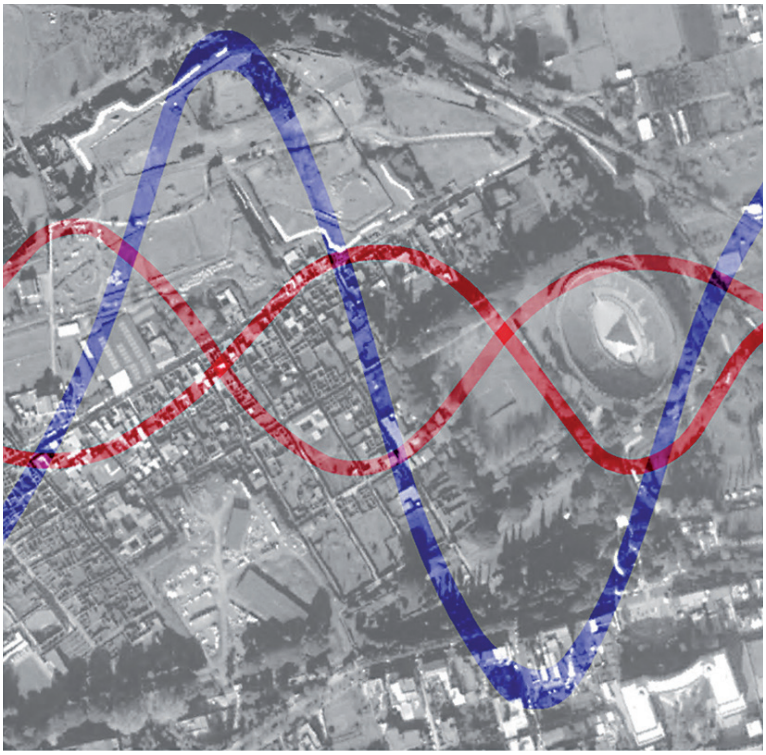
ARCHITECTURE HERITAGE and DESIGN

Carmine Gambardella

XVII INTERNATIONAL FORUM

Le Vie dei Mercanti



WORLD HERITAGE and LEGACY

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Culture | Creativity | Contamination

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Culture, Creativity, Contamination
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Digital Detox Tourism as a Resource for the Enhancement of Cultural Heritage. A Development Study for Certosa di Pisa in Calci (Tuscany).

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Abstract
Public cultural heritage demands innovative solutions to raise the required funds for maintenance and management in a context of reduction in public financial resources. This issue especially affects museum centres located in buildings of artistic and historic value requiring huge investments for restoration and maintenance. A proper mix of public and private activities is necessary to guarantee economic sustainability when public funds are scarce.
The paper proposes the case of Certosa di Pisa in Calci (PI), a publicly owned museum centre located in a former monastery. A study by the University of Pisa proposes to create a foundation for managing it, with the aim both to have access to private funds and to include new activities in currently unused areas of the building. In particular, the study proposes the creation of an accommodation structure for a specific tourist niche market, i.e. digital detox.
Digital detox tourism is born to deal with the increasing number of people dependent on technology. Digital detox accommodations are usually set in isolated buildings surrounded by nature, to help people unplugging from digital devices. Since old monasteries usually recall old spiritual life experiences, using them as locations where provide services of digital detox would be a modern reinterpretation of the original function of these buildings and might well help to rise resources for their maintenance.
The paper is organized in three parts: a) state of the art about digital detox and tourism trends; b) benchmarking analysis of six Italian digital detox accommodations; c) project proposal and cost-benefit analysis.

Keywords: Digital detox, Cultural heritage, Tuscany

Introduction
Public cultural heritage is an important element of landscape: it played a role in writing the history of a territory, becoming an essential part of the identity of a place[1]. In order to hand down to future generations the legacy of the past, we are challenged to find innovative solutions to raise the required funds for maintenance and management of cultural heritage, in a context of reduction in public financial resources. This issue especially concerns museum centres located in buildings of artistic and historic value, requiring huge investments for restoration and maintenance[2]. This paper aims to rethink the traditional role of heritage custodians, finding a mix of public and private activities ableto guarantee economic sustainability when public funds are scarce.
In the first section, it will be introduced the case of Certosa di Pisa in Calci (Pisa province, Tuscany), a museum centre located in a former monastery. After a short description of the current state of the building, it will be described the proposal by the University of Pisa to create a foundation for managing Certosa structure, with the aim to have access to private funds and to include new activities in currently unused areas of the building. In particular, the study proposes the creation of an accommodation structure for a specific tourist niche market, i.e. digital detox.

