) upgrading, (3) new consumption patterns, and (4) sustainability.

The first and the second phases are normally integrated and can be placed together, depending on the route planning of both production lines and social demands. The redesign phase is basically focused on technological innovations and does not demand changes in social and consumption patterns. The role of the conceptor is to define strategies in conformity to the LCA, design products that attend the concepts of reducing, reuse and recycle. The phase of upgrading is focused on information, once is based on services and goods that are clearly eco-oriented. This means that the new proposals of green products are already recognized as valid and accepted by market and society. Innovations here represent strong ecological criteria and may be done progressively, demanding some behavioral changes in consumption patterns. From this point on, the participation of the society is crucial, which plays a definitive role in the search for sustainability, once is still difficult nowadays to introduce ecologically friendly products in market [9, 10]. The next phase, as the title itself says, demands new consumption patterns to be consolidated. It is focused on behavior and proposes sustainable practices in terms of living, buying, reusing, recycling, etc. The environmental aspects are the centre of the design project and the decisions must include new alternatives of making products, new materials, new strategies and better results for both production and nature [10, 11]. Despite of the fact that changing is always difficult and takes time, this represents the higher step to achieve sustainability as a whole. The last phase is naturally to maintain new scenarios and sustainable life styles, which can only be possible within the cultural perspective of changing views.

The perspective of sustainability discusses new concepts of development. Changes must immediately occur in order to stop depletion of natural systems and jeopardize life itself. According to [12, 13], main considerations are necessary to be done on three strategic topics in order to achieve sustainable practices: (1) population, (2) search for well-being, and (3) technological eco-efficiency. At this point, sustainable solutions reflect in one hand social demands of goods and services, and on the other hand a technological response of innovation [10, 12] have presented a graphic model to better visualize the relationship between the Cultural Changes and the Technological Innovations. Eco-redesign is presented as solutions that are positive for the environment but not enough to be sustainable. According to [13, 14] the sustainability can only be achieved through new practices and trends that consider all aspects of natural and human systems themselves.

This idea signs some changes needed in order to achieve sustainability in different views, such as environment, society, ethics, culture, economy, etc. This strongly means changing the subject from technology through society and environment and vice versa. Urgent needs are signs of the times to show an example of this trend focusing the changes of perspective needed in resources utilization process in order to achieve sustainable practices [15, 16, 17].

Three main questions can be used as starting points when implementing an eco-oriented design programme: (1) in which ways does the company impact the environment?; (2) what exactly do these impacts represent to human society and nature?; and (3) how can the enterprise effectively improve its environmental performance?

These answers are normally used as part of a greater management strategy aimed to solve unconformities in production line and to work as a check list for conceptors and decision makers to follow in search for a better harmony between the resources utilization processes and the viability of life itself. In this context, CFE and CFS strategies are important tools to achieve sustainability, once both methodologies contribute to form a new pattern of industry with recycled materials, and a rational and adequate use of energy to develop efficient products and eco-friendly as well.

3. Conclusions

This paper analyzes some concepts and methodologies such as Concept for Environment and Concept for Sustainability associated to the work of conceptors within the sustainable development context. The idea is to better understand the ways, in which conceptors should act in order to achieve sustainability in different views, such as environment, society, ethics, culture, economy, etc.

Using these views as a starting point, some reflections on eco-oriented concept are presented. The main contribution of this paper is to present a theoretic model of eco-oriented concept and to suggest concept alternatives as a dashboard for conceptors and decision makers to follow in the search for a better harmony between the resources utilization process and the respect for nature and its limits.

Although several methodologies on conceptor's work have been published until now, more studies need to be carried out to consolidate eco-oriented concept through the definition of a new behavioral pattern for conceptors, which is an open approach yet. The concepts presented in this paper are part of a greater project of research aimed to link concept strategies (e.g. CFE and CFS) within the sustainable development context. The authors are opened to suggestions and comments that can contribute to achieve this common goal.

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