GALUP
Systemic design of Galup store

Thesis For Master Of Science Degree In Design Sistemico
Dipartamento di Achitettura e Design

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POLITECNICO DI TORINO
ABSTRACT

Galup (Piedmonte accent pronunciation [ga'ly:p]) is an Italian food company. It particularly be famous in the production of sweets, and founded in Pinerolo (Piemonte) in 1922 by Monsù Ferrua who is a Piedmontese dessert chef. The most famous product of the company is the Panettone with hazelnut glaze from Piedmont, created by the company in 1922.

Since 1922, the Galup has been founded here, which in the same territory that saw it born. Over time, the company has grown. It has acquired a commercial national and international market. Their panettone has been around the world and The Galup has become a recognized Italian sweet production brand, but nowadays it is important that the location of the Galup are still located in Pinerolo where began to produce panettone from 1948.

But in 2018, as the explosion of population, in order to satisfy human’s desire, many forest is destroyed rapidly, and the pollution became increasingly serious problem. Therefore we urgently need a method to solve these problem. The galup factory get raw material from different place around the Italy and European, even the world (the sultanas got from Turkey), it is bad for economy of Pinerolo and also for Galup.

So I decided to solve these problem by systemic method, The aim of this project is to transform the linear method in which the Pinerolo cultivated and replace it with a systemic model.
The process of determining the title and writing of this thesis was conducted under the guidance of Prof. Luigi Bistagnino and prof. Pier Paolo Peruccio, Thanks the professors for giving me knowledges, and paid more attention to cultivating my ideas, methods, and innovative abilities to solve problems, which laid a solid foundation for my future study and work and broadened my horizons.

In addition, I would like to thank my classmates who have given me a lot of care and help. Many of them have brought me a lot of joy in learning and living.

Finally, I would like to thank my parents in particular for their unselfish love, encouragement and support during my long career in school. This is the source of my continuous advancement. Thank you very much.
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INTRODUCTION

Nowadays, start from design of architecture living by us, to the daily production produced. All it need to update rapidly in order to our desire. The designer is more and more important from 20 century, because in those time, they more focused on how to rebuild the country destroyed by war, but now they are role who keep balance with relationship, in which contained production environment and social. Efforts to take some measures which can keep balance, moreover interact in many subjects in order to improve himself.

For the reason that a systematic design method is proposed here. Base on the local territory (Pinerolo), Through cooperated with agricultural, background of territory, industrial process and nature connection, in which build a relation net, use output emission of production system to be reuse to another production system.

Since the information explosion began, participants in a design process (politicians, economists, manufacturers, designers, consumers) can jointly influence the new direction of the goal, change consumer habits, and create new sources of revenue: redesigned The production process abandons the traditional linear production model and does not focus on the fanaticism of unit repetition.
01

TERRITORY
basic information about Pinerolo and local resource on the territory
1 TERRITORY
AND ITS INHABITANTS
Pinerolo is a town and comune in the Metropolitan City of Turin, Piemonte, northwestern Italy, 50 kilometres (31 mi) southwest of Turin on the river Chisone. The Lemina torrent has its source at the boundary between Pinerolo and San Pietro Val di Lemina.

It is around Pinerolo that revolves the economy of the waldensian valleys (right slope of Val Chisone, Valle Germanasca and Val Pellice) and of the plain between these valleys and the Po (river) course. Several industries have their base in this area, particularly mechanical, paper making, chemical and textile industries, and also absorb manpower from the nearby centres. It also is the trade center of the surrounding mountain area.

The territory of Pinerolo can be distinguished in three distinct areas, such as plains, hills, mountains. In fact, there is a minimum altitude of 291 meters at the border with the municipality of Scalenghe and a maximum altitude of 1,358 meters of Monte Sette Confini, located in the Val Lemina.

From a geomorphological point of view, the municipality of Pinerolo is limited to the south by the Chisone stream, to the north by the hills of Pinerolo and to the north-west by the Lemina stream. The Pinerolo concentric extends mainly at the foot of the hills, on a sub-alpine area crossed by the Lemina stream.

The plain area of the municipality of Pinerolo is the largest, representing about 77% of the entire territory; the hilly area.
Pinerolo has special meaning that is discovered to be medieval heart, it's history of Savoy, the three French dominations until the birth of the School of Cavalry. Pinerolo is located in the gates of Italy, Due to this is front of French, it has heavily influenced the history and culture of the city. Pinerolo is located in the center of the 'Pinerolese' which extends from the belt of Turin to the border with France; It characterized by a plural identity, which is proposed to the visitor with a varied and interesting cultural and environmental heritage. These places contained heavily culture heritage more than others moreover it has experienced varied religious.
ITALY PIEMONTE

GALUP, Systemic design of Galup store

 Territory
Basic information
About population of land, rainfall etc.

Pinerolo (Pinareul in Piedmontese, Pineiròl in Occitan, Pignerol in French, Pinarolium / Pinerolium in Latin) is an Italian municipality of 35,829 inhabitants of the metropolitan city of Turin in Piedmont.

The city of Pinerolo has the largest area of plains, accounting for 77% of the entire territory; the hilly area accounts for about 20%, while the mountainous area has the smallest area, accounting for the remaining 3%.

The territory of Pinerolo can be divided into three areas: plains, hills, and mountains. In fact, the minimum elevation on the border of Scalenghe in Val Lemina is 291 meters, and the maximum altitude of Monte Sette Confini is 1358 meters.

In Pinerolo, the average annual temperature measured by the Arpa hydrometeorological station is 13.5°C.

On average, at least 506 millimetres and a maximum of 1157 millimetres of rainfall were recorded during the year. According to the classification of Mennella, the rain gauge system is a type before the Alps, with the highest in spring and the second highest in autumn; the main minimum requirement is winter. In more detail, May is the wettest month; January and February have fewer months.

From a geomorphological point of view, the city of Pinerolo is confined to the Chisong River in the south, Pinerolo in the north and the northwest of the Leminé. Pinerolo concentricity is mainly located at the foot of the mountain, in the subalpine area where the Lemina River crosses.
SURFACE: 239,365,97 ha

SOIL TYPE: sandy/argillaceous

RESIDENTS: 504,355

TOTAL CATTLE AND BUFFALOES: 304,818

TOTAL SHEEP AND GOATS: 457,866

POULTRY: 1,141,133

PIGS: 27,115

TERRITORY: 50 km

UTILIZED AGRICULTURAL AREA: 18,781,41 ha

UNUTILIZED AGRICULTURAL LAND: 1,974,61,24 ha

WOODED AREA: 197,461,24 ha

Winery: 88,773,91 ha

Permanent crops excluding vineyard: 2,317,36 ha

Permanent grassland, pastures and meadows: 317,6 ha

Vineyard: 647,71 ha

Land with short rotation coppices: 97,817,33 ha

Unutilised agricultural land and other land: 20,825,971 ha

DEMOGRAPHIC DATA:
- Age 0-14: ~27.5%
- Age 15-64: ~59.3%
- Age 65+: ~13.2%
1. CULTURE AND TRADITION:

Iron Mask Festival

Every October, in Pinerolo, the historical re-enactment of the Iron Mask takes place, which is one of the largest and most important events in the city.

Military base

Pinerolo has always been a city of military traditions: in fact, there are numerous barracks in the city.

