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* ***Invited paper***

Preface

In the current issue of HoPUE the interdisciplinary thinking on landscape and urban identities proposes an innovative perspective of the section on *Historic urban landscape*, interpreted in a demo anthropological view, as "environment" where people lived, "territory of a community" and space of relations. Some elements of the intangible aspects of urban landscape are put in evidence, taking into account the role of traditions affecting the sense of identity of places. Cultural tourism (heritage tourism) induced by folklorism (historical celebrations, rituals, beliefs and customs, as relevant elements for the conservation of urban values) show that traditions are perceived as *nostalgia* for the past, and at the same time, spectacle events and investments having a strong impact on the local economy.

Another novelty item in the current issue of HoPUE is an additional thematic section dedicated to "*Advances in quantitative methods for housing and urban development*", on recent experiences in use of economic and financial quantitative methods for decision-making in housing and urban sector. This journal aims at animating scientific contributions on this subject, considering that – in particular for the formulation of choices in public investment – financial and economic analysis are fundamental to the feasibility evaluation of projects, and useful tool for the efficient allocation of scarce resources.

The general situation of instability and uncertainty of public housing and the now widespread housing problems in urban areas require a rethinking of the residential market to provide safe, decent and affordable homes. In this perspective, the financial engineering instruments established in the framework of the European Structural Funds are noteworthy, including significant opportunities for 2014-2020 period in the field of sustainable urban development. These are innovative strategies for the use of funds investing in public - private partnerships for the promotion and realization of social housing projects, use of alternative energy resources for existing buildings, promotion of sustainable mobility and urban regeneration. It would be interesting to share and spread this kind of experiences and policies implemented in European cities for sustainable urban development projects and integrated plans.

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In questo numero di HoPUE la riflessione interdisciplinare sui temi dell'abitare, del paesaggio e delle identità urbane propone una lettura innovativa della sezione sul paesaggio urbano storico, letto qui in chiave demo antropologica come "ambiente di vita" delle popolazioni che hanno abitato e abitano i luoghi, come "territorio di una comunità" e spazio di relazioni.

Si pongono alcuni elementi di riflessione sugli aspetti intangibili del paesaggio urbano e su come le pratiche urbane influiscano sulla formazione delle identità dei luoghi. Il rapporto tra folklore, città storiche e turismo culturale (heritage tourism) evidenzia

come, nello spazio urbano contemporaneo, le tradizioni siano spesso ri-vissute essenzialmente come nostalgia del passato, della casa e dei luoghi natii, ma al contempo risorsa economica da reinterpretare in chiave spettacolare.

Altro elemento di novità in questo numero della rivista è l'introduzione di una sezione tematica dal titolo "Advances in quantitative methods for housing and urban development", sui recenti sviluppi dei metodi quantitativi per le decisioni nel settore abitativo e in urbanistica. La rivista intende sollecitare approfondimenti su tali questioni, tenuto conto che – soprattutto ai fini della formulazione delle scelte di investimento pubblico – le analisi finanziarie ed economiche sono centrali nel processo di valutazione della fattibilità di un intervento, e strumento utile per l'allocazione efficiente di risorse scarse.

La generale situazione di precarietà dell'edilizia residenziale pubblica e il disagio abitativo ormai diffuso nelle aree urbane impongono un ripensamento del mercato residenziale per garantire abitazioni sicure, dignitose e a prezzi sostenibili. In tale prospettiva, degni di nota appaiono gli strumenti di ingegneria finanziaria istituiti nel quadro dei Fondi Strutturali Europei, con importanti opportunità per il periodo 2014-2020 ai fini dello sviluppo urbano sostenibile. Si tratta di strategie innovative per l'utilizzo di fondi che investono in partenariati tra settore pubblico e privato per la realizzazione di edilizia residenziale sociale, uso di energie alternative negli edifici esistenti, promozione di interventi di mobilità sostenibile e rigenerazione urbana. Pertanto si ritiene interessante condividere e diffondere tali esperienze e politiche implementate nelle città europee per i progetti urbani e i piani integrati di sviluppo sostenibile.

Barbara Ferri

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Lo spazio urbano come teatro della nostalgia: fenomeni di ritradizionalizzazione in un contesto provinciale italiano

Lia Giancristofaro[1]

Sunto. Le tradizioni e le ri-tradizionalizzazioni nei centri urbani oggi meritano una attenzione adeguata: non si possono definire come elementi "reazionari" o "inventati", assumendo che la modernità occidentale rappresenti l'unico possibile esito laico e razionale per ogni mondo tradizionale. Tradizione e modernità non sono le due facce opposte di una cultura o di una società, ma i diversi aspetti della storicità della medesima cultura.

Parole Chiave: spazio - relazioni sociali – folklore – modernità

Abstract. The downtown traditions and re-traditioning today deserve adequate attention: they can not be defined as "reactionary", "irrational" or "invented", assuming that Western modernity represents the only possible secular and rational outcome for each local world. Tradition and modernity are not the two opposite faces of a culture or a society, but different aspects of the historicity of the same culture.

Keyword: space - social relations - folklore - modernity

1. Le tradizioni nello spazio urbano: un approccio demo-etno-antropologico

Le società in scala ridotta (dette *società folk*) hanno occupato un posto privilegiato nel pensiero antropologico, e la piazza del villaggio è stata il prototipo del luogo d'incontro degli etnografi con la diversità

[1] lia.giancristofaro@unich.it

culturale. Nel 1886, le scienze demo-etno-antropologiche documentavano che, in Abruzzo, le persone lavoravano cantando; e lavorando continuavano a cantare sino al tramonto del sole, quando si faceva più felice l'ora del rientro a casa, del pasto comune e del riposo[1]. Dalle centinaia di documenti dell'epoca, deduciamo che i divertimenti erano pochi, le regole sociali rigide, la fatica fisica del lavoro era enorme e la dimensione culturale si fondava sul corpo, il quale recitava coralmente la sua presenza storico-sociale nello spazio. Nonostante le conflittualità e le profonde disuguaglianze di genere, di classe, di età, di status sociale, il flusso culturale era coeso e rassicurante, e assumeva un significato etico-religioso estraneo ai concetti geografici contemporanei.

Nel corso del Novecento, la cultura di massa, coi ritmi eclettici della cultura industriale e l'estensione dei confini del mondo, ha estinto o marginalizzato questa dimensione, la quale oggi viene altresì riscoperta, re-inventata e valorizzata come quella *dimensione residuale e periferica* incardinata sulle azioni di *memoria, conservazione* e *tradizione*[2]. In reazione alla massificazione dei consumi, alla proliferazione dei *non-luoghi* e alla spettacolare e disorientante invasione del capitale (e del potere) anonimo[3], si è diffusa la *nostalgia delle origini*, la quale è basata sul confine immaginario tra "naturale e culturale" e sulla distinzione retorica tra elementi "artificiali"ed elementi "autentici".

Ovviamente, è nella "autenticità" che è stato individuato il *bene*, in quanto questo concetto è capace di evocare solidarietà, unicità, omogeneità e moralità[4]. Tuttavia, nessuno di questi elementi può connotare una cultura, la quale, per sua natura, è ricca di dislivelli, porosa e possiede un certo grado di incoerenza[5]. La letteratura socio-antropologica è, su questo argomento, ricchissima. Fino a trent'anni fa, l'individuazione dell'autenticità culturale era l'ossessione degli studi demo-etno-antropologici. Attualmente, non si può fare a meno di leggere l'autenticità come un processo anziché come un dato, e questo ha complicato le cose. A partire dagli anni Novanta, infatti, gli studi hanno consolidato la convinzione che nella società contemporanea i gruppi culturali non sono entità oggettive, ma soggetti pubblici che si sforzano di creare e comunicare la propria differenza, appartenenza e

autenticità attraverso una serie di marcatori semiotici[6]. Ogni cultura, insomma, diventa "autentica" perché alcuni tra i discorsi e motivi che la compongono vengono avvalorati e legittimati tramite la loro circolazione esterna ed interna, costituendo, appunto, le forme culturali autentiche e quel particolare "oggetto" dello studio culturale che è l'identità collettiva.

Oggi, insomma, più che di autenticità, si parla di un "percorso di autenticazione culturale" che è sempre cosciente e politico, perché è finalizzato quanto meno a richiamare l'attenzione esterna su un particolare contesto culturale.

Il presente saggio, in tal senso, suggerisce la necessità di indagare proprio la circolazione dei discorsi dedicati alle forme di autenticità assunte dall'identità collettiva nelle principali città della Provincia di Chieti, ovvero Lanciano, Vasto, Ortona e, ovviamente, il capoluogo di provincia. Nel mondo dei social network e anche tra i cosiddetti *small media*, ovvero in quelle produzioni audiovisive che non rientrano nei circuiti nazionali, ma sono piuttosto circoscritti alla circolazione regionale e provinciale, è facile imbattersi in un tradizionalismo parossistico. Si tratta di autorappresentazioni della cultura locale i cui protagonisti, che fanno un uso entusiastico dei nuovi media, proclamano la necessità di valorizzare le tradizioni per il turismo e restaurare i costumi ad ampio spettro: tra i vari obbiettivi perseguiti, quello di tornare alla festa patronale *autentica* e *di un tempo*, con messa in latino, abito ottocentesco, donne a capo coperto e comunione in ginocchio. Ovviamente, simili proclami sono demagogici e privi di una coerenza tradizionalista e religiosa come quella degli Amish, che in questo caso viene vistosamente esclusa dall'occasionalità del travestimento, dall'uso delle nuove tecnologie e dall'impostazione prevalentemente turistica ed esibizionista della manifestazione. In questo caso, l'emersione di un essenzialismo e primordialismo nella "sfera pubblica" è sicuramente da collegare alla crisi della cultura pubblica della Nazione, la quale, nel frammentato, anzi, liquido mondo della post-modernità, non riesce a contenere la produzione accelerata di differenziazioni al suo interno[7].

L'immaginario, in questo contesto, gioca un ruolo fondamentale, perché può smettere di essere un immaginario semplicemente rivolto a

produrre credenze e feste condivise, per entrare in un gioco complesso in cui contribuisce all'invenzione di un contesto deterritorializzato: una sorta di "provincialismo nel mondo" che, creato dagli emigrati di ieri e di oggi, unisce idealmente un flusso di saperi che, all'estero, sembrano ancora riferiti e referenziali verso la vita culturale locale[8].

Insomma, non si tratta di un ritorno, peraltro impossibile, ad una religiosità contadina con la quale il filo della trasmissione culturale si è spezzato ormai da cinquant'anni. Si tratta piuttosto di un miscuglio inestricabile tra motivi arcaici ed elementi economici e fideistici post-moderni il quale, grazie al diffuso e molteplice uso degli strumenti tecnologici che consentono una visualizzazione ossessiva di forme e contenuti, si trasforma in costruzione delle comunità e in strumento del proselitismo associativo. Peraltro, l'utilizzo collettivo dei media digitali consente di studiare e comprendere meglio questa vita culturale che emerge dalla società locale. I social network (facebook, twitter) rendono visibili e accessibili pensieri, comunicazioni, emozioni che prima rimanevano nel sommerso, offrendo allo sguardo antropologico la possibilità di arrivare ad una comprensione più profonda delle pratiche. Perciò, la presente ricerca è stata condotta anche attraverso le fonti audiovisive ed elettroniche, perché oggi, con essendosi il folklore intrecciato alla cultura di massa, l'etnografo deve sempre più confrontarsi coi nuovi strumenti delle espressioni culturali. Si cerca insomma di condurre il lettore attraverso il mondo del web e delle altre forme della comunicazione contemporanea, per leggere, dietro gli strumenti digitali di cui le persone oggi si servono, i modi in cui si strutturano certe appartenenze simboliche del provincialismo abruzzese.

La principale caratteristica di questi soggetti attivi nell'espansione mediatica delle tradizioni, è l'appartenenza ad una fascia d'età ricompresa tra 40 e 75 anni; inoltre, essi hanno un capitale culturale medio, sono di provenienza paesana e risiedono in aree urbane[9]. L'entusiasmo per le tradizioni si manifesta, verbalmente, anche presso i giovani, nei quali la sollecitazione pare più legata all'invenzione di tradizioni per il turismo, che vengono appunto immaginate come una fonte di reddito. Peraltro, in tutti i portatori di questa passione per le tradizioni si manifesta una adesione alla cultura di massa. La "cultura

del presente", dunque, non esclude l'identificazione in valori esplicitamente durevoli e ispirati alla mitizzazione del passato agro-pastorale della regione, i quali il più delle volte vendono conosciuti tramite la lettura delle opere di documentazione scientifica che furono realizzate tra Ottocento e Novecento[10]. Insomma, la divulgazione degli studi folklorici è attualmente uno strumento per ridefinire i confini politici dell'identità regionale, ma anche per manipolare la cultura regionale con fini demagogici, indicando l'illusoria possibilità di creare posti di lavoro tramite esibizioni saltuarie ai turisti; ha alimentato l'opposizione dualistica tra modernità e tradizione, ma è stata anche l'occasione per criticare gli aspetti controversi della modernità occidentale.
Le interviste sono state rivolte a far emergere le motivazioni culturali del fenomeno che, a ridosso di un evento festivo, può implicare un impegno di alcune ore al giorno, passate a organizzare non solo l'evento festivo, ma anche le riprese dalle angolazioni migliori, per poi caricare foto e filmati sul web.

2. La festa in piazza come marcatore semiotico: neo-tradizioni laiche e ritradizionalizzazioni di ispirazione religiosa

Certamente, una simile ricerca non riesce a prendere in considerazione tutti i modi della rappresentazione e della comunicazione quotidiana dell'appartenenza. Bisognerebbe visionare, ad esempio, le videocassette non professionali che immortalavano le "tradizioni locali" già negli anni Novanta, le pagine dei quotidiani e soprattutto la liturgia del linguaggio delle televisioni private che, con la trasmissione in diretta di eventi come la *Processione del Venerdì Santo di Chieti*, la *Investitura del Mastrogiurato di Lanciano*, il *Toson d'oro di Vasto* e il *Perdono di Sulmona*. Queste ultime tre tradizioni sono state istituite negli anni Ottanta, traducono la "vecchia sacralità cattolica" e la "nuova sacralità laica" nelle nuove forme dell'immaginario delle tradizioni locali. I demo-etno-antropologi abruzzesi si sono, per certi aspetti, astenuti dall'affrontare una analisi antropologica su queste nuove tradizioni, forse perché hanno pensato che la fioritura di

rievocazioni storiche di tipo spettacolare e cinematografico, del tutto similari tra loro e con rievocazioni storiche di altre città d'Europa, fosse una espressione della cultura di massa, e non una di quelle espressioni folkloriche e sommerse che, essendo marchiate dalla marginalità, dal magismo, dalla religiosità popolare e dalla disuguaglianza, rientrano nel terreno etnologico. Nella presente ricerca, tuttavia, abbiamo notato che tra i seguaci delle nuove tradizioni abruzzesi si sviluppano emozioni patrimoniali e retrodatazioni nei secoli similmente a quanto accade nelle tradizioni festive che sono state studiate storicamente e valorizzate dai demo-etno-antropologi. Per esempio, a Lanciano molti giovani, essendo "nativi" del Mastrogiurato, fanno fatica a pensare che prima della loro nascita la solenne manifestazione non esistesse, dunque ne retrodatano la nascita di almeno un millennio. In seguito ad una specifica indagine, ho potuto constatare che la generazione più giovane crede che l'investitura sia non una rievocazione storica, dunque una *finzione*, ma una *tradizione*[11]. A questi giovani, il cui punto di vista è nel flusso culturale che scorre "dentro la pratica", sfugge il fatto che oggi l'investitura non produce funzioni giuridiche, amministrative o sindacali, ma ha solo un obbiettivo rievocativo, celebrativo e onorifico. D'altronde, la tradizione risiede, più che nelle idee, nelle sue stesse pratiche. Perciò, pur non potendo affrontare in modo completo un tema tanto complesso da richiedere il contributo dell'estetica, della semiotica, della sociologia, precisiamo che tali nuove pratiche non sono espressione di alienazione culturale: nonostante le apparenze diversifichino l'immagine delle varie rappresentazioni spettacolari, queste nuove tradizioni cerimoniali laiche possono aver sviluppato, al loro interno, un senso dell'appartenenza collettiva tale da far pensare ad una sorta di religiosità latente, la quale si riproduce e implementa con l'effervescenza del rito pubblico annuale.

Si tratta indubbiamente di folklore contemporaneo. A causa dei notevoli dislivelli sociali del passato, gli intellettuali avevano forzato il folklore dentro gli schemi della *cultura dei ceti umili e analfabeti*, senza chiarirne né il senso generale, né il suo peculiare procedimento fatto di retoriche, finzioni e rappresentazioni non ufficiali anche presso i ceti egemoni e alfabetizzati. La dinamica culturale tra queste dimensioni, nel corso del Novecento, è stata resa ancora più complessa

dall'influsso pervasivo della cultura di massa[12]. La modernità ha fuso i "corpi solidi", ovvero quegli obblighi etici e religiosi che avevano tenuto unite le società pre-moderne, caratterizzate dalle dimensioni ridotte e, assieme a questi obblighi condivisi, ha fuso anche le caratteristiche che consentivano di individuare il folklore. D'altronde, la fine delle ideologie, ovvero le grandi narrazioni pubbliche, ha reso impossibile la pretesa di verità assolute, aprendo la strada al pluralismo morale. L'unico rapporto sociale resistente a questa fase di liquefazione culturale è stato il rapporto di classe che, rafforzandosi, ha consentito il primato dell'economia intesa come razionalità che governa tutte le altre vicende umane e sociali[13].

Insieme al rapporto di classe, si è rafforzata l'idea della tradizione che, com'è intesa oggi, è un'invenzione della modernità e viene continuamente menzionata nel discorso pubblico più che in quello privato, al fine soprattutto di creare discriminanti e distinzioni di stile, gusto, essenzialità culturale[14]. La tradizione, in realtà, è un contenitore concettuale retorico e astratto. L'obbiettivo di rappresentare visualmente la tradizione corrisponde all'esigenza sociale di ancorare l'identità alla materialità della vita locale, che invece per sua natura è sfumata, deterritorializzata e volatile. Le parate in costume storico nel centro urbano, gli spettacoli in piazza e i relativi video, insomma, hanno sempre più la funzione di "musei spontanei" dei luoghi e della nostalgia delle origini che muove gli abitanti verso l'invenzione e la rivitalizzazione delle tradizioni locali e che spesso finisce con il finalizzare il folklore all'economia del turismo e dell'intrattenimento[15].

Questi obiettivi di spettacolazione turistica, ovviamente, non sono allineati con i procedimenti di conoscenza pubblica condotti dai demo-etno-antropologici, i quali fanno riferimento alla rielaborazione consapevole degli stili folklorici, piuttosto che ad una mera riproduzione sacrale del passato. Di fatto, nel sommerso tuttora si manifesta una progettualità condivisa e salvifica che si ispira al passato per immaginare un futuro ispirato alla sociabilità umana, e che rende certi schemi della cultura povera del passato ancora funzionali ad affrontare e risolvere situazioni di crisi e di subalternità[16]. Perciò, comprendere cosa sia il folklore nella contemporaneità e dove esso si nasconda presume una presa di coscienza antropologica che accetti,

come dato storico, proprio le componenti che pongono in crisi l'uomo attuale di fronte al folklore: e, cioè, la frammentarietà dei residui, la loro inattendibilità rispetto alle forme epistemologiche razionali, scientifiche e postcapitalistiche, la loro inadeguatezza ad essere risollevati a struttura unitaria, il loro contrasto con la realtà contemporanea industriale e consumistica.

3. La fusione tra folklore e cultura di massa: il neo-provincialismo contemporaneo

L'esplosione e la polverizzazione dello stato nazionale, unite ai flussi globali di persone e merci, anche nella Provincia di Chieti hanno creato un panorama culturale caratterizzato dalla disgiunzione tra immaginario e luogo. Il territorio, insomma, è divenuto un «deposito sincronico di scenari culturali» che permette un continuo processo di reinvenzione caratterizzata da quella che Appadurai chiama, con una formula efficace, "nostalgia senza memoria"[17]. Alcuni brani significativi di interviste reperite in campo o attraverso i social network possono restituire al lettore tutta la complessità dei motivi per cui l'immagine dei centri urbani vorrebbe somigliare ad una "Disneyland delle tradizioni", le quali si manifestano in modo spettacolare senza la sequenzialità calendariale che le connotava nel passato. Ad esempio, il Carnevale di Francavilla si tiene a febbraio ma si ripete in estate per i turisti, e vi si assiste pagando il biglietto; alcune feste religiose, come i Talami di Orsogna, dal periodo pasquale vengono ripetute in estate, sempre per i turisti; insomma, la sequenzialità calendariale, che vincolava queste feste al ciclo agricolo e stagionale, si è trasformata in una simultaneità al servizio della tecnica e dell'economia.

Accanto agli sdoppiamenti delle feste di origine contadina, sono state inventate nuove tradizioni cittadine e laiche per attrarre il turismo e per rinforzare la coesione nella vita pubblica, traendo ispirazione dalla storia locale. Il *Mastrogiurato*[18] e il *Toson d'oro*[19] sono stati accolti con entusiasmo dalle comunità, che non ne hanno considerato la difficile sostenibilità economica nel lungo periodo, dati i costi del noleggio o dell'acquisto dei costumi teatrali e dell'elaborazione delle regie e

scenografie, le quali implicano l'uso di sbandieratori, carrozze, cavalli, artificieri e giocolieri. Invece, ad Ortona una cerimonia religiosa annuale dal lungo antecedente storico (*l'apertura della Porta Santa*) ha subito un processo di modernizzazione tramite l'uso di abiti medievali che, indossati dai devoti, hanno modificato la scenografia della processione religiosa. Di un imponente corteo in costume si è dotata, insomma, anche la festa patronale di Ortona, dove la devozione per San Tommaso, nel cui nome si celebrano l'apertura della porta santa e la richiesta dell'indulgenza, viene mescolata alla ricostruzione spettacolare dell'arrivo delle reliquie a Ortona (1258). Si può dire, pertanto, che il corteo storico, a partire dagli anni Ottanta, sia diventato lo strumento per arricchire e rinnovare le feste patronali, che continuano peraltro a manifestarsi attraverso gli elementi che, per consuetudine, già nel primo Novecento le caratterizzavano, ovvero il movimento processionale gravitante nel centro urbano, la banda, l'intrattenimento musicale in piazza e lo spettacolo pirotecnico finale.

