

Functions and Perspectives of Public Real Estate in the Urban Policies: The Sustainable Development Plan of Syracuse

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Abstract. This study deals with the problem of the negotiation between public and private actors in the urban planning, in the case study of the Plan for the Sustainable Development of Syracuse (Italy). The contribution focuses on the modalities of execution of the Plan that envisages the tool of the Public-Private Partnership (PPP). The study intends to verify the equity of the negotiation mechanism and the advantage gained by the public actor from conferring two large buildings to a Real Estate Fund. The contribution is structured in three parts. The first part provides the general programmatic and valuation frame referring to the features of the area. It describes the overall development perspectives and therefore the whole process of real estate development that would be supported by means of the contribution of the fund. The second part describes the implementation of a cash flow analysis based on a hypothesis of use of the buildings previously outlined. The third part provides the elements of the analysis of the investment that are retroactive on the design hypotheses converging on the value assessed to determine the quota of participation of the Municipality in the Real Estate Fund.

Keywords: Strategic urban planning · PPP · Real estate finance · Sustainable planning · Property funds

1 Introduction

Urban regeneration constitutes the field of urban planning where the progressive approach between collective value and individual interest has been more significantly realized. The necessity to achieve an equal integration between private and public functions has led to the diffusion of negotiation forms where the fulfilment of the economic goals on both parts constitutes the premise for the success of the operation.

The advancement of the real estate finance, and the consequent vertical integration of the functions and the activities linked to the production of the urban space, have originated the idea that the densification of the income functions is the safest tool for the financing of public works and that the implementation of “cold works” is possible

only through the envisagement of “warm works”¹. The science of valuation includes some real estate finance approaches, but goes beyond its intentions, giving a “further” sense to the feasibility calculation. In particular, in the field of investment planning at the urban scale in fragile contexts from the point of view of the balance between functional and landscape features, the consideration of wide spans and the availability to appreciate their values is required, instead of the capability of foreseeing the prices.

More specifically: the calculation of the feasibility of real estate investments, mainly based on indexes such as IRR and PBP, privileges high transformation intensity interventions and high exploitation rate activities. In this way, it leads urban programming to relax the restraints on the most qualified real estate stock, which is characterized instead by low capitalization rates and is selected by operators more available to carry out virtuous forms of real hoarding.

In the spirit of the *economic-valuative logic* embodied in the perspective of the “beautiful city”, it is possible to assume the opposite point of view: first, the typical value terms of the urban, landscape and socioeconomic context from which the assets acquire their real estate identity are identified. Second, design hypotheses coherent with this identity are elaborated; the conditions for the convenience and financial feasibility are verified, establishing the invariants and generating the possible and most significant alternatives; the profile of the most suitable economic subject to carry out this type of investment is outlined. In general, the combination of restraints and opportunities in the historic city helps to select economic operators motivated by a perspective typical of the owners instead of the entrepreneurs, a perspective that participates in the urban dynamics instead of the dynamics of capital assets.

2 Case Study

Nowadays the urban regeneration process of Syracuse almost completely developed the potentials of the historic center, Ortigia, consolidated as the core of the architectural-landscape values and the brand of the city and its province. Such a fast achievement has spread towards the adjacent areas similar development perspectives, showing their territorial and economic-real estate complementarity. In particular, the coexistence of two clearly distinct harbor areas – the Porto Grande harbor west, and the Porto Piccolo East – close to Ortigia’s privileged waterfront, has fostered different ventures linked to the real estate finance tools and the possibility to obtain European financing.

Starting from the direct grant financing model for the redevelopment of the building stock (Special Law for Ortigia, 1976), more dynamic approaches based on foreign financing and consultation have been subsequently carried out. In this field, the objectives of the architectural-urban quality, the social welfare, and the economic growth have been integrated into a strategic vision concerning the use of financing and the success of the public investment.

¹ “Cold works” are usually infrastructures with no appreciable cash flows, while “warm works” have a quite high cash flow capable to pay back the investment costs.