Digital detox tourism is born to deal with the increasing number of people dependent on technology[3]. Accommodations are usually set in isolated buildings surrounded by nature, to help people to unplug from digital devices. Since old monasteries usually recall ancient spiritual life experiences, using these buildings as locations where to provide services of digital detox would be a modern reinterpretation of their original function and might well help to rise resources for their maintenance. As long as a cultural heritage is characterised by artistic and historical value, not all activities are suitable to be included: digital detox accommodation represents a positive proposal.
Digital detox state of the art will be described more deeply in the second section of the paper, along with tourism trends and a benchmarking analysis of six Italian digital detox accommodation structures in order to identify the best practices to be replicated in the project proposal.
In the third section, it will be described the project proposal and its evaluation by means of a cost-benefit analysis.
Results of analysis will be discussed in the fourth section, aiming to evaluate the economic feasibility of the project proposal.
Section fifth provides some concluding remarks.

1. The case-study: Certosa di Pisa in Calci

1.1 The history of Certosa

Certosa di Pisa in Calci is a former Carthusian monastery, founded in 1366 and surrounded by the natural environment of Monte Pisano. Carthusian life was devoted to contemplation, silence, study and manual labours. In the 18th century, the monastery reached its greater development as a renowned productive centre of foodstuffs between Pisa and Lucca: in its fertile lands and ponds, the monks practised agriculture. In 1861 the building was acquired by the Italian State and it lost part of its prestige.During the First World Warit was used as a military hospital but,nevertheless, the monks lived there until the dismissal of the order in 1978. After that, it was decided to turn the building into a museum centre.
Inhabited on a continuous basis by the monks for centuries and only recently transformed into a museum, the original layout of the complex is still preserved and easily recognisable. In Carthusian monasteries, each space was designed to serve a different functional purpose based on the life of monks. The spaces were: i) anchoritic spaces, for individual activities such as rest, prayer, study and work; ii) coenobitic spaces, for collective ceremonials; iii) productive spaces, for agricultural production, commercial exchanges and processing of raw materials; iv) guesthouse, for hospitality to pilgrims and other visitors.

Fig. 1: Façade of Certosa di Pisa in Calci (Pisa Province, Tuscany). Source: https://www.msn.unipi.it

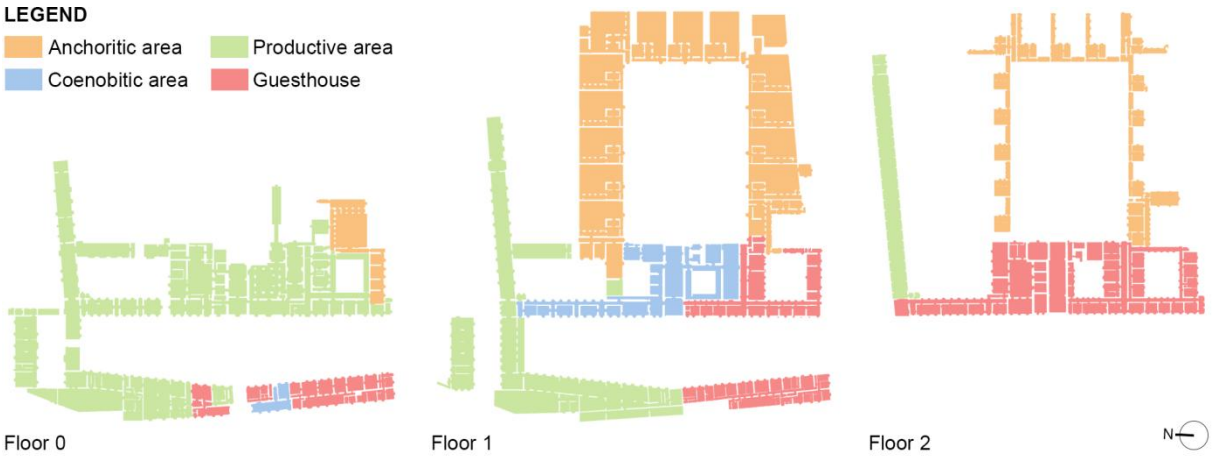


Fig. 2: Original space distribution based on monastic functions in Certosa di Pisa in Calci.

In 1978, a part of the complex was granted for free to the University of Pisa to host its Natural History Museum. Meanwhile in the monumental areas of the building it was established a public museum, namely the National Museum of Monumental Certosa, managed at regional level since 2015, by Polo Museale della Toscana (Museums system of Tuscany). Green areas, which used to be productive lands, are now reduced in extension and under the maintenance of the Agro-environmental Research Centre “Enrico Avanzi” (CiRAA) of the University of Pisa.