Until the early nineties, the School of the Military Veterinary Corps was located at the headquarters of which was also the veterinary component of the Military Interforces Academy of Health (NEASMI), founded in 1968 with headquarters in Florence, and the Military School of Mascara, founded in 1882, where the farrier’s craft was learned for a long time. Today the school is located in Grosseto, annexed to the Military Veterinary School, once also present in Pinerolo, near the Villy Pasquali barracks.
1. WILD ANIMAL

There are 18,000 protected hectares that welcome all alpine ungulates: chamois, goatmeat, deer, roe deer, wild boar and even muflon. The Cozie Alps Protected Areas Management Authority is a public body set up by the Piedmont Region in 2012 to protect and manage a vast natural

2. ARCHITECTURE

- Piazza Vittorio Veneto (better known as “Piazza Fontana”): it is located in the central meeting point of the Pinerolo area; designed in 1738, it was built by flattening the moats in front of the seventeenth-century walls
- The Basilica of San Maurizio is located in Pinerolo, already mentioned in documents from 1078, it was rebuilt in 1470 and restored in 1897: it has a late Romanesque bell tower from 1336 and contains 15th-century frescoes, an Ascension of Jesus Christ
- Palazzo del Comune: overlooks from the north of Piazza Vittorio Veneto. It’s Originally an arsenal of the military bastion, in the years of fascism the facade was restored and the civic tower was built. It houses the Civic Museum (bodoni
relics, weapons, coins, nineteenth-century paintings of the local school) and the remarkable Alliaudi Municipal Library (over 100,000 volumes, manuscripts, incunabula, and a precious collection of rare books).

- It’s located in the central Piazza Vittorio Veneto, the ancient Piazza d’Armi, which is nowadays commonly known as Piazza Fontana not so much for the large fountain that stands out, but for the memory of the architect Fontana who designed it, the Palazzo called Vittone, it was erected in 1740 for commission of the King Carlo Emanuele III, on project of the architect Bernardo Vittone, student of the Juvarra

3. RESOURCE

- It's discovered from more than a hundred location of cross-border area and half a million hectares, between the province of Turin and the French departments of the Hautes-Alpes and Savoie, sites that reveal the different phases of the history of the alpine chain. Visitation the mining sites including copper, silver, iron, coal, talc, which talk the story of human exploitation of underground resources since prehistoric times.
- The Cavour Natural Reserve is located in Cavour, near Turin. The reserve protects a particular hill dominating the country. The Rocca is an alpine peak rising on the alluvial plain of 162 meters. It is particularly visible because it rises in a flat area and it gives the impression of being out of nothing. The reserve, a step for migratory birds as only highland in a wide range, intends to protect flora and fauna
The salsa-alle-noci is a typical Piemonte dressing made from chopped walnuts along with olive oil, garlic, salt and bread softened in milk.

The "carpione" is a typical Piedmontese dish that takes its name from a freshwater fish, the carp. All over Italy has similar preparations for it, but they have different names.

Beef stew is a typical Italian dish to be savored hot and steaming. It is very substantial and appetizing but its realization requires a little time and patience because the meat has to be marinated for a night together with a bottle of red wine, vegetables and flavorings.

Panettone is an Italian type of sweet bread loaf originally from Milan, usually prepared and enjoyed for Christmas and New Year in Western, Southern and Southeastern Europe as well as in the Horn of Africa.

Pesche ripiene is a typical Italian dish to be savored hot and steaming. It is very substantial and appetizing but its realization requires a little time and patience because the meat has to be marinated for a night together with a bottle of wine, vegetables and flavorings.
3. SPORT

**Cycling**
Due to the proximity of the Alps with its wonderful climbs (Colle Vars, Izoard, Maddalena, Sestriere, Monginevro) both the Tour of Italy and the Tour de France have selected the Pinerolo and Pinerolo several times as a bicycle station.

**Hiking**
The Alps of Turin, from the Olympic mountains to the small alpine resorts, offer exceptional landscapes, splendid views and encounters with alpine culture, in which offering opportunities for fun and relaxation for everyone, hiking enthusiasts and families.

3. INDUSTRIAL ACTIVITIES

**ACEA Pinerolese Energia Srl**
ACEA Pinerolese Energia is the local company which is in order to supply of methane gas, About the property consisting of the Municipalities, which is oriented to ensure the economic development of the area, in which it operates the protection of its customers.

**Pulizie industriali Torino Max Molina**
Max Molina is a company that for over thirty years has been working in the field of the supply of industrial cleaning products in Turin, focusing in particular on technical equipment for cleaning, machinery, detergents and single-use items. It is the point of reference for companies, local administrations, hospitals and healthcare companies.
Galup

La Galup is an Italian food company, specialized in the production of sweets, founded in Pinerolo in 1922 by Pietro Monsù Ferrua, a Piedmontese pastry chef. The most famous product of the company is the low panettone with hazelnut glaze from Piedmont, created by the company in 1922.
CURRENT PROBLEM
OF TERRITORY

what do we see

SPIECES DIVERSITY

USAGE OF LOCAL
RAW MATERIAL

REDUCTION OF
WOOD AREAS

EUTROPHICATION
OF RIVERS

PASTRY TRADITIONS

ORGANIC
WASTE

INTENSIVE AGRICULTURE

DEEPLY BASED ON AGRICULTURAL
TRADITIONS

POLLUTION
PINEROLO AND THE SURROUNDING 50KM TERRITORY RESEARCH FIELD

CULTURE AND TRADITION

WILD ANIMAL

.resource

.industrial activities

.reduce wood areas

.polluted areas

.intensive agriculture

.organic waste
Pinerolo and the surrounding of 50 km

Research Field

Culture and Tradition

Wild Animal Resource

Typecal Dishes

Industrial Activities

Usage of local raw material

Polluted areas

Organic waste

Reduction of wood areas

Eutrophication of rivers

Deeply based on agricultural traditions

Polluted areas

Organic waste

Reduction of wood areas

Eutrophication of rivers

Deeply based on agricultural traditions

SPORT

usage of local raw material

Pastry traditions

Typecal Dishes
COMPANY

some introduction of GALUP and local territory history
Galup (Piedmonte accent pronunciation [ga’ly:p]) is an Italian food company. It particularly be famous in the production of sweets, and founded in Pinerolo (Piemonte) in 1922 by Monsù Ferrua who is a Piedmontese dessert chef.

Over time, the company has grown. It has acquired a national and international commercial success. The panettone has been around the world and Galup has become a recognized Italian brand, but the important direction of the Galup are still developed in Pinerolo. Pietro Ferrua and his wife Regina took over an old red brick oven located in Via del Duomo and Via del Pino to transform it day after day into the most beloved pastry shop in the local territory, the streets of the old town and via Fenestrelle, where industrial history since in 1948 of the company and it's still produced today.

Galup is not only a brand. but also a story, a beautiful Italian story.

Galup is a name, an original recipe, a panettone different from the others. Before Galup, the panettone was only Milanese. But it was changed from the low panettone with hazelnut glaze created by Pietro Ferrua.

Pietro Ferrua called Monsù Ferrua. Its the idea, its the recipe. An innovation, brilliant and tasty, which reinterprets an ancient Lombard tradition to give life to a new classic of the Piedmontese fine pastry. Over time, the recipe has been refined, but the characteristic of the dessert is always the same that Pietro Ferrua gave him in 1922.
Panettone is an Italian type of sweet bread loaf originally from Milan, it has experienced varied religious.

It usually prepared and enjoyed for Christmas and New Year in Western, Southern and Southeastern Europe as well as in the Horn of Africa, and to a lesser extent in former French, Spanish and Portuguese colonies.

A legend tells of a story that takes place in the 15th century when Ludovico il Moro was the Duke of Milan. It begins, one evening when the Duke’s cook was asked to prepare a delicious banquet, for himself and a number of nobles. The cook was successful in his feast, however, he had forgotten about the dessert in the oven, which had burnt by the time he realized. The cook was in despair but thankfully the little kitchen boy, Toni, suggested using the sweet cake he had made for himself in the morning using flour, butter, eggs, lime zest, and raisins. The cook was afraid he had no other solutions, so agreed to offer the cake to the guests. They both nervously stood behind the door to see the reactions of the Duke’s friends. To the cook’s relief, everybody loved the cake. The Duke enjoyed it so much that he asked for its name. The cook responded “L’è ’l pan de Toni”, meaning ‘the bread of Toni’. The name has since evolved to Panettone.
A manuscript of late fifteenth-century written by George Valagussa, tutor for Sforza family, reports the tradition of celebrating the so-called “rito del ciocco”.

The first reference to yeast is dated 1853 and can be found in “Il nuovo cuoco Milanese economico”.