Among the tools that may be framed inside this approach, the following are worth mentioning: The Community Venture Program (PIC) Urban Syracuse (1996 and 1998–2002), PIT n. 9 Ecomuseum of the Mediterranean inside the POR Sicily 2000–2006, Ortigia's Master Plan and the 2003 Sustainable Development Plan.

In the latter, the project for the redevelopment of the waterfront includes the realization of the touristic harbor and some residential buildings in the area of the S. Antonio Pier, the realization of the Urban Center in an historic building to be restored, the extension of the Pier itself to improve the mooring of big cruise ships, and the contextual realization of the Port Terminal, a mixed use and public-private management building.



Fig. 1. The area, the sample and the two properties. (Color figure online)

The implementing program envisages the use of the Public-Private Partnership (PPP) tool and the institution of the real estate fund in which the Municipality participates by conferring two public buildings: one of them, the smaller and more ancient, is currently in ruin; the other one, more recent, is currently used as a garage and must be renovated. The percentage of participation in the fund is given by the current value of the two buildings, valued as the 16 % of the total value.

The proposed contribution intends to verify the coherence of this valuation considering the potentials of the context in the perspective of the regeneration process currently on its course. From point of view of the urban quality and the architectural value, this process has been simulated inside two areas that are different part of the Umbertino district, and part of the Borgo S. Antonio district. It is possible to calculate the surplus of value corresponding to each of the generated strategies in the hypothesis that this process may be implemented by activating the equalization and compensation mechanisms. This expected surplus contributes to the dimensioning of the financial and

monetary variables included in the calculation of the value of public buildings to be conferred to a real estate fund.

This experimentation is aimed at integrating two distinct models of real estate finance: the first one is generalized, that means referred to the conditions of access to the equalization mechanisms with which the owners are stimulated to realize the works of the redevelopment of the urban fabric (Fig. 1 left). The second one is specific and refers to the two public buildings (Fig. 1 right) the Municipality confers to the real estate fund obtaining in return the right to share the profits of real estate investment, proportionally to the value of the two buildings themselves.

3 Methods and Procedures

3.1 Urban Perspective: The Redevelopment of the Borgo S. Antonio Quarter

The urban-finance pattern concerns the convenience for the householders to join the redevelopment program, thus contributing to its partial self-financing. The proposed pattern is carried out through the analysis, valuation and programming stages.

Analysis. The detailed analysis of the urban context was carried out identifying a sample of 21 Blocks, comprising 89 Architectural Units (AU) and 287 Functional Units (FU) [11].

Valuation. The valuation stage included the standard rehabilitation costs and revenues in terms of consequent real estate market value increase, according to a set of 9 different strategies, ranging from conservative to transformative (the first one regards the status quo). The resulting real estate value surplus is considered the base for the internalization of the externalities due to the general enhancement program, according to each of the supposed strategies. Given the natural trade-off between urban landscape layout and economic feasibility (financial sustainability, self-financing ratio), the pattern allows the decision makers to arrange the strategy that best matches the two conflicting performances.

Programming. The strategies were arranged by progressively relaxing the constraints concerning:

- the usage of the ground floors – from the current to the most profitable layout;
- the intervention categories – from maintenance to renovation;
- the cubage increase of the AUs – from the least to the most valuable one, once established some invariants.

It is possible to set the physical mechanisms able to make permission fees and incentives fit the real estate value surplus for each AU, basing on this knowledge and valuation system. Permission fees or incentives S can be calculated as follows: $S = [V^* - v - k(1 + wacc)^m(1 + r')^n] / [(1 + wacc)^m(1 + r')^n]$, where: V^* is the final real estate value (after transformation), v is the current real estate value, k is the building cost, $wacc$ is the average weighted cost of capital, r' is the business risk premium rate, m is the short loan life and n the transformation period.