Le rievocazioni storiche, d'altronde, soddisfano i bisogni della post-modernità – spettacolarità, autorappresentazione apologetica, appartenenza territoriale – e creano legami temporanei finalizzati alla fruizione veloce della memoria storica. Questi nuovi rituali, che fin dagli anni Ottanta sono stati presentati nei saloni del turismo come eccellenze del territorio, al loro esordio vennero criticati dai dissenzienti in quanto travestimenti spettacolari e privi di quel valore sovversivo che il Carnevale storicamente aveva presentato a beneficio del ceto subalterno[20]. In effetti, il travestimento spettacolare dei cortei storici implica un irrobustimento dei ruoli sociali a beneficio dei figuranti, i quali impersonano il potere e la nobiltà locale. Dunque, queste parate sono assertive del potere e poco utili per il rinnovamento sociale. In definitiva, si tratta di strumenti politici conservativi tramite i quali la popolazione ripropone le asimmetrie che, ieri come oggi, dominano la società: la disuguaglianza di genere (il ruolo delle donne nei cortei storici è sempre ancillare e subalterno a quello degli uomini), di età (il ruolo degli anziani è superiore a quello dei giovani), di sangue ovvero classe sociale (il ruolo dei nobili e della loro immagine lussuosa è preponderante, nei cortei storici schiavi e servi della gleba non vengono nemmeno rappresentati), di etnia (le persone del posto hanno un ruolo

esclusivo). Ciononostante, il sistema delle parate in costume storico attualmente incardina l'emozione patrimoniale. D'altronde, la definizione di eredità culturale è dinamica ed è l'emozione popolare che guida il discernimento, comunitario e condiviso, di ciò che è patrimoniale rispetto a ciò che non lo è. Peraltro, la crescente domanda popolare di monumenti spirituali, attraverso la forza delle declinazioni locali, ha originato forme rivendicative di diritti[21], rendendo sempre più difficile, nel livello regionale, distribuire le diminuite risorse finanziarie tra le organizzazioni che legittimamente protestano per la sperequazione che si è venuta a creare tra manifestazioni analoghe divenute difficilmente sostenibili per le comunità che le hanno generate[22]. La necessità di finalizzare le manifestazioni festive allo sguardo esterno dei visitatori si è accompagnata a nuove forme di interessamento politico che gli enti, governativi e non, hanno rivolto anche verso quei rituali folklorici precedentemente ritenuti imbarazzanti, e nel livello regionale sono state condotte varie azioni di immaginazione pubblica di un ipotetico *patrimonio festivo abruzzese*[23]. Questo interesse politico e mediatico, congiuntamente all'aumento del tempo libero e della connettività individuale, ha sollecitato il fenomeno della ritradizionalizzazione, o anastilosi delle tradizioni, basata sull'introduzione nelle aree urbane di rituali paesani appartenenti alla cultura autarchica, contadina e paesana, caduti in desuetudine da decenni e ora riproposti a scopo turistico e ricreativo[24]. Ovviamente, si tratta di finzioni, di ricostruzioni storiche basate sui testi storici, attraverso i quali alcuni ipotetici elementi della vita del passato vengono selezionati, mimati, recitati e illustrati trasformando la documentazione folklorica in "antefatto storico" del folklore pubblico di oggi[25]. Tra gli spettacoli più in voga, la messa in scena del "matrimonio tradizionale", con carattere di finzione (l'azione non determina alcun cambiamento di status tra coloro che impersonano gli sposi): una sorta di gioco sviluppato in più tappe, ovvero la "tradizionale richiesta della mano di una ragazza" tramite ambasciatore; il trasporto rituale della dote della neo-sposa nella casa maritale; e, infine, il "matrimonio tradizionale" in abito borbonico, con l'immancabile profluvio di riprese audiovisive e condivisione di immagini sui social network. Un altro gioco contemporaneo reiterato è la finzione dell'antica questua in onore di

Sant'Antonio abate, dove nel periodo natalizio, a scopo turistico e di intrattenimento, nei centri urbani e nei centri commerciali, i figuranti, in abito ottocentesco, al suono della zampogna, sfilano cantando i testi etnologici raccolti in Abruzzo da Finamore, Lupinetti e Giancristofaro, senza attuare quella funzione della reciprocità paesana che era la richiesta di risorse alimentari da parte dei meno abbienti. L'evento, infatti, non è spontaneo e "dal basso", e non nette in gioco quel welfare locale che in passato era rivolto a coloro che erano colpiti dall'indigenza, ma viene attuato da persone benestanti o economicamente autosufficienti, è pianificato dagli Assessorati, dalle agenzie turistiche e dai centri commerciali, i quali lo calendarizzano e lo enfatizzano tramite comunicati stampa, pubblicità e manifesti. I figuranti, insomma, non sono cantori improvvisati, né popolani bisognosi, ma performers che si esibiscono su commissione gli sponsor pubblici e privati. Una ulteriore riproposizione del modello rituale tradizionale a fini di intrattenimento è il "salto dei ruscelli" in onore di San Giovanni Battista, realizzato la notte del solstizio d'estate (21 giugno) o la sera della vigilia del 24 giugno. Anche in questo caso, la motivazione magico-religiosa dell'azione storica è andata perduta e la post-modernità ne ripropone solo la forma, arricchendola con motivazioni esoteriche o tradizionaliste. Tutti questi giochi, nel corso degli ultimi dieci anni, sono stati registrati, specialmente nel periodo estivo, nei paesi della Maiella (Palombaro, Guardiagrele) e della cintura metropolitana di Chieti e Pescara (Cepagatti, Torrevecchia Teatina, Montesilvano, Spoltore).

Queste spettacolari pantomime di storia locale nel centro urbano, pur essendo dichiaratamente percepite come finzioni, vengono impropriamente considerate rivitalizzazioni delle tradizioni, il che implica un forte elemento di credenza, sacralità e religiosità. Esse sono basate sulla dicotomia del ruolo di attore, interpretato dalla popolazione, quello del pubblico, rappresentato dai residenti e dai mass media in funzione dei quali la ricostruzione purista ha acquistato un senso politico, sociale, economico ed esistenziale. L'uso di ricostruzioni di abiti dell'epoca è fondamentale, per gli attori il costume è lo strumento fondamentale della separazione scenografica e, così come avviene per i cortei di rievocazione medievale, in mancanza del travestimento lo

spettacolo non avrebbe luogo. L'uso di costumi semiofori, insomma, è alla base delle rievocazioni storiche urbane di questi nuovi riti laici della contemporaneità. La ritualità di questi eventi laici dimostra che, nelle società moderne, il rito si distacca dal sacro e, nonostante questo, conserva la sua efficacia rituale la quale, per la sua forma codificata, conferisce un'aura di tradizionalità ai materiali sociali più nuovi[26].

Il fine latente di questi processi potrebbe essere quello di controllare la creatività contemporanea, per una sorta di rovesciamento della cultura di massa in una cultura verticale che vorrebbe essere cultura della qualità, ma che non riesce ad andare alla radice della manifestazione folklorica, non restituisce il senso profondo di essa, non lascia prefigurare una percorribilità futura, magari attraverso forme nuove, alle quali non viene lasciato spazio, né legittimazione[27].

Etnografando gli scenari di queste ri-tradizionalizzazioni, il sapere demo-etno-antropologico viene rovesciato ed emerge che, nella percezione dei più, la tradizione popolare non è tanto quella cultura ecosostenibile, frugale, precaria e fragile, in fase di soccombenza, degna di essere salvaguardata, né quella espressione residuale della diversità locale, quanto il potente convincimento dell'autorità culturale sovratemporale dell'oggi. Non è il risultato di una dialettica e di un faticoso assestamento semiotico, economico e politico tra il ceto egemone e il ceto subalterno, come la percepiamo da Gramsci in poi, quanto invece la fiducia nel criterio infallibile della verità di cui sono detentori gli antenati ed i loro medium contemporanei. Per una sorta di sciamanesimo evocatore dello "spirito degli antenati", le ritradizionalizzazioni giocano un ruolo politico egemone riallacciandosi all'uso corrente dell'aggettivo "tradizionale" il quale, anziché essere usato nel senso descrittivo, è usato in senso qualitativo, sulla base dell'idea popolare e accentratrice secondo la quale ciò che rientra nel recinto del "tradizionale" sia incomparabilmente meglio di tutto il resto.

La metafora organicistica di questa delocalizzazione e riproposizione spettacolare dei modelli arcaici della religiosità popolare evoca il trapianto di una risorsa da chi non può più servirsene (in tal caso la popolazione del borgo montano in fase di spopolamento), al corpo vivo dell'area urbana che necessita appunto di *linfa tradizionale* per inventarsi un'appartenenza culturale e per stimolare la popolazione

attraverso nuove ritualità. Da questa ossessione per la "tradizione autentica", a dire il vero, non sono rimasti immuni neppure i paesi dove i rituali arcaici si tengono da molti anni con continuità formale: i detentori del sapere della festa, sentendosi umiliati dalle spettacolarizzazioni urbane, si sono sentiti in dovere di salvaguardare la forma e sono tornati alle fonti scritte, dedicando molto zelo alla ricerca dell'archetipo della loro festa: "La nostra festa ha bisogno di un restauro della sua immagine per restare al passo, perciò stiamo promuovendo l'uso di costumi autentici del XIX secolo, il più possibile aderenti ad un bozzetto della Valle del Foro che uno storico ha ritrovato in un archivio. Se i giovani indossassero abiti tradizionali, il turismo se ne gioverebbe e loro sarebbero guidati da nuovi valori, perché noi abbiamo qualche problema con l'alcolismo giovanile. In occasione delle feste patronali, la musica, il ballo, i botti, spesso sono la scusa per eccedere, per cercare lo sballo, e noi non vogliamo questa decadenza morale" (Antonio G., anni 56, deputato della festa, Fara Filiorum Petri). Che la società provinciale attualmente presenti un calendario ufficiale così ricco di riti, esprime il bisogno di simboleggiare e riprodurre le culture locali e di gruppi precisi, come le confraternite le associazioni culturali, che sono tutte comunità immaginate. Dietro questo panorama patrimoniale che i politici indicano come un efficace veicolo di marketing territoriale, c'è un brulicante sistema di volontariato, di pratiche del dono e dello scambio, di circuiti economici informali e di sostenibilità sociale. Solo lo sguardo antropologico, con la sua attenzione alla diversità dei punti di vista, può dare un'idea della complessa articolazione tra i livelli micro e macro di questi fenomeni sociali e culturali, senza però rinunciare ad un approccio critico con cui guardare alle scelte politiche, con la consapevolezza che queste contengono dei presupposti spesso impliciti sul funzionamento della società locale[28]. Una simile analisi, peraltro, restituisce dati interessanti sui processi di adattamento, innovazione e rifunzionalizzazione operati a livello locale in modo positivo soprattutto nelle fasi preparatorie degli eventi pubblici; in questa occasione, infatti, si sviluppa una densa e profonda socializzazione, un affratellamento che si raggiunge grazie ad azioni ritmiche fatte insieme (preparare pasti comuni, cucire costumi teatrali, realizzare piccoli oggetti in forma di bricolage) e all'uso implicito ed esplicito della musica[29]. Tuttavia, si

tratta di un volontariato frammentario e non sistematizzato, tanto che le associazioni tendono a lavorare in modo solitario, come per una sorta di campanilismo interno. Nelle città oggetto d'indagine, operano decine di associazioni culturali non integrate tra loro oppure operanti in contrapposizione, per una sorta di irrigidimento pubblico nella difesa del proprio *particulare*. Il modello comunitario, infatti, invece di promuovere rapporti paritetici e negoziali, tende a poggiarsi ancora sulla "mentalità familiale" (da cui il principio della normativa asimmetrica e le rigide gerarchie di status), riproducendo una socializzazione paternalistico-affiliativa che è fatta di protezioni e difese reciproche (nonché amici e nemici comuni). Questo può produrre una scacchiera di piccole dittature, di realtà parallele di reciproca estraneità, di indifferenza al collegamento, allo scambio, all'aggregazione. Questo *vicinato senza alleanze* tra microcosmi associativi paralleli disperde le risorse in tante murature chiuse dove i gruppi riproducono il proprio perimetro di riconoscibilità[30]. Quando qualcuno riesce a superare i propri vincoli, affratellandosi con altri gruppi, ne viene fuori un'unione consorziale tra associazioni omologhe che non rinnova il tessuto socio-culturale, perché è finalizzata ad un rafforzamento lobbistico delle piccole dittature di cui si è fatto cenno, le quali in tal modo mirano ad ottenere una legittimazione nel discorso pubblico. Le possibili alleanze tra gruppi potrebbero invece seguire un criterio eterogeneo, piuttosto che omogeneo, per rinnovare ed allargare la propria identità, solidarietà, condivisione di norme e di valori attraverso un interscambio tra diversi generi, appartenenze di status e classi d'età[31].

4. La tradizione come legittimazione del presente. Per una etnografia del consumo culturale

A partire dagli anni Duemila, le tradizioni e le ri-tradizionalizzazioni nei centri urbani si attualizzano nella realtà, ma ottengono l'attenzione pubblica soprattutto per mezzo dei social network e della circolazione mediatica, per cui una festa popolare o un corteo storico, se nel momento della loro unica edizione annuale o semestrale possono registrare, di fatto, cinquemila spettatori, nella realtà

virtuale possono ricevere trentamila "like", ovvero visite virtuali e attestazioni di gradimento, poiché il circuito videoamatoriale di YouTube e i social network determinano una sorta di permanenza immaginaria della visualizzazione dell'evento nel lungo periodo. Insomma, tra le attività popolari del tempo libero e nel mondo dell'informazione locale si manifesta una corrente (*mainstream*) di interesse per questi eventi tradizionali che è oramai considerata convenzionale, e a sua volta rispecchia l'interesse del grande pubblico, come spesso accade nell'ambito dei flussi di significato che sono liberi solo in apparenza[32]. In tal senso, attraverso gli strumenti innovativi di un flusso di informazioni che somiglia alla cultura della società di villaggio, la società contemporanea tende a riprodurre chiusure, disuguaglianze, asimmetrie e familismi, dotandoli di immagini rinnovate solo a livello estetico-formale[33].

Questo flusso libero del significato delle tradizioni contemporanee certamente non può essere condizionato e indirizzato verso obbiettivi di maggiore sociabilità, se non attraverso una critica socio-culturale. Si guarda con disapprovazione e preoccupazione chiunque metta in discussione la libertà d'espressione, di parola, d'informazione. Tuttavia, l'aggettivo "libero" non è privo di ambiguità, perché significa "incondizionato", "gratuito", "senza costi apparenti": tuttavia, nelle società artificiali del neo-capitalismo post-industriale, entrare in un negozio o in un circuito implica sempre una spesa nascosta, un sacrificio morale, anche laddove l'entrata è gratuita. Questo flusso libero di informazioni e valori riferiti alla tradizione, insomma, potrebbe conservare l'egemonia di alcuni centri di elaborazione del potere e conservare la disuguaglianza di genere, di età, tra territori periferici e con gli immigrati, che sistematicamente rischiano l'esclusione sociale da queste attività locali.

Ma c'è di più. Il profluvio delle immaginazioni di un passato mitico si traduce in rappresentazioni mediatiche finalizzate ad occultare le brutture e i paradossi di una cura per il paesaggio che è principalmente allegorica. Queste espressioni nostalgiche, insomma, potrebbero funzionare come una sorta di dispositivo di compensazione al degrado paesaggistico dei centri urbani. Le pratiche istituzionali di deterioramento del territorio non si oppongono alle retoriche culturali

sull'eccellenza dei luoghi. I sistemi di degrado agiscono nascondendosi dentro rappresentazioni rassicuranti, come la nostalgia dei costumi d'un tempo e la loro rievocazione allegorica. Creare un sistema di finzioni attraverso le immagini può anche funzionare come un anestetico culturale che renda più accettabile assistere ad una predazione paesaggistica finalizzate molto più alla speculazione economica che all'utilità sociale: capannoni vuoti per fabbriche mai entrate in funzione, ecomostri incompiuti, interporti deserti, centri commerciali in dismissione, cementificazione selvaggia, macerie, campi incolti, abusi edilizi e cumuli di scorie della società dell'usa-e-getta assumono dunque le sembianze di un "disturbo di fondo" rispetto alla fruizione di un piacevole catalogo di immagini virtuali del "passato che entra nel presente" e degli scorci urbani più suggestivi, frutto della manipolazione più o meno consapevole di fotografi professionisti e dilettanti che abilmente escludono dall'inquadrature le brutture, gli sprechi e le incoerenze del territorio[34].

Nell'attesa pluridecennale di una educazione pubblica sul senso della tradizione nella contemporaneità, i mutamenti geo-economici nel frattempo sopravvenuti già non la rendono più in grado di assicurare continuità e forma alle esistenze individuali, gettate in un nuovo ordine culturale. Dunque, anche nel contesto in oggetto, un inevitabile esaurimento di questa "nostalgia senza memoria" spingerà le persone a vivere il localismo in maniera più aperta, creativa e riflessiva, e per questo sono urgenti e necessari interventi idonei a fornire orientamento e supporto alle comunità.

Note

[1]Finamore G., 1886, 4-7.
[2]Giddens A., 1999, 53-68.
[3]Augé M., 2009.
[4]Papa C., 1999.
[5]Hannerz U., 2001.
[6]Cfr. Dei F., 2012, 107-120; Vereni P., 2008.
[7]Geertz C., 1999, p. 57 ss.
[8]Cfr. in merito Spedicato Iengo E., Giancristofaro L., 2010.

[9]In Abruzzo, data la parcellizzazione dei nuclei urbani, incastellati nelle aree montane per difendersi dalla malaria e dagli attacchi della storia, sette comuni su dieci hanno meno di 5.000 abitanti. È in queste piccole entità che, fino al Novecento, si sono manifestati fenomeni di resistenza di alcune tradizioni pubbliche e private. Tuttavia, i piccoli paesi vanno oggi incontro ad un incessante spopolamento a favore delle aree urbane.

[10]All'epoca era ancora possibile identificare le tradizioni popolari in base alle caratteristiche dei loro portatori, i quali erano contadini analfabeti, anziani e residenti stabilmente in piccoli paesi o contrade. Attualmente, invece, tutti sono potenziali portatori di folklore: residenti in città e in campagna, ricchi e poveri, colti e incolti, come vedremo in seguito.

[11]Giancristofaro L., 2006, 69-73.

[12]Dei F., 2011, 501-518.

[13]Bauman Z., 2002.

[14]Giddens A., 1999, 58-62.

[15]Vereni P., 2008, 41-48.

[16]In merito alla dissolvenza dell'oggetto di studio e a nuovi modi per individuare il folklore al di là della connotazione formale, cfr. Dei F., 2008, 445-464.

[17]Appadurai A., 2001, 231-266; Vereni P., 2008, 33 ss.

[18]La figura giuridica del mastrogiurato venne descritta dallo storico lancianese Marciani C., 1974. Gli studi di Marciani, tuttavia, non erano motivati da una campanilistica e sterile idolatria del passato, bensì volevano rappresentare una utile scoperta di vecchie e nuove forme di libertà sociale nel capoluogo frentano. Le opere ebbero un'eco pubblica negli anni Settanta e sollecitarono l'invenzione del rito dell'investitura allo scopo di ricordare l'innovatività giuridica ed economico-sociale che la cittadina aveva nel Medioevo. Tuttavia essa, per il modo in cui è condotta, sembra sacralizzare la conservazione di quella disuguaglianze ascritte (genere, etnia e appartenenza nobiliare) che nel passato come nel presente sono agli antipodi dello sviluppo economico. Oggi, assieme all'attore popolare che personifica il Mastrogiurato, il quale è scelto tra i notabili maschi e anziani della città, al ritmo dei tamburi sfilano centinaia di figuranti vestiti da baroni, marchesi, mercanti e paggetti.

[19]A Vasto, il tempo di riferimento è il 1722, quando nel feudo, da parte del marchese Cesare D'Avalos e su delega dell'imperatore, venne consegnato al principe Colonna l'onore della collana dell'antico ordine cavalleresco del Tosone (ossia vello) d'Oro. Gli studi storici su questo episodio, coi suoi sfarzi e le sue presenze istituzionali, alla fine degli anni Ottanta hanno indirettamente

stimolato la cittadinanza a rievocare in forme rituali l'ammirata soggezione del popolo verso il potere nobiliare.

[20]Cocchiara G., 1981, Il mondo alla rovescia, Torino, Boringhieri.

[21]Heinich N., 2012, 1, 19-33; Giancristofaro L., 2006, 69-73.

[22]Cfr. le proteste del presidente dell'associazione "Il Mastrogiurato di Lanciano" per la repentina riduzione dei finanziamenti regionali: «I fondi non arrivano, o arrivano in minima parte rispetto a ciò di cui ci sarebbe bisogno. In pochi anni si è passati da 70 mila € di finanziamenti agli 8 mila dell'anno passato. La situazione è diventata insostenibile a causa dei circa 80 mila € di debiti contratti dall'associazione negli anni precedenti (…). Conti alla mano, viene spontaneo chiedersi come mai alla *Giostra cavalleresca* di Sulmona e alla *Perdonanza* dell'Aquila la Regione abbia erogato fondi, rispettivamente, per 50 mila e 80 mila euro. Chiediamo alla politica di non far morire questa storica manifestazione lancianese», in "Lanciano News", 3 luglio 2015. In seguito alle proteste, la Regione Abruzzo ha stanziato 50 mila euro, oltre ai 25 mila erogati dal Comune, in "Chieti Today", 6 settembre 2015.

[23]La popolazione abruzzese negli ultimi trent'anni è apparsa entusiasta di questa reinvenzione egemonica della tradizione nel livello popolare. Il fenomeno, peraltro, omologa l'Abruzzo ad altre regioni, cfr. Buttitta I., 2013, 64-77.

[24]Dal gr. anastḗlōsis "riedificazione", riferito alla cultura materiale dei popoli, dunque all'archeologia. Il termine viene in questo caso riferito alla cultura senza considerare che essa ha natura intangibile: non è possibile restaurare un oggetto simbolico, filosofico, volatile e, per sua natura, irripetibile.

[25]Specie per quanto riguarda il costume, la documentazione è interpretativa, campionaria e non del tutto attendibile, perché i ritrattisti avevano potenziato l'elemento pittoresco e festoso, evitando di immortalare gli aspetti indigesti della vita popolare, ovvero la povertà, la malattia, la disuguaglianza di età e di status, i quali vennero considerati solo dall'antropologia post-gramsciana, cfr. Silvestrini E., 1986, 5-44, e Dei F., 2008, 445-464.

[26]I cortei in costume storico, insomma, potrebbero avere una funzione identitaria e difensiva che è simile a quella di rassicuranti parate in uniforme, in Segalen M., 2002, 83-88.

[27]Spedicato Iengo E., 2006, 4, 296-303.

[28]Cfr. Ranisio R., 2014, 131-140.

[29]Apolito P., 2014, 50-78.

[30]Spedicato Iengo E., 2006, 296-303.

[31]Per esempio, converrebbe che un'associazione per le tradizioni popolari, anziché seguire lo spirito lobbistico e consorziale, si associasse con una per la

salvaguardia ambientale anziché con una sua omologa, e converrebbe che un'associazione di giochi medievali si associasse con una per l'inclusione degli stranieri di religione non cattolica, anziché con una sua omologa, con l'evidente finalità di aumentare il proprio peso politico. Purtroppo, le politiche associative locali tendono a finalizzare i percorsi di rete alla mera richiesta di finanziamenti pubblici piuttosto che allo sviluppo sociale.

[32]Sui nuovi modelli del processo culturale e sui loro condizionamenti, cfr. Hannerz U., 2001, 55-80.

[33]Gallini C., 2004.

[34]Cfr. Ciccozzi A., 2014, 46-49.

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Building with wood in the Mediterranean area

Antonella Della Cioppa[1]

Sunto. L'idea di costruzione in legno è spesso legata al concetto di temporaneità o ricreatività, ma, con le nuove frontiere dell'architettura biocompatibile, energeticamente efficiente, il legno viene proposto come una valida alternativa ai tradizionali materiali da costruzione. Il contributo illustra gli esiti di una ricerca tesa ad ottimizzare le prestazioni dell'involucro in legno in zone a clima mediterraneo, integrate a soluzioni tecnologiche come componenti opachi con intercapedine di aria chiusa o aperta fortemente ventilata.

Parole Chiave: edifici in legno, clima mediterraneo, Blockhouse, Platform frame, Timber frame, X-lam.

Abstract. The idea of wooden building is often linked to the concepts of impermanence or leisure; however, whit the new frontiers of bio-compatible, energy-efficient, wood is recommended as an efficient alternative to the traditional building materials. The paper shows the results of a research aiming at optimizing the performance of the wooden envelope in Mediterranean climate areas integrating technology solutions such opaque components with closed or opened strongly ventilated air cavity.

Keyword: wooden buildings, Mediterranean climate, Block house, Platform frame, Timber frame, X-lam

[1] Department of Architecture and Industrial Design (DADI) of the Second University of Naples – a.dellacioppa@hotmail.it

1. Introduction

Wood has always been used in building and in the last years, it is coming again in the fore thanks to more attention paid to the building sustainability and to an important technological innovation. Wooden houses are more and more demanded, thanks to a new awareness about the advantages to build with wood in terms of building quality, healthiness, earthquake safety and with a great value for money, but also because "wood is able to give an important answer to the growing attention to energy and environmental problems, aiming for the role of main character in the green economy, thanks to the ability of combining living comfort with an energy saving and the pulling down of the CO2 emission in the atmosphere" [7].

In the collective imagination, wooden buildings are temporary houses built quickly because provisional needs, as emergencies or for leisure, and with a limited life (as a tool shed or a mountain chalet). This opinion comes from the prehistoric men, who started building shelters when they left the natural shelters as caverns with materials they found around as wood and stone. Moreover, because of their life as nomads, the buildings had to be removable and dismantled, so they were unstable and makeshift. Since then much progress has been made, and today wooden buildings are much more complex and technologically advanced.

Mountain area and cold climate is particularly favourable for this building process thanks to the high availability of the raw material in situ determining in the course of time a consolidated building tradition. However, wood can be a valid alternative to the traditional materials for buildings (bricks, cement and steel) also in southern countries with a warm mild temperate Mediterranean and subtropical climate.

In the Mediterranean area, the use of wood is traditionally limited to building roofs, floors, finishes (windows and doors), but it is rarely used for buildings and cladding, because the prevalent need is the control of free solar gains. In fact, for the buildings in the Mediterranean area, the "shadow right" has priority over the "solar right", as the Mediterranean climate invites to consider prevailing the technological

and design parameters related to the energy performance for summer air conditioning: energy needs for cooling and dehumidification [5].

Energy consumption in our country showed that the consumption for air conditioning in summer is greater than heating in winter, therefore, at present the attention to the protection from summer heat is extremely interesting for designers.

This research aims to define the possible technological, building and design solutions useful to optimize the wooden envelope performance in the Mediterranean climate areas. The research, divided into phases, is first of all about collecting the information about climatic features and the traditional building techniques of the Mediterranean, and also technical data about firms specialized in wooden prefabricated houses. This enables us to understand deeply the geographic context and the current market supply characterized by different building systems provided with specific features.