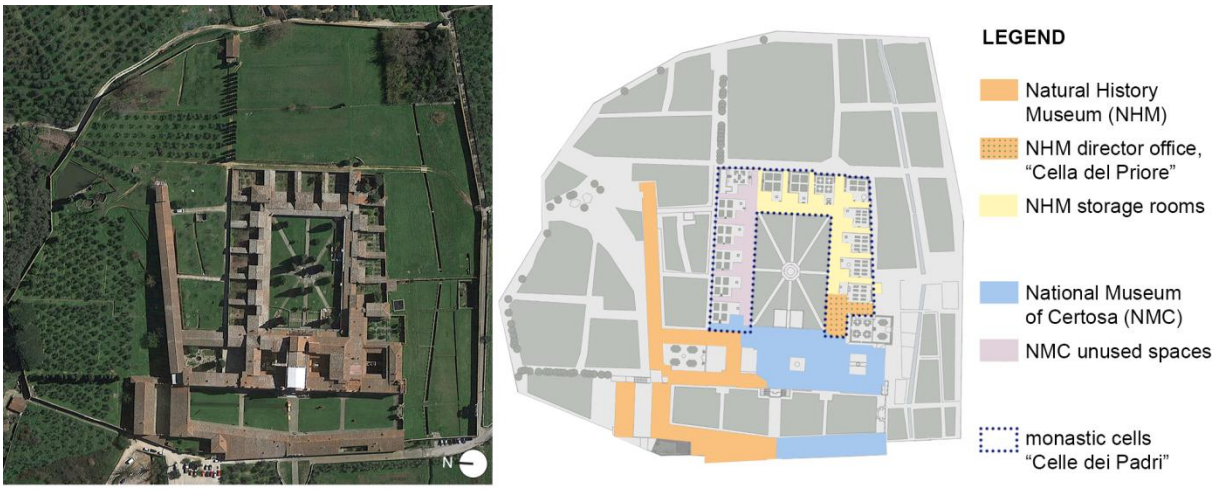


Fig. 3: Site plan and current space distribution of Certosa di Pisa.

1.2 Current status and research aims

Certosa di Pisa in Calci is subject of the research project “Studi conoscitivi e ricerche per la conservazione e la valorizzazione del Complesso della Certosa di Calci e dei suoi Poli Museali” (Knowledge studies and researches for the maintenance and enhancement of the Certosa di Pisa in Calci and its Museums) by the University of Pisa. The study has highlighted some critical issues about the monument. On one hand, there are few visitors, in particular to the National Museum, owing to different reasons, among which inefficient marketing strategy, lack of employees, presence of architectural barriers, poor relationships with other nearby touristic attractions and lack of adequate public transportservices or cycling paths. On the other hand, the building is suffering from architectural and structural deterioration, especially in those areas that are currently unused. Deterioration is not only caused by shortage in public funds, but also by the coexistence of two museums managed separately, which implies difficulties in planning and delays in operating maintenance programs. The aimof our research is to develop an enhancement proposal to deal with those issues, in order to raise adequate funds for the maintenance and management of the complex.

As well as defining the necessary restoration activities and restructuring measures, aim of the study is to describe future scenarios for the Certosa, identifying a proper mix of public and private activities, in order to reach economic sustainability. Given the artistic and historical value of the building, the activities of the foundation have to be compatible with the nature of the monumental complex.

1.3 Project proposal: Digital detox accommodation as a future scenario

The University of Pisa proposes the institution of a foundation, in order to have a legal entity to manage the museums, which can dispose of public and private funds. This is a strategy to enhance public cultural heritage according to art. 112, D.Lgs. 42/2004 - *Codice dei beni culturali e del paesaggio*, the Italian law on cultural heritage and landscape. Among eligible private activities to raise money for economic sustainability, this paper proposes the creation of an accommodation structure for a specific tourist niche market, i.e. digital detox. The term means “detoxification from overuse of technological devices”. An old monastery surrounded by nature is suitable to host this activity because digital detox tourism is pursued by people who want to escape from a stressful working life, far from chaotic cities, with the aim to reconnect themselves with their body and mind[4]. The accommodation structure will be set in monastic cells (*Celle dei Padri*), recalling a spiritual way of life that was quite usual before the advent of technology. Furthermore, it will give value to an underutilised area of the monastery without modifying the museum arrangement.

In the following sections, the paper evaluates the future scenario by deepening the topic of digital detox tourism and developing a cost-benefit analysis of the project proposal.

2. Digital detox tourism

2.1 Digital detox tourism benefits

Technostress, related to overuse of computers, tablets and smartphones when at work, is considered an occupational disease in Italy,whose risk has to be evaluated according to *Testo Unico sulla salute e sicurezza sul lavoro*, the Italian Law on health and safety at work (D.Lgs. 81/2008 and 2019 update). Symptoms are anxiety, hypertension, insomnia, panic attack, memory disorders and concentration problems. On the one hand, the constant use of technology has simplified many aspects of life but, on the other hand, there is an increasing number of people dependent on digital devices as a side effect. This problem affects not only workers, but also people using devices for leisure or other purposes. Ever more people, regardless of age, tend to develop compulsive behaviour and dependence to digital devices causes health[5], privacy[6] and social[7] problems. Digital detox tourism is born to deal with those issues, offering a set of experiences that can help people unplugging from digital devices and reconnecting to real life.

