MaGER Master Program
2014

Sustainable Business and Green Management

Case-study on

"Sustainability is about creating the kind of world we want for ourselves, our neighbours, and future generations. It challenges us to live our lives and make decisions as individuals, organizations and societies so that we make sure that future generations have access to the same opportunities and quality of life that we do." Sustainability Primer by Natural Step Canada

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THE COMPANY

Equilibrium S.r.l. was born in 2011, by Paolo Ronchetti and Barbara Ceschi a Santa Croce 's initiatives, as an innovative Start-Up with registered office in 12 Mons. Moneta Street in Lecco, Italy.

Equilibrium has developed the "Equilibrium System" which includes 5 different business units:

- *Equilibrium Seed Bank* – selection and development of hemp varieties for industrial and pharmaceutical applications
- *Equilibrium Hemp Processing* – separation of principle components of the hemp stalk *Equilibrium Bioedilizia* – hemp based biocomposites for the construction industry
- *Equilibrium Neutroceutica* – hemp seeds based human nutrition
- *Equilibrium Farmaceutica* – hemp based solutions for treatment and prevention of diseases

Equilibrium Bioedilizia is the first mover of Equilibrium System as a strategic decision after four years invested in R&D. It operates in the sector of the green buildings offering innovative and certified products for thermal insulation. Its products can be applied in the construction of new buildings as well as in refurbishment operations. Equilibrium is the result of the realization and implementation of a vision, investments in R&D, human capital and strategic planning with the goal of maximize the energy saving, home comfort and the respect for the environment. We will focus on "Equilibrium Bioedilizia" in this paper, as it is currently the most relevant business function and the company's core business.

Equilibrium's current management team is made by Paolo Ronchetti (Co-Founder and CEO), Barbara Ceschi a Santa Croce (Chairman) and Gilberto Barcella (Technical/Sales Director).

The initial business concept was developed during Paolo Ronchetti's Master project in the fields of Green Economy and Sustainable Development – being the argument of his final dissertation - and later improved within a project financed by Irish government.

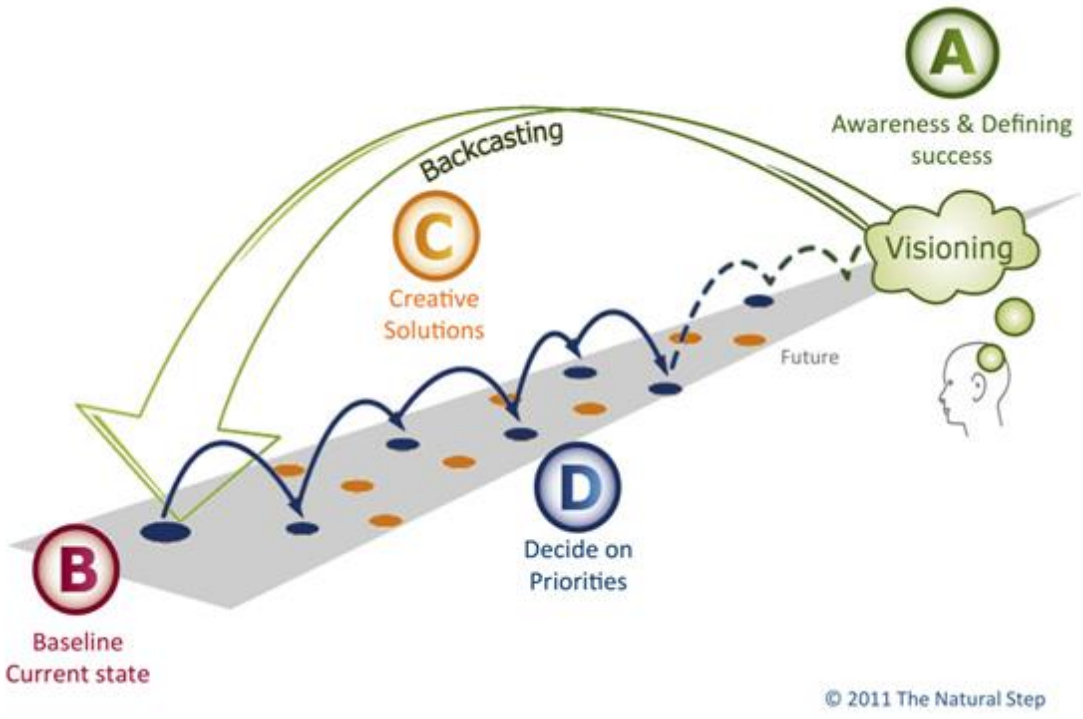
The decision to start Equilibrium was pushed by 2 main positive trends: the EU directive 2010/31 regarding the energy performance of the new construction buildings, and the late 90's "rediscovery" of the industrial application of natural fibers such as linen, hemp, kenaf and cotton.