Then, it is about the analysis of minimum requirements as requested by the Italian law to firms producing wooden prefabricated houses, about energy-environmental performances of buildings to define potential requirements that wooden houses should have if built in a Mediterranean climate area.

2. Strategies to optimize wooden envelope performances

In Mediterranean climate areas (A, B, C and D), the main need, linked to the climate is not to reduce the thermal dispersions in winter but the thermal store in summer. Another factor that gives a great contribution to create a not-comfortable situation in these areas in summer is the relative humidity that reaches 90% peaks, increasing the physical heat perception and causing breathing difficulties.

The climatic conditions of Italian coast area can be compared to the foreign coast in the Mediterranean area (Fig.1) where it is possible to find the same features and technological solutions because of the climatic conditions.

Buildings in the Mediterranean area are compact to grant the most advantageous ratio between the envelope surface and the heated

volume, and efficient with regard to thermal dispersions in winter, with small opposed openings to favour the natural ventilation in summer, with variable arrangement spaces (portico, loggia, patio, filter spaces, greenhouses) that have a selective behaviour optimizing performances all the year long. [3]

In the Mediterranean buildings, the exposure to south is favoured to pick up solar rays through the openings in winter, when the sun is low, and to shade the glass surfaces from solar rays in summer, when the sun is high, with horizontal eaves such as balconies, loggia, limiting the east and west openings, because there in winter energy is exiguous, when the sun is low and has a limited duration. In fact, the sun track is short in winter, while with the overheating in summer, when the sun is low and goes in depth, the solar track is longer and the rays are difficult to shade.

Generally, the northern side, that is touched by the sun just at the sunrise and the sunset in summer, is characterized by limited openings to avoid dispersion; these are necessary just to activate the natural ventilation during the warm season to “unload” during the night the heat collected by the south wall during the day. A typical Mediterranean building is the house with a patio, which has a compact structure with openings just towards the patio.

Fig. 1 Areas with a Mediterranean climate

A building element is the roof that represents the sky connection of the building. It is necessary to pay much attention in the Mediterranean area. Obviously, this element is affected by the direct sunshiny more

than any other is. The Mediterranean houses' roofs are of different types and the most used are vaulted, dome and terraced.

Every type has a building tradition based on experience and the tests had as result optimal functional performances.

The terraced roof is done with a further roof using light materials as straw and textile that ensures to shade by solar rays and creates a usable room open on the sides [6].

This light roof is removed in winter to enable the solar rays to heat the roof ensuring the free solar supplies to the underlying space.

Because of their shape, the vaulted or dome roofs favoured the reduction of thermal accumulation on the surface irradiated by the sun directly, and consequently the quantity of thermal energy absorbed and transmitted to the interior side. Moreover, they contribute to activate the convective motions for the internal ventilation. To improve the airflows, on the vaults or dome is upper side there is often an opening to flavour the discharge of the internal warm air.

Another very important factor to control in the Mediterranean buildings is the colour.

The colour influences the surface absorption and the transfer of the energy received for radiation: the dark colours have a high absorption's coefficient, while the light colours have a low absorption's value. Therefore, dark colours that absorb mainly solar radiation must be avoided in warm climates, while light colours, that reflect it, reduce the thermal energy reception.

Among comfort requirements established by the M.D. 26/06/2015 (Att. 1), it is clear the request to use cool roof with high solar reflectance materials with a minimum value of 0,65 for the flat roofs and of 0,30 for pitched roof to limit the energy needs for summer air conditioning.

In fact "*Encouraging the eco-efficient and auto-sustainable-oriented technological innovations is the current researching and working conditions' main feature (from net zero energy buildings to plus energy buildings). They can be the result of a mental innovation, both ecological and environmental. For the technological choices, it is not enough integrated in the cover a photovoltaic or solar thermal system to build an energetically efficient building [...] When choosing building*

materials and systems, it is important to incentivize the techniques and local traditional materials' appreciation, well translated in an innovative way, and the products' choice to be eco-friendly and recyclable. From these points of view, wood is a material with a very good performance" [2].

Project solutions involving raw materials and the fulfilment with a checked environmental and energy cost in a lifetime... and over! They are the answer to the growing awareness in the building field, that proposes wood as a natural building material with the great advantage to be not harmful to man's health and to be eco-friendly and renewable, according to the "environmental aware" attitude.

However, the use of fully natural materials when building wooden house caused higher prices in comparison with traditional buildings.

In fact, bio-buildings even with a higher initial cost permit to recover these costs with lower energy consumption and a very low building maintenance.

Wood is characterized by a low value of thermal conductivity, so the buildings built with this material perform very well from a thermal and acoustic point of view. This permits to reduce heating losses in winter and cooling ones in summer.

It is possible to say that a wooden wall of 25 cm thick isolates as much as a concrete wall of 60 cm thick.

There are different building techniques for wooden buildings. The most widespread techniques are essentially four:

- Blockhouse, consisting of wooden slats or trunks overlapping directly on the building site to build the self-supporting walls thanks to special 3D clamps;
- Platform frame, consisting of assembling the single walls directly in a firm, following a 2D frame structure. They may be subsequently enveloped with various finishing materials;
- Timber Frame, consisting of assembling directly on the building site wood beams and pillars joined with a complex system of joints. In addition, in this case the envelope can be done using various materials.
- X-lam, consisting of assembling in a firm the walls with 3/5/7/9 wooden layers forming a cross structure and then pasted

together. Then the walls are covered with various finishing materials.

The first type is the oldest and the most rustic, typical on mountains with a heavy structure but with big limits about the dimensions of the rooms and the different shape that the building may have, because of the length of the usable axes or trunks. The other types have in common the finishes versatility that makes them more similar to the traditional building made with other materials.

The timber frame is the builders' favourite type, because it is possible to adopt an important design freedom and architectural solutions. On the contrary, the platform frame enables a huge design simplicity and maybe just a little advantage in terms of building costs and time. This is more standardized, penalizing design and personalization.

The building aspects, technical and formal, to consider optimizing the buildings' performances in the Mediterranean area are mainly the natural ventilation, shades and the solar absorption coefficient of the external finishes [2].

In particular, in warm climates and in summer, ventilation is an efficient tool to guarantee the passive cooling of the buildings. The air movement and renewal, that are greater when higher is the difference between indoor and outdoor temperature and pressure difference, remove naturally the excess heat from the buildings because of thermal convection. This ensures to find cool and permits to improve the air quality.

Even the shadows give a great deal to the thermal accumulation control because they reduce the thermal contribution caused by the direct solar radiation.

To create an efficient system it is possible to adopt some more or less complex design strategies. The law about energy performance control of the buildings states the use of shading systems to reduce the heat contribution by radiation through glassed surfaces. Working on the building's geometry it is possible to create on the façade alternated full and empty layers or horizontal projections ("wrinkling") that create shadows.

In summer, shading systems have to guarantee shadows on transparent surfaces with a South-West/South-East exposition to obtain 70% shading percentage. It is also important to use systems to reduce incoming heat for solar radiation in summer and not impede the free solar supply that is needed in winter: protection systems must limit the direct radiation in summer, but it must be allowed in winter.

Moreover, for a better use of building materials, it is needed to know their "behaviour" with a high temperature or its variation.

Considering the different thermal features, choosing a material for the finishing of the external opaque surfaces depends on the absorption and the emissivity's coefficients.

The absorption's coefficient of the solar radiation (α) indicates how a material can absorb radiating energy that affects itself; in general, dark and rough surfaces heat more than the light and smooth ones. The emissivity (ε) indicates how a material consumes the radiating energy that affects itself; in general, dark and rough surfaces consume heat more than the light and smooth ones. It is recommended to use materials with a low α and with a high ε. It is not simple because materials often have opposed parameters [1].

These two parameters influence the temperature control of the external surfaces of a building, in particular in the Mediterranean areas where the affecting solar energy is very high especially in summer. The surface's temperature of an opaque envelope's element exposed to the sun defines a heat quantity that will be able to get inside the building.

Therefore, in warm areas as in the Mediterranean areas, it is necessary to control as much as possible the incoming and outgoing thermal flux, acting on the external surface's finishing (material, colour and roughness) and using shading systems of the solar radiation. To evaluate the performances comparing them, the building elements considered in this research are the external wall (Tab.1) and the roof (Tab.2) because these elements are the most substantial borderline between indoor and outdoor.

FIRMS' COMPARISON - COMPULSORY REQUIREMENTS													
BUILDING SYSTEM_Platform Frame	BUILDING ELEMENT_ **EXTERNAL WALL**												
	FEATURES												
	Transmittance (W/mq.K)	Shift	Thickness	Structural material	Material	Vapor Barrier	Cover	Waterproofing	Internal Insulation	External Insulation	Anchors to the foundations	Earthquake resistance
Firm A	0,14	---	31 cm.	White or red spruce	Hardwood	yes	Wood conglomerate - Masonite	yes	Wooden fibre	Various materials	Steel brackets	yes
Firm B	0,16	12 h	31,4 cm.	Scandinavian pine	Plywood	yes	OSB Panel (oriented strand board)	no	Wood wool	Wood wool + Magnesite	Steel threaded boards or pressure plugs	yes
Firm C	0,14	13 h	29 cm.	---	Hardwood	no	OSB Panel (oriented strand board)	no	Wooden fibre or mineral wool	Wooden fibre or mineral wool	---	yes
Firm D	0,13	14 h	27/34,6 cm.	Conifer	Plywood	yes	OSB Panel (oriented strand board)	no	Wood wool	Rock wool or cork	Steel threded boards and chemical resin or through pressure plugs	yes

Tab. 1 Firms' comparison about compulsory requirements' when building external walls.

FIRMS' COMPARISON - COMPULSORY REQUIREMENTS												
BUILDING SYSTEM_Platform Frame	BUILDING ELEMENT_ **ROOF COVER**											
	FEATURES											
	Transmittance (W/mq.K)	Shift	Thickness	Structural material	Material	Vapor Barrier	Cover	Waterproofing	Insulation	Anchors to the walls	Ventilated roof
Firm A	---	---	25,2 cm.	Spruce	Hardwood	yes	Fireproof plasterboard	Slated Sheath	Mineral wood	Steel brackets	no
Firm B	0,17	5 h	28 cm.	Spruce	Plywood	yes	OSB Panel (oriented strand board)	Slated Sheath	Polystyrene XPS	---	yes
Firm C	0,16	13 h	22 cm.	---	Hardwood	no	OSB Panel (oriented strand board)	Grip cloth	Wooden fibre or mineral wool	---	yes
Firm D	0,20	11,4 h	20,5/27 cm.	Conifer	Plywood	yes	OSB Panel (oriented strand board)	Slated Sheath	Rock wool or wooden fibre	---	yes

Tab. 2 Firms' comparison about compulsory requirements' when building a roof cover.

The comparison of transmittance, phase-shift and abatement parameters is needed to understand if there is an adequate technological solution. In fact, the cover thickness varies from 22 cm to 28 cm, the transmittance values are quite the same for every firm while the shift varies a lot. For covers, the shift is from 5 hours minimum to 13 hours maximum. This data is very important for the Mediterranean climate because, in these areas, the law imposes a 12 hours shift to guarantee the removal of the daytime thermal loads during the night. From the tables, it is clear that the firms use different materials for the buildings, covers and insulation without a significant variation of the compulsory requirements.

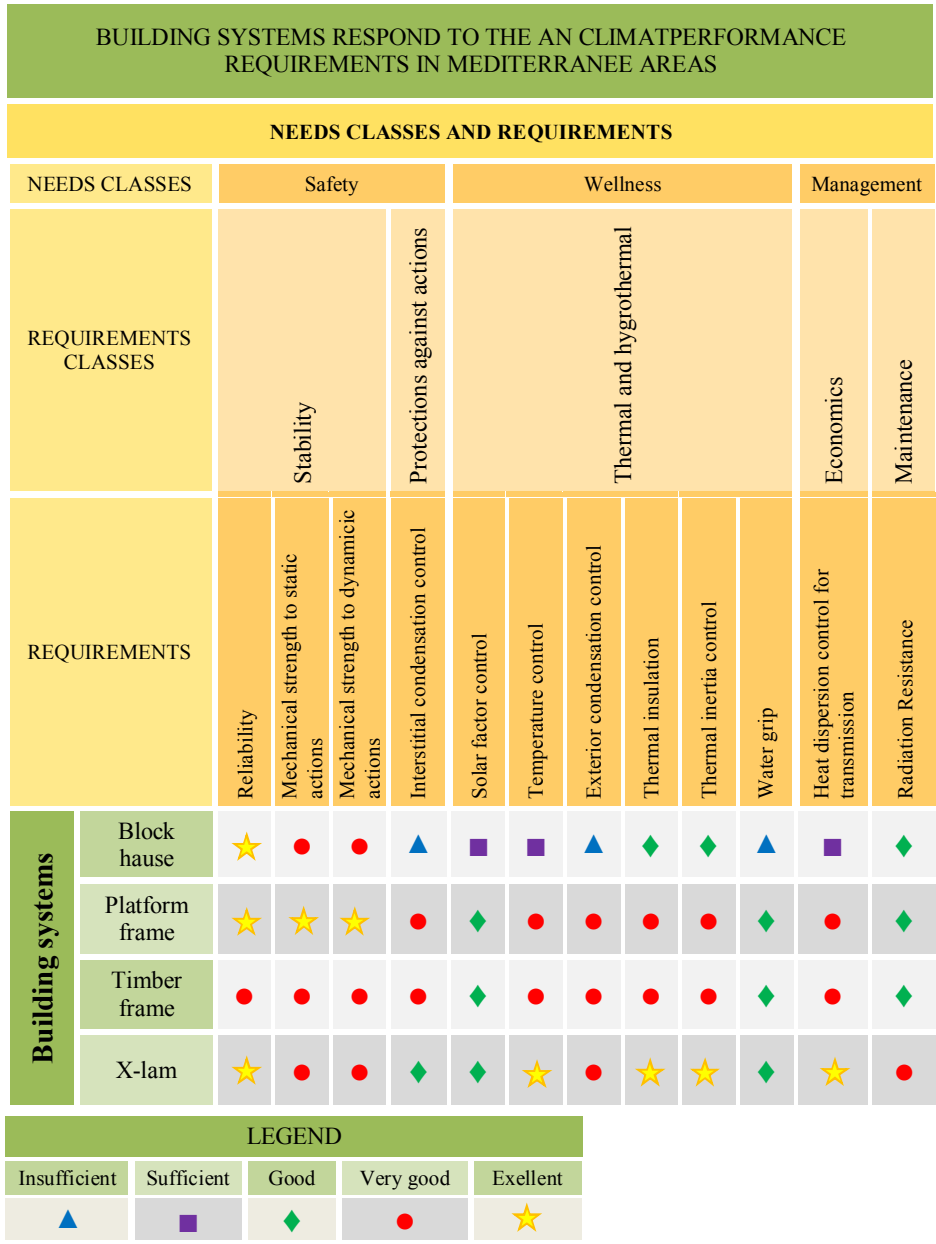
To analyse and compare the most common building systems, there is a table (Tab.3) in which there are all the needs and requirements according to the UNI laws to define the building and the systems involved (environmental and technological).

In the table, there are just the most important requirements and the main features of wooden houses according to climate conditions of the Mediterranean areas. This analysis showed that, about safety, the building systems have a good attitude to keep unchanged the supporting functions of the structural elements, according to external climate conditions with a slight decrease for X-lam system that evaluating the dissipative capacity and thanks to the Structural Factor q0, it is less strong than others are.

About thermal and thermal-hygrometric requirements, the results are less favourable for the Block House system. This system is made up of a unique wooden block, where a good external insulation is not allowed unlike other systems that have multilayer walls created to improve the performance. Also for managing, the Block House system has low performance features for the Mediterranean climate.

For this building system, the control of thermal inertia is more difficult than other systems and so more energy is needed for heating, but also for cooling or for an isolating integration.

To sum up, a careful design that considers the integration of technological solutions able to guarantee environmental comfort conditions during the year enables the use of wood as a building system in the Mediterranean area.



Tab. 3 Building Systems Respond To the performance requirements in Mediterranean climate areas' scheme

An eye to the past helps to capitalize the knowledge based on experience acquired in centuries of building activity without thermal installation.

"*This doesn't mean that it has to be a traditional or vernacular architecture, because the morphological, typological and technical-building solutions suffer an evolution in relation to the emerging needs and the introduction of new materials and new building systems. [...] Designing nowadays in the Mediterranean areas means to understand the reasons linked to the climate, to resources, to materials of the places. Designing in these areas doesn't impose a lavish reference to traditional building architecture of those areas, but an innovative interpretation of the reasons that lead the realisation for centuries*" [4].

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Energy redevelopment of historical centres in the pursuance of the cost-effectiveness principle

Maria Fiorella Granata[1]

Abstract. In historical centres the search for architectural and plant design solutions for the achievement of higher energy and environmental performances of buildings has to reconcile the preservation of the peculiarities of the building stock on the one hand and the economic efficiency of the interventions on the other one. The cost-effectiveness principle, which is adopted by European policies for the improvement of energy performances of the building stock, may be satisfied through the use of specific macro and micro-economic valuation models.

Keyword: cost-effectiveness; energy redevelopment; historic centres; operational model.

1. Introduction

The improvement of efficiency in energy use is a global objective for the need to combat climate change [1] and handle the critical issues related to energy supply in many countries [2]. Negative effects of non-efficient energy use impacts also on human health and quality of life [3].

Climate change is an ominous phenomenon affecting rural, natural, and urban areas on all sides of the world. Main risks of climate change for urban areas concern air pollution, heat waves, extreme precipitation and storm events, inland and coastal flooding, landslides, increased drought and water scarcity [4]. Other damaging effects are also the distributive impacts on poor populations in both rich and poor nations due to the less capacity to respond to them [5].

[1] Department of Architecture, University of Palermo, Italy; maria.granata@unipa.it.

It is recognized that cities are responsible for the global climate change owing to their important contribution to the production of greenhouse gases, but they have great opportunities for reducing it nevertheless [1, 6]. In particular, the urban stock of building is considered a key sector for its potential in reducing the impacts of cities on climate change [6].

Almost all the nations of the world have recognized the importance to manage the worrying aforesaid phenomena and recently committed themselves to tackle the problem [1].

The European Community has integrated the improvement of efficiency in energy use into policies on buildings and recognized, since the initial directives for energy efficiency (93/76/EEC and 2002/91/EC), the strategic importance of the economic factor in energy improvement, proposing the cost/benefit principle as a criterion for decision in the definition of measures to improve the energy performance of the stock of buildings.

After anticipating the Community regulation on the Energy efficiency with the law no. 10/1991, which was not mostly accomplished for a long time, Italy provided itself with a National Energy Strategy and a National Action Plan for Energy Efficiency, which involve the civil building sector whose final energy consumption is about a 39.1% of the global national one [7]. Since 2005 Italy has adopted a series of measures for the implementation of EU directives in energy efficiency matter, which require the identification of optimal levels of energy performance based on the criterion of the global cost.

This work focuses the energy redevelopment of historic centres, since almost a 50% of the Italian stock of residential building was built up before the year 1961 [8]. The improvement of the energy performance of buildings can be an objective compatible with the needs of conservation even of historic buildings, provided that the specificities of each case are taken into account.

This paper is organized as follows. First the identifiable relationship between energy improvement and the real estate market in Italy (section 2) and the role of the cost-effectiveness principle in energy policies for the management of the stock of buildings according to the macroeconomic and microeconomic points of view (section 3) will be

outlined. Then the specificities of the energy redevelopment in the historic centres will be discussed, also in relation to the applicability of Italian tax and financial reliefs (section 4). Finally an operational model for the energy requalification of historical centres will be proposed (section 5) and some concluding remarks will be given (section 6).

2. Energy redevelopment and real estate market in Italy

The market value of a building is made up of a natural component, resulting from the cost of production factors and services used and covering a rate of normal profit, and a speculative component resulting from a complex of micro and macroeconomic factors [9] influenced by cultural, political and socio-hermeneutical tendencies [10, 11].

Empirical evidence shows that, in general, buildings with higher energy performance have higher cost of construction [9], but also a value advantage of the order of 5-12% on the Italian real estate market [12], with a market price premium for increase of energy class that is stronger between lower classes that between the higher ones [13].

The energy certification of buildings, introduced by the Law no. 10/1991, Article 30, has become mandatory in Italy for the alienation and the lease of the properties since 2007 as a result of the Legislative Decree no. 192/2005, Article 6. The data above mentioned confirm that the "energy performance" of buildings, as it is defined by the Ministerial Decree of June 26, 2015, assumes an explicit role in the real estate market. While the analysis of the financial feasibility of an investment according to the different points of view of the manufacturers, the owners and the users of the buildings would lead each of these actors to focus their interest to the energy aspects of different stages of the life cycle of buildings [14], the certification of the energy performance, giving an economic role to the energy quality in the real estate markets of sales and leases, has the merit to converge the different positions, involving directly or indirectly the economic actors in all phases of the life cycle of the buildings.

3. The cost-effectiveness principle in the energy policies for buildings in Italy

The need to contrast the global climate crisis cannot escape the consideration of the economic and financial feasibilities of interventions on buildings. Otherwise, the search for the optimal solution in terms of energy savings profile could result in an unnecessary dissipation of financial resources diverted from other public and private uses.

The reconciliation of the improvement of energy performance with economic and financial feasibilities has assumed full centrality in Directive 2010/31/EU on the energy performance in buildings, which was implemented in Italy with the Decree Law 63/2013. The Directive 31/2010/EU introduces, by the Regulation (EU) no. 244/2012, a benchmarking mechanism to determine optimal levels of cost to be used to formulate energy prescriptions for buildings, taking into account the outdoor climatic and local conditions (Article 1, paragraph 1). In order to define regulations applicable at national level, the Regulation requires the identification of optimal levels of energy performance based on the criterion of the overall cost, relative to the reference buildings which represent the whole typological and constructive categories of buildings.

The "'cost-optimal level' means the energy performance level which leads to the lowest cost during the estimated economic lifecycle"[1] (Article 3, paragraph 14). In economic and estimative terms, it needs to identify the highest level of effectiveness of interventions for the energy quality of the buildings achievable with permissible levels of cost, taking into account the local climatic conditions. Where subsequent modest energy efficiency improvements would result in higher incremental financial commitments there would be less investment opportunities.

The Directive founds the calculation of the optimal levels of energy performance in a function of cost on the energy "global cost" methodology (UNI EN 15459: 2008), and proposes to adopt the "microeconomic" ("financial") approach or the "macroeconomic" approach. The first one corresponds to a private perspective, whilst the second one fits the public point of view.

The global cost includes the initial investment cost, the annual costs (running and replacement cost) and the final value, or, where applicable, the disposal cost. Moreover, in the "macroeconomic" view, the cost of greenhouse gas emissions in terms of the monetary value of environmental damage caused by the building must be added (figure 1).

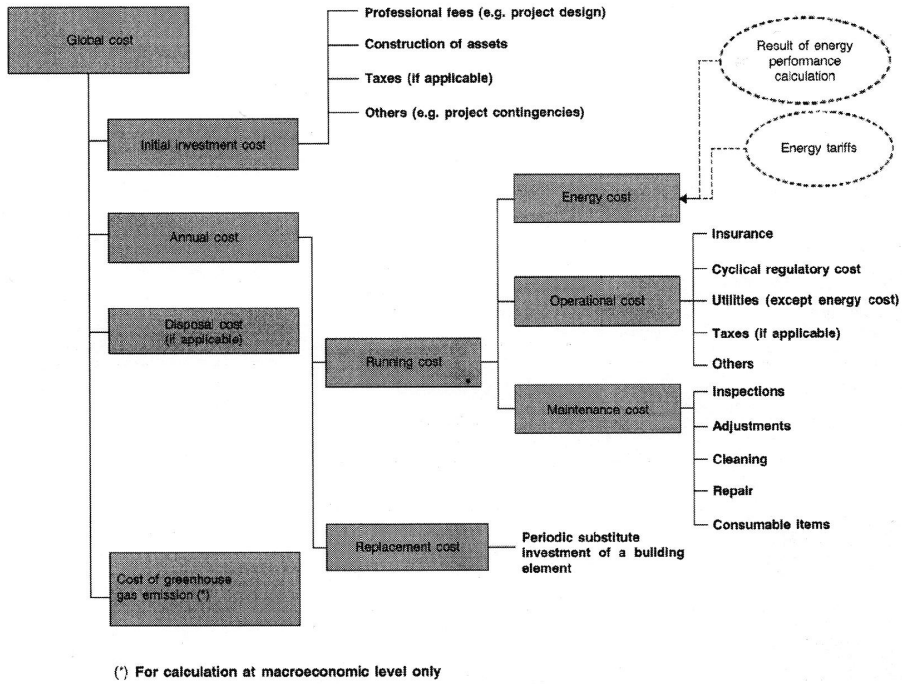

Fig. 1 - The global cost according to the framework methodology
Source: European Commission, Communication 2012/C 115/01, p. 16.