3.2 Public Properties Appraisal

In the perspective of the Public-Private Partnership (PPP) adopted by the Municipality to integrate into its urban policy the private venture opportunities, the appraisal of the public properties needs to fit the fair value for the public and the feasibility for the company. The PPP provides for the creation of a joint venture in which the Municipality participates by conferring two important properties to a real estate fund. Moreover, the Municipality shares the capital and profits in proportion to the value of the transferred assets. The company assumes the obligation to realize the full amount of public and private works in exchange for the planning permits for the construction of new buildings and the restoration of the existing ones.

The appraisal of the two properties has been carried out by means of the residual value method as explained in the previous paragraph: $S = [V^* - k^*(1 + wacc)^m(1 + r')^n] / [(1 + wacc)^m(1 + r')^n]$, where the symbols have the same meaning; k^* is the building cost including the planning permission fees S , which in this case does not vary. New functions have been envisaged for both properties according to the development perspectives as outlined in the nine strategic layouts; the building costs have been calculated in detail, considering all costs for the renovation works as listed in the preliminary design drafts that have been specifically drawn up.

3.3 PPP – Public Private Partnership

The Green paper published by the European Commission in 2004 [6] affirms that the term PPP refers to forms of cooperation between public authorities and the world of business, which aim to ensure the funding, construction, renovation, management or maintenance of an infrastructure or the provision of a service.

The main characteristics of PPP are the long duration of the relationship between public and private partners; the funding of the investment, which in part is from the private sector, but it can be partially funded with public funds; multiple tasks assigned to private players; the distribution of risk between private and public sectors.

The same document distinguishes between contractual PPP and institutionalized PPP. The first involves the creation of a mixed equity company, held jointly by the public and the private partner while the second concerns to a partnership, which is based only on contractual connections between different actors.

PPP and project finance have developed around Europe, mainly in Spain, Portugal, France, Italy, UK, and Germany, which account for 95 % of all European PPPs by number. Italian examples concerns turnpikes, car parking, underground railway lines, new hospitals replacing the old ones, kindergartens, sports facilities, cemeteries and gas distribution networks [5]. The turmoil of the market has slowed down the number of projects and initiatives under the umbrella of PPPs.

In the last period, practitioners and academics began paying more attention to PPPs as viable solutions to urban challenges and urban regeneration, stressing the benefit of those approaches. The major attraction is to bring the private players and their finance into the project. The partnership can also improve the understanding of the different approaches adopted by the two partners and their various perspective, combining

responsibility for its community and shareholders for the investments. The PPP can also improve the management of the process, which underpins the success of regeneration projects. The private sector brings expertise and capital to the redevelopment projects so that actions can be delivered quickly, with a long-term sustainability.

3.4 Italian Real Estate Investment Funds

Italian Real Estate Investment Funds (REIFs) were introduced in 1994. The REIFs are a pool of assets represented by units relating to a plurality of investors and managed on their behalf and in their interest by a Saving Managing Company (Società di Gestione del Risparmio – SGR).

Independent valuers assess the fair value of the assets included in the funds twice a year. Italian REIFs mainly invest in [10] real estate assets, real estate rights and shares in real estate companies; listed and un-listed financial instruments; bank deposits; receivables and securities embedding receivable and any other asset that is traded and that has a value determinable on a biannual basis.

Italian REIFs can be categorized according type of investors, which includes public funds (“retail funds”), namely when every investor could participate in the fund and private funds (“institutional funds”), in which only “qualified” investors (as banks, property investors, etc.) have shares of the funds and speculative funds. The speculative funds (“hedge funds”) are highly risky funds with a few investors, greater decision-making freedom and flexibility.

Based on how the funds were established, REIFs are divided into ordinary funds (or “blind pool funds”), which collect money through subscription first, and then invest in properties; contribution funds (or “seeded funds”) buy properties or interests in real estate company and then sell shares in the funds; mixed if shares are subscribed both with properties and money.

Finally, funds can be created with contribution of private property/money or through public properties. The latter is formed by transferring public properties in the ownership of public administration and other territorial public bodies. Italian REIFs can be closed-end funds, and the entire amount of the capital is determined during subscription and cannot be modified; semi closed-end funds are allowed to increase or change their value by issuing new shares.