Galup had become a factory in 1948, when monsoon Pietro Ferrua had set up a small industrial workshop. 

Revive (2013)

A group of young entrepreneurs in Turin, Italy, has acquired the historic panettone factory of Monsù Ferrua. In 2013, it reopened with the formalization of the acquisition of the company by the new property.

And from the 70’s until the triumph of the 80’s, Galup Panettons had established themselves around the world. In the 90’s the decline began, with the first loss account in 1994, of about 200 million lire. Due to the economic downturns and increased competition, the company has since continued to reduce production and staff until it ceases business on 1 October 2012.

In 937, on Christmas Eve, a large piece of wood was placed in the fireplace and three wheat breads were served on the table.

The true origin of the cake can be found in the Middle Ages when people used to celebrate Christmas with a bread richer than the one ate every day.

Up to 1395 all bakeries in Milan (except for Rosti bakery, supplier of the richest families) were allowed to bake wheat bread just for Christmas in order to give it as a gift to their customers.

Certain phases of this long evolution are documented. In 1606, according to the first Italian-Milanese dictionary (Varon milanes), the “Panaton de Danedaa” was a big bread, like the one baked at Christmas. Francesco Cherubini gives us a richer description in his famous Milanese-Italian dictionary in five volumes.

1922

The cake company producing panettone which refreshed the recipe of Milan’s panettone created by Mr. Pierro Ferruo in 1922, and then, he and his associates built up the company producing specifically panettone and candies so called “galup” in Pinerolo.

The company’s most well-known product is the low panettone with Piedmont Hazelnut icing.

Toni, lowly scullion at the service of Ludovico il Moro, was the inventor of the Italian panettone.

Other legends attribute the invention to other creative pastry such as Ughetto degli Atellani or Sister Ughetta.
1395 in Milan
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The presence of the cake in a book written in Piedmont in the nineteenth century proves that it is well known since antiquity in the region chosen by Flamigni as site for its production plant.

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70's-80's of 20 century
In the 70's until the triumph of Galup Panettons had established themselves around the world.
Galup company has many type of panettone having delicious taste and good odour. When I went to the main store of Galup located in Pinerolo, I saw more than 10 types panettone put on the Shelves that include many different taste, chocolate, classical, cherry, paradiso, pears and apple so on.

Now, we would introduce main products panettone and mainly focus on the classical one.
The classic Galup panettone is the most famous product of tradition recipe, including IGP hazelnut and nature natural yeast from local territory.
The type of Milan panettone is original type panettone. It includes Sultanas and other raw material which like other panettone.
It’s specially panettone with pear and chocolate. It has special taste with other type of panettone.
The paradiso panettone has more sugar than other type of panettone, it used some special type of yeast.
It's specially panettone with apple and chocolate. It has special taste with other type of panettone.
It's good tasty panettone which rich in chocolate and special cream.
Other types of backage (same raw material)
The panettone tastes like desserts made by mother and feeling like home. Producing panettone is complicated. The process includes fermenting, cutting, mixing, shaping, toasting, punching, packing, etc. It's mechanized production without dyes and preservatives. But in another hand, The Galup does not forget to produce by hand, because when you open the package, you can see and feel that the glaze is handmade: irregular and different in every Galup, thick and crisp.

The panettone is still produced today in a family atmosphere, with the contribution of men and women who know each other and keep the memory of an important story.
• 1. **Fermenting**
  Preparation of natural yeast.
  The word "natural yeast" refers to a mixture made of water and wheat flour, acidified by the fermentation activity of yeasts and lactic bacteria deriving from the mother. "Mother" means a portion of dough made of natural yeast taken from a previous process that acts as a microbial graft.

• 2. **Cuting 2 times**
  Cutting 2 times is benefits for the succession of additions of the various ingredients which consists in incising the upper surface of the dough with a cross-shaped cut.

• 3. **Mixing**
  Additions of the various ingredient will be mixed in this step.

• 4. **Shaping**
  The forming phase conditions for obtaining of the final appearance of the product
5. Toasting
The final leavening takes place in the baking mold in conditions of time, temperature and humidity depend on the personal experience of the craftsman.

6. Punching
In order to refresh the taste of panettone, they will be punched the hole under the products.

7. PACKING
At this stage the product is overturned. then they will be packaged at the end of the cooling.
In the galup panettone, many raw materials were used. After investigation, it was found that each 1KG of palmetone needs 300g of soft wheat four type 0, 3g of salt, 95g of sugar, 16g of natural yeast 2pz (80g) of eggs, butter, candy, Raisins need 100g, 105g, 110g respectively. Need 90g of piemote hazelnut, honey needs 25g, packaging needs 20g. the classic panettone annual production is 1.505ton.Of all the production months, the production in June and July was the lowest, while the production in November and December was the highest. Because of Christmas reasons.

After calculation, the amount needed for each raw material in a year can be calculated. After that, the relationship between supply and demand and the amount of raw materials produced locally can be calculated.
RAW MATERIAL NEEDS OF PANETTONE OF GALUP PER 1 YEAR

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Total Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft wheat flour</td>
<td>1,320.22t</td>
</tr>
<tr>
<td>Salt</td>
<td>37.7t</td>
</tr>
<tr>
<td>Sugar</td>
<td>1,200t</td>
</tr>
<tr>
<td>Natural yeast</td>
<td>1,431.5t</td>
</tr>
<tr>
<td>Egg</td>
<td>120.5t</td>
</tr>
<tr>
<td>Butter</td>
<td>150.5t</td>
</tr>
<tr>
<td>Candied</td>
<td>158.0t</td>
</tr>
<tr>
<td>Sultanas</td>
<td>84.3t</td>
</tr>
<tr>
<td>Hazelnut</td>
<td>135.5t</td>
</tr>
<tr>
<td>Honey</td>
<td>37.65t</td>
</tr>
<tr>
<td>Package and others</td>
<td>30.1t</td>
</tr>
</tbody>
</table>

The classical panettone "s annual production is 1,505t.
### Recipe of Classical Panettone of Galup

**LIST (1KG)**

- Soft wheat flour type "0" 300g
- Salt 3g
- Sugar 95g
- Natural yeast 16g
- Milk 56g
- Eggs 2pz (40g)
- Butter 100g
- Candied orange peel 105g
- Candied lime peel 105g
- Sultanas 110g
- Piemonte hazelnut 90g
- Honey 25g
- Package and others 20g

The classical panettone's annual production 1,505t
- Natural yeast is fermented about 30 days.
- Add water and olive oil.
- Add the tender wheat floor.

- Slowly stir 10-15 min.
- Add sugar and fruit then continue to stir.

- Finish the shape during transport to toast.
- After baking for a while.

- Add sugar after punching.
- Plastic packaging on the product.
- After paper packaging and fasten by rope.

- Organic fertilizer.
- Recycling garbage.
- Emission.
1. Natural yeast is fermented about 30 days.
2. Add water and olive oil.
3. Add the tender wheat floor.
4. Slowly stir for 10-15 minutes.
5. Add sugar and fruit, then continue to stir.

- **Packaging**: Paper packaging, fastened by rope.
- **Emission**: Organic waste.

**Processing:**
- **Heating**
- **Dirty Water**
- **CO₂ Emission**

- **Shaping**
- **Toasting**
- **Punching**
- **Packaging**

- **Add sugar after punching**
- **Plastic packaging on the product**
- **After paper packaging and fastened by rope**

**Selling**
- **Trabsoirt**
- **EAT LATER**

**Materials:**
- Barley
- Honey
- Piemonte hazelnut
- White egg
- Rice flour
- Rice starch
- Water
- Egg
- Electricity

**CO₂ Emission Levels:**
- High
- Medium
- Low
CURRENT SITUATION
analysis each part of getting raw material farm and find problem
3 CURRENT SITUATION
ANALYSIS & RESEARCH

GALUP, Systemic design of Galup store
CURRENT SITUATION

Nowadays, most of percentage of raw materials are dependent to import from outside of Piemonte. On the other hand, the local raw material wasn't used to panetone production process.