In the microeconomic evaluation approach, we consider only the costs and monetary benefits arising directly from an investment, taking into account market prices, applicable taxes and subsidies, but excluding the costs of environmental damage caused by greenhouse gases and other pollutants. In view of the provisional nature and,

however, of the variability of energy incentives, the Regulation allows the possibility of calculating the total cost from the microeconomic point of view neglecting the subsidies for private investors. In this case, any gains arising from the energy produced will not be considered. Discount rates consistent with market conditions will be used.

In the public or "macroeconomic" perspective the costs and benefits indirect and induced by a certain investment in energy efficiency must be considered, which apply to other entities different from investors. In this case all the taxes, incentives and applicable subsidies are excluded from the calculation of the total cost, while the costs generated by the emission of gases that alter the climate and other pollutants are included. Discount rates compatible with the strategic priorities and the general economic conditions of member states will be adopted.

In the financial and public approaches, the discount rates to be used for the sensitivity analysis must be expressed in real terms.

For the operational purposes it is relevant to note that the estimate of the overall cost in both types of calculation provided by the Regulation have restrictions of validity. In general, the financial analysis carried out for the reference building does not necessarily provide the best results for the individual investment decisions: The sustainable solution for energy improvement actually depends on the specific building and on individual financial perspective of the investor. With regard to the macroeconomic analysis, the monetary approach is not able to seize all the externalities of an investment for energy improvement to society, since some benefits are intangible and cannot be monetized or may still entail in significant difficulties for monetary quantification.

4. Energy redevelopment and historical centres

4.1. Peculiarities of energy redevelopment of ancient buildings

The improvement of the energy performance intends to contain the operating costs of buildings. This objective is not considered feasible only for recently built or new buildings, but it is compatible with the

needs of conservation of historic buildings, even under a protection regime. In fact, the Legislative Decree on the energy performance no. 192/2005, Article 3, paragraph 3a, recently amended by the Law no. 90/2013, limits the derogation to its application to cultural heritage, including the historic centers, in the one case in which it is ascertained that the fulfillment of energy requirements involves substantially distortions of their character or appearance, with particular reference to historical, artistic and landscape patterns.

In general, the energy redevelopment of buildings in historic centers poses particular constraints arising from compliance with traditional forms, materials and building techniques. The identification of redevelopment interventions presents even greater difficulties in the cases where protection restrictions on built heritage are in force, imposing the respect of the original buildings to preserve their "expressive authenticity" (Venice Charter for the restoration and preservation of monuments and sites, 1964).

To deal with the specificities of the energy qualification of the historic buildings, the Ministry of Heritage and Culture and Tourism prepared special guidelines aimed at combining the optimization of energy performance with any existing constraints on the building [15]. The guidelines provide direction on methods for conducting the energy audit, the identification of opportunities for energy savings, and the operational phase of the intervention on historic buildings.

4.2. Applicability of the Italian tax and financial reliefs for the energy redevelopment of historic buildings

The European Community regulations provide that the calculation of the global cost of energy redevelopment interventions can be conducted according to the two ways in which the active tax and financial reliefs are taken into consideration or are disregarded.

Tax deductions for energy redevelopment of buildings for civil use have been introduced in Italy by the Law December 27, 2006, no. 296, for the year 2007 and, even if they have undergone several revisions, are still in force (Law December 28, 2015, no. 208). For the current year

they consist in a tax deduction equal to a 65% of the expenditure incurred for interventions increasing the level of energy efficiency of existing buildings, regardless of the intended use.

The interventions subsidized are both the overall upgrading of buildings and individual interventions on the wrappers of the buildings, the replacement of winter heating systems, the installation of solar panels for the production of hot water, the installation of home automation systems for control of heating, hot water production and air-conditioning plants. For each type of intervention the maximum limit of deduction is set.

For small size interventions for increasing energy efficiency and the production of thermal energy from renewable sources, private entities can also take advantage of the so-called "thermal account" (Conto Termico), regulated by D.M. December 28, 2012. The incentive consists of a contribution to the implementation of interventions for the increase in energy performance of existing building envelopes and of existing equipment for space heating and for the installation of plants using renewable sources.

The continuity with which the tax relief has remained active after it was introduced suggests the possibility that it might become a structural advantage [7]. This promises the utility to consider the facilitation in guidelines for the energy redevelopment of a given historical center. Since in the cases of the global redevelopment of buildings and of works on building envelopes the deduction is subject to the achievement of pre-established energy efficiency requirements, the compatibility of these limits with the interventions that can be made on the special historic buildings in question must be verified.

5. Proposal for an evaluation model for the energy requalification of historical centres

The recovery of historical centers must frequently deal with specific problems, for example the difficulty of movement of modern means of transport in narrow and/or winding streets, which can help to increase the heaviness of interventions. Another economic limit may

result from the difficulty of access to the tax incentives for energy improvement, which are subject to the achievement of predetermined energy performance levels.

In old centers, since the buildings are often characterized by highly variable types of construction, volumetric shapes and spatial orientations, the adoption of the minimum performances of the reference buildings nationally defined does not appear viable[2].

As it was recalled above, in the legislation on the matter, the financial evaluation of interventions poses into relation the possible actions for the improvement of energy performance with their discounted global cost, calculated in the two modes in which the final value is included or excluded. ENEA (National Agency for New Technologies, Energy and Sustainable Economic Development adopted the second hypothesis in the procedure developed for the "Strategy for the Energy Requalification of the National Real Estate" ("STrategia per la Riqualificazione Energetica del Parco Immobiliare Nazionale", STREPIN) prepared for the Ministry for economic development. The model proposed by ENEA solves an evaluative problem of classification of the redevelopment interventions considered in order to identify the actions that meet the criterion of the optimal cost. Developed in compliance with the requirements of European Regulation no. 244/2012 and the relevant non-binding guidelines, the model refers to the whole Italian territory. As required by legislation, for each category, the reference building represents "the normal and average" building and must be representative of the most common physical, technical, construction, and use parameters [7]. The reference buildings considered in the ministerial strategy are not always comparable to those of the cities into account, since they do not consider the huge variety of physical shapes and construction techniques in the national territory. This problem is even more significant for buildings in historic centers, where peculiar architectural styles, construction and urban morphologies techniques affecting the energy performance of buildings may be found.

In view of the technical, construction and climate characteristics of each place, it could be appropriate to prepare ad hoc studies identifying

actions suggested on the basis of a cost-effectiveness evaluation, in order support the financial efforts of the actors implementing them.

With reference to a specific stock of historic buildings many of the parameters indicated by the above national guidelines on the definition of subcategories of buildings are sufficiently homogeneous. It is the case of the age, the size, the protection constraints, the construction products used in load-bearing structures and other components. The reference buildings to be considered will therefore be limited to the number required to define the variability of orientations and shadings induced by natural or constructed barriers to solar radiation that can have a significant impact on energy demand.

The ad hoc approach proposed here aims at reconciling the opportunity to have a realistic picture of the stock of buildings in question with the need for a smaller computational burden of primary energy requirement resulting from the energy efficiency measures and packages of measures that can be adopted in the historical urban areas considered[3]. The financial evaluation of investments for improving the energy behavior related to specific reference buildings for the urban context into consideration can, with good approximation, reflect the investor convenience, unless of subjective characteristics in relation to the expectations and willingness to invest.

Although the European Community regulations on energy efficiency of buildings are actually addressed to the Member States, even in the definition of guidelines to be applied at the municipal level, it could be useful complementing the financial evaluation with the public one, in which the economic and non-economic costs and benefits associated to the interventions are considered.

The financial and macroeconomic evaluations constitute an overall information system able to better direct the redevelopment of buildings, even at the local level. The micro and macroeconomic evaluations should also be developed in two versions in which the available financial and tax reliefs are taken into consideration or are overlooked.

For a given historical center, it would seem useful for the above purposes the preparation of a specific evaluation model, based on the principle of cost-effectiveness, which could support decisions on upgrading the energy efficiency. As it was shown in the case of the

urban areas of more recent formation [16], the model should put into connection a dual system of evaluations through a related system of spreadsheets. The one should allow the calculation of a set of financial indicators (investment costs, operating costs, global cost, revenues or savings, discounted payback period), the other a system of energy-environmental indicators (energy consumption, self-production of energy, emissions of CO_2 and other pollutants saved). Given an energy upgrading category of intervention, the integration of the two systems of indicators will allow the identification of its costs in the different phases of the life cycle[4] of buildings, the level of energy performance achieved, the tax and financial reliefs accessible in the specific case and the global cost, integrating or not the public help. The system of energy-environmental indicators in the macroeconomic part of the evaluation model supplements the cognitive framework, providing additional elements for the choice of interventions. Since the externalities, or effects not directly attributable to the investment, are not all translatable into monetary terms for the calculation of the overall macro-economic cost, and the environmental externalities are minimally included in market values and supplemented with difficulty in accounting prices, the analysis of economic efficiency prescribed by European directives could be usefully conducted through a system of non-monetary indicators that can provide a comprehensive information framework on the effects generated by the intervention itself, on the model of the cost-effectiveness analysis in which the environmental costs and benefits are measured in physical terms[5].

Given a reference building and subsequent levels of energy performance achievable by the different categories of intervention, the combination of the results provided by the model in its financial and macroeconomic parts will enable to establish the preferable interventions on the base of the cost-effectiveness principle. The overall analysis of the results will allow extrapolating reasoned guidelines for energy upgrading of the urban context under consideration.

The main steps of the analysis proposed include: the identification of the building types recurring at the local level, defined by the spatial conformation, the volume, the constructive techniques and exposures; the identification of eligible interventions in accordance with the

existing architectural and technical constraints; the calculus of energy performance (in terms of savings in energy consumption) and environmental performance (reduction of CO2 and other pollutants emissions), of the investment cost and the management costs of the "building-facility system" to achieve, if possible, the minimum level of energy efficiency required by current legislation; the calculation of the above indicators corresponding to further improvements in energy performance; the identification of the recommendable interventions for each building and construction type found in a perspective of analysis of the building lifecycle.

6. Conclusions

The EU Regulation no. 244/2012 requires Member States to identify optimal levels of energy performance on the base of the global cost criterion.

The achievement of lower energy consumption in the buildings is the result of a complex system of factors involving the disposal of urban spaces, the spatial and technical-constructive shape of the buildings and the same behaviour of the users. In addition, in the consolidated cities the objective variables on which it is possible to intervene are reduced to only those related to the horizontal and vertical enclosures of buildings and technological installations.

The particular characteristics of the urban plots and construction methods in town centres define their architectural identity on the one side and create specific constraints on possible interventions for energy improvement on the other. Despite these difficulties, there is a need to reconcile the conservation of the historical areas with the performance standards of the indoor spaces required by the contemporary users and, with regard to energy performance, by current legislation.

The search for architectural and plant design solutions for achieving higher energy performance of buildings has fueled numerous studies. Nevertheless, the theme of the relationship between energy/environmental performance and economic efficiency [17, 18, 19, 20] requires further investigation, since the quest of cost-effective

design solutions in the field of energy quality of buildings cannot be separated from the specific macro and micro-climatic context [21, 22], from which they are heavily dependent, and from the specific building types and construction techniques locally in use in new buildings [14, 16] and in the historical buildings [23]. Therefore, in general, the adoption of the results of studies concerning different climate, urban, architectural and structural contexts is not effective. Decisions on interventions for the rehabilitation of the stock of buildings in a given historical center can only be adequately supported by specific investigations adhering to local peculiarities.

The definition of specific guidelines, designed for the energy redevelopment of a given old town, appears a useful tool to provide basic indications that, although perfectible in relation to individual buildings with the help of technicians, can provide guidance for the real estate owners' investment choices and support the public management of urban transformations. In such a context, the use of integrated assessment of energy redevelopment interventions [11, 24] is particularly effective.

The model proposed for the evaluation of the sustainability of the energy redevelopment interventions is based on a fundamental system of ecological and economic-financial impact indicators, calculated for an adequate number of reference buildings that represent the majority of the buildings of a given historic center. The assessment model is capable of providing an adequate information support to orient the intervention choices on the buildings on the basis of the relationship between energy-entropic quality and private/public costs. In particular, the additional information supplied by the energy-environmental indicators of the macroeconomic part of the evaluation model will provide local authorities with elements useful to establish the preferable interventions on the base of the cost-effectiveness principle and to identify the need for possible special forms of stimulation of investments for energy improvements of historical buildings.

Notes

[1] The lowest cost is determined taking into account the investment costs related to energy improvement, the maintenance and operating costs (including the energy costs and savings and the earnings from energy produced) and, where applicable, any disposal cost. The "estimated economic lifecycle" refers to the remaining estimated economic lifecycle of a building where energy performance requirements are set for the building as a whole, or to the estimated economic lifecycle of a building element where energy performance requirements are set for building elements (Directive 2010/31/EU, Article 2, paragraph 14).

[2] In ancient centres energy performance levels of the buildings can be improved but not always the thresholds of access to incentives can be reached [Baldi G., Collura S., Iuliano L., Karra M., Mandracchia S., Linee guida per il recupero e la valorizzazione del centro storico di Modica. Il tema della riqualificazione energetica del patrimonio edilizio (Guidelines for the reclaiming and the improvement of the historical centre of Modica. The theme of the energy redevelopment of buildings). Supervisors: G. Trombino, G. Rizzo, M. La Gennusa, M.F. Granata. University of Palermo, academic year 2014-15].

[3] A general list of possible energy efficiency measures on buildings that are not protected is provided by the European Commission in the Guidelines accompanying Commission Delegated Regulation (EU) No. 244/2012, paragraph 4.1.

[4] In assessing the energy efficiency and related costs, the energy embodied in the building can be neglected and the only phase of use of the building can be included in the analysis, because of the difficulties of retrieval of the primary data [25] related to the construction process and prediction of the complete life cycle of buildings due to their susceptibility to suffer physical and functional changes [26]. This simplification is assumed in the ministerial model elaborated by ENEA [7].

[5] The cost-effectiveness analysis compares in a public perspective the effects of an action with the associated costs, refusing to monetize the benefits generated by the same action. The cost-effectiveness analysis can be usefully applied when the effects of an action are monetized with difficulty, as it occurs in interventions for redevelopment of buildings

whose consequences concern the protection of ecosystems and human health, the well-being of users, the mitigation of climate change and the prevention of other undesirable environmental effects.

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Mediterranean think tank to share urban energy policies and measures: *meethink_energy project*

Antonella Trombadore[1]

Abstract: MEETHINK_Energy is an european research project leaded by Tuscany Region under Horizon 2020 call for proposal, involving 30 municipalities of 6 different EU countries to develop a *Mediterranean think tank* to share urban energy policies and measures stimulating a multilevel governance model involving policy makers, technicians, stakeholders in a bottom-up integrated approach. Common protocol, criteria and energy performance indicators will be shared and tested in 3 pilot actions with s/m sized city partners.

Keyword: *Smart cities, smart governance, think tank network, renewable energy management, energy efficiency in buildings & districts.*

1. Mediterranean vision

With 80% of European citizens living in urban areas, cities have a crucial role to play in the transition towards a low-carbon economy. Faced with the challenge of ensuring the quality of life of their citizens while becoming more energy efficient, cities must look at the system level and develop integrated urban development strategies that will make them both sustainable and better places to live.

Cities in the Mediterranean need to change and develop to overcome growing difficulties and adapt to the increasingly knowledge-intensive economies. Cities need to become 'smart cities'. The "Smart Cities in the Mediterranean" Strategic Partnership aims to work for 'smartering' cities in the Mediterranean region by sharing resources, knowhow and experience.

[1] Università degli Studi di Firenze – Dipartimento di Architettura, via S.Niccolò 93, 50125 Firenze antonella.trombadore@unifi.it

European and Mediterranean cities, although different from each other, they have similar needs that can be tackled best through a common approach. *https://eu-smartcities.eu.*

Fig 1. Siviglia: passive cooling effect in the open space due to the shading devices

2. Theoretical background

The PLEEC project – "Planning for Energy Efficient Cities"

For various reasons, cities aim at improving their competitiveness and their position in comparison to other cities (Begg 1999). Since the European integration process has diminished, differences in economic, social and environmental standards (Pichler- Milanovic 2005), cities have converged in their basic conditions for competition, which is

increasingly scaled down from the national level to the level of cities and regions (Storper 1995).

However, socio-economic inequalities are still considerable on a regional level, although the efforts of Cohesion Policy have largely succeeded in reducing disparities between the richer and the developing countries. New member states face a growing economic gap between central urban areas and remote rural regions (Kramar 2006). This trend enhances the importance of specific local characteristics, which provide comparative advantages competing for increasingly footloose and mobile global enterprises, investors, tourists and capital (Parkinson et al. 2003, Giffinger et al. 2003).

In these comparative studies, cities are evaluated and ranked with regard to different economic, social and geographical characteristics in order to reveal the best (and the worst) places regarding either quality of life or conditions for economic activities. In this way, the comparison of cities can support stakeholders on the one hand, but it can also be an important guide for future city development on the other. Having realized these specific potentials of city rankings, policymakers increasingly make use of their results.

Thus, city rankings have become an important empirical base for disclosing comparative advantages and sharpening specific profiles and consequently for defining goals and strategies for future development. Secondly, positive results in a widely published and approved city ranking can also be used as a central part of a city's marketing strategy as a top rank in a highly reputed ranking definitely helps to improve the international image of a city. As part of this process, city rankings reinforce the competitive perspective steering urban development; their placing focuses the strategic efforts of urban politics mostly on strengths, neglecting weaknesses.

3. The Smart Cities' Approach

Smart City projects are developed as a consequence of increasing city competition in Europe, which has been induced by economic globalization and political integration processes (Begg 1999) and which

very obviously enforced cities to steer urban development in a more strategic way. European cities are characterized by diverging historic backgrounds, different functions and conflicting interests, a specific positioning within the European urban system is a rather complex challenge, which demands well-reflected strategic planning and governance efforts based on local conditions. Hence, the specific strengths and weaknesses of a city are the central base for defining future development options.

The "European Smart Cities" approach, which was elaborated by Vienna University of Technology (Centre of Regional Science) in 2007 and revised for the specific requirements of the PLEEC project in 2013, concentrates on medium-sized cities and their perspectives for competitive and sustainable development. Even though the vast majority of the urban population lives in such cities, the main focus of urban research tends to be on 'global' metropolises. As a result, the challenges of medium-sized cities, which can be rather different, remain unexplored to a certain degree. Medium-sized cities, which have to compete with larger metropolises on corresponding issues, appear to be less equipped in terms of resources and organizing capacities. In order to enforce endogenous development and to achieve a good position, these cities have to identify their strengths and opportunities even more carefully and to ensure comparative advantages in key resources against other cities of the same level.

Fig 2. Cairo: the typical effect of traffic

These "Smart City"-profiles aim at supporting a forward-looking and evidence-based strategic planning considering two different components of urban development: First, the evaluation of cities has to consider issues as awareness, flexibility, transformability, synergy, individuality and self-decisive behavior. Especially awareness seems important for a "smart" city as certain potentials can only be mobilized if inhabitants, companies or administrations are well aware of the cities' position. This kind of assessment must not be confined to the internal structure of the city but has to consider its surrounding regions and its position in the regional system of cities. Second, the profiles should not only focus on single aspects, but consider all fields of urban development, which requires a clear and transparent identification of characteristics for the evaluation (Giffinger et al. 2007). In this context the "Smart City"-profiles identify six key fields of urban development incorporating the main aspects of "Smartness", as indicated in the following definition:

"Smart City is a city well performing in [relevant key fields of urban development], built on the 'smart' combination of endowments and activities of self-decisive, independent and aware citizens." (Giffinger et al. 2007)

Fig 3. Amman: view of urban density and architectural typology

4. The aim of Meethink_Energy project

Meethink_Energy is a european research project leaded by Tuscany Region under Horizon 2020 call for proposal, involving 30 municipalities of 6 different European countries (Albania, Greece, Italy, Serbia, Slovenia, and Spain). The project will stimulate a multilevel governance model by joining regional with local authorities and involving policy makers, technicians, stakeholders in a bottom-up integrated approach. The core of the project focuses on the definition of a common protocol and on the identification of common criteria and performance indicators of energy efficiency, as well as on a pilot phase during which the multilevel governance model will be tested in collaboration with small and medium-sized city partners. Several potential scenarios will be evaluated to compare performance. In this way, the multilevel governance model will allow to improve the quality and the effectiveness of energy policies and measures developed by the cities, as well as the connection among different key-actors and levels of government.

The core of the project focuses on the definition of a common

protocol and the identification of common criteria and energy efficiency performance indicators, as well as on a pilot phase during which the multilevel governance model will be tested in collaboration with city partners.

With a focus on three thematic priority areas (energy efficiency in buildings & districts, in particular public bodies buildings; renewable energy sources & distributed energy generation; energy in urban mobility), the aim of the project will be achieved by sharing activities through large-scale networking, peer-to-peer learning and best practices, by assessing the training gaps and needs of the participating municipalities in reference to energy efficiency planning and implementation; by developing a detailed capacity building strategy for public authorities at different levels of governments.

At the same time, a common ICT platform will be integrated with existing networks (e.g. PLEEC, Europeansmartcities 3.0). The platform, supported by a peer-to-peer methodology, will be structured with three different access levels (free access, policy makers, technicians) and it will be made up by a tool to share the data, (open data repositories), a decision support system and a communication website. The platform will support public authorities in monitoring and evaluating their current situation with the aim to identify strengths, weaknesses and opportunities as a baseline for evaluating the next energy efficiency policies and measures. The platform will allow to involve public/private stakeholders and promote a multidisciplinary Think Tank network across the EU.

Moreover, the project will support MS public authorities to implement article 7 of the EE Directive by setting up, revising and implementing robust Energy Efficiency Obligation schemes (EEOs) or alternative policy measures while providing appropriate information and tools and to strengthen the capacity of EU regions and municipalities in institutionalizing sustainable energy policies into their operations and committing and fulfilling their Covenant of Mayors obligations.

5. The added value of multilevel governance approach

While many initiatives focus on the local level only, Meethink_Energy project will also highlight the regional dimension of energy efficiency efforts. This aspect assumes a great relevance, for example, in the field of mobility, where a big share of transport energy use is related to commuting which is usually not confined to municipality boundaries but subject to a functional region. Also other important aspects, as renewable energy production, management or land use planning, will be characterized by a considerable regional dimension.

The regional dimension will foster the multilevel governance approach in specific three ways:

- The regional dimension will drive the indicators framework, the database structure and the monitoring tool;
- The regional structural and cohesion funds managing authorities will be involved in the selection of energy saving packages during the development and evaluation phase of Local Action Plans scenarios in order to reduce the governance gap among regional and local planning and to achieve synergies and effectiveness of integrated actions;
- Through the engagement of several municipalities of the same region in the project, Meethink_Energy project will set-up regional groups to foster debates on regional issues, supplementing the local agenda.

Moreover, the regional groups will allow a fast exchange of ideas and approaches to implement energy efficiency measures in similar policy contexts, while the cross-national exchange between partner cities will promote new thinking and critical perspectives on local practices.

Meethink_Energy project wants to make a real input to achieve the European targets by improving legislation through action of learning and dissemination of Best Practices on sustainable building and knowledge transfer. A special attention will be dedicated to the building sector (improving energy saving - energy efficiency in existing building).