In 2012 Equilibrium won two awards: “Premio per lo sviluppo sostenibile” promoted by “Fondazione per lo sviluppo Sostenibile” and “Ecomondo”. The other one is “Premio innovazione amica dell’Ambiente” promoted by “Legambiente” (one of the Italian largest environmentalist associations).

In April 16th 2014, Equilibrium management received in Rome the “Premio Impresa Ambiente” award.

BASELINE-VISION-SOLUTIONS-ACTIONS MODEL AS A THOUGHT PROVOKING EXERCISE

Within the framework of business management, it is often useful to break down into steps the various stages that bring an innovative, sustainable business idea into practice. We decided to briefly explain the process through the ABCD model adopted by the Natural Step (2011), in order to provide a holistic view on the business case and create a link in what we are going to analyze in the following sections.



BASELINE VISION SOLUTION ACTION. (ABCD)

In the case of Equilibrium, this model fits particularly well since the various steps adopted by the company management are very clear. In fact, already during Paolo Ronchetti's studies in Sustainable Development in Ireland, he had written a master thesis on the benefits of the lime-hemp composite as an ecofriendly solution for house insulation. Thus, he was aware of the environmental benefit of both insulating houses (lower energy demand and lower energy waste) and using lime-hemp as the insulating solution (much more sustainable than conventional materials (Shea & Lawrence, 2012). As a backing reference for the relevance of such an initiative in Italy, it can be seen that the highest portion of final energy use is devoted to the residential sector, up to 35% of total (ISTAT, 2012). By envisioning a possible future for eco-friendly home insulation he started step by step to build his own business concept and implement it in Italy. This involved deepening the knowledge in the process of hemp-lime binding, facing the psychological, "physical" and legal barriers in developing such a business, and involving the relevant stakeholders in order to make his idea come true.

As a result, today Equilibrium is a very young and promising business that is expected to grow steadily. The core business, "bio-insulation", is an exceptional blend of value creation for customers (translated into lower energy bills), remarkable sustainability achievements (lower energy demand in insulated houses, low environmental impact of the hemp-lime composite) and opportunities for growth and profits for the company. However, this sector is only part of the vision of Equilibrium. The aim of management is to fully exploit the potential of industrial hemp at a larger scale, by integrating in the value chain of hemp production and entering in various, different potential markets for hemp products. The fascinating aspect of this vision is the particular "social" approach of the company: the aim is not to protect the idea through patents and enter the market aggressively, but rather keep their innovation open sourced and involve stakeholders and possible partners in order to bring about positive change.

Said this, on one side the aim of our research is to "test" and "show" the sustainability-related aspect of the bio insulation provided by Equilibrium in order to evaluate the achievements and comment the limits or possibilities for improvement.

On the other, we try to address the opportunities and challenges of the company from a wider “business management” perspective.

THE SUSTAINABLE VISION:

To study the overall environmental balance of lime-hemp buildings a number of studies were undertaken. In the following chapters the results of a LCA and a SLCA studies will be discussed, in order to show, from a technical standpoint, the environmental impact of the hemp lime composite.

Life Cycle Assessment (LCA)

Life Cycle Assessment (LCA) is an objective procedure for the evaluation of energy and environmental loads related to a process or to an activity. Seen as a tool of energy and environmental management both in the management of industrial activity and in the administrative level, the LCA also validly proposes itself as new support for well-established techniques, such as environmental impact assessment and risk analysis. Actual buildings’ required features are energy efficiency and eco-friendliness. The building's energy efficiency can be improved by implementing effective passive or active energy strategies. Improvements to heating, ventilation and air conditioning, lighting, can be classified as active strategies, while improvements to the elements of building envelope can be classified as passive strategies. The goal of this LCA study of the wall is to develop a comparative analysis of environmental impacts generated by alternative designs of a stratigraphic package constructed in order to obtain a certain value of transmittance. The analysis of impacts was carried out at constant transmittance. This type of study analyzes what is the lowest impact design solution.