For example, the sultanas couldn't cultivate in Piemonte province but it can be cultivate in Turkey, so we have to import it from extra Europe due to the sunshine and temperature suitable, but for other crops, it's benefit that cultivate in local territory, there is plenty of sunshine here and hardworking famers. For instance, the egg imported from Cuneo province could produce in local territory, it's good opportunity to develop local finance.

This event will make the local agriculture undeveloped and caused a large outflow of funds.
PIEMONTE HAZELNUT
Current situation of Nocciole Marchisio company

- Logistic platform
- Network water
- Water
- Chemical pesticides
- Chemical composed
- Network electric
- Electric energy
- Package
- Factory
- CO₂
- Atmosphere
- No collection
- No recycle
- High emission
- Drying
- Remove shell
- Measure
- Quality check
- Roasting
- Selection
- Grind
- Package
- Other sales channels
- Waste products
- Waste
- Transport
- Gravel
- Transport
- Customer
- Network water
- Network water
- Water
- No divided water
- Heat
- Sewer
- Rain water
- Seed
- Pesticides
- Preparation territory
- Collection
- Sowing
- Growing
- Territorial
- Single species
- Hazelnut
- No recycle
- Divided water
- No collection
- No recyle
Current situation of Brezzo Miele company

- Breeding
- Collection
- Smoking
- Extracting
- Dirty water
- NO2
- CO2
- Waste products
- Water
- Electric energy
- Network
- Logistic platform
- Production platform
- Other sales channels
- Long chain
- Customer
- NO2
- CO2
- Water
- Electric energy
- Network
- No divided water
- No pollution
PIEMONTE

Current situation of Ferraris uova company

POULTRY FARMING

- animals
- chemical pollution
- chemical detergent
- hay
- network water
- network electric

FEEDING & REPRODUCTION

- fixed stable
- feeding
- reproduction

WASTE

- chemical pollution
- excrement
- water with detergents
- waste litter
- older animal
- animal

PROCESSING

- package
- dirty water
- shell
- waste products
- eggs

Other sales channels

- customer
- Butcher shop

Eggs

EGGS FACTORY

- eggs
- high emission
- no divided water
- no recycle

LOGISTIC PLATFORM

- electric energy
- water
Current situation of Padania "è più" milk company

- Milk factory
  - Fixed stable
  - Feeding
  - Reproduction

- Logistic platform
  - Network water
  - Electric energy
  - Fuel

- Waste products
  - Sewer network
  - Electric network

- Stressful life
- Wrong feeding
- Chemical pollution

- No divided water
- No recycle

- Butcher shop
  - Customer
  - Long chain

- Other sales channels
ITALY
Current situation of Cesarin Candita company

CANDIED ORANGE PEEL
CANDIED LIME PEEL

CICILIA
Franch

package
collection
soak
boil
selection

residue
fruit
waste

sewage network
water network
electric network
water electric
energy

long chain
outside of local territory

no recycle
no divided water

other sales
channels

customer
Current situation of TAVI Sultanas turkey company

logistic platform

chemical composed

Delta pesticide

seed

growing

collection

preparation territory

network water

rain water

atmosphere

sultanas

stems

leaves

transport

waste

Other sales channels

customer

Galup

Single species

no divided water

no recyle

high emission

CO2

atmosphere

water

atmosphere

water

atmosphere

water
Current situation of "Dacia" Sugar company (UK)
Current situation of corman butter company (Belgium)

- Milk factory
- High emission
- Transport
- Sewer
- Dirty water
- Waste products
- Waste
- Recycle

- Water
- Electric energy
- Network water
- Network electric

- Other sales channels
- Customer
- Rocking
- Selected

- No divided water
- Galup
Current situation of "Sacchello Primia" sunflower seed oil company

- customer
- other sales channels
- oil
- stems
- leaves
- seed
- flowers
- territory
- sowing
- growing
- collection
- preparation
- territory
- waste
- sewer network
- electric network
- gas network
- atmosphere
- no divided water
- no recycle
- chemical pesticides
- composted
- pressed
- electric energy
- oil
- water
- rain water
ITALY
Current situation of package company

- Resin
- Wood
- Forest

- Network electric
- Network water
- Electric energy

- No local resource
- No divided water
- No recycle

- Wood chips
- Dirty water
- Waste
- Sewer

- Produce
- Cutting

- Package
- Other sales channels

- Galup
- Customer

High emission
**LINEAR APPROACH**

**what is wrong with linear system**

In pinerolo, most of the raw materials used to produce panettone can be grown. However, Galup panettone is extremely dependent on imports of food from outside of pinetolo rather than locally resource.

The local agriculture used a lot of chemical fertilizer. These fertilizers would destroy the ecological balance of the land. After the fertilizer has been used through the land, a large amount of chemical substances will remain in the territory, and these substances will remain in the plant with growing, it will be eaten by humans finally then it hurts humanity itself.

In a linear system, there is no relationship between the elements, which is also causes huge waste.

It’s a problem not only for a import raw material, but also a problem exported to outside of pinetolo, even the world. It would make bad influence for local economic, all the earnings that are made by selling the product are going to outside the territory and into the pockets of a few. This practice also weakens the local markets.

We must change the methods of the production sector, switch from a “linear” production model to an advanced “interrelated” production model, and find a solution in a truly interdisciplinary “new theory”.

Experience of this concept in the industrial field shows that production activities may reflect the principle of nature’s metabolism, that is, so called no waste is produced.
S U N F L O W E R F A R M

- Preparation territory
- Sowing
- Cultivation

FA C T O R Y

- Produce
- Cutting

C E R E A L C O M P A N Y

- Harvesting
- Type grains
- Wheat grains
- Rye grains

B R E E D I N G M I L K

- Collection
- Reproduction
- Milking

C L E A N I N G

- Empty bottle
- Waste products

A L L P R O D U C T S

- No recycle
- Chemical pesticides
PROBLEM

why is it wrong

The linear process works for now, but it also produced many problems about pollution and ecosystem. It must be changed by systemic design mind that is in order to be a good system.

Start from the next page, there will be explained each problem found in the inputs and outputs.
In order to defend insects being bad for crops, many farmers would like to use chemical pesticides to kill insects, but it’s difficult to degrade on the soil after using. The plants are being constantly spread with chemical pesticides and feed with fertilizers. The use of pesticides in long term weakens the plant, making it more easy to get sicknesses and plague.

As bad as pesticides, the chemical fertilizers break ecosystem of soil. The balance of territory will be broken in long term using chemical fertilizers. making it more easy to get sicknesses and plague.

by the other hand, the animals and insects are in contact with it that will be poisoned.

A large amount of animal excrement (feces, urine) is produced in the farm everyday. Excessive accumulation of these wastes will destroy the land and affect the normal growth of the land crop.
The used chemicals will remain in the soil. It is difficult to recycle, and if it was possible it would represent high costs and a waste of supplies. It will pollute water when water thorough out from soil.

In a linear farm, many organic fertilizers are produced, but they are not recycled. These organic wastes can be used for composting (branches, leaves, stem of plant, etc.) can be used as fuel after composting.

A account of raw material import from outside of Pinerolo, It would make bad influence for local economic, all the earnings that are made by selling the product are going to outside the territory and into the pockets of a few. This practice also weakens the local markets.
Intensive agriculture can lead to a series of consequences, such as the decline in the quality of the crops produced, and the lack of good feeding of animal husbandry animals.

There is a lot of waste of drinkable water in every farm, water is not separated at every level, and water used in territory was not recycled in future. that leads to a lot of waste, and would destroy the ecosystem balance.
NEW SOLUTIONS

Find a series of solutions that can solve each problem.
NEW CROPS & NEW ACTIVITIES
**SYSTEMIC NEW CROPS**

About process of producing raw material in past period of time, Galup store imported material from far away from local territory. However, these materials produced by pesticide and chemical fertilizer make a lot horrible output which are bad for biosphere. Shocking is that these goods are not only all selected by farmers but also think it’s necessary. But in my new system approach, try to use the output of each part as input to other crops. These continue to be used as recyclable resources.