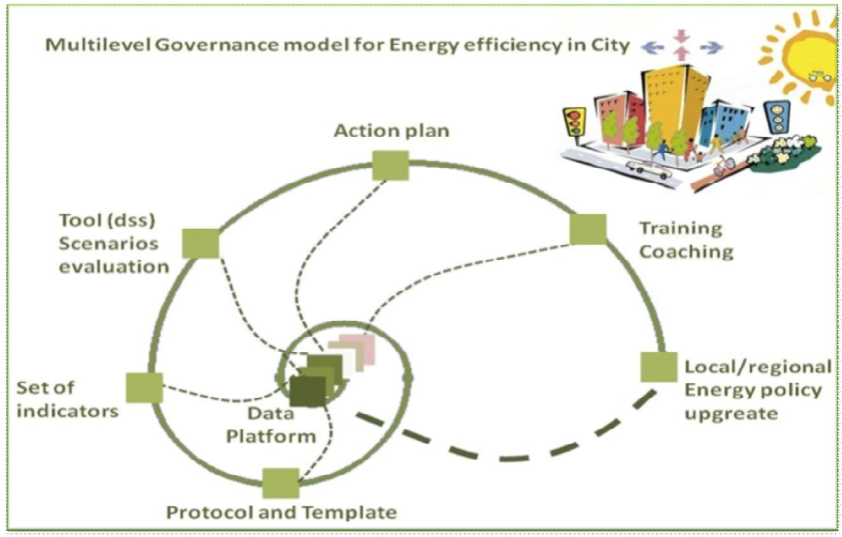


Fig. 4 Multilevel Governance model for Energy efficiency in City

Level approach	Objectives	Main results	Field	
Policy	Integrated approach multilevel regional scale Definition of the energy efficiency performance indicators in order to asses the potential scenarios and integrated solutions for a comprehensive city planning. Stimulating interactions between stakeholders/officers/ administrators and citizens/final users, to ensure the opinions and views of all interested parties.	New integrated management model	***Governance***	***THINK***
Measure	Definition of scenarios, integrated technological solutions and socio-economic measures. The development of a strategic plan and creation of scenarios, consolidating the foundations to support properly an Action plan. Valuation and analysis of SEAPs results, in order to keep track of the gap between achieved results and achieved goals, in reference to the EU 2020 targets. Benchmark with other position in respect to the EU targets and other SEAPs achievements.	Scenarios Action Plan SEAPs evaluation and monitoring	***Planning***	
Tool	One of the components of the MEETHINK-Suite multilevel governance model and tool, *as support decision system,* to close the distances between policy choices, planning at the regional/local scale, fostering the building capacity on Energy Efficiency Governance integrated approach, data management, monitoring and results analysis of SEAPs in respect with EU 2020 targets.	Data base, Protocol Decision support system software	***DATA Platform Suite***	***TANK***
People	Think tank network - Knowledge exchange New level of "advanced municipality" Skills and policy capacity building to define new Energy saving target and visions	Local Chapter Cross-departmental tasks unit	***Skills and Knowledge***	***NETWORK***

Tab. 1 Multilevel Integrated approach : 4 LEVEL Policy, Measure, Tool, People

The general objective of the Meethink_Energy is to experiment an innovative approach in empowering public authorities to develop, finance and implement ambitious sustainable energy policies and plans on the basis of reliable data and analyses in sectors with high energy saving potential such as buildings, industry and urban mobility with a geographical coverage of clear European added-value and considering capacity building as an integral part of the project proposals-including EED implementing bodies, joining regional with local authorities and involving policy makers, stakeholders and technicians in a bottom-up integrated approach.

The model will be supported by an international network and tools (platform, database, software) to reach a vertical and horizontal cooperation, generating synergies and economies of scale on the defined priority areas.

6. The network of local Municipalities

Meethink_Energy targets Regional/Local Administrations of 30 European small and medium-sized cities: under 5,000 (small), 30.000/300.000 (medium) inhabitants. More than 1500 public agents/trainees/trainers should essentially benefit and take forward the project results in the short and long term, according to the stage of local planning activity.

The participating municipalities might very likely be involved in very different stages of their actions. Some might consider to subscribe the Covenant of Mayors, others might have already submitted an Action Plan and work on its implementation or are even close to the evaluation stage and might have to follow up on its results. It would make sense to support the municipalities in the specific stage. There are two main groups:

1. *Start-up Municipalities*: Help to map their stakeholders, identify energy problems (data), develop an Action plan, etc.
2. *In progress Municipalities*: Help to prioritize their existing Action Plan, probably critically review, monitor implementation and evaluate impacts.

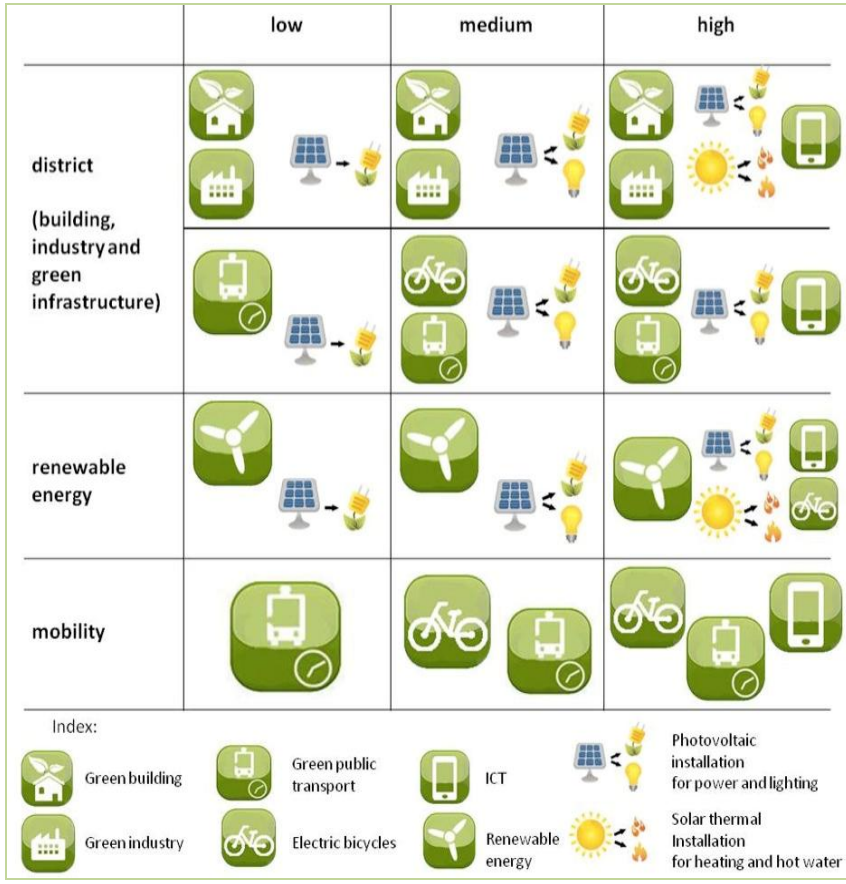
Again, as a unique selling point for *Meethink*, the project puts more attention to the second point with a focus on evaluation of the Covenant of Mayors efforts in the different municipalities. It would be really an added value of the project. All cities of Tuscany and Sardinia Regions and a couple in Greece and Slovenia are already in the CoM. It would show that we are working already on the next step in some municipalities ("Covenant of Mayors 2.0").

Meethink_Energy will involve local experts and technicians of public authorities (as trainees/trainers) with experience in/or building and city planning, Energy efficiency Action Plans and the capability as trainers to conduct activities at European level, to consolidate the "*Meethink peer to peer methodology network*". A network where a group of agents/experts from different cities working on similar issues evaluates local policies, programmes and practices being implemented in a particular city and gives recommendations on possible action areas or improvements.

7. Action Plan and scenarios

Impacts are expected on the accuracy and efficacy of the New Energy/City Action plans and the calibration of the existing ones, specifically in reference to three priority areas (energy efficiency in buildings and districts; renewable energy sources and distributed energy generation; and energy in urban mobility), a time/cost reduction during the planning development and recalibration processes, possibility to access to qualified and highly qualified personnel especially in the case of small and medium sized cities, smartness/experience exchange container, not only a database but a knowledge and experience open source library. Meethink_Energy project wants to make a real input in the achievement of a better energy efficiency, promoting renewable energy and reducing GHG emissions, by creating an international platform and improving legislation through action of learning and dissemination of Best Practices on sustainable building and knowledge transfer.

The following chart defines the three thematic priority areas, energy efficiency in buildings and districts; renewable energy sources and distributed energy generation; and energy in urban mobility, of Action Plans where to intervene in order to achieve the best of energy efficiency. In each area will be considered three action levels (low, medium, high), that are conditioned by municipalities' vision, needs, priorities, stakeholder involvement and budget.



Tab. 2 The chart defines the actions and strategies that should be combined in the three thematic priority areas (energy efficiency in buildings and districts; renewable energy sources and distributed energy generation; and energy in urban mobility).

7. The Meethink_Energy Think Tank mission

In the long term, Meethink_Energy Think Tank will support the achievement of EU 2030 and 2050 energy saving targets and GHG reduction goals outlined by the "Roadmap for moving to a competitive low-carbon economy in 2050" the EU "Energy Roadmap 2050"[1] and in the "EU policy framework for climate and energy in the period from 2020 to 2030".

In the short term, it will have a direct impact on a number of EU Directives where real energy performance is crucial to effective implementation.

The expected impact will reflect the multilevel approach of the project:

- ***Policy/Governance***: New multilevel integrated management model
- ***Measure***: Criteria, set of indicators, scenarios, Action Plan SEAPs evaluation and monitoring
- ***Tool***: Data base, Protocol, Decision support system software
- ***People / Skill and Knowledge / Network***: implement technical skill as well as policy awareness in order to define new cross sectors strategies in energy planning. Structure as Local Chapters (at national level) as support and training expert group of Think Tank network; Cross-departmental tasks unit (at municipality level).

By focusing on real Municipalities energy data, collection, analysis and monitoring of SEAPs data, Meethink-energy addresses one of the main barriers *to enhance the capacity of public authorities to plan and implement sustainable energy policies and measures.*

The project will contribute to implement the awareness and capacity building in the field of energy efficiency multidisciplinary planning of more than 1500 public officers (police makers, funding managers, technicians, city/energy planners, decision makers and administrators) of 30 municipalities of 6 different European countries (Albania, Greece, Italy, Serbia, Slovenia, and Spain). Thanks to the

common experimentation activities, they will become able to apply locally the set *of common criteria and multidisciplinary performance indicators in order to drive ambitious integrated regional and/or local Sustainable Energy Action Plans.* The Think Tank mission, in the short-medium period, is to train other officers into their respective countries/region/municipalities, to diffuse Meethink-Energy methodology and integrated solution capabilities on energy efficiency and city planning. At the same time will be the first members of the *peer-to-peer* exchanging information (energy consumptions/savings data, know-how, experiences, failures, best practices, etc...) network, sharing concepts and helping officers of other municipalities in building up robust and accurate energy/city plans.

Project partners

RT- Regione Toscana – *Coordinator*, IT
UCPH Kobenhavns Universitet, DK
Except, NL
Tecopy SA, ES
ANCI Toscana Associazione Nazionale Comuni Italiani Toscana, IT
CRES Centre for Renewable Energy Sources and Saving Foundation, EL
RAS Regione Autonoma della Sardegna, IT
ENERAGEN Asociación Agencias Españolas de Gestión de la Energía, ES
LEA Promurje Lokalna Energetska Agencija za Pomurje, SI
Vojvodina Provincial Secretariat for Energy and Mineral Resources, RS
AEA Albania Energy Association, AL

Notes

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Communicative construction site: technological tools improving knowledge for users

Antonella Violano[1] Roberto Castelluccio[2] Lucia Melchiorre[3]

Sunto. In un settore governato da creatività progettuale ed efficienza economica, la sfida è traghettare il progetto tecnologico del *cantiere di trasformazione di contesti sensibili* verso orizzonti di nuova generazione, in cui sia fattibile innescare processi attivi di partecipazione, integrazione e comunicazione. Pur considerando tutte le categorie prestazionali cogenti (sicurezza, energia, ambiente, gestione), lo studio ha focalizzato l'attenzione su identità visiva e comunicazione, dimostrando come l'uso di strumenti appropriati consente di massimizzare sia il beneficio culturale che economico.

Parole Chiave: Cantiere Sostenibile, Recinzione Smart, Contesti Sensibili, Progettazione Tecnologica, Comunicazione.

Abstract. In a sector governed by both design creativity and economic efficiency, the challenge is ferrying the technological design of the *transformation of sensitive contexts construction site* towards "new generation" horizons, where it is feasible starting active processes of participation, integration and communication. While considering all cogent performance categories (security, energy, environment and management), the study focused on visual identity and communication, showing that the use of appropriate tools allows to maximize both the cultural and economic benefits.

Keyword: Sustainable Construction Site, Smart Fence, Sensitive Environment, Technological Design, Communication.

[1] Department of Architecture and Industrial Design (DADI) of the Second University of Naples –antonella.violano@unina2.it
[2] Department of Civil and Environmental Engineering of the University of Naples "Federico II" - roberto.castelluccio@unina.it
[3] DADI of the Second University of Naples – melchiorre2007@hotmail.it

1. Construction site: be communicative (by A. Violano)

The urban construction site is not only the physical location of the city transformation, but it is a creative energy catalyst, a developer of economic resources and a stimulator of *cittadinarietà* (Cirafici, Melchiorre, Muzzillo, Violano, 2015). (Fig. 1)

Because the immaterial transformation, connected with it, is virtuous and productive with the most modern development criteria we must ask ourselves about new ways to conceive and design the construction site as an opportunity for testing strategies. I speak not only of strategies for environmental sustainability, as expressly required by the new Procurement Code (Legislative Decree No. 50/2016, Art. 21, 31, 34) but also for communication, participation and social inclusion. The area of transformation, strongly characterized by a high engineering of processes and technologies related to the execution of the work, provides, in a direct or indirect way, to the people and to all users, an opportunity of knowledge and communication. It is about both the ongoing transformation and the future scenario that is being achieved, that the understanding of the historical, cultural and social values, that the transformation calls into play and increases. In the case of restoration sites of Cultural Heritage (architectural and/or archaeological) is not only to mitigate the negative effects of the changes, since the 'accompany' the transformation process with appropriate communication actions that give users, who have temporarily interdicted the direct use, alternative media for knowledge and opportunities for participation.

The participation in the transformation stimulates the sense of belonging, educates the maintenance of heritage, reduces vandalism, preventing / mitigating social conflicts and, in a more or less direct way, it also facilitates the smooth conduct of construction activities.

However, in this era where communication is a vital need, the most significant opportunities for an urban construction site is to be transformed into a communication tool. In particular, the frontier of the construction site is the technological infrastructure that governs the in-coming and out-coming flows of material, people, energy and information.

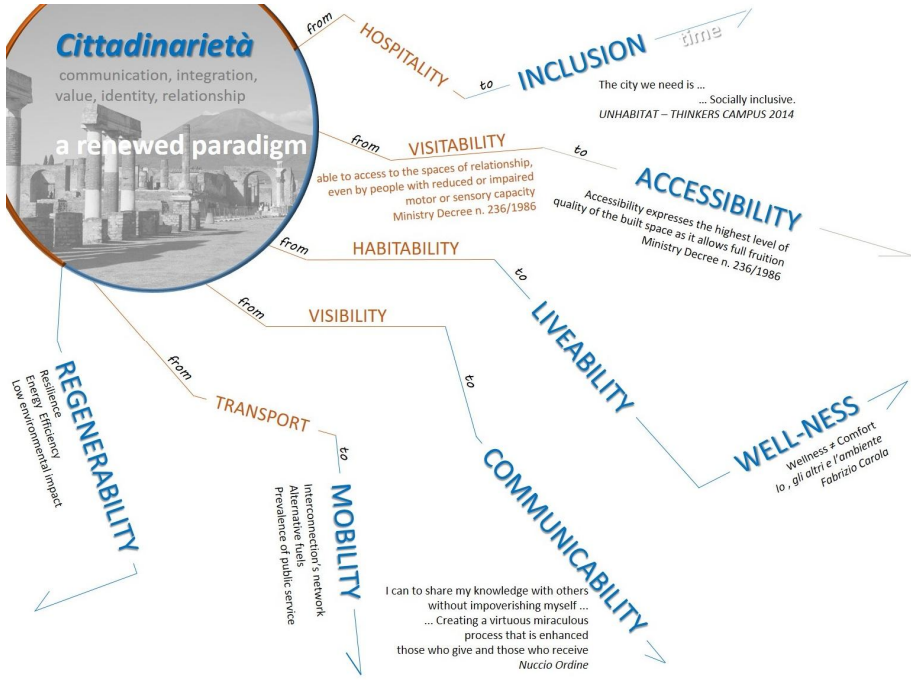

Fig. 1 – The "Cittadinarietà" concept

The communication process, which is temporally limited to the duration of the construction site, can be interpreted, from a design point of view, both as vertical communication tool, in which the sender of the message is unique, while the addressees are varied without the roles can be reversed, and as horizontal communication tool, where there are different senders and addresses, whose roles are interchangeable.

In all cases, the senders are (at least) two: the technician, which designs the construction site, and the communicator, which processes the Communication Plan (following indicated with CP). Both of them can decide if to design a fence can send informational unidirectional messages, without providing the possibility for the users (citizens, tourists, operators ...) to interact expressing thoughts, opinions, feelings and judgments; however, they may also decide to adopt communication strategies where users interact.

In the first case, the construction fences are of the traditional type, even if integrating informative and advertising panels, which have an

added value in a densely frequented urban context. In the second case, instead, we are in the presence of new generation fences.

The fence is not only a barrier, it becomes an inclusion tool, integrating multisensory communication media in order to get the full involvement of citizens, residents and tourists, thanks to the adoption of advanced technological systems: LED lights with proximity sensors, Wi-Fi devices, web portal, interactive screens. In this way, the quality of the processing space evolves and improves, made of smells, noises and sounds, which determine sensory stimuli, visual perceptions. This emotional reactions condition uses, spatial and functional quality, flows, rhythms ... in generally, the elements of the urban landscape and its "ambiance".

The communicated message (the information) can also be graphically changing, can change shape, colour, size, can be deconstructed and renovated in its materiality, and can be modified according to the cognitive needs of the user, triggering a bidirectional communication exchange. For this reason, "*hybridization, re-use of modified forms play an important role in the development of knowledge. In this creative, the potential leeway of the thought are expanded, both convergent and divergent sense, and in this sense the new technologies can be used to prepare the active manipulation areas, micro worlds of passage, intermediate dimensions between the possessed pre-knowledge and the domain of knowledge, that can be explorable and acquirable*." (Bianconi, 2005, p. 19)

The point of convergence between the action of protection and enhancement of cultural heritage (expressed in the construction site) and the action of communication and dissemination of knowledge (in the technological system of its fence) is, especially in the case of major projects for big events, in the CP and, in some cases, in the Visual Coordination Plan.

The Communication Plan for the Jubilee 2000, the Olympic Visual Coordination Manual for Turin 2006 and London 2012, the Communication and Fruition Plan of The Major Project Pompeii are just a few examples of standard practice for the management of the "great process" transformations, in which the management of the cultural and

social effects, as well as environmental, generated during the construction phase is very important.

Below, the paper illustrates the implementation strengths of these strategies.

2. The Communication Plan of the Jubilee in 2000 (by R. Castelluccio)

The construction site fence is the boundary surface - usually vertical - between the interior space, where you develop your business activities and the external space. This undergoes a temporary functional contraction and a discomfort in view of a future implementation of goods and services.

The CP is the instrument through which you want to generate a unique identification signal for society, which also has the added value of reducing the perceptive impact of the construction site. In addition, it highlights the benefits that will derive from the fulfillment of the work and it illustrates the characteristic topics of the work and the potential connection with other interventions on the territory (Diffused Communication Plan).

The participation concept, established by Principle 10 of the Rio Declaration on Environment and Development of 2012, is also invoked by the new Procurement Code (Legislative Decree no. 50/2016), in which Article 22 introduces the principle of transparency in the participation of stakeholders and the public debate in the planning phase.

It is reaffirmed the notion expressed by De Carlo about sharing the architecture: "*To get out from the sterile atmosphere of isolation in which is located the architecture, it is important that people participate in the transformation processes of cities and territories, but it is also important that the architectural culture wonders about how to make the architecture inherently able to participation... It is necessary to communicate not only during the design phase, but also in the project implementation phase*". [Sclavi, 2002]

The CP is an advanced instrument for participation in the executive phase, an integral part of the decision-making process [UNI 7867 - UNI 10723 - Appendix A]. During the construction phase, the work designed involves "physically" the future users, impacting, even temporarily, on the life quality.

Therefore, the construction site structures must technologically interpret the plan objectives, defining - by the design point of view - the fence materials, elements and functions (filtering, opaque, interactive...). It is necessary to assess simultaneously both work activities provided within the construction site (with particular reference to the evaluation of the risks involved and the necessary security safeguards to ensure), and the type of construction site to install (roadwork, archaeological, building, environmental) and its loads which from the outside can stress the frontier structures.

In addition, they have to consider the plant modifications needs of the construction site, identifying cases of static and / or dynamic construction sites.

In fact, the construction sites often change shape during the work, impacting on the external environment dynamics, namely they alternate over time different work activities, which require different types of general protection devices.

It follows that the frontier design must consider a multitude of variable factors in time and space. These factors should complement the dynamics of communication and enjoyment of external spaces.

In order to communicate to citizens the systemic integration objective of the interventions during the implementation phase (whose theoretical expression is the three-year plan of Public Works - D.Lgs.50 / 2016, art.21), it would be desirable that Public Administrations adopt the Communication Handbooks and that, for extended construction sites and for "Construction sites Event", the final design was accompanied by an appropriate CP.

A similar experience has been developed on the occasion of the Great Jubilee of the year 2000 by the Roman Agency responsible for the preparation of the Jubilee. The Handbook designers started from the identification of the main types of construction site and then divided into sub-classes:

1. Roadwork
    a. Fixed with vehicular traffic
    b. Fixed without traffic
    c. Dynamic with vehicular traffic
    d. Dynamic without traffic
2. Roadwork in Archaeological Areas
3. Building sites
    3.a. With scaffolding
    3.b. Without scaffolding or with distant scaffolding
4. Green Maintenance.

They have established the types of fences and compatible materials with the external stresses and with the necessity of developing the CP, leaving to the subsequent designers of each site the choice of the type according to the requirements connected with the specific machining operations and with the content of Operational Safety Plans.

The boundary conditions prevision and the possible stresses evaluation allowed to plan and resize the main elements, which are divided into:

A. Bearing elements
    A.1. Frame
    A.2. Security Barrier
    A.3. Scaffolding

B. Panels
    B.1. PMMA sheet
    B.2. Grid
    B.3. Multilayer panel
    B.4. Inside sawn
    B.5. Sheet steel
    B.6. Corrugated sheet
    B.7. Soundproofing sheet
    B.8. Scaffolding envelope

In particular, the panels are defined in relation to the risks produced by the internal machining operations and to the needs of the communication project.

The different elements combination defines the optimal fence, which has to be integrated by communications media. Within the Handbook,

technical and illustrative tabs for each element have been drafted; some of them are listed below as an example. (Figs. 2-3-4).

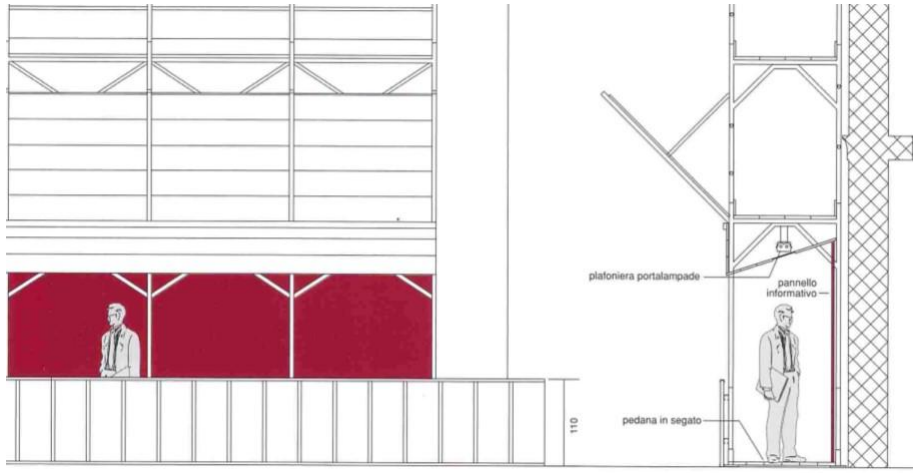

Fig. 2 – Jubilee Communication Guide: scaffolding with passage

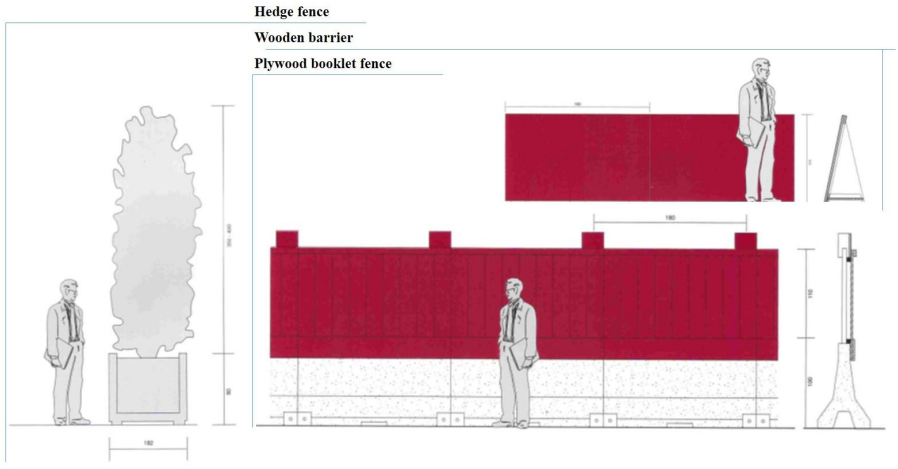

Fig. 3 – Jubilee Communication Guide: hedge fence, wooden barrier and plywood booklet fence

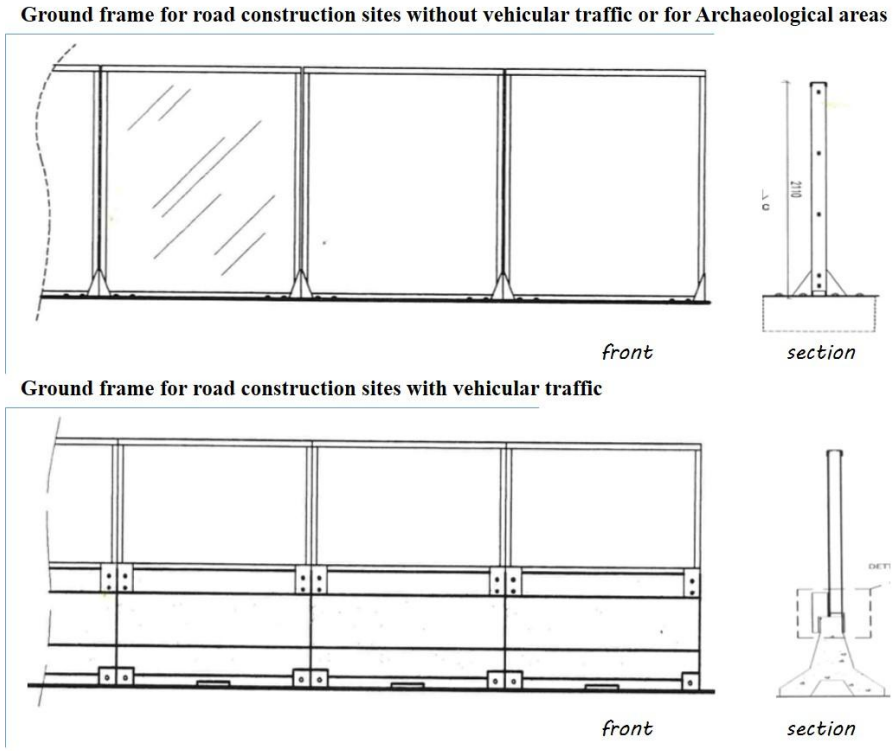

Fig. 4 – Jubilee Communication Guide: ground frame for Archaeological areas and road works with or without vehicular traffic

This approach has achieved the goal of promoting the perception of the Integrated Great Jubilee Project. The Roman citizens were able to identify the different moments of the city transformation, connected by a single perceptual message. In this way, the participation was maximized and the urban environmental impact of the intervention was reduced as a whole.