The growth since 1999 has been rapid and at the end of June 2015, there were 262 REIFs and the overall investment value was €31.45 M with a cut of 0.4 % in comparison to the previous year. After a constant growth during the last decade, the market now seems quite stable. The Italian REIFs have targeted both private and institutional investors. 24 funds are open to all investors, which represent the 9 % of all market, while 238 are reserved for qualified investors, and take 91 % of the market. This last type of investment is the largest component of the Italian funds, both in terms of the number of funds and value. Funds with contributions represent now the 71 % of the total market, showing a decrease in numbers in the last four years.

The majority of funds invests in offices (48,8 %), followed by retail (13 %) and residential property (13,4 %), showing a poor diversification. Investments in the

industrial sector have been reduced in the last few years (3,4 %) while RSA is 1,5 %. The logistic sector represents 2,9 % and other sectors amount 12,7 %.

The geographical area of Italy that plays the most important role in REIFs [1] is the North West (44 %), followed by the Centre (34 %), the North East (12 %) and South with the Islands (8 %). Foreign investments are only 2 % and have fallen (in relative terms) with the increase in new domestic investments.

The need to diversify more fully is the main issue for Italian funds [9], in terms of sector and regional allocation. Currently, the funds seem to be poorly diversified and prone to risk with investments concentrated mainly in offices in Rome and Milan and trophy buildings, located in the best locations in these cities or other main centers.

3.5 Jessica

JESSICA is the acronym of *Joint European Support for Sustainable Investment in City Areas*. This initiative of European Commission works in collaboration with the European Bank for Investment Bank (EIB) and the Council of Europe Development Bank (CEB), and it aims at promoting sustainable urban development and regeneration. European countries can choose to use part or some of their EU structural fund allocation in the revolving fund to channel the financial resources and the investments into projects concerning urban areas. JESSICA supports projects in areas as urban infrastructure, heritage or cultural sites, redevelopment of brownfield sites, creation of the new commercial floor space for SMEs, IT and/or R&D sectors, university buildings, energy efficiency actions. Contributions of the European Regional Development Fund (ERDF) are assigned to Urban Development Funds (UDFs), which invest them in public-private partnerships or other projects included in an integrated plan for sustainable urban development. These investments may be granted in the form of equity, loans, and/or guarantees.

Alternatively, managing authorities can decide to allocate funds to UDFs using Holding Funds (HFs) designed to invest in several UDFs. Owing to the revolving nature of the instruments, investment returns are reinvested in new urban development projects, reusing this way public funds and promoting the sustainability and impact of EU and national funds. Forms of investment used by the FSU can be of three types, namely loans, guarantees, equity.

JESSICA has many advantages for the development of strategic action in urban areas. For example, as a financial mechanism, it offers the opportunity of repayable assistance from the structural fund for investments, which should generate returns and so pay back the investors. This could also be improved with the mix of structural funds with other sources of funding and the ability to involve other public and private investors, resulting in a better support to a great number of projects. The instrument is characterized by flexibility, in terms of the use of funds (possible use of resources in the form of loans, guarantees or equity investments). JESSICA also implements the expertise of the private sector, banks, structural fund managing authorities, cities and towns in project implementation and management. These instruments are also a catalyst for the establishment of a partnership between different countries, cities, EIB, CEB, banks, investors in order to face the problems, which affect the urban areas.

JESSICA helps to increase efficiency and effectiveness of financial instruments, creating stronger incentives for the implementation of an urban development project, thanks to additional financial resources for PPP with a strong emphasis on sustainability.

3.6 Risk Approach

The perception of risk on the part of real estate investors plays an important role in the investment decision. In the economic literature, the ways by which the investors choose in risk condition has been extensively analyzed. In particular, this literature shows as the investors choose based on the tradeoff between the possible expectations of profit that the investment is capable of generating and the perception of risk associated with this investment [17].