Digital detox accommodations are usually surrounded by nature: historical isolated buildings, such as monasteries and hermitages, are a perfect location to break daily routines, reducing stress levels thanks to the green environment they are set in.

Thus, digital detox provides answers to two challenges: confronting side effects of technology overuse and proposing a new function for historical heritage against abandonment. Adding digital detox function to old monasteries could be a solution to raise funds for maintenance by proposing the original aim of these buildings in a modern key.

2.2 Digital detox in tourism trends

Digital detox tourism is a kind of wellness tourism, a segment of tourism market chosen by people seeking experiences of healthy lifestyle, from a physical, mental or spiritual point of view. According to UNWTO [8], wellness tourism is increasing because people want to escape from mass tourism, pursuing the joy of missing out, namely, to be cut out for a while from the continuous stream of information owing to permanent Internet connection. From 2015 to 2017, this tourism segment has been growing by 6.5% annually, the highest growth rate of tourism market, reaching an estimated value of $639.4 billion in 2017, which account for 16% of the global tourism market[9].

Among potential customers of wellness tourism there are workers. CEOs of big companies have quickly understood the potential benefits for their employees of digital detox activities and have introduceddigital detox programs to improve focusing skills and creativity of their workers[10]. Thus, ever more accommodation structures are specializing in digital detox offers and host job meetings in a quiet environment wherethe experience is improved by a set of stimulating activities to improve productivity.

2.3 Comparing digital detox accommodations: benchmarking analysis

This subsection provides a comparative analysis between six digital detox accommodations, in order to identify best practices tobe replicated for the development study of Certosa di Pisa in Calci. The structures were chosen based on some similarities with our case-study, i.e. far distance from urbancentres, historical buildings turned into luxury accommodations for people seeking the experience of an essential life, with a taste from the past.The reference models are:

1) *Eremito dell'Alma*, a XIV century hermitage, 20 km far from Orvieto (Terni province, Umbria);
2) *Monastero di San Biagio*, a IX century monastery near Nocera Umbra, 50 km far from Perugia (Umbria);
3) *Grotte della Civita*, ancient caves in the historical quarter Sasso Barisano, in Matera (Basilicata);
4) *S. Stefano di Sessanio*, a medieval village located in Gran Sasso National Park, 30 km far from L'Aquila (the capital city of Abruzzo Region);
5) *Relais S. Maurizio*, a XVII century monastery, near S. Stefano Belbo, 30 km far from Asti (Piedmont);
6) *Castello di Velona*, an XI century castle on the top of a hill in Val d'Orcia, 40 km far from Siena (Tuscany).

Even if these structures are far from highly populated centres, they are well connected to main mobility infrastructure and some of them provide a private transfer service to main closest airports.

The following benchmarks were used for the comparative analysis: distance from the nearest population centre, typology and prices of rooms, services provided to guests, activities and events organized, food services, ICT services, touristic circuits,and territorial integration. This last benchmark describes the relation of the structure with the system of nearby attractions. ICT services represent social networks and features of dedicated websites, which play an important role in directing tourist choices.

Model	Rooms and price range per night	Food services	Guest services	Organized activities
1	*Celluzze*, early monastic cells, single or double. 200 - 250 €	*Il refettorio*, vegan and vegetarian traditional cooking.	Parking shuttle, pool, relax area, yoga room, refectory. No Wi-Fi, no TV.	Horse-riding excursion; hiking; travel workshop and coaching; horticulture; yoga, meditation, fasting, cooking and iconography classes.
2	Double rooms, *Sacrestano*, *Abate* and *Priore*. 100 - 200 €	Restaurant in early refectory, traditional cooking, zero-mile food.	Medical spa, pool. No Wi-Fi, no TV, no phone signal.	Herboristic wellness program; hydrotherapy; yoga, meditation and cooking classes.
3	18 rooms and suites spread in old caves. 250 - 550 €	Restaurant in early cave-church, opportunity of exclusive dinner.	Airport shuttle, car valet, massages, babysitting, car and bike rent.	Hiking; horse- and bike-riding excursions; enogastronomic and guided tours; cooking classes.
4	29 rooms spread in buildings around the village. 150 - 350 €	A tea room and two restaurants, traditional cooking and folkloristic environment.	Shuttle, car rent, bike and snow-racket rent, babysitting, massages, local food shop.	Hiking, horse-, bike-riding excursions; canoing; truffle hunt; enogastronomic and guided tours; cooking, weaving and saponification classes.
5	36 suites, different sizes. 450 - 900 €	A wine & cocktail bar inspired to Hemingway journeys and a restaurant. Zero-mile and slow food.	Airport shuttle, wellness and medical spa, beauty treatments, wine therapy, yoga recovery.	Hiking; bike-riding and orchid excursions; golf; cooking, yoga and meditation classes; pastoral and winery activities.
6	12 suites, different sizes. 350 - 2500 €	Two restaurants and a bar, traditional cooking, zero.mile food.	Luxury car rent, oli-spa, chromotherapy, physiothrapy, pool.	Horse-riding excursions; historical car tours; medieval re-enactment; falconry and cooking classes; vintage.