Unfortunately, the Agency testing found no proper follow, and today, except the technological innovations related to the communication dynamics and tools, the Communication Plans are not much diffused. Therefore, even if with some years away, this Jubilee Communication Plan can be considered an appropriate starting point to develop a new experimental research.

3. Olympics Construction site: Turin 2006 and London 2012 (by L. Melchiorre)

What unites events of "high profile" [Roche, 2000], such as Olympic Games, Universal Exhibitions, or in some cases even political and religious events (such as the Jubilee) is to be cultural events on "a large scale", of international importance, desired and planned with "well in advance", affecting a wide audience. [Essex and Chalkley, 1999; Hiller, 2000] They are unique and exceptional events involving the host city in reduced spaces and for limited times. [Dioguardi, 2006] One of the most effective tools for the promotion, development and control of the satisfaction level of these "events", which are real tourist catalysts and attractors, is communication. For this reason, it has intensified, in recent years, the spread of the trend to draft for large construction sites and events the so-called CPs and in some cases the Visual Coordination Plans. The following is a reflection on the theme of the visual identity architecture for the communication of urban construction sites, adopted during the two recent Olympic editions: Turin 2006 and London 2012.

About the Olympic phenomenon, it is easy to understand how they are no longer just a time of sport celebration, but they have been transformed into a big business, assuming a real status of “brand” that involves significant modifications to the host territory. This implies the development of response strategies, which define a specific identity in relation to its main stakeholders. The visual languages have evolved over time with ever-greater complexity, although some common elements can be identified from a visual point of view, namely: a logo, pictograms, posters or graphic constructions with significant images, the Olympic torch and one or more mascots.

The works and the numerous urban transformation projects planned for the Winter Olympic Games in Turin in 2006, led to a deep change in the face of the city, far from the stereotypical image of the industrial city. This "new" image of the city is not originated from a simple improvisation or by the exceptionality of the event; it was the result of a specific strategy for promoting and redefinition of the whole city physiognomy. [Martina, 2006]

In order to achieve these objectives, a real CP was elaborated. This plan has been structured by objectives, actions, tools, and takes the construction site itself, as its main communication medium, which in addition to the physical realization place, becomes an opportunity for interaction among clients, operators and users.

The Visual Coordination Handbook of construction sites, adopted in 2002, was a clear reference to undertakings entrusted with the implementation of urban transformation projects, and the subjects, individuals and institutions who, for various reasons, were responsible for the management, coordination and communication of these construction sites, represented by the "Torino always on the move" logo.(Fig. 5) All information contained in the Handbook lead back to some graphic and structural constant elements, which, as a whole, contribute to make the construction sites immediately identifiable as parts of a single great transformation project of the city. However, these elements are flexible and adaptable to different operating and communication needs of individual projects.

The Regulation provides, in detail, the provisions concerning:

1. Type of communication devices (shape, size, billposting method, fonts);

2. Type of information (legal and institutional information or other information).

3. Type of institutional communication media: a brand / logo with the rules for their application to the main tools such as fences, signs, prints, newsletters, multimedia and even a set of basic prints.

Fig. 5 – The visual identity: an application example on the construction site fence. (Source: Image extracted from the Construction sites Handbook, Turin 2002)

Unlike the city of Turin, London for the Olympic Games does not adopt a Visual Coordination Plan for construction sites in progress in the city during the pre-Olympic excitement period.
This does not indicate a lack of attention by London to the construction site fences theme, but instead reflects the fact that it is already for several years ago among the cities (with Tokyo and Berlin) which dedicate more attention to safety and visual image of urban construction sites, regardless of the combination with big events.
This is clear from the countless number of singular construction site fences set up in the period before 2012.

Fig. 6 – The London fences in the Olympic and pre-Olympic period

Among the numerous examples of such fences, they are reported as case studies: The hoarding decoration for The Shard at London Bridge Quarter, The Greenwich Peninsula - advertising hoarding run, and the fence for the construction of a series of Luxury Living in Shoreditch. (Fig. 6)

These examples show that it has been chosen not to give a unique look to all construction sites of the city on the occasion of Olympic Games, because the visual identity was already well established in the practical activity in London.

In addition, if Turin adopted two different corporate images, one for the construction sites of the city and another in order to create a "brand" of the Olympic city, London adopts one only visual coordination in order to give a specific look to the city (and particularly to Stratford, the neighbourhood in the eastern suburbs of London, where it was made the Olympic Village).

By incorporating the best practices used in previous Olympic and Paralympic Games, in London were set at first the basic rules for a temporary way finding strategy and subsequently it was designed the signage infrastructure sketched in a manual called "Kit of Parts".

For the realization of this manual, graphics principles, directions and structural design were formulated. In this way, the way finding system had to ensure maximum efficiency in terms of readability, downsizing, cost and application through a variety of communication means. Therefore, the "Kit of Parts" had to provide for every type of event and location.

4. The Communication Plan of “The Major Project Pompeii” (by A. Violano)

The Major Project Pompeii – MPP- is a comprehensive system of planned interventions that arises from the need to secure the *insulae*, consolidate the structures, restoring the decorated surfaces, reduce the geological risk ... but also increase the visitability areas and improve the quality of the cultural offer of this archaeological site, which is one of the most important in the world.

Applying the new paradigm of "cittadinarietà", developed to meet the new demands of contemporary society wishing to the preservation of memory beyond matter in conservation, the Visitability of the cultural heritage is transformed into the Accessibility.

It is no longer sufficient to guarantee the access to the spaces of relationship, even by people with reduced or impaired motor or sensory capacity (Ministry Decree n. 236/1986), but it is necessary the Accessibility must be expressed by the highest level of quality of the built space as it allows full fruition, also during the construction site phase. The added value comes, in fact, from the possibility of having access to the intangible knowledge of good even though its physical enjoyment is impeded.

The MPP does not consider this kind of technological options, even if, between the lines of future development of actions, it seems that we can foresee this possibility.

Anyhow, actually all planned works of the MPP are provided in five different integrated Plans, according to the principle of programmed preservation:

1. Knowledge Plan
2. Works Plan
3. Communication Plan, improving uses and services
4. Safety Plan
5. Technics Plan, for strengthening and capacity building

They represent an uncommon flywheel of a cultural catalization, related to the diagnosis, restoration, design and cataloguing, innovatively managed not only in rules but also in content. In this way, the archaeological site can really enjoy new life as a place of production of active culture without decreasing the action of protection and conservation.

On the contrary, the virtuous cycle of knowledge production in the future may support more appropriate conservation and enhancement strategies, if the construction sites will be provided by smart fence for continuous use.

Fig. 7 – The five integrated Plans of the Major Project Pompeii

The first step in this direction was made through the CP offering a visual identity representation of archaeological heritage of Pompeii, which originates from the formal and chromatic characteristics of the decorations in the 'third style' in the *tablinum* the Mysteries Villa. (Fig. 8) It is aimed at creating a coordinated image of the site (SAPES and POMPEII brand, development of corporate identity), communication and information media (informative, educational and service signage, indication of location, notice boards and educational panels, also in Braille, luminous displays and window graphics, used in permanent structures of the archaeological area), BTL materials, brochures, guides (in eight languages) and a new plan of the archaeological site. A complex involvement of non-invasive and highly identity cognitive simplification.

"*The basic principles which have allowed to coordinate all activities and then are beyond transaction of Promotion: define a real" territory of story and relationship "by creating the conditions to protect and promote Pompeii also in its perception and identity dimension, so as to enhance the meanings which it carries, and to nurture the relationship with the different categories of users, with which*

dialogues". (Source: Communication and Fruition Plan of Major Project Pompeii)

In addition, the Fruition Plan provides, as well as promotional videos and restyling of the website, a series of thematic itineraries, managed through mobile systems with intuitive navigation. A series of virtual and physical clues are spread and narrative articulations, based on rigorous historical and archaeological data, reconstruct life in Pompeii in its daily (food, crafts, leisure, funeral rites), social (political, entertainment, religion, civic administration and judicial), historical, artistic, archaeological, geological and environmental aspects. However, all promotional efforts are aimed to promote the archaeological site during the operating phase, i.e. when the phase of restoration and safeguarding is completed. In fact, the activities of communication and dissemination of knowledge are not related to the construction phase.

Therefore, the opportunity to use this time when the direct use of heritage is not directly accessible to tourists and visitors, has been lost.

Fig. 8 – The Major Project Pompeii

5. Future Prospective (by AV)

The three illustrated case studies are examples of good practice in the transformation (read: conservation and enhancement) of the cultural heritage. They highlight the widespread need to manage the communication and knowledge flow that is appropriate to this kind of heritage, also during the delicate phase the construction site.

The Communication Plan of the 2000 Jubilee is one of the first structured examples implemented in Italy, which had a remarkable success and recognition of the identity during the phase of transformation linked to that big event.

The London Olympics case seems to bring out traces of a new model where it is not the city, which takes shape on the event, but instead it is the latter, which uses and reinvents spaces and places in the city. The reason why it is believed that such topics may be potential and interesting analysis issues is the fact that the design methodology of the "Construction sites event", in order to be recognized and operate as a discipline, needs new perspectives, ideas, fields in which to operate and evolve. [Melchiorre, 2015]

The case of Pompeii offers the opportunity to manage differently the major restoration work, which can be considered as pilot projects. In this specific case, the time of implementation of restoration works is neither insignificant nor limited in time. In addition, the continued presence of widespread and timely construction sites, in the archaeological area, the large amount of installed temporary structures for the implementation of the restoration work and the lack of care in decorum and in the image of such devices, determines the decrease of 'cultural offer that damages the image and attractiveness of the archaeological site.

On this site, the social cost of the transformation becomes a cultural and economic cost. The smart construction site is the opportunity to offer a different form of use (virtual fruition, augmented reality, assisted knowledge) not only to compensate for the lack of direct use, but also to integrate cultural offers and generate moderate additional flows of visitors.

Every construction site, even the smallest, has its own identity, which is related in part to the good in the restoration, in part to its surround. In an age ruled by the economic culture that considers valid and efficient only what is cost effective, forcing the third dimension of sustainability, we have the civic and moral duty to recover strongly the value of the other two dimensions (socio-cultural and environmental) . The identity aspects take priority, according to this view, and are suitable for the cultural foundation of the valuation process and awarding of "meanings".

The promotion of the image and the management of communication flows go beyond the visual corporate identity design (by the sign to the creation of multimedia, etc.); but it is nourished through constant research of appropriate tools and energy critical diffuse / imprinted in the new places of the contemporary city.

Communication is not only the mere provision of information; it must allow users to understand events, arouse curiosity and activate a dialogue within the public opinion and with public authorities who in most cases are the actors of the transformations.

Finally, flexibility, adaptability, permeability, perceptual and social involvement are the key words with which contemporary society demands of managing the transformation of its habitat.

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Project for a new urban landscape

Lorenzo Capobianco[1] Rossella Franchino[1] Carlo Mele[1]

Abstract: The need to create a union between man and nature is the theme that has inspired the redevelopment discussed in this work. This connection is through a structure that simultaneously offers an urban farm and student residences. The layout of the farm horizontally in front of the residences is dictated by the idea of wanting to exploit the natural environment as a transition area between the urban and natural worlds, while also introducing the students to their houses that are completely immersed in nature**.**

Keyword: environmental design, urban farm, off grid.

1. A design of "future"[1]

Abdul Kalam, an Indian day-dreamer engineer and "People's President" often said: "A dream is not that which you see while sleeping, it is something that does not let you sleep."

OECD (Organisation for Economic Co-operation and Development) states the ambitious but necessary target to reach within 2050 to invert the world pollution trend: reducing 75% greenhouse gases production. Beyond a deep revision of the basic philosophy about the industrial policies of each country, it is evident that an important contribution can come from the building growth and/or the existing buildings' reconversion in "intelligent buildings" able to produce energy and recycle waste.

Although this "behaviour" is correct and desirable even if not enough widespread, the contribution of architects and engineers cannot be held just in a tight space as small "disciplinary paddock", exhausting in the attempt of combining, through experimentation, research and

[1]Department of Architecture and Industrial Design "Luigi Vanvitelli" - Seconda Università degli Studi di Napoli - Italy

technological contents with aesthetic values. But, recording complexity and the speed of contexts', habits' and contemporary needs' change, it should be again herald of wider visions and shared values; in other words, it should build a real design of "future".

If, on the one hand, for clear reasons, we are forced to give up the ambition of the unitary design as an instrument to rule the transformations of our towns, on the other hand, it is necessary to recall into question our "overlook" on things and problems before being overwhelmed by the renewal trend that has the same features of a real cultural revolution: the inversion of unlimited growth's standards, that were the XX century urban development's target, sets up a "new town" that seems denying the architect as a profession, giving an opportunity to all those spontaneous and "bottom-up" initiatives that appropriate those obsolete urban places when activities about associations, culture and handmade jobs proliferate.

If, with an immediate impact, this events attract our attention because they are able to offer valid "immediate solutions" for the real emergencies in the contemporary towns, about them the answer given by the administrations and professionals leave for the traditional approach to problem's solutions. It is clear the deep need of a total oversight supported by the ability of an organic vision of things. The role of the designer can be a carrier.

A new need of harmony comes to light from the disharmonic change of our towns: the towns still need beauty. An everyday beauty, understandable and shared that can't finish just in the research of the aesthetical dimension and that can't settle of the new functions' immateriality and that can't fulfil the installation in a new unit of the city of a multitude of single objects.

The beauty we need is a beauty linked to the past, carrying the theoretical basis that also trusts in the understanding of the town plan.

It is necessary starting new models to transform and operate to entrust their centrality to the human gaze. Through closed and measurable shapes, the sense inversion of the perception of strengthened elements in the urban landscape, an updated relationship between public and private space, we can examine the theme of a new housing to give back the identity to the places of our everyday life. In everyday life, this

"housing feeling" seems to be free from the "prison" of the walls to project to the spaces of the city, building a belonging feeling among inhabitants, city and a new possible sense of identity of the places. So, a possible city that offers itself as light and colour of a new urban landscape, possible answer to the diffusion without quality and rediscovering the space related to the city as a real alternative to the models of growth and change that gaze elsewhere: a new and a more perceived care that opens to the research of a language and of expressive understood and shared shapes, able to reduce the wide gap between common sense and architectural research, to shape those common unaware needs that, if unheard, can release a destroying charge in the transformation process of the image of the city and how it is composed.

In this direction, the interest for the project resides in the research and hybridization of different types and functions for the building of a new possible urban image and places' identity.

The Horizontal Urban Farm is a multifunctional building built thanks to the combination and union of recognisable shapes and figures.

The students' residences are houses, the gardens become vegetable gardens and they overlap themselves in a unitary building. Its basement, developing tracks that without a continuity solution, "multiply" the presence of the nature lifting the ground line (the natural one) to the sky line: it is a business step for the free time and for the social life where students can sell and buy products of their vegetable gardens. A project that involves the most recent experiences of the contemporary architecture entrusts its contents to an expressed desire to be immediately recognisable, hoping that recognising it can come into the world that "belonging" feeling that creates a spontaneous feeling to take care of the places.

2. The environmental quality control[2]

Anthropic activity, with interrelated complex structures and relationships determines its own track in the environment, with it being a sign of decay and eventually left as a burden on future generations. In

order to limit the footprint, it is necessary to assume that any redevelopment interventions have the goal of making sustainable changes to the environment in which they will be carried out. It is therefore a priority to orient any redevelopment intervention so that the unavoidable impression is contained as much as possible, with this being achieved by increasing the load capacity defined as the ability to absorb and control the anthropization phenomena with a sustainable impact on the ecosystem .

Study of the conditions of the environmental water, air and soil matrices is one of the preliminary stages in redevelopment interventions of the areas that have been affected by past anthropic activities.

The reuse mode, reconfiguration, natural landscape and usability are all closely related aspects in order to achieve a renewed quality of the environmental conditions of the area as a whole.

The redevelopment of the areas previously used for human activities is often approached from two perspectives, that are independent of each other: technical and landscape. The first deals with the technical design of the processing operations, not particularly linking it to the next intended use and merely focused on checking the quality of the environmental matrices. The second focuses on the final configuration and the new use of the site, often underestimating the need of the technical intervention so as to remove the causes of the deterioration of environmental quality. The final result is that of obtaining, except in some particularly interesting cases, either a global control of environmental quality, that is often not in synergy with the reuse intervention of the site or a superficial arrangement without any control of the affected environmental subsystems.

It is therefore essential to identify the technical assistance required to monitor the environmental matrices in each case, but it is also highly significant that the intervention is structured in close synergy with the site's environmental transformation. The cases that may occur are varied and depend on both the previous use of the site as well as the new reconfiguration, with them ranging from just a functional disposal so as to move the activities to another place or decommission with ecological and environmental implications due to the previous use.

It is, therefore, highly important to customize the environmental control intervention by identifying the technological systems necessary, case by case, favouring the application of natural ones or with small engineering that, of course, make the intervention even more environmentally effective.

In integrated rehabilitation interventions which include the redevelopment of the area for an appropriate re-use, even the network infrastructures that provide environmental services should be properly planned. It is of fundamental importance to identify the links of the networks with the environmental base upon which to apply the service and, therefore, with the needs of the water, air and soil matrices in order to optimize the configurations for which the networks take the environmental status in relation to the various types of local contexts that may arise.

In this context, a particular contribution to the development of networks to be used can be provided by the off-grid system, i.e. the local network system that is detached from those of the territory. Currently this system is applied to a limited settlements or in the event that the infrastructure networks are not sufficiently disseminated or where to carry out a demonstrative application.

This off-grid system is completely self-sufficient and not connected to any distribution networks, with it managing the energy, gas, water and wastewater needs by using its natural resources in the area. The aim is to conserve natural resources as well as connect the environmental and landscape values of the areas for an overall development of the territory.

3. A horizontal social urban farm for the transformation of an Expo lot in Milan[3]

The need to create a union between man and nature has been one of the main themes of debate in architecture in recent years. The city, ever more complex and sophisticated in order to grow and prosper, requires increasing amounts of energy and natural resources, imposing a heavy environmental toll. The energy resources crisis and scarcity of land to

be cultivated in large cities and saturated urban centres have pushed the primary sector to new boundaries as dictated by new technologies.

In this context, architecture has assumed a key role due to radical and sometimes utopian visions having suggested new sustainable solutions, which will push cities towards prospects for improvement in the quality of lives. One of the most interesting scenarios proposed in the architecture about the evolution of nature and the city has the opportunity to expand the presence of agriculture and more generally of plants in urban landscapes. This has lead to vegetable surfaces on both vertical walls as well as horizontal surfaces. A policy that fits perfectly with market orientations such as the zero km market farm or simply improving environmental quality. It is possible to imagine areas of the city that are home to a veritable recolonization of nature and an open evolution of plant and animal biodiversity.

Agriculture and the city are generally designed as two distinct spheres of society. However, nowadays, in design culture, there are numerous debates on the potential of urban agriculture. In fact, environmental literacy among designers and researchers has grown, along with the enthusiasm for agricultural production within and outside the city. Public interest in food, its production and its distribution in a globalized world has also contributed to it.

The project originates from the participation in a competition for the design of an Urban Farm with adjoining student housing. The project area is part of the current Expo site, in the town of Rho to the northwest of Milan. The plot is located at the Cardo, adjacent to a square and an open-air theatre and was occupied by the "Future Food District" pavilion. The longest side is 84.20m with an east-west orientation, while the short side is 78m with a north-south orientation.

Numerous examples of urban farm realized over the last years have demonstrated how the closer these structures are to nature, the more effective they are over time.

The aim was to create a village of student houses, single and double rooms distributed in height and alternating with full and empty spaces, with sloping roofs, using modular alternation to create the vegetable gardens. It covers three large residential blocks, 5 metres off the ground in order to make room for commercial and services areas on the lower

level. In front of the buildings, there is a platform that constitutes a horizontal "farm". The horizontal farm makes it possible to organize the cultivation and grazing on a single level. The decision to place the farm in front of the residences is dictated by the idea of wanting to exploit the natural environment of cultivation and grazing as a transition area between the urban and natural worlds as well as introduce students to their residences completely immersed in nature.

The entire complex is accessible via two pedestrian walkways and a driveway placed north of the plot, intended exclusively for emergency transport or for the loading and unloading of goods.

The walkways on the ground floor cross 34 metres of cultivated fields and pastures. Afterwards, there is the area under the raised 5 metre platform, it has three functions; south a shopping arcade, a bar, a small supermarket and an area devoted to markets, north deposits for crops, stables and the presence of an aviary, at the centre, there is a library, a laboratory, a laundry, an exhibition space and environments for services and administration. From the ground floor, it is possible to reach the first level, +5 metres via two ramps, or three elevators (one for each building), or from three different stairways. The ramps are inclined to 8% and are characterized by a rail-to-ceiling, with a woven texture so as to allow for the fusion with climbing plants. The stairs have a fundamental role in the project. From the ground floor to reach the platform five metres high, stairwells have been inserted that recall those of a rural farm. The student housing is divided into three four floor residential buildings, with a height of 19.30 m and 10 m apart from each other.

The buildings have a central courtyard that lets in light along with a stairwell and an elevator that reach all the floors. Each floor is characterized by a number of single and double rooms, with a total of 18 per building, which are partly cantilevered, with a sloping roof and are arranged in an irregular manner creating gaps between them. This rhythm of interspersed houses generates the common spaces, used as vegetable gardens or areas of relationship between the students themselves. The buildings, in addition to creating a figurative effect of a vertical village, extended in height, also house a number of vegetable gardens thus constituting a "vertical farm" managed by the students.

The individual residences are completely covered with straw panels, a construction technique used mainly in the northern European countries, but that is extending to other parts of Europe. To make the structures self-sustainable, systems that use renewable sources are being used, such as photovoltaic and wind energy, in order to significantly reduce energy consumption.

Finally, there is also an aviary that makes a valuable contribution to the repopulating of the volatile species in order to contribute to restoring the ecosystem.