The impact of the three stratigraphy and their releases into the environment, which quantify the emissions for the construction phase of 1 m^2 of wall:

The indicators used for this type of analysis are:

1- Greenhouse Gas Protocol

2- Cumulative Energy Demand

3- Eco indicator 99 (H)

1-The Greenhouse Gas Protocol allows quantifying the greenhouse effect, the impacts due to the construction phase of these walls, and then the use of the materials used.

IMPACT CATEGORY	Unit	Biomattone	Isulating artificial	Isulating natural
Tot	kg	12,821	59,341	41,304
Fossil CO2 eq	kg	34,488	62,099	66,333
Biogenic CO2 eq	kg	0,559	0,330	7,592
CO2 eq from land transformation	kg	0,001	0,001	0,001
CO2 uptake	kg	-22,226	-3,088	-32,622

2- Cumulative Energy Demand evaluates energy demand, i.e. was quantified the energy necessary for the realization of the walls.

IMPACT CATEGORY	Unit	Biomattone	Isulating artificial	Isulating natural
Totale	MJ	480,73	775,85	1160,94
Non renewable, fossil	MJ	220,21	671,03	677,09
Non-renewable, nuclear	MJ	32,13	59,59	107,66
Non-renewable, biomass	MJ	0,004	0,001	0,001
Renewable, biomass	MJ	218,73	34,55	358,05
Renewable, wind, solar, geothe	MJ	0,16	0,74	1,75
Renewable, water	MJ	9,49	9,94	16,40

3- Eco indicator 99 takes into account different categories of impact (aggregate indicator). Predominant is the impact resulting from the consumption of fossil fuels, there were also significant contributions arising from inorganic pollutants and climate change. Is evident that the wall Bio-mattone correspond minor impacts.

IMPACT CATEGORY	Unit	Biomattone	Isulating artificial	Isulating natural
Tot	Pt	1,628	4,481	5,200
Carcinogens	Pt	0,020	0,025	0,060
Resp. organics	Pt	0,001	0,003	0,002
Resp. inorganics	Pt	0,364	0,685	0,953
Climate change	Pt	0,247	0,443	0,475
Radiation	Pt	0,002	0,004	0,008
Ozone layer	Pt	0,000	0,000	0,000
Ecotoxicity	Pt	0,014	0,026	0,040
Acidification/ Eutrophication	Pt	0,029	0,050	0,064
Land use	Pt	0,037	0,035	0,582
Minerals	Pt	0,009	0,021	0,040
Fossil fuels	Pt	0,905	3,189	2,975

SLCA analysis

SLCA is a sustainability tool developed by The Natural Step for the evaluation of the sustainability level of a product's life cycle. This tool performs a qualitative analysis, allowing identifying the areas with the greater impacts trough the product's life cycle considering the four principles of sustainability.

The process implies the use of a questionnaire containing some questions about every phase of the life cycle. The results are presented through a colored matrix that can easily communicate the sustainability impacts also to whom that haven't experience in this field. The successive in-depth analysis will lead to identify an effective pathway towards the full sustainability.

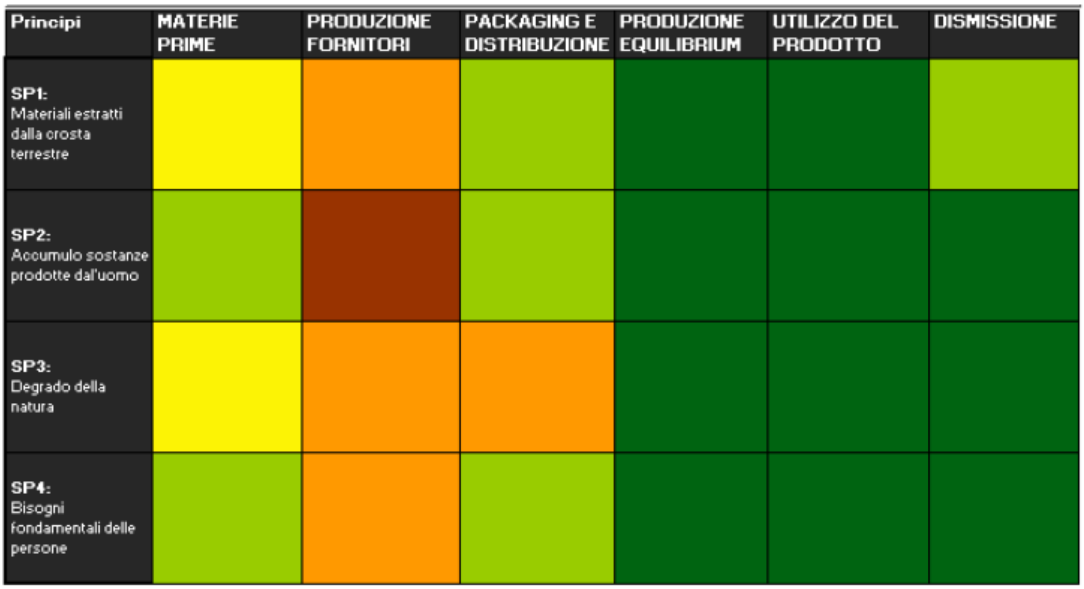
The five areas of the life cycle analyzed are:

- Raw materials
- Internal production
- Packaging and distribution
- Use of the materials
- Decommissioning

Every cell of the SLCA matrix contains 7 questions about impact and ongoing interventions on them. When the questionnaire is received the results are aggregated and the color of every cell is assigned through these criteria:

7 SI	6 SI	4-5 SI	2-3 SI	1 SI	0 SI	0 Si/NO
Molto bene	**Bene**	**Abbastanza bene**	**Ok**	**Abbastanza male**	**Male**	**Sconosciuto**
Tutte le risposte sono positive. Il principio di sostenibilità è rispettato.	La maggior parte delle risposte sono positive. Il principio è rispettato in maggioranza.	La maggior parte delle risposte sono positive. Il principio è rispettato in maggioranza.	Qualche risposta positiva. Il principio di sostenibilità viene rispettato solo in parte.	La maggior parte delle risposte negative, il principio è per lo più non rispettato.	Tutte le risposte negative, il principio non è rispettato.	Insufficienti conoscenze per effettuare una valutazione in merito.

The results for Equilibrium are:



Globally we can say that Equilibrium is founded in compliance with the four principles.

Observing the matrix we can understand that the phases between production and decommissioning comply perfectly with the four principles of sustainability. The three precedent phases instead need some interventions, in particular the production of Equilibrium's suppliers. The unsatisfactory result in this phase is principally addressable to the lack of knowledge and interaction between

Equilibrium and his suppliers, in particular the lime manufacturers. This subject will be addressed in the next chapters.

Supply chain management, lime production

The lime is a fundamental element in the composition of the Equilibrium hemp based bio-composites; it works as an alloy to bond together the hemp pieces. The production process consists in the cooking of calcium and magnesium carbonate at 900 °C, to obtain the oxide from the reaction:

$$CaCO_3 \rightarrow CaO + CO_2$$

The calcium oxide coming out from the oven is generally smashed and pulverized, before being transferred to the storage. The phases of the production can be synthetized in the following steps:

- Limestone extraction
- Storage and preparation of the limestone
- Storage and preparation of the fuel
- Limestone calcination
- Lime treatment
- Storage and transportation

Lime production is extremely energy intensive. Assuming perfect efficiency, producing a ton of lime from pure calcium carbonate requires 811 kWh. In practice, the process is considerably less efficient.

A major by-product of the lime industry is stone spalls, or pieces of limestone that do not meet the size requirements for kiln feed. Another by-product is kiln dust. The composition of kiln dust varies depending on the nature of the kiln feed and fuel used.

Lime production leads to emissions of particulate matter (PM); metals; and gaseous pollutants, including carbon monoxide (CO), carbon dioxide, sulfur dioxide (SO_2), and nitrogen oxides (NO_x). Limestone is approximately 44% carbon dioxide by weight, and this carbon dioxide is released during calcination.

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EMAS

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Data di registrazione
07 ottobre 2004

ATTIVITA':
ESTRAZIONE DI CALCARE E PRODUZIONE DI OSSIDO DI CALCIO TRAMITE LE FASI DI: FRANTUMAZIONE, VAGLIATURA, LAVAGGIO, COTTURA, MACINAZIONE, VAGLIATURA ED INSILAGGIO. PRODUZIONE DI CALCE IDRATA TRAMITE LE FASI DI IDRATAZIONE, MACINAZIONE, INSILAGGIO ED EVENTUALE INSACCAMENTO – CODICI NACE: CB 14.12 – DI 26.52

Questa organizzazione ha adottato un sistema di gestione ambientale conforme al Regolamento EMAS allo scopo di attuare il miglioramento continuo delle proprie prestazioni ambientali e di pubblicare una dichiarazione ambientale. Il sistema di gestione ambientale è stato verificato e la dichiarazione ambientale è stata convalidata da un verificatore ambientale accreditato.
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Data di Rilascio
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Scadenza della Dichiarazione Ambientale
17 giugno 2007

Comitato Ecolabel - Ecoaudit
Il presidente
On. Pino Lucchesi

As just seen the lime suppliers are responsible for the major part of the GHG emissions of the supply chain. In particular, Equilibrium's major lime supplier is Unicalce.