Model	Events	Territorial integration	Social networks and websites	Touristic circuits
1	Thematic retreats: meditation, yoga, nourishment, digital detox.	1. it is near Monte Peglia and river Tevere parks. In about 1 hr by car there are Orvieto, lakes of Bolsena and Trasimeno.	Location history, owner's feelings before restoration, video and photogallery. FB, Instagram, Twitter.	Design hotels, Tablet, Veggie hotels, Kiwi collection, Healing hotels of the world
2	Thematic retreats: meditation, yoga. Thematic dinners.	2. it is immersed in the nature. In about 1 hr by car there are Gubbio, Assisi, Spello, Foligno, Perugia and Trasimeno lake.	Location history, owner's feelings before restoration, video and photogallery. FB, Instagram, Twitter, YouTube, G+.	Historic hotels of Europe, Italy luxury guide, Eccellenze italiane
3	Conventions and weddings.	3. it is in ancient part of Matera, near Murgia Park. Opportunity of excursions to Dolomiti lucane, Alberobello, Castel del Monte.	Owner's feelings before restoration, photogallery, preeboking of services and activities. FB, Instagram, Twitter, YouTube.	Alberghi diffusi, I borghi più belli d'Italia (Italian Touring Club)
4	Conventions and weddings.	4. it is located into Gran Sasso and Monti della Laga National Park. Many naturalistic trails are starting from the village.	Owner's feelings before restoration, photogallery, preeboking of services and activities. FB, Instagram, Twitter, YouTube.	Alberghi diffusi
5	Conventions and weddings.	5. it is located into Langhe, UNESCO heritage between Alps and Ligurian sea. In about 1 hr by car there are Turin and Genoa.	Location history, photogallery, e-commerce local product, preeboking of services. FB, Instagram, Twitter, YouTube.	Relais & Chateaux, Chaîne de Rôtisseurs
6	Conventions and weddings.	6. it is located in Val d'Orcia, 4 km to S. Antimo Abbey, 12 km to Montalcino. In about 1 hr by car there are S. Quirico, Pienza and Siena.	Location history, photogallery, customer reviews, preeboking of services and activities.. FB, Instagram, Twitter, G+.	Maison Dom Pérignon

Fig. 4: Tables of benchmarking analysis.

Websites communication is crucial: descriptions of location are directly targeted to customers, to create a direct dialogue with them. The history of restoration is ever told as a tale to invite people visiting the structure and feeling the same inspiration experienced by the owner rediscovering the primordial beauty of the place. This expedient is used to give peculiarity to that particular accommodation versus an anonymous structure for mass tourism. The same purpose is given to the choice of proper names for different rooms and areas of the building, which recall the history of the structure. Of course these structures have social network accounts to promote themselves; on the one hand, Internet is considered a threat that has to be kept back from the guests, on the other hand it is a

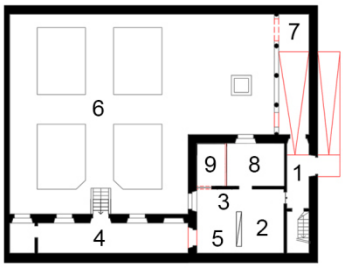
good tool for marketing strategy, because people with social network dependence are easily reachable through sponsored links posted on social networks.
In summary, best practices emerging from the analysis are: i) efficient use of ICT resources, implementing a website with customizable and unique offers, booking online for journeys and activities, promotional use of social networks; ii) offer of various activities, for individuals or groups, aimed at improving working skills productivity, rediscovering oneself and recreating a relationship withnature and landscape. Activities can be classified in four categories: *food* including cooking, baking and agricultural activities such as cultivation or pastoralism; *movement* including hiking, gymnastics, sports, yoga, meditation;*personal wellness*includingcoaching, spa, reading, mindfulness, auto-focusing, creativity stimulation;and *specific activities*related to location such as arts, handicrafts, historical or folkloristic traditions.

3. The project proposal

Analysis of the case-study of Certosa and deepening on digital detox tourism were useful to define a future scenario that will be described in this section.The project proposes to employ the areas which now are underused by the museums fora digital detox structure, in order to add a new function to the building which could raise funds to management and maintenance of the monument. The project assigns new functions to monastic spaces based on a modern reinterpretation of their original purposes. Spaces are organised as follows. Accommodation rooms will be set in monastic cells, on two levels (floors 1 and 2). Entrance to the structure is set in south-eastern corner of the building, as to not interfere with the flow of museum visitors. In correspondence of the entrance, there is a big hall and a little shop for local products. Common areas will be set in Cella del Priore and in Grand Duke's wing. They occupy two levels: floor 1, as the entrance, and floor 2. Management services of the structures are on the ground floor. (Fig. 5).