In order to use land efficiency maximize, introducing specific new system plants connect the natural land and new crops. As for the reason, I added some new crops (protein beans and Liliaceae) which improve crop relation and soil fertility. These plants provide a series of benefit. For instance, for example, legumes with high protein content, such as beans, peas, clover, etc., can increase soil nitrogen content.

There are also some plants that can protect to basic crops, such as growing garlic. Garlic can release substances that inhibit the growth of weeds and acts as a mosquito repellent for some animals and insects.
GALUP, Systemic design of Galup store

**CHARACTERISTICS**

- Pumpkin stems are rigid, prickly, and angular
- Generally weigh between 3 and 8 kilograms

**LEAVES**
- A kind of dish of Korean

**PEEL**
- Used to be skin mask after grinding
- Can be fed to poultry, as a supplement to regular feed, during the winter to help maintain egg production

**SEED**
- A edible and nutrient-rich raw material of oil
- Are a popular snack that can be found hulled or semi-hulled at most grocery stores

**Pumpkin**

**HARVEST SEASON**

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Maize (mais) can be used later as fodder, bedding (litter), or soil amendment. Used as production of ethanol fuel. Dried kernels are used as feed of livestocks. maize cobs used as a biomass fuel source. Human generally food.

**Characteristics**

- 3 m (10 ft) — 13 m (43 ft) in height
- Short-day plant and flowers in a certain number of growing degree days > 10 °C (50 °F) in the environment to which it is adapted
- Maize is susceptible to droughts and intolerant of nutrient-deficient soils

**Harvest Season**

Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec
---|---|---|---|---|---|---|---|---|---|---|---

Galup, Systemic design of Galup store
**CHARACTERISTICS**

- A bulbous plant
- It grows up to 1.2 m (4 ft) in height
- It produces hermaphrodite flowers
- It is pollinated by bees, butterflies, and other insects

**CLOVES**

Garlic cloves are used for consumption (raw or cooked) or for medicinal purposes. Very famous raw material around the world.

**SPATHE & LEAVES**

- It also can be eaten.

**USUALLY GROWS NEAR**

- Cherry

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**HARVEST SEASON**
**CHARACTERISTICS**

- The seeds may be planted as soon as the soil temperature reaches 10 °C (50 °F).
- The plants growing best at temperatures of 13 to 18 °C (55 to 64 °F).
- Grow well in cooler, high altitude, tropical areas.

**USUALLY GROWS NEAR**

- Cherry
- Wheat
- Corn

![Diagram of a plant with labeled parts: leaves, root.](attachment:image.png)

**HARVEST SEASON**

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**GALUP, Systemic design of Galup store**
CHARACTERISTICS

- the average daily temperature of the winter-type variety is 16-18°C, that of the mid-winter type is 14-16°C, and that of the spring type is 12-14°C.

- It grows up from 60 to 100 centimeter in height ordinary

RESIDUES

good bioenergy when burnt it

USUALLY GROWS NEAR

BARLEY GRAINS AND WHEAT GRAINS

HEAVY GRAINS

RYE GRAINS

HARVEST SEASON
The plant has an erect rough-hairy stem

It could reach typical heights of 3 metres

Sunflower leaves are broad, coarsely toothed, rough and mostly alternate

The cake remaining after the seeds have been processed for oil is used as a livestock feed

It markets its oleaginous fruit for human consumption

The peel of seed is intended as fuel boilers also used in beds chickens can be used as soap.

Leaf tea reduces high fevers and has astringent properties.
CHARACTERISTICS

- the plants are 30–120 cm (1–4 feet) tall
- the magenta, white, bluish white, or yellow flowers are borne singly or in clusters and produce legumes with 2 to 10 seeds.

FLOWER

- it is grown as a mid-summer pollen source for honeybees.
- vetch is as forage for ruminant animals, both as fodder and legume.
hemp is grown in temperate zones as an annual cultivated crop and can reach a height of up to 5 metres (16 feet). LEAVES can be used as feed of livestocks and can kill tough weeds in farming. ROOT can be trasiton to alcohol fue. SEED can be used as feed of livestocks and can be trasiton to alcohol fue. CHARACTERISTICS hemp is grown in temperate zones as an annual cultivated crop and can reach a height of up to 5 metres (16 feet). USUALLY GROWS NEAR harvest season.
**STEM**
- medicine can be prepared from the stalks (peduncles) of the drupes
- a green dye can also be prepared from the plant

**TREE**
- they are grown as ornamental plants in gardens,
- wood can be produced to furniture.

**CHARACTERISTICS**
- Its tree is a deciduous tree growing to 15–32 m (49–105 ft) tall
- The bark is smooth purplish-brown with prominent horizontal grey-brown lenticels on young trees, becoming thick dark blackish-brown and fissured on old trees.

**USUALLY GROWS NEAR**
- June

**Harvest Season**
- May

---

*Galup,* Systemic design of Galup store
**TREE**

- They are grown as ornamental plants in gardens,

**CHARACTERISTICS**

- Rounded leaves with double-serrate margins
- The flowers are produced very early in spring before the leaves
- The fruits are nuts 1–2.5 cm long and 1–2 cm diameter,

**USUALLY GROWS NEAR**

![Hazelnut](image)
NEW ACTIVITIES

relation between activities

My design idea is to convert the company taking in examination from intensive to organic, meaning a philosophy of life to appreciate all the harmony of a cultivated field, the succession of the seasons and of the time.

in fact, implemented in ways that respect and promote fertility and vitality of the soil, At the same time the typical qualities of plant and animal species.

Our "systemic farm" will be composed of new activities and relationships. Starting from the early stages, the change would already be visible from the absence of fertilizers or chemical fertilizer.
**Biocompost**
Compost is organic matter that has been decomposed and recycled as a fertilizer and soil amendment. Compost is a key ingredient in organic farming.

**Electricity generation from biogas**
The generation of a combustible gas from anaerobic biomass digestion, is a well-known technology. There are already millions of biogas plants in operation throughout the world. Whereas using the gas for direct combustion in household stoves or gas lamps is common.

**Producing paper from stem**
Collection of plant stem use to make paper, greatly increase plant utilization.
**Phytodepuration**
Phytodepuration is a natural treatment technique that reproduces natural purification processes in a controlled environment.

**Biological pest control**
Biological control is a method of controlling pests such as insects, mites, weeds and plant diseases using other organisms.

**Vermiculture**
Vermiculture is the product of the composting process using various species of worms, usually red wigglers, white worms, and other earthworms, to create a mixture of decomposing vegetable or food waste, bedding materials, and vermicast.
Collecting residues of crops (especially corn) from the fields does not reduce its soil quality. According to several scientific report, those material could be better used as an energy resource. For example how to obtain high quality bioethanol from residues of crops, Ethanol is an alcohol that can be obtained from sugary crops and from several cereals. For every kind of fermented cereals could produce about 30 kg ethanol.

In Brazil, it almost replaced for petrol. in USA it is made from corn. It can be mixed up to 30% to petrol being to the biofuel that has a lower environmental polution because they produce less CO2 and CO.

Biomethane is a highly efficient and friendly environmental energy. It is produced through the decomposition of organic by anaerobic microorganisms being low temperature conditions, it mainly includes of methane, containing part of carbon dioxide and a amount of nitrogen and other trace gas components.

We designed a series of chemical processes that consist of animal manure, plant humus, and recyclable materials from other factories. Ultimately, the available energy will be formed. It has also provided energy for other farm equipments and household electricity. The final residue can also be recycled into the soil for degradation.
It is a biological process that uses bacteria that function in an oxygen free environment. These bacteria convert volatile solids into carbon dioxide, methane and ammonia.
HOW DOES IT WORK?

- Anaerobic digestion-absence of oxygen, aka fermentation
- Organic waste is put in a airtight chamber to keep oxygen from entering
- Plant, animal and fecal matter typical
- Methane, Carbon dioxide, Hydrogen sulphide formed
electricity Generation from biogas

**ADVANTAGES**

- Lessen global climate change
- NO2 changes into CO2 310 less effect on climate
- Reduces waste
- Rural creation of reusable energy higher S of L
- Saves money, resources.