Analyzing the SLCA questionnaire the unsatisfactory performance obtained in the SLCA analysis by the "suppliers" sector must be addressed to a lack of knowledge and communication between Equilibrium and its suppliers. Unicalce obtained EMAS certification, so a certain of number of answers in the SLCA analysis can change from "don't know" to "Yes". Asking for the EMAS environmental report and analyzing it it's the first step towards the evaluation and possibly the improvement of the environmental performaces of supply chain.

After an in depth analysis of the lime production system will be possible to address possible solutions or actions in collaboration with the supplier.

An important question is the real bargaining power of a small firm like Equilibrium on a big lime producer like Unicalce. Equilibrium accounts for less then 0,1% of the revenues of Unicalce. To improve the bargaining power with the purpose of developing more sustainable initiatives there will be two main ways:

- Increasing the volumes purchased
- Constituting an "association" among the customers of Unicalce with the goal of finding more sustainable solutions for the environment and for the future of the sector. This can be shaped like "The Better Cotton Initiative a collective of major organizations (including Adidas, H&M, ICCO, IFAP, IFC, IKEA, Oxfam, PAN UK and WWF) undertaken towards the cotton producers.

THE LINK BETWEEN STRATEGY AND SUSTAINABILITY

Sustainability and its link to competitive advantage of companies has been a common subject of discussion among management literature. The prevailing thought is that sustainable practices can actually lead to better economic performance (Porter, 2008), due to increasing efficiency and effective management.
Our aim is to analyze the performance of Equilibrium in order to understand whether its particular sustainable business concept can lead to a strategic competitive advantage in the long term. As a result, the last sub-chapter of this

section will be a SWOT analysis that summarizes the main concepts explained throughout the paper, and provides the relevant suggestions for a long term sustainable growth of Equilibrium.

The competitiveness of the Equilibrium products: a brief comparison

The market of insulation is very peculiar, and in some cases, sustainability in this sector can be threatened. The reason to this lies in the fact that there is the general misconception that "concrete built is better built". The question, given the specific market segment, is: "Can a sustainable lime-hemp material convey the same technical features as the conventional one?"

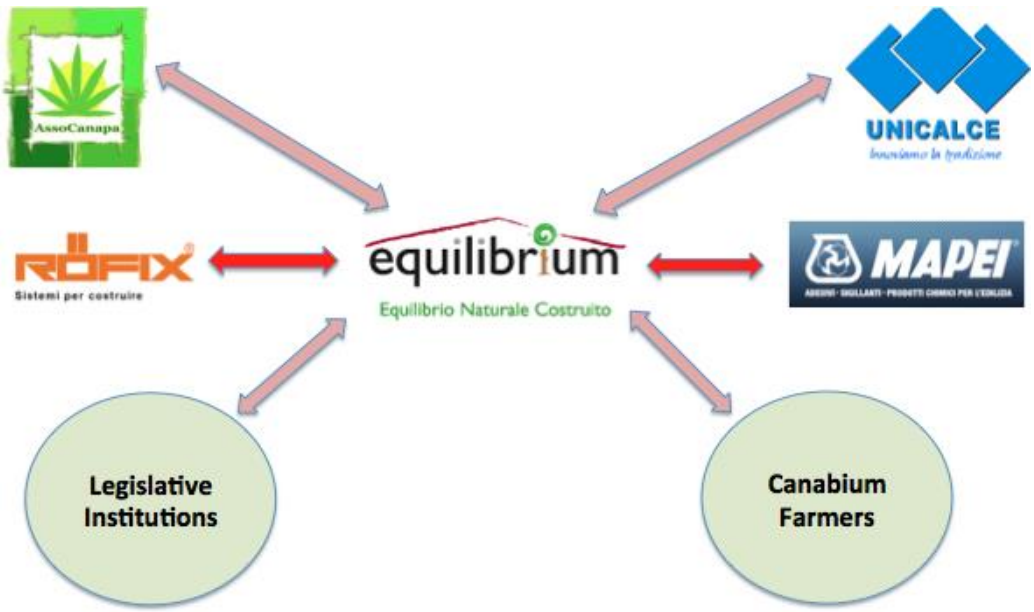
This section aims at providing the technical features of the material in comparison to similar substitutive products. Perhaps the most important feature of insulation materials is the transmittance of heat. In order to show the performance of the core product by Equilibrium, the Bio-mattone, we shows information provided by Politecnico of Milano, where 1 m^2 of infill made with Bio-mattone as opposed to conventional materials are compared