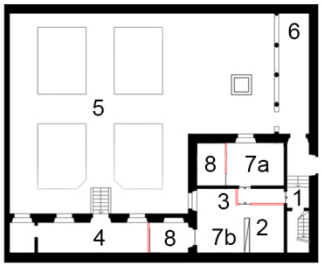
Fig. 5: Integration of a digital detox accommodation structure in Certosa di Pisa in Calci

Common areas are located in southern part of the structure. On floor 1 there are labs for handicrafts, painting room, library, rooms for thematic retreats and cooking class rooms. On floor 2 there are kitchen, refectory, in the same place where monks used to have meals all together, and wellness centre with yoga and meditation area and a bio-wellness area, recalling the herbalist tradition of Carthusian monks. Activities are concentrated in the same area in order to create a continuous path, for individual or groups, thatallows guests to escape from daily routine. The structure will hire specialised staff for each activity.
There are two hypotheses to restore the cells (Fig.5), solutions A and B. Solution A provides for the realisation of two rooms from one cell, both of 45 sqm, with bathroom, bed, study and meditation spaces. Solution B provides for the realisation of three rooms from one cell, one of 17 sqm, with only bathroom and bed, and the others of 31 and 45 sqm, arranged as rooms in solution A.



Solution A: Floor 1
1. Entrance - 3 sqm
2. Meditation - 9.6 sqm
3. Study - 4 sqm
4. Storage - 25 sqm
5. Relax - 9 sqm
6. Courtyard - 210 sqm
7. Loggia - 16 sqm
8. Bedroom - 11 sqm
9. Bathroom - 5.5 sqm

Solutions A and B: Floor 2
1. Meditation - 13 sqm
2. Study - 5 sqm
3. Relax - 11 sqm
4. Loggia - 16 sqm
5. Bedroom - 7 sqm
6. Bathroom - 5.4 sqm



Solution B: Floor 1
1. Entrance - 3 sqm
2. Meditation - 9 sqm
3. Study - 4 sqm
4. Storage - 19 sqm
5. Courtyard - 210 sqm
6. Loggia - 16 sqm
7. Bedroom - a: 11 sqm, b: 8 sqm
8. Bathroom - 5.5 sqm

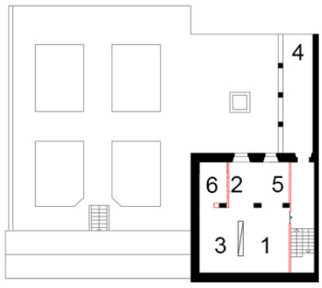


Fig. 6: Hypotheses of restoration for a monk cell, solution A and solution B.

4. Cost-benefit analysis

Cost-benefit analysis was done to evaluate the economic viability of the project. In solution A, the structure can host 24 guests; in solution B, the structure can host 36 guests. In the following, economic and financial analyses are developed for each solution, in order to evaluate two indexes of feasibility for an investment: respectively, Break Even Point (BEP) and Net Present Value (NPV).

4.1 Economic analysis

BEP is the point in which revenues and costs are equal. Revenues are calculated as gross income per room. Costs are divided in restoration and operating costs. After evaluating the costs, we will study the variation of BEP depending on price per night per room, to determine the minimum hotel occupancy rate in order to guarantee economic feasibility of the project.

Restoration costs were calculated with a bill of quantity (BOQ) for each solution. Operational costs were found in “Prezzario della Regione Toscana, Provincia di Pisa 2018”, i.e. unit costs laid down in the appropriate regional schedule of costs for Pisa province at 2018[11]. The operations required to restoration are: reconstruction of wooden-beam floors and roof, consolidation of the walls, restoration of floors and plasters, realisation of wheelchair ramps, installation of new doors and windows, and realisation of water and sanitation, heating, and electric systems. Restoration costs include cost of furniture, obtained by comparison with price lists of luxury providers, since the typical customer of a digital detox structure demands high-level standards. The total amount of restoration costs was divided by the total area to get costs of restoration per sqm.

Operating costs are divided in fixed and variable costs: unless otherwise specified, their amounts were calculated by comparison with similar accommodation structures and by consulting average costs of the hospitality sector[12][13]. The following fixed costs were considered: insurance, maintenance, amortization, interest, administration and staff costs. Staff cost was deduced by CCNL (the reference national collective labour agreement for the sector) [14]. Variable costs, depending on management and catering, were calculated as daily costs per room.

$$\text{Amortization amount} = \frac{K_A}{n}$$

$$\text{Interest expense amount} = K_A \frac{n+1}{2n} r$$

K_A mortgage loan = restoration cost
n lifetime of the structure = 40 years
r annualized interest rate[1] = 2,49%

[1] *Source: Cassa Depositi e Prestiti SpA*

Restoration cost	Restoration cost per sqm [€/sqm]	*Total Restoration Cost* [€]
Solution A	1,591.53	6,958,147.70
Solution B	1,613.76	7,055,365.15

Fixed cost	Share insurance	Maintenance	Amortization	Interest expense	Administration cost	Staff cost	Variable cost	*Total Operating Cost*
Solution A [€]	6,000.00	60,934.56	173,953.69	88,794.66	42,000.00	476,695.32	103,400.64	951,778.88
Solution B [€]	6,000.00	91,401.84	176,384.13	90,035.28	42,000.00	476,695.32	155,100.96	1,037,617.53

Fig. 7: Tables of costs.