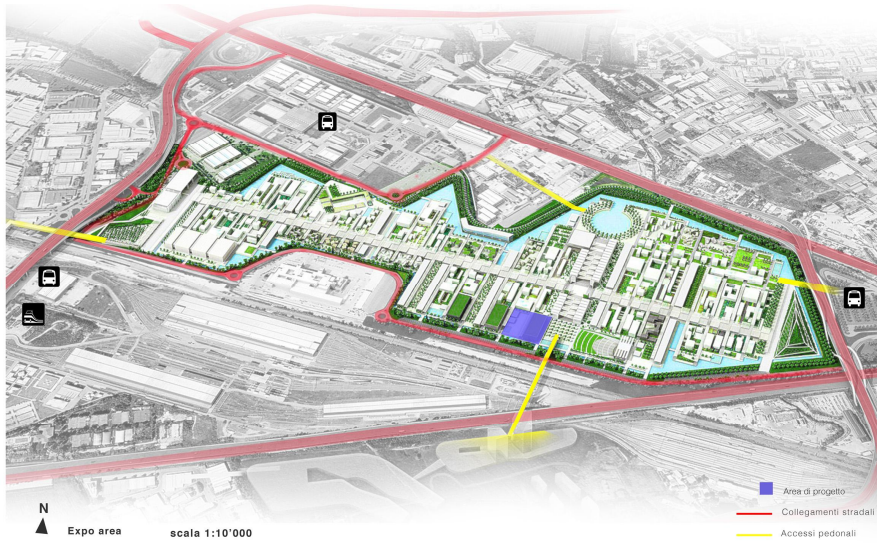

Figure 1 - Territorial overview

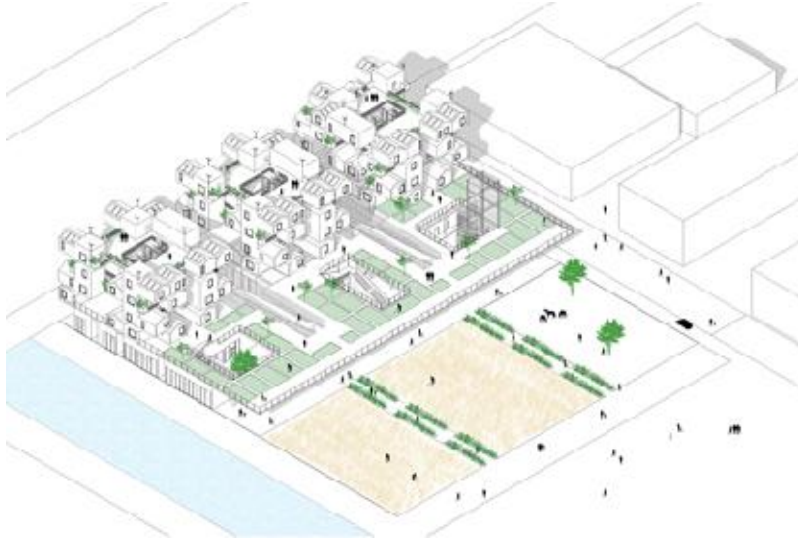

Figure 2 - Axonometric view

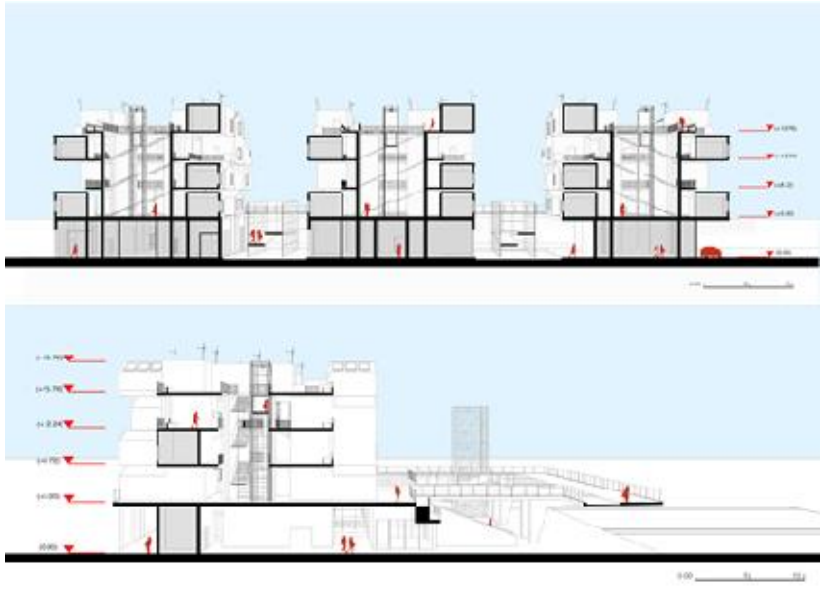

Figure 3 - Sections

Figure 4 - General view of the project

Figure 5 - View of the project from the terrace

Figure 6 - View from one of the buildings

Figure 7 - View of the roof system of the project

Figure 8 - General night view of the project

Notes

[1] The paragraph: "A design of future" is edited by Lorenzo Capobianco

[2] The paragraph: "The environmental quality control" is edited by Rossella Franchino

[3] The paragraph: "A horizontal social urban farm for the transformation of an Expo lot in Milan" is edited by Carlo Mele

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Social Housing and the redevelopment of open spaces. A case study of Scampia (NA)

Claudia de Biase[1] Caterina Frettoloso[2] Valentina Perrone[3]

Abstract: Starting from an experimental didactic experience on the Scampia neighbourhood (Na), a place where the works realised are underused, anonymous and not valorised, authors address some of the key issues to understanding the dynamics that create these neighbourhoods, as well as the strategies necessary to innovatively rebuild the compromised relationship system between the user and the environment.

Keywords: environmental redevelopment, housing policies, participatory strategies, neighbourhood planning.

1. Some preliminary considerations (Caterina Frettoloso)

Open spaces give interesting redevelopment opportunities for public residential areas both in defining new types and meanings as well as in purely technological and environmental terms. The considerations that follow, inspired by an experimental didactic study[1] on the Scampia neighbourhood (Na), address some of the key issues to understanding the dynamics that create these neighbourhoods, their effects on the territory and the city, as well as the strategies necessary to innovatively rebuild the compromised relationship system between the user and the environment.

[1] Department of Civil Engineering, Design, Building and Environment, Polytechnic and Basic Sciences School, Second University of Naples.
[2] Department of Architecture and Industrial Design "Luigi Vanvitelli", Second University of Naples.
[3] Department of Architecture and Industrial Design "Luigi Vanvitelli", Second University of Naples.

Environmental redevelopment interventions of collective spaces, especially in situations of social and environmental problems, require a design approach focused on an idea of overall sustainability that, starting from energy efficiency as a guideline for interventions on built heritage, aims at the promotion of sustainable lifestyles as a key element in improving the quality of life of the users [1].

The organizational patterns of redeveloped open urban spaces should meet specific functional requirements dictated by the collective way of life, more and more oriented towards increasing flexibility that does not mean, as often occurs, the lack of a design choice.

It means working on the performance characteristics of spatial elements in an integrated approach to the project where the technical and functional aspects are interwoven with social and environmental issues. This will make it possible to integrate the issues that could be called “acquired”, i.e., related to the accessibility of the site in relation to its specific functions (also with respect to different types of flows that cross and overlap the open space), to the issues associated with security, lighting and cleaning, with further areas of consideration being mostly due to environmental sustainability.

Figure 1: Project area – Via Labriola - Scampia (Na). Photograph: V. Perrone.

2. Rebuilding the user/environment relationship: the redevelopment of residential open spaces (Caterina Frettoloso)

The planning strategies implemented in Italy in the field of public housing, especially in the 1970-80s, highlight the almost total absence of any form of public open space project. In most cases, the neighbourhoods have oversized collective spaces whose functions are disconnected from an analysis of the real needs of the population in relation to the specificities of the intervention context [2].

The design response, in terms of an eco-oriented redevelopment of both the existing and new open spaces, as highlighted by the experiences of social housing matured in northern European over the last fifteen years, aims to create spaces that promote, first of all, social gathering as part of an integrated design that includes the mobility network. In this logic, even the green areas, at different scales, play a functional role by helping to connect/separate/shield, improving the micro-climate comfort and perceptive conditions, while also playing a key role in the temperature and humidity balance of the neighbourhood [3].

As part of the Architectural Technology sector, it is possible to "*outline a shared critical horizon, based on four paradigms: an ecological one, which promotes the densification of building interventions, reduction of land consumption and non-renewable resources, environmental efficiency of the areas and buildings, the use of local and environmentally friendly materials; an energy-environmental one, which distinguishes between energy and technological retrofit interventions of building envelopes, bio-climatic and environmental optimization of the buildings; a social one, which outlines actions to improve the architectural quality and environmental comfort of the living spaces and relationships as well as increase the quality of services for the users; a technological one, which characterizes interventions based on the requirements of flexibility, adaptability and reversibility to facilitate, on the one hand, new life cycles of the buildings and the reduction of technological obsolescence and, on the other, to accommodate user variability and the transformation of the housing needs*" [4].

The open spaces, sharing this premise, should pursue the logic of re-connecting the user-environment relationship through the construction of a new environmental balance that can be implemented by connecting "*the urban scale to the area with the local natural system, restoring fundamental ecosystem services and opening up to the use of local natural resources, [proposing] a structure of the segment in which the succession of open spaces [follow] an equilibrium logic that aims to ensure the connection between the green areas and the permeability of the soil*" [5].

This strategy cannot be separated from the "*thinking of a new meaning of the open spaces in an environmental perspective, defining user destinations, spatial quality, comfort levels; but also by treating the open space as integrated energy/environmental devices*" [6] in a way which considers the neighbourhood and open spaces as a single complex system.

In Europe, the comparison with the quality of life in its most totalizing form addresses the interests of local governments and planners, on the one hand, to qualify (and quantify) the contribution of the green in micro-climatic and ecological terms. While on the other, to work on the functional-system integration of high-technology systems (energy producing systems, infrastructure for sustainable mobility, performance surfaces).

Sharing this approach, the intervention proposed for one of the unused open spaces the Scampia neighbourhood, which will be discussed in the following paragraphs in the context of the regulatory framework and the project proposal, has the aim of promoting the functional, environmental and social aspects of the area. The introduction of attractive features, identified from the analysis of the functional-space context, as well as the promotion of participatory planning strategies, are, in fact, the basic elements of the project aimed at increasing the user-environment relationships.

From a purely fruition perspective, the idea is that of a space on different levels of usability and, therefore, the relationship between the users: waiting and passing places (public level), place for sharing – on a neighbourhood scale (semi-public level) and place of sharing – on a building scale (semi-private level). The aim is to identify the spatial

organization, in line with current social housing trends, in order to suggest ways of inclusive interaction and use and that, starting from the consolidated neighbourly relationships, build more complex relationships on a neighbourhood scale. The application of these strategies involves a careful analysis of the current situation aimed at highlighting the potential of the urban context, while attempting to retrieve those elements that represent the critical points of the city with the help of neighbourhood associations that work there on a daily basis. The participation of the users in parts of the design process (in the specific case to the ideation and execution phases), not only increases the degree of the sharing of the choices made but also increases the probability of a shared use and, especially, maintenance.

3. Residential construction in Italy: a brief history (Claudia de Biase)

To understand how to redevelop open spaces in an urban context, it is important to understand the part of the city involved[2].

An analysis of the evolution of public and social residential construction is essential so as to understand the effects (the creation of neighbourhoods) on the territory and the city. It is worth noting how throughout history, public construction in its various facets, has almost always been carried out for large urban planning interventions, rather than simply building, macroscopically intervening on the urban fabric and conditioning the development lines.

The first regulations date back to 1903, with the so-called Luttazzi Law[3] that had among its objectives that of fighting private speculation as well as building neighbourhoods with rent equal to incomes and help to reduce the gap between individual initiatives and municipal centralization. This regulation, for the first time, set up public financing for the creation of low-income housing and had the merit of starting a long period of experimentation on the theme of housing. Among the first houses, the Mac Mahon (1908-1909) was an emblematic case, on about 32,000 square metres, with a widespread and unusual variety including: terraced houses, courtyards with walkways and villas on two

floors. Despite this, "*the results are exquisitely nineteenth century, with small apartments and poor services*" [7], a characteristic that will be a constant in public building in Italy. Some years after this first intervention, another law n. 89/1908 was issued, which coordinated the Luzzatti Law with subsequent laws n. 555/1907 and n. 5/1908. An important innovation introduced by the consolidated text is the addition of the type of affordable housing to the existing public housing, the terms that will be clarified a few years later. The TU on cheap-social construction, approved after World War I, with RD 30 November 1919 and the next TU 24 March 1938, n. 1165 on cheap-social construction defines the new structure, on a provincial basis, of the IACP, the institution appointed for the construction and management of the housing. An important new aspect was the clear distinction between cheap construction and social housing, clarified in articles. 48 and 49 of the TU 38. In this case, the Second World War blocked any form of building, with it only resuming after the war, when there was a reconstruction problem and in particular that related to housing for the social classes with a low income[4]. In 1949, law n. 43 was issued, better known as the Fanfani Plan. The bill entitled "Measures to increase manual workers employment, facilitating the construction of workers houses" was based on the belief – which permeated Italian history – of construction as a driver of the economy. The duration of the Plan was initially seven years, and then extended to 1963, with Law n.1148/1955. In the first seven years, Conrad Beguinot wrotes "*attention turned mainly to meeting the pressing housing needs without paying much attention to the problems related to the insertion of urban settlements, delegating this task to the municipalities that will identify areas where to intervene*" [8]. These are the years when neighbourhoods without services and disconnected from the contexts arose, only with "a cluster of houses, more or less plastically ordered social housing emerged, and the failed urban grading and "repeatability" of building types, regardless of the context in which they are realised. The second seven years tried to rectify these shortcomings and began to consider the organic district, to quote the words of Ludovico Quaroni [10]. In any case, it is in these years in Italy that there was the beginning of the crowded popular neighbourhoods, on the idea of the "city-region", the horizontal city of

Patrick Geddes [11]. As Di Biagi [12] wrote, until 1960, the neighbourhoods realised followed the rationalism of Le Corbusier, on the one hand, or the organicism of Frank Lloyd Wright, on the other.

The real characteristics of the new neighbourhoods, however, regardless of the theory which underlies the design, are the peripheral location and poor rapport with the city [13]. To address these problems, the CEP was founded in 1954 (social housing coordination), which tried to achieve, in the words of Quaroni, "neighbourhoods susceptible to independent life"[14]. The CEP neighbourhoods, despite being poorly built, form the basis of Law n. 167/62 and, above all, tried to overcome the problem of the peripheral location of the neighbourhoods [15], which, unfortunately, will return.

In 1962, Law n. 167 was passed, which intended to facilitate the acquisition of building plots for cheap social housing, with the PEEP being introduced, the main example of "sector" implementation planning. The law aimed to frame the cheap and social housing neighbourhoods within the logic of planning and, above all, to ensure that these new plans were not episodic. The decision to equate the PEEP to PP *"... affirms the concept that interventions in the field of cheap and social housing should not be episodic; they must be organic and articulated with the urban planning policies of the city and must identify and qualify, based on the ten-year requirement, both the residential areas as well as those for public services and equipment*"[16]. Therein lies the peculiarity of the PEEP: Plans for affordable and popular housing are obligatory for a number of municipalities and the proportion of housing to be allocated to public housing (ERP) is established by Law n. 167/62 . As anticipated, in Law n. 167, there is a clear intention, then entirely disregarded by the facts, not to create PEEP exclusively in parts of the territory intended for building expansion, but to predict these plans "*even in areas where there are properties whose demolition or transformation is necessary due to sanitary reasons or it is deemed necessary for the implementation of the plan*", so as to insert the lower classes in the urban context. In fact, except for a few cases, the choice to insert the PEEP in expansion areas, with preliminary urbanization hardly ever being carried out by the municipalities, has produced

neighbourhoods without any form of networks and services in peripheral areas, completely outside the context of the city.

Naples, with the Secondigliano Scampia neighbourhood, an important example of the results and effects of the Area Plans, is still one of the neighbourhoods that has the most need for an urban redevelopment project.

4. Under construction: a didactic experience (Valentina Perrone)

Under construction is an urban redevelopment project set in the extreme northern outskirts of Naples, in the economic and popular neighbourhood of Scampia. As Stenti wrote, with Law n. 167 of Secondigliano, there will be the first large-scale planned public building intervention in Naples [17]. The neighbourhood arose from some interventions carried out by Ina Casa in 1957, with the construction of 7 buildings, about 100 m long, spaced 80 m apart, 14 floors high and with a central area for social services and facilities. The Secondigliano Area Plan was configured like a micro-city in the city [18], or rather as a satellite town of 65,000 inhabitants [19]. Whereas, Scampia became a mono-functional neighbourhood with one of the largest concentrations of new public housing, with no facilities and equipment and where the particular location of the lots and the oversized structure of the road networks over time would generate physical degradation conditions and housing problems [20].

Even the works realised, such as the green spaces that make the neighbourhood the most green area of the city of Naples, are underused, anonymous and not valorised. An example is the area chosen for the intervention to be carried out, located on one of the main streets of the neighbourhood, but which is nevertheless in a state of decay and neglect as well as being subject to continuous acts of vandalism.

The functional space analysis highlighted how the site is used very little. During the day and in any season, it is nearly always completely deserted, the planned activities are not carried out and the area is only used to get to the street behind the main buildings, which has direct access to it. However, the environmental-ecological analysis showed the

state of degradation of the area: poor maintenance and continuous acts of vandalism have caused damage to the main pieces of equipment on the site, which today is like an open dump with piles of rubbish and weeds everywhere.

Having analysed the problems of this area, it was considered appropriate to resort to participatory planning to create an area characterized by different functions, some of which are managed with the help of the local residents. An important role, from the early planning stages, was given to collaborating with one of the associations in the area which, thanks to its experience and work with the inhabitants of the area, was able to direct the design strategies to be put into place. During this first phase, informal interviews with the residents of the area were carried out since they were a very useful tool to define the framework of needs necessary for the subsequent identification of the functions to be provided within the site.

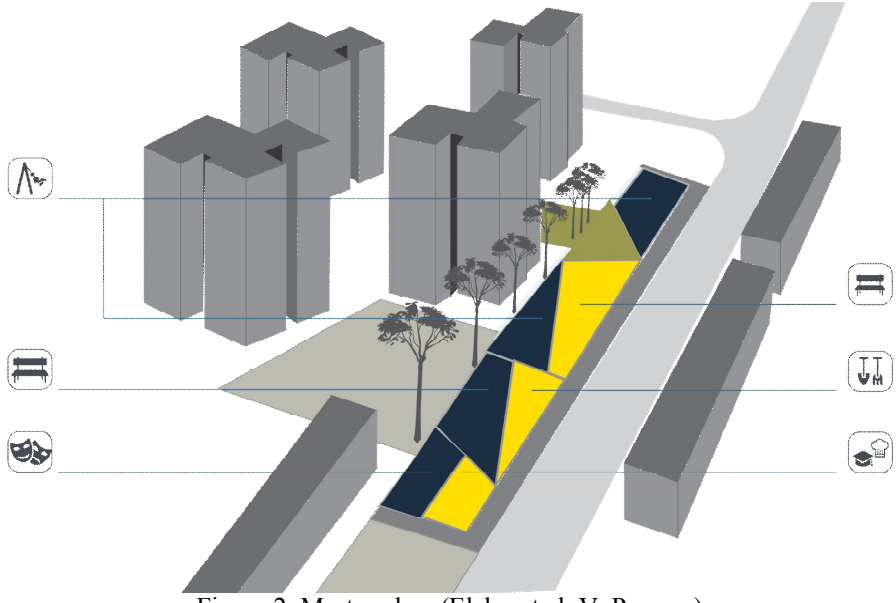

Figure 2: Master plan. (Elaborated: V. Perrone)

The new functions to be allocated to the area were considered, choosing to divide it into three different levels: a first level, at street level, with a public nature and includes all the necessary functions for

both the users and inhabitants of the neighbourhood; a second level, under the previous one, dedicated to participatory planning areas, and a last level, next to residential buildings adjacent the area, mainly designed as a pertaining space.

Considering that the public area is long, a continuous and multifunctional structure was proposed, with it assuming various forms depending on the specific function. A structure composed of steel tubes, covered with strips of wood from environmentally sustainable forests, creating various modules of which the parts will be welded together in the factory and then be joined together directly on site. The strips of wood will be wedged into the structure thanks to the tubes at C and H, which are then closed with appropriate plugs.

This method will make both the assembly as well as the replacement of any individual elements easier. The structure will then be completed by a few coloured signal tapes that will be twisted around the tubes and create games of light and shadow.

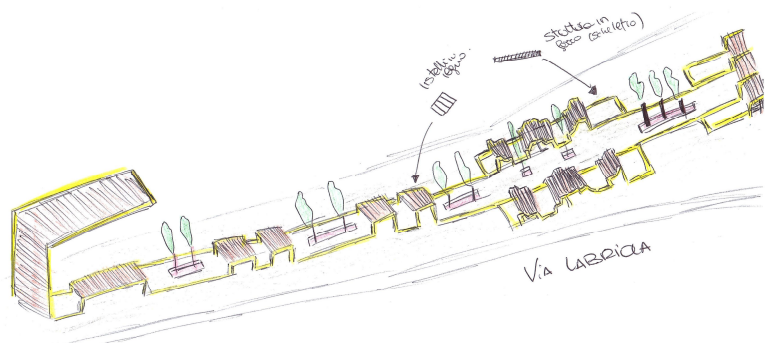

Figure 3: The multifunctional structure in the public area. (Elaborated: V. Perrone)

The participatory planning strategies are at the centre of the project events, designed to welcome the initiatives proposed by the nearby Catering College “Vittorio Veneto”. For this reason, the main element of the area is a long table made thanks to the participatory planning of the college students who, following the simple instructions given supplied during the carpentry workshop, will complete the table by slotting the wooden strips into the prebuilt steel structure, also intertwined with coloured ribbons on the special umbrellas which are

then fixed to the table to ensure the shade during the hottest hours of the day. Everything will be made within a month of opening the site.

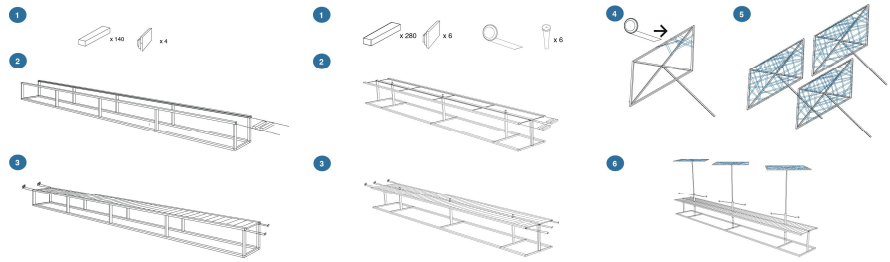

Figure 4: Instructions for completing structures in the event space. (Elaborated: V. Perrone)

The rest area will be completed within two months and consist of a series of preinstalled steel structures on which citizens, also in this case thanks to special instructions for use, intertwine the signalling ribbons. The structures will be oriented so as to ensure shade during the hottest hours of the day according to the seasons. Under each structure, "mounds" of land will create ideal places where to stop, meet and relax.

The green system should improve the comfort conditions of the intervention area, with trees so as to reduce the effect of the wind during the winter. The urban vegetable garden will further enhance the link between the place and the inhabitants and will be completed by the users, always thanks to special instructions for use, within three months of the opening of the site.

The participatory planning areas will be joined by others, realised by the designer and primarily designed for residents of the adjacent buildings and dedicated to leisure and recreation.

Figures 5, 6: The rest space before and after be completed. . (Elaborated: V. Perrone)

Notes

[1] Thesis in Design and Communication entitled "Under construction. Environmental redevelopment and participatory planning in Scampia (Na)", candidate V. Perrone, supervisor prof. C. Frettoloso, co-supervisor prof. C. de Biase.

[2] The term public housing appeared for the first time in Italian law with Law no. 865/1971, even if the definition was already present in the

second paragraph of art. 1 of Presidential Decree December 31, 1972 n. 1035. What is different to speak of Economy and Popular Construction, with which the term means a fully planned neighbourhood, built and managed by public institutions or social housing, in which the private entity builds and manages (with regulations) housing to be rent or sold to the disadvantaged categories.

[3] The Luzzatti Law did not give a definition of social housing, which can be found in the Regulations, approved by Royal Decree No. 164/1904.

[4] In 1945, the reconstruction Plan was issued with D.L. 154/1945.

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Estimating the parameters of a flexible mortgage loan*

Salvador Cruz Rambaud[1] Ana María Sánchez Pérez[2]

Abstract: This paper aims to analyse mathematically some new models of mortgage which provide the borrower with the possibility of modifying some parameters characteristic of traditional amortization. These transactions will be labelled as flexible mortgage loans.
A *sine qua non* condition for the growth of the real economy, and specifically of the housing sector, is the increase in the movement of capital. In this way, the financial system plays a very important role to stimulate the economy in sectors such as the property market, seriously affected by the housing crisis and the declining purchasing power of potential buyers.
Given the difficulty which some families have in obtaining a mortgage loan, some Spanish banks have adapted their supply of financial products to the needs of clients, by relaxing some contractual conditions of the loan amortization.
In this paper we are going to analyse the most relevant models of the so-called flexible mortgage loans, and more specifically those loans with a significant final repayment, fixed instalments or flexible duration.