Type of insulating	Thickness	Transmittance	Weight
Bio-mattone	25 cm	0,34 W/m2	113,1 kg/m2
Brick and Insulating Artificial	31 cm	0,34 W/m2	201 kg/m2
Brick and insulating natural	33 cm	0,34 W/m2	210,82 kg/m2

What can be seen is that Bio-mattone actually succeeds in conveying the same transmittance at a lower thickness and weight needed for the purpose of insulation. In this respect, the Bio-mattone is not only a sustainable but also an effective

solution on the market of insulation materials. As can be seen above, the "Bio-mattone is qualitatively competent not only with respect to conventional insulation materials, but also with respect to other "bio" solutions. Part of the product collocation is given also in terms of pricing. According to Dotelli (2012), Equilibrium products, combined in different "insulation configurations", managed to obtain a price reduction from 2-20% when compared to conventional insulation products. In fact, competitive pricing is a deliberate strategy adopted by Equilibrium, as confirmed by Paolo Ronchetti during an interview. Up to now, when taking a closer look at the products, we can say that the Equilibrium offering is sustainable, qualitatively efficient and offered at a competitive market price.

THE ENVIRONMENT OF EQUILIBRIUM: PORTER'S FIVE FORCES



Bargaining power of suppliers: Medium/*High*. Starting from the upper part, we can observe Equilibrium's main suppliers. Assocanapa s.r.l is the only entity in Italy that deals with the transformation of canabium (mainly shredding) and it supplies to Equilibrium nowadays just 10 % of its needs. The main Equilibrium hemp supplier is La Chanvriere De l'Aube. They supply the raw shredded hemp needed for the lime-hemp composite adopted by Equilibrium. Unicalce, on the other side, is the limestone supplier of Equilibrium and the sole leader in limestone hydrated lime production in Italy. It can be easily seen that Equilibrium at the moment is a "supplier dominated" company. This is particularly evident in the case of Unicalce, that is a bigger player than Equilibrium in terms of size and importance in the Italian market.

This is an obstacle also when taking a look at sustainability: we have shown that the weakest point in the LCA of Equilibrium products is given by the process involving limestone. This aspect is strictly connected to Unicalce, and given the low bargaining power of Equilibrium; it can be a difficult problem to tackle.

Rivalry among existing competitors: Direct competitors: ***Very low*** .the only direct competitor for Equilibrium is CalceCanapa. It is a Bologna's firm waiting for the maturity of the market, so as to lower the risk of the business. This goes to a lack of innovation for CalceCanapa.

Indirect competitors: we have to distinguish between two kinds of indirect competitors.

Those who do restructuring operations and those engaged in operations of new constructions.

The former are represented by all the producers and retailers of thermal insulation products, from the synthetic ones (made from petroleum) to the natural ones (made from wood, sheep wool, cork). The level of threat deriving from those producers is ***low***, because such products have lower efficiency and performance compared to the Equilibrium's.

The latter represent a ***high*** level of threat for Equilibrium since they can observe economies of scale and big market shares.

Threats of substitute goods: in this particular case, the existing competitors we mentioned previously produce the substitute goods. It is difficult to assess substitute products to insulation without forcing the analysis[1].

The naturals ones represent a ***low*** level of threat for Equilibrium. Among the "natural" solutions, Equilibrium products show a higher than average performance while still maintaining competitive pricing.

The traditional products represent a ***medium/high*** threat for Equilibrium. Due to the ability of obtaining economies of scale, the traditional producers can sell their product or win a contract at a lower price. In addition, they also enjoy the advantage from the misconception "concrete built is better built".

Threats of new entrants: *low/medium*. Through a personal interview with Paolo Ronchetti, we understood that Equilibrium doesn't fear the entry of new players. Since they act as first movers in the Italian market, they want to grow as the main player in the transformation and supply of industrial hemp in the long term. This would place Equilibrium in the position of providing not only sustainable insulation materials, but enlarging their scope to the various uses of hemp (nutrition, textiles, etc.). Under this approach, new entrants are seen by the founder as a positive externality rather than a threat. This is why he decided to have an open attitude to the market (thus avoiding patents, etc.). However, there is still the threat of a big player from the construction industry entering into the specific market niche of Equilibrium.