To estimate incomes, daily gross income per room was calculated as the difference between price per night per room and variable cost per day per room. By benchmarking analysis in section 2.2, it was determined a suitable range of prices per night per room. We assume a range of 200-300 €/day for solution A and of 150-250 €/day for solution B.
For different values of price per night per room, it was calculated the hotel occupancy rate that returns a zero Net Income, using the following formulas (N is the number of opening days):

$$\text{Net Income} = \text{Gross Income per day per room} * N * \text{Hotel Occupancy Rate} * \text{n° of rooms} - \text{Fixed Costs} = 0$$

$$\text{Hotel Occupancy Rate}_{BEP} = \frac{\text{Fixed Costs}}{\text{Gross Income per day per room} * N * \text{n° of rooms}}$$

Solution A	
n° of rooms	24
fixed costs [€/year]	848,378.24
opening days in a year	276
variable costs per room [€/day]	15,61

Price per room per night [€/day]	Gross income per room per night [€/gg]	Hotel occupancy rate (BEP)
200	184.39	**69.5%**
250	234.39	**54.6%**
300	284.39	**45.0%**

Solution B	
n° of rooms	36
fixed costs [€/year]	852,049.29
opening days in a year	276
variable costs per room [€/day]	15,61

Price per room per night [€/day]	Gross income per room per night [€/gg]	Hotel occupancy rate (BEP)
150	134.39	**63.8%**
200	184.39	**46.5%**
250	234.39	**36.6%**

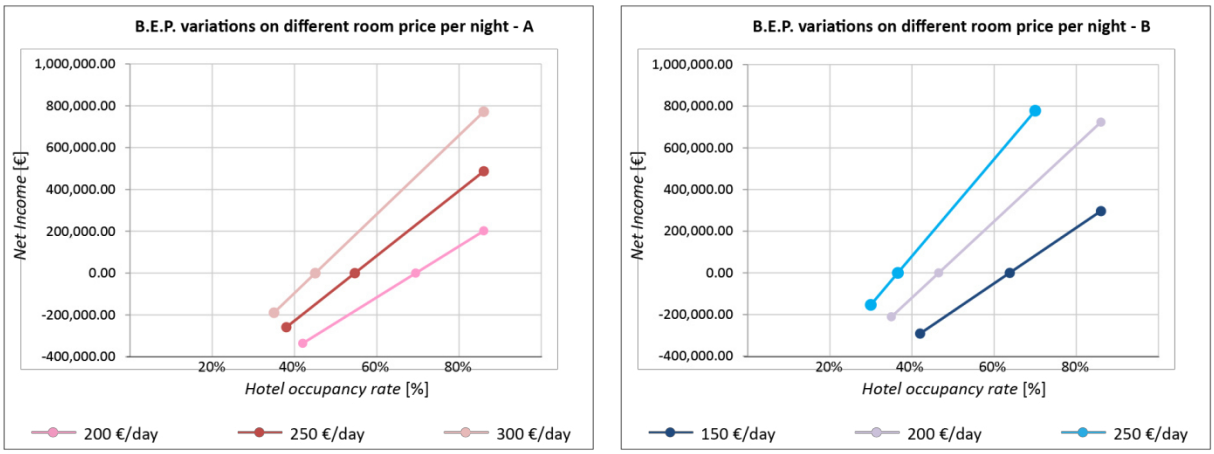


Fig. 8: Variation of Hotel occupancy rateand corresponding BEP, depending on room price per night.

The number of nights in a year was estimated on the base of tourism data about Tuscany derived from the report "Toscana, borghi da amare 2017" (Tuscany, villages to love) [15]. According to the report, accommodation structures not above the sea level had an average Hotel occupancy rate of 68% in 2017. As it is apparent from tables and graphs, economic analysis shows Hotel occupancy rates (BEP) lower than 68%, except for solution A with price per room of 200 €/day. This result highlights the economic feasibility of the proposed scenario.