Keyword: mortgage, flexible loan, amortization, repayment, duration.

1. Introduction

The financial and housing crisis in Spain has resulted in a progressive loss of the purchasing power of families since 2008 and then in a declining demand in domestic economies. Drop in

*Invited paper

[1,2] Departmento de Economía y Empresa, Universidad de Almería.

consumption means less demand for manufactured goods, leading to the all familiar detrimental effect on the labour market.

In an effort to reduce the large stock of unsold properties, the market has reacted by reducing prices, but unfortunately this measure has not been sufficient to stimulate the demand for houses. The problem lies in the fact that contracting a mortgage loan in the current situation, with a high level of unemployment, may lead families to serious problems in making some monthly repayments of their mortgage. On the other hand, the bank sector is in a bad situation, and interbank loans have diminished due to the mutual distrust among banks. Additionally, the increase in the level of default implies that financial companies have raised the level of caution in the granting of credit with further restrictions and a more careful analysis of risk levels.

Given that reactivating the economy of a country requires an increase in the movement of capital, financial institutions have been forced to adapt to the individual needs of clients by diversifying the supply of mortgage loans. More specifically, in order to adapt to the circumstances of possible future clients, flexible mortgage loans have been designed to try to increase the demand for credit on the part of families contemplating house purchase.

Flexible mortgage loans are applicable regardless of the method used for loan repayment (French system of amortization, American system of amortization, constant principal repaid amortization method) [1]. Additionally, contracting a mortgage loan can involve some possible discretional characteristics such as the existence of interest-only periods or different levels of applicable interest rates: constant, variable or mixed, etc. [2, 3, 4 and 5].

In recent years, financial institutions have offered a wide range of flexible loans which provide the borrower with the possibility of choosing the amount or the period of making some repayments. Within this new type of loan, it is necessary to mention some of the main kinds of flexible mortgage offered by Spanish banks, and which exhibit the following characteristics:

- The possibility of deferring some monthly instalments until the end of the loan term, when no more postponements are allowed.

This is clearly not a condoning of interest but a postponement in the payment of the debt.

- Opting for a constant monthly instalment (within a range) when the interest rate of the loan is variable. This methodology transfers the element of variability of the transaction to its duration.
- Choosing a percentage of the loan principal to be repaid on a specific date within the transaction period.

Depending on the economic situation of the borrower, the application of these methodologies can be very appealing. In Section 2 a revision of the previous studies on this subject will be presented. Then, in Section 3 we will focus on the most innovative kinds of flexible mortgage loans. Finally, Section 4 summarizes and concludes.

2. State of the art

It is well known that loans are a widely-used source of funding. When they are applied to support a real investment, obtaining positive net returns may take a certain period of time. In this case, the first opportunity for applying flexibility arises because it may be advantageous for the borrower to negotiate the existence of either some interest-only periods or several periods during which no payments are required [6].

De Pablo [7 and 8] has been one of the first scholars to introduce flexibility in the design of loans by correcting the amount of the periodic instalments taking into account the rate of inflation corresponding to each period. Thus, if the interest rate is constant, the instalments are variable because they are corrected in line with changes in the rate of inflation. The use of this model allows borrowers not to lose purchasing power since they can assign the same proportion of their salary to the loan repayment. This payment correction implies that the loan duration will be variable depending on the inflation rates, and will consequently be referred to as “loans with variable duration”. In

this correcting method the French amortization system has been used to calculate the initial periodic instalment. Later instalments are calculated by correcting them based on the inflation rate in the corresponding period. On the basis of these instalments, it is necessary to recalculate every year all financial magnitudes involved in the loan amortization schedule, such as principal repaid, interest due, and outstanding principal.

On the other hand, Cruz and González [9] presented a similar methodology for the case in which the interest rate is variable, this model being more usual in mortgage loans. The procedure consists in adjusting the instalment figure depending on the inflation rate and the interest rate corresponding to each period. This amortization system again allows the borrower not to lose purchasing power because the instalment has been adapted to both the inflation rate and the market interest rate.

Cruz *et al.* [10] introduce a correction of the loan instalments by using the earnings projected by companies belonging to the agricultural sector. García *et al*. [11] carried out a methodology based on the adjustment of the loan instalments to the net income generated by the investment project for which the principal is intended. This approach is based on the idea that business continuity requires that the profitability of investments exceed the cost of capital used for financing. Its implementation requires an *ad hoc* amortization system for each funded project which involves the use of complex statistical methods to predict the variables (for example the PERT method).

Cruz and González [12] propose the possibility of agreeing a percentage of the total loan amount to be repaid within a specific period. Cruz [13] analyses the average duration of the so-called flexible loans and the expression to determine the monthly instalment. A first solution to this problem consists in calculating the number of expected unpaid monthly instalments by considering that all will be paid at the end of the loan term with their respective accumulated interest charges. This problem is solved by maintaining the monthly instalment constant during the loan duration and its possible extension. Cosgrove [14] presents an application which may be applied to some borrowers who opt for a flexible repayment contract.

Traditionally, borrowers are required to make their debt payments on or before the agreed expiration date. A late payment usually results in additional interest, financial charges or penalties. Such a rigorous loan repayment structure does not take into account that the borrower may have some financial difficulties during the loan period and may be unable to make the payment on time. Nevertheless, in the context of a flexible loan, some obligations of the borrower can be relaxed without penalty. For example, the borrower may opt for the payment of certain specific instalments to be deferred. We will see these versions of flexible loan in Section 3.

3. Financial analysis of flexible mortgage loans

In the granting of mortgage loans there are numerous options which allow modifications to take into account specific details which appear in the usual mortgage contract, such as amounts, maturities, interest rates, etc., taking into account the differing circumstances of individual clients. In addition to these options, there are other possibilities such as early repayment, the extension of repayment periods or the existence of interest-only or non-payment periods. Usually, interest-only and non-payment periods coincide with the first periods of the transaction; however, some banks allow distributing these periods throughout the whole transaction. The most usual partial repayment periods are:

- Interest-only periods where the amortization of the principal is not necessary. Each instalment only makes payment of the interest corresponding to the respective period.
- Non-payment periods where the payment of neither interest nor amortization are necessary.

3.1. Mortgage loans with a final instalment

In this variant of mortgage loans, the borrower has the possibility of postponing the repayment of a percentage (α) of the principal (C_0) until the end of the loan term (n). The aim of this type of mortgage is

that, during the first years of the transaction, the monthly instalments can diminish. This model is particularly appropriate when a lack of liquidity is expected during the first years of the loan.

Discretionally, the bank may offer the possibility of renegotiating the final instalment, by increasing both the mortgage term and the interest rate.

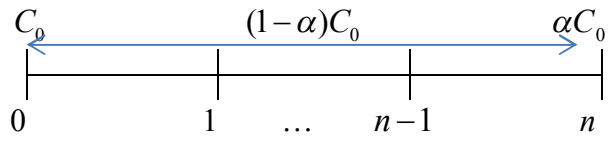

Figure 1: Graphic representation of amounts involved in a mortgage with a final instalment.

The constant instalment (a) which amortizes the loan can be calculated taking into account the outstanding principal at time $n - 1$, calculated by the retrospective method:

$$C_{n-1} = C_0(1+i)^{n-1} - a \cdot s_{\overline{n-1}|i}. \quad (1)$$

As the outstanding principal at time $n - 1$ is also αC_0, one has:

$$\alpha C_0 = C_0(1+i)^{n-1} - a \cdot s_{\overline{n-1}|i}, \quad (2)$$

from where:

$$a = \frac{C_0\left[(1+i)^{n-1} - \alpha\right]}{s_{\overline{n-1}|i}}. \quad (3)$$

Table 1 shows the amortization schedule of this type of mortgage loan.

Period	Interest rate i_s	Instalment a_s	Interest due I_s	Principal repaid A_s	Outstanding principal C_s
0	-	-	-	-	C_0
1	i_1	a_1	$I_1 = C_0 i_1$	A_1	$C_1 = (n-1)A$
2	i_2	a_2	$I_2 = C_1 i_2$	$A_2 = A_1(1+i)$	$C_2 = (n-2)A$
. . .	. . .	. . .	. . .	. . .	. . .
n	i_n	a_n	$I_n = C_{n-1} i_n$	$A_n = \alpha C_0$	$C_n = 0$

Table 1. Amortization schedule of a general mortgage with a final instalment.

This loan can be interpreted as the mixture of a French amortization loan with a principal $(1-\alpha)C_0$ to be amortized in $(n-1)$ periods, and an American amortization loan of amount αC_0 to be amortized in n periods.

Example 1. We are going to analyse the amortization schedule for a mortgage loan with the following features: the loan principal is €100,000 at a constant interest rate of 5% for 12 years (for the sake of simplicity, we will consider annual repayments). This loan includes the option of making a payment at the end of the transaction of 25% of the total loan principal.

Period	Payment a_s	Interest due I_s	Principal repaid A_s	Outstanding principal C_s
0				100,000.00
1	10,279.17	5,000.00	5,279.17	94,720.83
2	10,279.17	4,736.04	5,543.13	89,177.71
3	10,279.17	4,458.89	5,820.28	83,357,43
4	10,279.17	4,167.87	6,111.30	77,246.13
5	10,279.17	3,862.31	6,416.86	70,829.27
6	10,279.17	3,541.46	6,737.70	64,091.57
7	10,279.17	3,204.58	7,074.59	57,016.98
8	10,279.17	2,850.85	7,428.32	49,588.66
9	10,279.17	2,479.43	7,799.73	41,788.93
10	10,279.17	2,089.45	8,189.72	33,599,21
11	10,279.17	1,679.96	8,599.21	25,000.00
12	26,250.00	1,250.00	25,000.00	0.00

Table 2. Amortization schedule for a mortgage with a final instalment.

To see more clearly the evolution of this kind of mortgage, Figure 1 displays the loan amortization sequence:

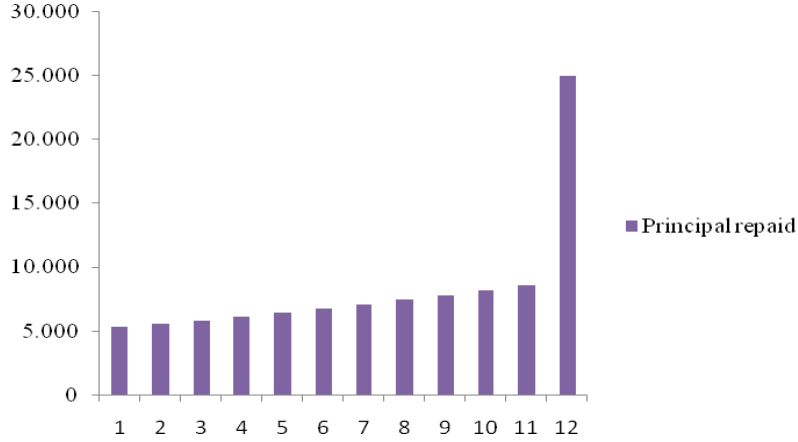

Figure 1. Evolution of the principal repaid for a mortgage with a final instalment.

3.2. Mortgage loans with variable interest rate and constant instalments

In this kind of mortgage loan the interest rate is variable but the periodic instalments (which include partial repayment and the interest due) remain constant during the whole life of the transaction. In other words, the borrower always pays the same amount independently of changes in the interest rate, although these will obviously affect the duration.

In this way, the borrower must choose the instalment with a minimum amount: the instalment must be higher than the interest due in each period. The smaller amount the borrower chooses, the greater the loan duration, and for this reason the loan period must also have an upper limit. On the other hand, if the chosen monthly instalment is greater than the calculated one, the period of the loan will become shorter.

In this type of mortgage loan, the variability of interest rates is transferred to the loan duration. In this way, an increase in interest rates will lead to higher loan duration, and vice versa. From the point of view of financial mathematics, the work by Molina [15] answers the following arising question: by how many periods would the duration of a "constant instalments mortgage" increase as a consequence of the variation in the market interest rate?

The annuity of a mortgage with constant instalments can be calculated starting from the interest rate corresponding to the first period (i) in the following way:

$$a = \frac{C_0}{a_{\overline{n}|i}}. \tag{4}$$

This amount can be used during the n years of the loan term. Assuming that the interest rate increases by a constant cumulative percentage (α) with respect to the originally considered interest rate:

$$(1+i_k) = (1+i)(1+\alpha), \tag{5}$$

the previously calculated instalment figure is not sufficient to repay the loan principal. Given that the instalments vary in geometric progression

of common ratio $(1+\alpha)^{-1}$, the loan principal (C_0) can be calculated as the sum of a geometric sequence:

$$C_0 = A(a,(1+\alpha)^{-1})_{\overline{n+k}|i} = a\frac{1-\left(\frac{(1+\alpha)^{-1}}{(1+i)}\right)^{n+k}}{(1+i)-(1+\alpha)^{-1}}. \quad (6)$$

.

On the other hand, $C_0 = a \cdot a_{\overline{n}|i}$. As the change of interest rates affects the loan duration, by considering both equalities, the time by which the duration will be increased (represented by *k*) will be:

$$k = -\frac{\log\left[1-a_{\overline{n}|i}\frac{(1+i)(1+\alpha)-1}{1+\alpha}\right]}{\log[(1+\alpha)(1+i)]} - n.. \quad (7)$$

In the case that the borrower, at any given time of the transaction, decides to modify the amount of the constant instalment, the duration of the transaction will be increased if the constant instalment is reduced, and vice versa.

Example 2. Assume a person who opts for a flexible mortgage loan with constant instalments and variable duration depending on the variations in interest rate.

In the case that the loan, with a principal of €100,000, is contracted at a constant interest rate of 5% for 10 years, the amortization schedule is shown in Table 3.

Period	Instalment a_s	Interest due I_s	Principal repaid A_s	Outstanding principal C_s
0				100,000.00
1	12,950.46	5,000.00	7,950.46	92,049.54
2	12,950.46	4,602.48	8,347.98	83,701.56
3	12,950.46	4,185.08	8,765.38	74,936.18
4	12,950.46	3,746.81	9,203.65	65,732.53
5	12,950.46	3,286.63	9,663.83	56,068.70
6	12,950.46	2,803.44	10,147.02	45,921.68
7	12,950.46	2,296.08	10,654.37	35,267.31
8	12,950.46	1,763.37	11,187.09	24,080.22
9	12,950.46	1,204.01	11,746.45	12,333.77
10	12,950.46	616.69	12,333.77	0.00

Table 3. Amortization schedule for a mortgage with constant instalments and interest rate.

However, the contracted loan allows a variable interest rate. Let us assume that the interest rate will increase by 1.65% per year. Observe that this fact will not modify the instalment because the variability in the rate of interest will be transferred to the loan term. In this case, we can calculate the increment of the loan duration (k) as follows:

$$k = -\frac{\log\left[1 - a_{\overline{n}|i}\dfrac{(1+i)(1+\alpha)-1}{1+\alpha}\right]}{\log\left[(1+\alpha)(1+i)\right]} - n = 1.0029.$$

In this way, the new loan duration is $n + k = 10 + 1.0029 = 11.0029$ years. The amortization schedule is shown in Table 4.

Period	Payment a_s	Interest due I_s	Principal repaid A_s	Outstanding principal C_s
0				100,000.00
1	13,108.15	5,250.00	7,858.15	92,141.85
2	13,108.15	5,322.34	7,785.81	84,356.04
3	13,108.15	4,872.61	8,235.54	76,120.50
4	13,108.15	4,396.91	8,711.24	67,409.25
5	13,108.15	3,893.72	9,214.43	58,194.82
6	13,108.15	3,361.48	9,746.68	48,448.15
7	13,108.15	2,798.48	10,309.67	38,138.48
8	13,108.15	2,202.97	10,905.18	27,233.30
9	13,108.15	1,573.06	11,535.09	15,698.21
10	13,108.15	906.77	12,201.38	3,496.83
11	3,698.81	201.99	3,496.83	0.00

Table 4. Amortization schedule for a mortgage with constant instalments and variable interest rate.

Figure 2 displays the annuities of the loan with constant instalments during the operation term, except for the last period. At the same time, we obtain a clearer picture of the evolution of the interest and the annual amortization.

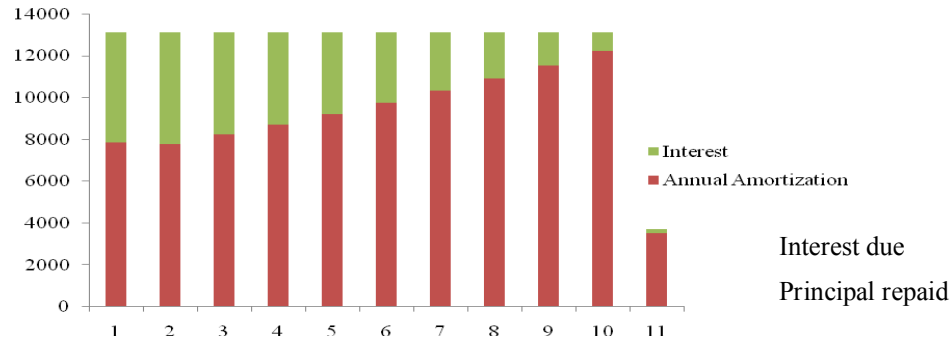

Figure 2. Principal repaid for a mortgage with constant instalments.

3.3. Mortgage loan with flexible number of monthly payments

In this subsection, we are going to study a new type of mortgage loan, designed to take into account the situation of those clients who may have serious problems in making some of the monthly repayments.

Flexible loans are a new type of financial product offered by some Spanish banks such as BBVA to facilitate mortgage payments for some borrowers. More specifically, a flexible loan is a type of loan in which the borrower has the option to defer some monthly instalments until the end of the transaction. In any case, it is necessary to clarify that this is not a condonation of the debt but a deferment of repayments to immediately after the loan term, with the implicit understanding that new postponements will not be allowed each year.

The borrower can choose the postponement of up to two monthly instalments within each year (any two monthly instalments, as decided by the borrower). This type of loan is both a financial and a random operation where the amount of the monthly instalment is certain and the maturities are random [16, 17 and 18].

In other words, the borrower can choose to make the payment of 12, 11 or even 10 monthly payments per year. Usually in this type of loan, the bank sets an upper limit for the total number of unpaid monthly instalments during the total loan term.

In order to implement these transactions, the bank has to make an estimation of the average number of unpaid monthly instalments by the borrower to determine the real loan duration, where logically the corresponding accrued interest charges should be added. In other words, if the financial institution is interested in keeping constant the value of the monthly instalments during the entire life of the loan, the real duration should be calculated. This estimation then serves as the basis for determining the value of the monthly instalment, taking into account these estimated deferments in the initially agreed maturities.

In order to make this estimation, we will use the following notation:

- p_1 is the probability that the borrower fails to make two monthly payments in a year,

- p_2 is the probability that the borrower fails to make one monthly payment in a year, and
- p_3 is the probability that the borrower makes every monthly payment.

These probabilities depend on the specific situation of each borrower. Obviously, $p_1 + p_2 + p_3 = 1$ and usually $p_1 > p_2 > p_3$ holds. So, the expected number of the annual unpaid monthly instalments is:

$$\bar{t} = 2p_1 + 1p_2 + 0p_3 = 2p_1 + p_2 \ . \quad (8)$$

Thus, if the loan duration is *n* years, the expected number of unpaid monthly instalments in the total period will be $\hat{n} = \bar{t} \cdot n$. Usually, banks require an upper limit for the number of total non-paid monthly amounts ($n_{\max}$), in which case the number of unpaid monthly instalments would be $\hat{n} = \min\{\bar{t} \cdot n, n_{\max}\}$. If the bank does not require an upper limit for the number of total monthly instalments which can be deferred, this limit will be 2*n*. However, it is usual that banks limit to 10 the number of monthly instalments which can be deferred during the period of the loan.

By employing combinatorial analysis, the borrower has $\binom{12}{2} = 66$ possibilities to defer two monthly instalments every year, $\binom{12}{1} = 12$ possibilities to defer one monthly instalment every year, and $\binom{12}{0} = 1$ cases in which all monthly payments are made during the year.

So, if all possibilities of postponement (0, 1 or 2 monthly payments) have the same probability, then $p_1 = \frac{66}{79}$, $p_2 = \frac{12}{79}$ and $p_3 = \frac{1}{79}$. Consequently, the expected number of unpaid monthly

instalments in every year would be $2\frac{66}{79}+1\frac{12}{79}=1.823$. Therefore, in the case that the mortgage loan term is 15 years, the expected number of deferred monthly instalments in 15 years would be $1.823 \cdot 15 = 27.345$.

The amount of the resulting monthly instalment (m') will be deduced from the following equation, in the case of using the French amortization system:

$$C_0 = m' \cdot a_{\overline{n-\hat{n}}|i_{(12)}}. \tag{9}$$

In the previous example, the value of the monthly instalment, assuming a loan of €150,000 at a 6% nominal interest rate, would be:

$$m = \frac{150{,}000 \cdot 0.00407}{1-(1+0.00407)^{-180}} = €1{,}177.15,$$

versus

$$m' = \frac{150{,}000 \cdot 0.00407}{1-(1+0.00407)^{-153}} = €1{,}319.05$$

that the bank would require by taking into account the flexibility in repayment by the borrower.

Similarly, we could calculate the alternative interest rate (i') considering a monthly payment of €1,319.05 on a time horizon of 180 months. So:

$$m' = \frac{150.000 \cdot i'_{(12)}}{1-(1+i'_{(12)})^{-180}} = €1{,}319.05,$$

from where:

$i'_{(12)} = 0.55\%$.

Therefore:

$i' = 6.68\%$.

In order to generalize the above presented approach, two new concepts can be considered (Cruz, 2013). Indeed, we consider the general case in which:

- n represents the number of years covered by the loan,

- k represents the repayment frequency ($k = 2$ in case of semestral repayments; $k = 4$ for quarterly repayments; $k = 12$ for monthly repayments, etc.),
- p represents the maximum number of repayments which can be deferred every year. Obviously, $p \leq k$ holds, and
- $n_{\max}$ represents the maximum number of repayments which can be deferred during the n years of the loan term.

If we denote by $a_{\overline{n/k}|i}$ the sum of the present values of all possible unitary incomes due at the end of each period, where k of the n unities are zero ($k \leq n$), it is verified that (Cruz, 2013):

$$a_{\overline{n/k}|i} = \binom{n-1}{k} \alpha_{\overline{n}|i}.$$

On the other hand, if we denote by $(r_1, \alpha_1; r_2, \alpha_2; ...; r_k, \alpha_k) a_{\overline{n}|i}$ the sum of the present values of all unitary incomes of $r_1 + r_2 + \cdots r_k \leq n$ payments due at the end of each period and distributed into n periods, one has:

$$(r_1, \alpha_1; r_2, \alpha_2; ...; r_k, \alpha_k) a_{\overline{n}|i} = \left[\begin{array}{l} \alpha_1 \binom{n-1}{r_1 - 1} \binom{n-r_1}{r_2} \cdots \binom{n-r_1-\cdots-r_{k-1}}{r_k} + \\ + \alpha_2 \binom{n-1}{r_2 - 1} \binom{n-r_2}{r_3} \cdots \end{array} \right.$$

$$\left. \cdots \binom{n-r_1-\cdots-r_{k-1}}{r_k} + \cdots + \alpha_k \binom{n-1}{r_k - 1} \binom{n-r_1}{r_1} \cdots \binom{n-r_1-\cdots-r_{k-2}}{r_{k-1}} \right] a_{\overline{n}|i}.$$

In summary, this financial product offers the borrower the possibility of deferring some monthly instalments until the end of the loan term and under certain conditions. A practical example has been employed for the financial analysis of this product where we have

specified the maximum number of possible deferred monthly instalments. With this information, we determine the average delay in repaying the entire loan and the value of the new monthly instalment necessary to amortize the loan in the initially agreed period of time.

Conclusion

The situation of the construction industry in Spain, one of the most important sectors in the national economy, is very difficult as a consequence of the well-known financial crisis and the high rates of unemployment.

In spite of the noteworthy decrease in house prices in the last two years, the reduction of the saving capacity of families as well as the severe restrictions on credit (as a banking strategy to reduce default) have not favoured the recovery of the sector.

In order to increase credit activity, it has been necessary for financial institutions to offer some new kinds of mortgage loan which take into account the situation of individual clients. These models of loan have been labelled "flexible loans", because they make the repayment of principal easier by modifying certain characteristics of the mortgage. In this way, the borrower can choose among a wide variety of possibilities which affect either the amount of the instalments or the duration of the loan.

In summary, "flexible loans" facilitate the adaptation of the different elements of the mortgage contract to client needs. More specifically, the options of contracting either a greater repayment at the end of the mortgage, a constant periodic instalment or a flexible maturity have been mathematically analysed in this paper.

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