**DISADVANTAGES**

- Not as clean as natural gas
- Methane has greater effect on climate change
- Contamitive gases can hurt engines
- Limited production, not controllable
After 1900, vegetable fibers from various sources have been transported into thin sheets for use in trade, communications, law, and even for shelter. Cotton and linen rags were the first fibrous raw materials to get widespread status in paper making, and they are also needed for specialty productions. Increasing demands for paper ultimately surpassed the availability of rags, so that other sources of fiber were sought. Near by the year 1800, a lot other materials of agricultural origin began to come into use somewhat temporarily. Although woods have become the prime source of paper making fibers during the last 100-125 years, annual plant fibers retain their importance. The technical feasibility of non-woody materials is substantiated by more than 300 paper mills throughout the world that use such raw materials. Both necessity and special properties account for their use. The potential for various plants is being investigated intensively by the United States Department of Agriculture’s Agricultural Research Service, to discover new crops that could be applied in the national agricultural project and in the commercial products of paper.
producing paper from stem

recycling

end use

transportation

paper making

chemical pulp

mechanical pulp

recycled fibre

plants fibre

paper for recycling

GALUP, Systemic design of Galup store
Phytodepuration is a natural treatment technique that is in order to reproduces natural purification processes in a environment controlled. Phytodepuration systems have been developed before the 80’s in the US and in Central Europe. They are artificial little plants, in ordinary filled with inert material and fed with aquatic plants (macrophytes). These plants reproduce the natural purification processes typical of humid areas. The macrophytes can be floated, flooded or emerging. The systems can have superficial or sub-superficial streams and the sub-superficial stream can be horizontally or vertically oriented. Superficial streams support all the types of macrophytes, sub superficial one only the emerging macrophytes.
**bathing bacins: bio-pool**

Natural pools are intended to be maintained without any chemicals and or devices that would kill bacteria microbes, animals, or plant life. The filtration, cleaning, and clarifying of bathing water takes place purely by hydraulic and biological processes. All bathers should know that the water is not disinfected or sterilized by any chemical or mechanical means and that the vessel should be regarded as a swimming pool for considerations of health and safety.

**waste water treatment**

Surface area H-SSF systems: 232m²
Quantity of treated water available for reuse: 14.5m³/day (approximately 5,300m³/year)
It is estimated a period of about 9 years as depreciation time of the construction costs and the annual maintenance costs.

**conclusion**

Ecological water treatment potential increase in bio-diversity costs of realization and management content multifunctional devices (mainly protection and treatment) good integration with the landscape the preservation and protection

GALUP, Systemic design of Galup store
BIOLOGICAL PEST CONTROL

How does it work?

Biological control or biocontrol is a method of controlling pests such as insects, mites, weeds and plant diseases using other organisms. It relies on predation, parasitism, herbivory, or other natural mechanisms, but typically also involves an active human management role. It can be an important component of integrated pest management (IPM) programs.

There are three basic strategies for biological pest control: classical (importation), where a natural enemy of a pest is introduced in the hope of achieving control; inductive (augmentation), in which a large population of natural enemies are administered for quick pest control; and inoculative (conservation), in which measures are taken to maintain natural enemies through regular reestablishment.

Natural enemies of insect pests, also known as biological control agents, include predators, parasitoids, pathogens, and competitors. Biological control agents of plant diseases are most often referred to as antagonists. Biological control agents of weeds include seed predators, herbivores and plant pathogens.

Biological control can have side-effects on biodiversity through attacks on non-target species by any of the same mechanisms, especially when a species is introduced without thorough understanding of the possible consequences.
Biological pest control

Insectivores

Pests

digestion

earthworm

vermiculture
VERMICULTURE
How does it work?

Vermiculture means the controlled growing of worms in specialty structures. They are benefit for the territory, there is many reasons. The earthworms spend a lot of time even their whole life ingesting, grinding, digesting and excreting soil, they treated more than 15 tons soil per year. These worm were inriching in nutrients and bacteria for the soil, their underground calves also produce channels in the soil that could be riched the soil.

In the other hand, Worms can help crops and trees to be better. Crops roots need oxygen everytime, and worms caves prefectly provide channels, which can get air to the roots deep within the ground.
05

SYSTEMIC DESIGN

Using systemic design approach to solve problems
5 SYSTEMIC DESIGN
NEW SYSTEM & NEW APPROACH
SYSTEMIC APPROACH

What is systemic design

In the past, product design only started with the appearance of the product, which means that the product designed would be quite limited, although it also means coordinating and integrating all concepts (functionality, symbolism, culture, technology and productivity) but we need to exceed this approach.

Face to increasing complexity, we must stop to pay our attention to the product as well as its cycle, turning to complex relationships emerging from the production process and shouldering greater social responsibilities.

Therefore, we must change the methods of the production sector from a “linear” production model to an advanced “interrelated” production model. This concept is derived from the metabolic principle of nature, namely the principle of no waste generation.

In my new design for the galup store, I turned the output from a problem into a resource, resulting in good economic benefits.

In the future, we can design and create an ecologically sustainable community. The technological and political choices are in harmony with nature, not to control nature but to learn from it.
**METHOD**

**How to build a new system?**

Finding the relationship between each crop is an important factor for designing a new system. Each production part produces a lot of substances. For example, when candies were producing, the fruits are going to be removed peels, cores and processed through a series of processes.

Before they become candies, A large number of leaves, peels. Branches has been wasted in the process producing. In the previous linear system, those waste of resources were extremely serious. Therefore, we start from two pionts and establish a new system design.

1. Investigate the resource what they are going to use and origin of each raw resource.
   It is clear that the output resources (leaves, stems, fruits, etc.) of each plant are concerned about the input resources of other factories. For instance the requirement with large amounts of hay at the milk farm, the requirement to supply energy, and so on. The output of one activity is another input that is generated. It’s most important idea of system design.

2. Totally understand the relationship between each activity
   As we build information, we need to understand the relationship between each activity. This analysis is followed by setting up all systems together to create a macro system.
**Seed**: The harvested seeds of each grain were collected and used for re-seeding. This will reduce the cost of buying seeds from GDO.

**Small branches**: Each part of crops branches can be used for many types handcraft, based on the local territory. these branches recycled are benefit for development of local economic. however, It’s also a good compost raw material

**Fruit**: The harvested fruit will be transport to different factory for processing, and then, There are also some fruits (eg: hazelnut) that will produce waste (shell, peel) during the initial processing, these parts also could as livestock feed or compost. some used products waste can be collected that put in the Biogas digesters, contribute to providing bioenergy.

**Leaves**: Sunflower leaves can be recycled as paper raw material, nevertheless crops leaves can be recycled as livestock feed and compost.

**Stems**: The wood of big branches is suitable for doing handicrafts.
Due to there is only 2 speices fruits raw material about panetone of Galup,h owever one of them is cicilia orange,which must be grown in cicilia. so,I decided to connect both of fruit farm and crop farm.Like this,we not only save the cost,but also improve biodiversity.

Seed: In the process of removing core,these seed can be recycled as cultivation seed in next year.

Small branches: These are too small to transform for handicrafts, but they are rich in vitamins nutrients ,It is meaning that are perfect for natural fertilizer production.

Fruit: The fresh cherries is rich in iron element, Cherries are used as a raw material for pharmaceuticals. After the harvest, The fresh cherries are transported to the candy factory, and after a series of process of making candy it becomes a delicious candy. Many waste generated in these processes and then,they can be used as a raw material for composting.

Leaves: Honestly,Cherry leaves are only for Ornamental plants, but when they are withered, it also can be transformed to feed livestocks.