These studies show that investors take a different behavior in relation to the decision time for the investment. In fact, normally in the short time, the behavior of investors is what in literature is called “mixed feelings” driven by irrationality. In the long run, the investor has the ability to contain the irrationality, find comfort in a complex information and then choose according to the principles of economic rationality [17]. The investors usually make a long-term choice, in fact, if on one hand, it is due to a substantial financial commitment and the other has long waiting times to achieve revenue objectives. It is obvious as that in this case the risk grows in proportion to the commitment of capital resources and time. The general investor, in any case, regardless of its particular attitude has the task of minimizing the uncertainty related to the activity to be undertaken, and if you can turn the uncertainty into risk. The types of risk of real estate are as follows [14]:

1. *Market risk*: the risk that the operating cash flows do not develop as expected, due to changes in demand and supply; structural changes in the population; Macroeconomic factors such as interest rates, growth and inflation rate.
2. *Environmental risk*: the environment that will have a negative impact on property value (public health or a factor that reduces the attractiveness of the property).
3. *Risk related to construction*: problems in a building that go beyond the level of maintenance, or the wrong design of a building, which can be reduced at the purchase.
4. *Legislative risk*: the impact that many laws determine on real estate investments, in particular in the field of taxation, transaction costs, regional planning.
5. *Liquidity risk*: the liquidity of a property is related to marketing period and the number of the transactions.
6. *Management risk*: it concerns several elements such as marketing issues, rent collection, maintenance planning.
7. *Financial risk*: it is related to the use and the amount of debt and the interest rates.

The traditional methods for the treatment of risk instead of objectively quantifying the perception of risk, involve the addition of a premium to the return required under “normal” conditions of risk. This additional premium results in recovery time shortened, in demands for higher returns and downsizing of cash flows.

Among the traditional methods for the treatment of risk there are: Risk Adjusted Discount Rate (which consists of an “adjustment” in the discount rate in order to bring back the recovery time in the limit of the maximum acceptable and chosen on a subjective basis); certain equivalents (the certain equivalent is the amount to be cashed, on a given date t , which makes indifferent the choice between that same amount to be cashed that can be considered reliable and the one expected from an investment) [17].

The methods are based on the analysis of probability. In this case, to the static formulation of the NPV, which assumes a certain structure and certain cash flow, and parameters for which it is impossible to construct a probability distribution, it is possible replacing a spectrum of forecasts based on specific terms. The risk control through a probabilistic approach needs to identify the risk factors that mostly affect the outcomes that can be conducted using the partitioning of the NPV technique.

This method is based on the division of cash flows, net of tax, because of its fundamental components, which are expressed as a percentage of the total present value, thus defining the relative importance of each of them.

An extension of this methodology, which limits any errors in the forecasts from the original approach, is the sensitivity analysis. The technique is based on modifying one at a time the inputs and on studying the resulting impact on the output.

In the case of probabilistic approaches, often it can be difficult to estimate directly all possible combinations of values that the various parameters can take on the base of the respective probability distributions. To solve this problem, the approach of the Monte Carlo simulation is used. Introduced in the '60 [12], it simulates a statistically high number of possible combinations of key parameter resulting from the assumption of probability distributions.

Associating each NPV its frequency or the number of times has seen the same value repeated in the simulation, it is possible to build a certain probability distribution of values of the NPV, and so determine the net present value expected from the investment. Furthermore, the Monte Carlo simulation allows overcoming a weakness of the analysis of the sensitivity, i.e. the lack of correlation between the variables under investigation. In fact, it is not plausible to assume for variables such as prices or costs, as their swing downwards or upwards can occur without affecting other parameters.