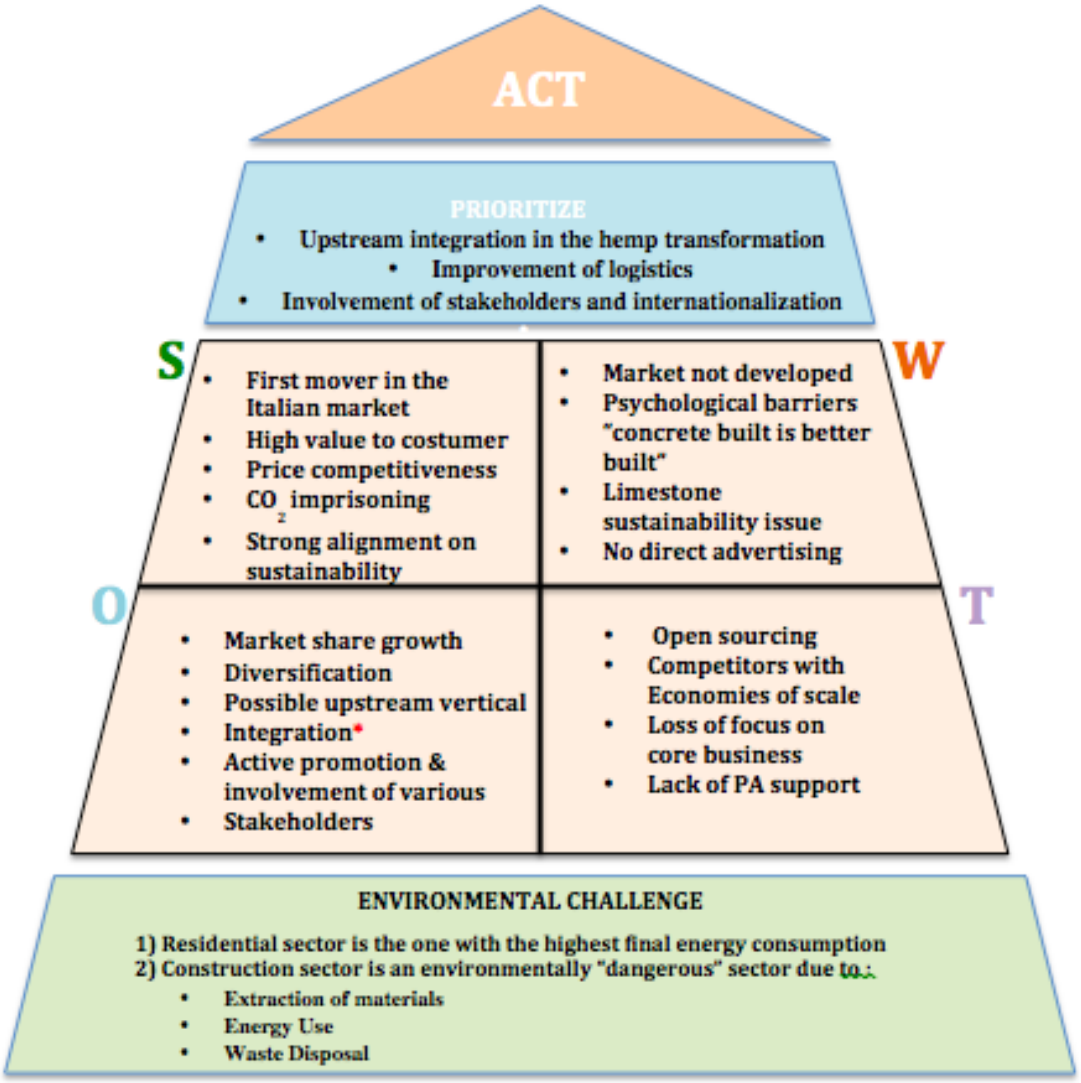
Bargaining power buyers: *High*. Bargaining power of buyers is very high for different reasons. Firstly, there is an intrinsic characteristic of the sector. Construction and insulation is very locally rooted, meaning that companies operating in a range >300 km is low. Thus, buyers are understandably affected by the location. Secondly, home

[1] E.g If price of power and electricity falls drastically, insulation of houses becomes less attractive, but it is very improbable.

insulation is a long-term investment, where customers may not necessarily seek sustainability but rather cost effectiveness, timing of construction, etc. In this respect, being a small player for now, Equilibrium may observe some disadvantages when compared to other larger players. A solution to enhance and drive customers towards equilibrium is a well-planned advertising strategy. Up to know, the company choice is to do this mainly via Internet, social media and exhibitions. Given the value addition to customers (insulation=lower power bills), also traditional advertising could be preferable.