Wood: The cherrywood is suitable for making furnitures,and they are best material for local handcraft.
Feed: The animals feeds obtained from residues remaining in each part farm because there is numerous crops waste in whole farm, whatever farm A or farm B. It has 3 types livestock in my farm B, They are pig, chicken and cow. They are each responsible for unique link of the entire system, in order to keep balance of ecosystem. For instance, the pigs can eat food that cows don’t eat, chicken excrement also are good digest food that can be eaten by pigs.

Excrement: Livestock dung produced a lot of methane gas and then, we could collect it in the biogas digesters. The feces of animals also are used as fertilize for the crops. Particularly, chicken dung can be eaten by pigs, this material is benefit for pig’s digestive system. Some animal feces, especially that of cows, are fuel sources when dried. It means that the energy needed of farm (driving machine, light etc) can get from dung dried.

Other waste: Many other wastes will be produced in the panettone raw material production process. For example, empty milk bottles will be produced after dairy cows are milked. Empty bottles can be used after cleaning. Eggs will be transported to the factory for processing. After galup processing the eggs, many egg shell will be wasted. These egg shells are very good source for the fertilizer.
Fruit farm system chain

**milk and eggs farm**
- dirty water
- shell
- excrement
- Water with detergents
- waste litter
- waste products

**CICILIA ARANCIA**
- orange

**biodigester**

**preparation territory**
- water
- rain water

**sowing**
- biological pest control
- seeds
- hay

**growing**
- territory

Collection waste litter excrement

Water with detergents

**drity water**

Shell

**waste products**

**CANDIED ORANGE PEEL**
- Candied Lime Peel

**biocompost**

**vermiculture**

**biological pest control**

**water**

**selection**

**biodegradation**

**cereal Integrated farm**

**phytodepuration**

**leaves**

**stems**

**cherry**

**fruit**

**residue**

**hay**

**biocompost**

**water**

**drity water**

**residue**

**fruit**

**drity water**

**residue**

**fruit**
Milk and eggs farm system chain

- cearal Integrated farm
- fruit farm
- biodigester
- Energy: gas, energy
- Water: water, water with detergents, excrement
- Chicken: chicken
- Cows: cows, older cows, young cows
- Eggs: eggs, processed eggs
- Milk: milk, processed milk
- Feed: feed, excrement
- Fuel: fuel
- Drug: drug
- Weed: weed
- Hay: hay
- Biocompost: biocompost
- Fixed stable: fixed stable
- Feeding: feeding
- Reproduction: reproduction
- Biodigester products: gas, energy
HONEY FARM
Farm B

In the farm producing honey, there is not much waste generated, however the main waste is the water which used to clean the producing honey equipment, as well as some similar used containers for honey production, the used beehives and so on. The processing method is also the same as mentioned above. It is used as a compost material to contribute to the improvement of soil fertility.
**Fiber maker:** In this system, a lot of plant fibers are obtained by collecting plant wastes from other farms as well as grass. For example, corn stem are a kind of plants with high fiber, and we extract fiber from the harvested corn.

And, there’s an endless variety of techniques for cutting, scraping, cooking, retting, pulping, sheet formation, pressing, and drying that will all affect the resulting paper.

**Paper recycling:** The process of waste paper recycling most often involves mixing used/old paper with water and chemicals to break it down. It is then chopped up and heated, production of panettone process needs a lot of paper package, these paper can be recycled after used. This is a great way to save energy and maintain economic vitality.
Honey farm system chain

- Bee
- Water

Biodigester:
- Gas
- Energy
- NO₂
- CO₂

Breeding
Smoking
Collection
BEES FACTORY

Extracting

package

dirty water

honey

waste products

phytode-puration

fruit farm

flowers

health

bees

ACT

ory

Integrated floral

customer

feed
Paper factory system chain

- Fruit farm
- Integrated farm
- Flowers
- Stems
- Leaves
- Resin
- Wood chips
- Recycle
- Dirty water
- Produce
Local store of galup

Cooperation store

super market

10%

15%

50%

NA TURAL YEAST

PRODUCTION

SUGAR

PRODUCE

SULTANAS

Honey

BEE

SUNFLOWER

OIL

SUNFLOWER

PRESS

BREEDING

SMOKING

COLLECTION

EXTRACTING

PACKAGE

STATEMENT

MILK

MILK

WASTE

LACTATION

EGG

CHICKEN

INSECTIVORES

HAY

WASTE

BUTTER

COW

COW

WASTE

LEATHER

CHEMISTRY

EXHIBITION

400km

2000km
First of all, realising each growth cycle of crop is extremely useful for our farm. Next, it is designed to plant every crop and companion plant that can interact with it. Then, base on different cultivation time about crops, we separated on their characteristic and their harvest, keep it in rotation depended on their harvest seasons, in order to keep high percentage of use land.

Each one of many crops from our system farm has different life cycle. We need realise every plant because of his characteristic which help us to cultivate them.
<table>
<thead>
<tr>
<th>YEARS</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
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**Pumpkin**

Produces pumpkin during harvest season from March to August

**Mais**

Produces mais during harvest season from March to August and from July to October (2 times for 1 year)

**Garlic**

**Production bean**

Produces potein bean during harvest season from May to September of next year

**Grass**

Grass has many times harvest (6-7 per year) for all year

**Barley grains**

**Wheat grains**

**Rye grains**

**Sunflower**

Sunflower can be sown all year, the cycle of harvest is 80-100 days.
Systemic design of Galup store

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<th>YEARS</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
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</tr>
</thead>
</table>

**hazelnut**

Produces hazelnut harvest from September to November every year

**cherry**

Produces hazelnut harvest from September to November every year

Other plants mentioned:
- cherry
- hemp
- vetch
- hemp
RELATION BETWEEN EACH CROPS

Companion Plants interaction

Companion plants means two kinds of plants that are planted together, when they are growing, they will give each other a good influence on another one. For example, garlic can drive away pests that will effectively drive out bean pests.

More companion plants also help to land rotation. For instance, natural legumes benefits to the land nitrogen fixation, which results in a reduction of fertilizer used even disapperarance. Not only increased the account of other crops, but also made the land more dynamic.

Excessive weeds also tend to bad influence for local crops, it affect the growth of local crops even make them die. Therefore I added hemp that it not only suppresses weeds but also softens the land, making the land more fertile.
Garlic can drive away pests that will effectively drive out cherry tree pests. 

Garlic can drive away pests that will effectively drive out bean pests.

Mais can provide natural scaffolding for beans.

The bean fertilizes the kind of grains.

The vetch fertilizes the kind of grains.

The vetch fertilizes the kind of hazelnut.

Mutual influence and mutual benefit.

The bean nodules fertilizes the corn, while the leaves of the pumpkin cover the ground to prevent soil moisture evaporation and weed growth.

Possible Companion Plants

GALUP SYSTEM FARM

NEW CROPS
It is important to introduce a soil rotation with specifics cooperation of plants and the cereals that need natural fertilizers in the soil. For this reason, I have introduced to cultivation analyzed companion plants in the above. These are crops that improve soil fertility in favor of those followers, providing agricultural advantages over the years that are consolidated to several years.

From these soils, sereals cultivated also get different type raw material, for example the legume straw, that is dry and bare stems of broad bean, vetch, bean, pea and other grain legumes. These residues have a eating value lower than hay, however these sereals have more additional value that is used as medicine, making skirt, feed animals etc.

Other cover crops are vetch, clover and pea, and they are also leguminous, which fix atmospheric nitrogen and thus increase its storage in the soil. Besides of that, other winter vegetables protect the land during the winter months. About the disruptive effects caused by the acid rain and run-off phenomena, particularly harmful in the hilly areas.

If the ground were covered fully weed, that takes away light from them, and that lead to other crops shielded under the sunshine, even makes them die. Due to developing crops has been limited, I decided to import plant which used to defense weeds. Therefore I designed some cover crops such as Garlic releases substances that inhibit the growth of weeds on my farm, at the same time, the garlic acts as a repellent for some animals and insects.
The ordinary hemp was also inserted into the rotations. The hemp can be grown repeatedly on the same terrain because it does not impoverish it, reclaiming and softening it as well as keeping the structure of the land.