4.2 Financial analysis

This section analyses financial feasibility of the project, corresponding to a positive NPV (Net Present Value). NPV provides a method for evaluating and comparing capital projects or financial products with cash flows (CF) occurring at different times. Assigned the lifetime of an investment (T) divided into equal time periods (t), NPV is the summation of discounted cash flows (DCF) for each period. DCF estimates the present value (PV) of a future CF as how much money would have to be invested currently, at a given rate (r) of return, to yield the cash flow in future. Thus, NPV is given by the formula:

$$NPV = \sum_{t=0}^{T} DCF_t = \sum_{t=0}^{T} \frac{CF_t}{(1+r)^t} = \sum_{t=0}^{T} \frac{B_t}{(1+r)^t} - \frac{C_t}{(1+r)^t} = B_{Present\ Value} - C_{Present\ Value}$$

Discount rate (r) is chosen as weighted average cost of capital, based on time value of money and risk premium.
CF_t is the difference between annual Benefits (B_t) and Costs (C_t), evaluated as follows.
B_t are Earnings before interest, taxes, depreciation, and amortization (EBITDA), calculated as:

$$\text{EBITDA} = \text{n° of rooms} * \text{N} * \text{Hotel occupancy rate} * (\text{Gross Income/day/room} - \text{Variable costs/day/room})$$

C_t are indirect costs. Direct costs are share insurance, maintenance, staff and administration costs, whose annual values are equal to those calculated in §4.1, and the loan repayment instalment.
The loan repayment instalmentwas calculated with the following formula, given the hypotheses established in §4.1 of mortgage repayment in 40 years with quarterly instalments at annualized interest rate of 2.49%:

$$\text{Annual amortization} = K_A \frac{r}{1 - \frac{1}{(1+r)^{nk}}} \qquad r = \frac{R}{k}$$

K_A mortgage loan = restoration cost
n lifetime of the structure = 40 years
k n° of instalments per year = 4
R annualized interest rate = 2,49%

In our analysis, t = 1 year and T = 43 years, equals to the sum of years of architectural and structural restoration (estimated in 3 years) plus the average lifetime of accommodation structures (40 years). Based on a discount interest of rate (r) equal to 8%, we calculated NPV in case of minimum Hotel occupancy rate (H) in order to guarantee economic feasibility determined in §4.1. Results show a positive NPV: this confirms the feasibility of the proposed scenario by a financial point of view. Then, keeping the discount rate fixed, we calculated the Hotel occupancy rate that allows us to have a NPV equal to zero for three different room price levels. For each price level, the value obtained indicates the minimum level of Hotel occupancy rate above which the investment is convenient.

Solution A	
n° of rooms	24
N (opening days in a year)	276
annual amortization	68,807.29
direct cost	585,629.88
r (discount interest rate)	8.00%

Price per room per night [€/day]	Hotel occupancy rate (BEP)	Hotel occupancy rate
	$NPV_{r=8\%} > 0$	$NPV_{r=8\%} = 0$
200	**69.5%**	**55.0%**
300	**54.6%**	**43.3%**
500	**45.0%**	**35.7%**

Solution B	
n° of rooms	36
N (opening days in a year)	276
annual amortization	7,055,365.15
annual direct cost	585,629.88
r (discount interest rate)	8.00%

Price per room per night [€/day]	Hotel occupancy rate (BEP)	Hotel occupancy rate
	$NPV_{r=8\%} > 0$	$NPV_{r=8\%} = 0$
150	**63.8%**	**50.4%**
200	**46.5%**	**36.8%**
250	**36.6%**	**28.9%**

Fig. 9: Variation of NPV and Hotel occupancy rate depending on room price per night.

As shown in table 9, the values of H determined by analyses are always lower than 68%, i.e. the average Hotel occupancy rate of similar accommodation structures in Tuscany. This result confirms the financial feasibility of the proposed scenario.

Conclusions

The presented proposal was defined starting from an analysis of the potential attractiveness of the cultural heritage, the identification of an activity (digital detox) compatible with its characteristics and a benchmarking analysis to define the characteristics of the identified activity (digital detox). Among the possible segments of tourist offer, the digital detox seemed the most compatible with the enhancement of this cultural asset and, at the same time, one able to attract private investments to guarantee economic sustainability without undermining identity and artistic and historical values of the cultural heritage, but rather enhancing its potentiality. Both Break-Even and the Net Present Value analyses were used to evaluate the proposal. Results show that the scenario meets the requirements of economic and financial feasibility and, due to its capacity for synthesis, this approach could be very useful in studies of valorisation of monumental cultural heritage.
As regards future research developments, the studies on the enhancement of the Certosa di Pisa in Calci will continue with the definition of further scenarios checking the opportunity to add different sets of activities to the museum use. Once assessed with respect to economic and financial sustainability, these scenarios will be compared, and the best ones will be submitted to the main stakeholders for

their participatory evaluation. Indeed, since many stakeholders will be involved in the implementation of the proposal and that Certosa di Pisa in Calci is a cultural and common heritage, it is important sharing the proposal to develop it in more detail and carry it out successfully.

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