THE SUSTAINABILITY: S-SWOT ANALYSIS

This section summarizes most of the concepts outlined during the paper, as well as additional statements arising from our interview with Paolo Ronchetti and our personal inferences. We decided to adopt the framework adopted by the World Resources Institute (2012), because it manages to frame the traditional Strengths-Weaknesses-Threats-Opportunities analysis in a broader context in view of sustainability.



This framework is useful in the way that it provides the main aspects to focus on when analyzing the company while keeping in mind the sustainability challenge they chose to tackle. The main strength is the innovative business concept that makes Equilibrium to be the first mover on the Italian market, together with the sustainable nature of the lime-hemp composites. A possible weakness of the business concept is the early stage of market, leading to the initial misconception by customers, or a slow demand growth. Under the sustainability aspect, the lime manufacturing is the main issue, since they depend upon Unicalce and do not have a large enough bargaining power in order to assess the environmental impact of lime. The largest opportunity can be seen in the possibility to integrate vertically upstream in the Hemp processing. During the interview, Paolo Ronchetti stated that their main focus

is to integrate in hemp transformation rather than hemp production. This would lead Equilibrium to have major control on Hemp derivates, and would enable them to include further stakeholders. Possible threats are mainly given by the possible lack of public authority support when dealing with industrial hemp, together with a loss of focus on their core business, being construction and insulation.

CONCLUSION

As we have seen, Equilibrium's business concept is based on an unquestionable sustainable solution that can provide strong benefits for society as well as promising financial results. We addressed the technical environmental performance of the core product as well as a wider understanding of the company from a business management perspective.

A sustained growth of the company is what is needed to achieve the long-term objectives we have mentioned in the SWOT analysis. However, given the explicit priorities of Equilibrium in the medium long term, we would advise to focus on the aspect of enlargement and vertical integration in the hemp transformation. This would imply of focusing also on the "logistic" aspect and supply chain of the company. This is particularly relevant given the characteristics of the construction and insulation sector where location of production plants is very relevant. In addition, efficient logistics are particularly relevant for Equilibrium given the low weight density of the hemp-lime composite.

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www.equilibrium-bioedilizia.it

APPENDIX

To have a better understanding of the company performance, we tried to perform a brief financial and capital structure analysis of Equilibrium. The data has been taken from a non-definitive report submitted by Equilibrium to Regione Lombardia. We grouped the most relevant categories in order to convey an easier understanding. Since the data inputs were partially estimated by Equilibrium, the tables below have the sole purpose of a general and not definitive outlook on balance sheets and income statements.

INCOME STATEMENT 2013	Amount
Revenues	€ 650,000.00
Inventory variation	€ 5,000.00
Purchases	€ (200,000.00)
Depreciation	€ (35,000.00)
Labour Costs	€ (150,000.00)
Pension Funds	€ (10,000.00)
Other Costs	€ (60,000.00)
EBIT	€ 200,000.00
Administration Costs	€ (130,000.00)
Interest Expense	€ (7,000.00)
Other Costs	€ (17,000.00)
Income Before Tax	€ 46,000.00
Tax (32.6%)	€ (15,000.00)
NET INCOME	€ 31,000.00

ASSETS	Amount	DEBT	Amount
Equipment	€101,000.00	Long Term	€87,000.00
Fixed Financial Assets	€8,000.00	Short Term Debt	€285,000.00
Short Term Assets	€339,000.00	EQUITY	
Inventory	€40,000.00	Own Capital	€119,000.00
Cash	€3,000.00		
TOTAL	€491,000.00	TOTAL	€491,000.00

INDICATOR	DESCRIPTION	Amount
D/E	Debt/Equity	312.61%
ROA	Sales/Total Assets	145%
Debtor Days	Accounts Receivable/Sales * 365	124.10
Creditor Days	Account Payables/Purchases* 365	459.90
Current Ratio	Current Assets/Current Liabilities	1.189473684