Starting from the graphic of the next page we have hypothesized some usable rotation plan in the company referring to the traditions of the territory. The hypothetical crop rotation is shown over a period of four years. (Cold temperature and hot temperature)
GALUP SISTEM FARM

cultivation seasonality 2nd year

SPRING

SUMMER

AUTUMN

WINTER

40% mais 30% hemp 20% bean & pumpkin 10% cherry & hazelnut

65% wheat grains, barley grains & rye grains 15% garlic & vetch 10% cherry & hazelnut
65% 15% 10% 10% wheat grains, barley grains & rye grains
60% 10% 20% 20% 40% maize, beans, pumpkins
60% 10% 20% 20% 20% 20% garlic & vetch, cherry & hazelnut

35% year

GALUP SYSTEM FARM
With the technology develop faster and faster, industrial agriculture increasingly uses nitrogen-based fertilizers. It is important that nitrogen-based fertilizers should be responsible for harmful processes ranging from loss of biodiversity as well as global warming. It also a numerous damage for ozone pollution. However, wherever you are, most country depends on nitrogen fertilizers which use it for food production in agricultural industry. According to an analysis by the Institute of Health, the high presence of nitrogen derivatives will lead to the onset of numerous diseases.

In summary, now we need to find a new way to replace nitrogen-based fertilizers with healthier fertilizers. The total amount of nitrogen on Earth is fixed, there is an abundant supply in the earth’s atmosphere - nearly 79% in the form of nitrogen gas (N2). However, N2 is unavailable for use by most organisms because the two nitrogen atoms are held together by very strong and stable chemical bonds. This makes the N2 molecule effectively inert. In order for nitrogen to be used for plant growth it must be “fixed” in the form of ammonium (NH4) or nitrate (NO3) ions.

Therefore, I planted a lot of legumes, as well as clover and hemp, on systemic approach farm. The nitrogen fixation process of these plants is mainly driven by the living and symbiotic-related bacteria of the plants. Using the legumes and plants of these legumes, nitrogen, ammonia, and nitrate, which using available form of plants present in the soil.

How does it work? First of all, The plant
may absorb it when plant available forms of nitrogen, ammonium and nitrate exist into the soil. Secondly, it may be soaked out of the water under the root space or the denitrifying bacteria may use it as an energy source and discharge it back to the atmosphere as N2. Finally, nitrogen released to the atmosphere may start cycling again.

Farmers use compost or plant crops over the soil. The nitrogen recycling will be their advantage. In a compost, the same microorganisms (bacteria, fungi, and protozoa) and invertebrates (worms and insects) present in adjacent soils break down organic matter into proteins and amino acids. Finally, microorganisms break it down into nitrates and ammonium salts that are absorbed by plants. Whatever it is a dead organism or a manure, soil microorganisms can regulate the decomposition and release of available nitrogen in the plant. The decomposition during the nitrogen cycle is a time release process. The decomposition of organic matter by microorganisms is regulated by soil temperature - the higher the soil temperature lead to faster decomposition.

Acid rain and atmospheric deposition can remove nitrogen from the cycle by harvesting runoff. Runoff can also carry nitrogen in organic forms (N, NO₃⁻, NH₄⁺). Crop residues and legumes contribute to nitrogen fixation. Soil organic matter and micro-organisms play a role in nitrogen immobilization and leaching. Plant uptake is another pathway for nitrogen removal. Denitrification and nitrification are processes involved in the nitrogen cycle.

- **Nitrogen fertilizer**
- **Manure**
- **Crop residues**
- **Legumes**
- **Nitrogen fixation**
- **Runoff (organic N, NO₃⁻, NH₄⁺)**
- **Rain cloud**
- **Demineralization**
- **Ammonification**
- **Plant uptake**
- **Micro-organisms**
- **Nitrogen fertilizer**
CONCLUSION

Summary and review problem
6 CONCLUSION

SUMMARY & INDUCTION
**TERRITORY**

**LINEAR**

- Wasted lots of resources
- Cultivation without Biodiversity
- Chemical fertilizer
- Responds to t requests

**SYSTEMIC**

- Majority use of local resources
- Respect for the local environment
- Healthy, natural, and clean
- Variety of native products

**LOGISTICS**

**LINEAR**

- Import raw material from out of territory
- Long chain for transportation
- Numerous intermediaries

**SYSTEMIC**

- Import raw material from local territory
- Short chain for transportation
- Direct sales

**ECONOMIC**

**LINEAR**

- Global economy
- Based in quantity
- Wasted resources
- Few activities in the territory

**SYSTEMIC**

- Promotes local economy
- Based on quality
- Values the resources
- Created some new activities

**SOCIETY**

**LINEAR**

- Single agricultural culture
- Global consumption
- Globalized culture
- Loss of traditions
- Focus on quantity

**SYSTEMIC**

- Multiculturalism
- Created more job opportunities
- Consumption of healthy products
- Preservation of local traditions
- Quality propensity
Local development depends on whether produce Pinerolo’s local own production system and how it transformed from a single farming model to the integrated farm which has a gap between intercropping patterns. The value of the system approach lies in the role of land in the interaction of species discovered.

The first step, as land, it is worth respecting to understand the nature of each species and how are they interacting with each other so that they can help them become stronger and healthier. It is also important that elimination of such chemical products, fertilizer and pesticide requirements.

Some benefits of biodiversity It’s:
- Respect the life cycle of the territory: Each species will be produced on its own time. Every month and every year’s material flow will be changed, especially, land is produced every month.

- Each species has special features. About this, features are a powerful prevention of plague and plague weapon of disease.

- By producing different species and its specific output, more activities feeding that result helps macro system (territory) comes transformation and development in future.
The function of activities and importance of each of them changed the way of territorial engineering.

From a perspective of linear relationship, there is no clear relationship between each activity therefore, there is a lack of connection between each activities, Any activity is less importance in the system.

Instead, From a perspective of system relationship, you can see all the activities in the point of view, It is of equal importance in the system. Redistributed resources play an important role in each activity. It’s not only a single activity, but also every activity in the system is like this.

It is a more dynamic system. Each activity helps other activities, And also helped by its activities, They are interconnected by output and input, which is strengthen relations in this system, if an activity disappears, the system can also survive. There is no negative consequence of itself. For the contrary, if an activity fails in linear system, the entire system will nearly crash. On the other hand, In the linear method, there are only a small amount of activities, and these activities are even harmful to the territory.

In addition, these activities are dependent on and imported from outside, not based on local market. Therefore we created new activities, The system model created by these activities eliminates the large monopoly structure between national companies. Strengthen their local economic ties between local activities. These products will be sold in the local market.
The method for increasing the economy of the project is not only relying on higher land use efficiency, but also on the economic benefits of planting different crops.

In fact, the key to applying this method is whether a systematic approach is used, agricultural practices can not only measure by economic means, we must also consider macro system such as territories and products.

However, by improving the quality of all products as a means to increase economic efficiency, it may be lead to pinerolo area profits improved. Importing many products from remote locations into pineloro is changing to localized production, which is also a way to increase economic efficiency. Because it reduces the consumption of transportation distance.

Products resulting from the elimination of chemicals pesticides and fertilizers and low quality species. The new system eliminates chemicals and pesticides and improves product quality. Hazelnut used to be the only source before the local economy, income is now not only hazelnut but also corn, wheat, pumpkin and many other different crops.

But their entire existence is beneficial, that is to say, each one of its outputs becomes an input, producing zero waste.
Economic comparison of current and system

- **Local Territory**
  - **Linear Agriculture**
    - **GALUP Factory**
    - **Local Cooperation**
    - **Cooperation Store**
    - **Super Market**
    - **Super Market from World**

  **Logistics**
    - **High emission for transport**
    - **High cost of transport production**

**Local Territory**

**ITALY**

**European Territory**

**Current System**

**Low cost of transport price**

**Low emission of transport**
Local Resources

- Getting raw material by their own territory

Local Cooperation

- Low emission of transport
- Low cost of transport price

Local Store Galup

Local Territory

Economic comparison of current and system
07

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