Another approach is the *Build - up approach*, which is generally used for the determination of the discount rate (where the rate is given as a sum of various risk factors). It can also be applied to determine the cap rate (cap rate = risk-free interest specific rate + risk premium r_{pBuA}), since also this rate expresses the risk resulting from the sum of several elements: $r_{pBuA} = \alpha_r + c_r + p_r + l_r + i_r + f_r + s_r + b_r + t_r + m_r + ecp_r$, inflation, context, property, lessee, insurable, financial, system, building, test, management, exchange-country-political, respectively. The risk-free interest rate can be identified by the value assumed by a bond with the highest rating, normally a debt instrument issued by a State with a strong economy. The identification of the second component of the rate presents critical issues related to the identification and quantification of the factors that influence the specific risk premium. The factors affecting the specific risk premium can be clustered into three groups [14]: the economic and financial factors, the type of property and the specific risk of properties (which can be grouped into six categories: location, physical characteristics, legislation

and taxation, the rental and contractual situation). The *RER (Real Estate Risk) pattern* determines an overall risk coefficient of a real estate in relation to the risk that can be attributed to the characteristics of the building tenant, to the context characteristics and endogenous factors of a building unit [4]. The RER aggregates the risk components into three main factors in the hypothesis that these have equal influence on the size of the risk: *Tenant specific risk*, *Context specific risk*, *Property specific risk*: $r_{pRER} = (t_r + c_r + p_r)/3$. For measuring *tenant specific risk* t_r : arises from the assignment of a rating to four different factors: the cyclical nature of the industry belongs the tenant; commodity characteristics of the activity; the solvency degree can be attributed to the company; the numbers of tenants.

For measuring *context-specific risk* (exogenous characteristics of the goods) c_r must be assessed: the rank of the city in which the property is located; the position of the same in the urban context; the intrinsic characteristics of the local housing market. The measurement *property-specific risk* p_r includes the size of the building, the typological and qualitative characteristics of the building, and the replaceable of the building.

The RER model lends itself not only to the valuation of the risk of a single real estate investment but with the appropriate methodological cautions, also to the appreciation of the risk of a real asset portfolio.

4 Results and Discussions

4.1 Generating Strategies: Urban Equalization and Regeneration

Basing on the architectural, technological, materials and urban features of the buildings, the restraints and the attitudes to transformation, and therefore, the intervention categories ranked according to eight strategies – from the most conservative to the most transformative one – have been defined for each functional unit (UF) (Fig. 2). Figure 3 summarizes the results and the relations between the main variables, which provide useful indications for the definition of the risk model.

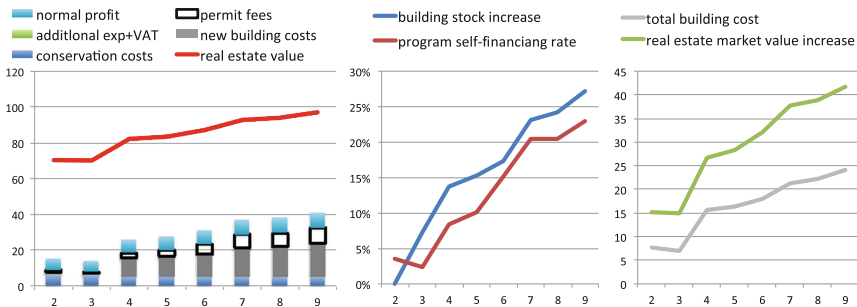


Fig. 2. Comparison between the eight strategies in terms of: cost/revenue components; building stock and program self-financing rate increase; building costs and real estate value increase. (Color figure online)

4.2 Real Estate Development of the Two Properties: Appraisals

The basic elements for the valuation of the real estate investment in the transformation of the two buildings concern the layouts of the buildings themselves defined on the grounds of an outline scheme, and the corresponding costs and revenues. The costs are equal to the sum of the prices of the elementary works b_k defined basing on the Official Price List for Public Works of the Sicilian Region (2013) applied to the quantities q_k , and its unit prices p_k : $c^* = \sum_k q_k p_k$ (Fig. 3).

areas	masonries	horiz struct	finishigs	doors/windows	equipments	dump	total costs
entrance	€ 932	€ 4.649	€ 11.427	€ 2.933	€ 1.559	€ 43	€ 21.543
hallway	€ 1.165	€ 18.450	€ 11.099	€ 2.123	€ 6.406	€ 89	€ 39.331
warehouse	€ 1.459	€ 9.847	€ 17.258	€ 4.215	€ 3.985	€ 55	€ 36.819
toilets	€ 1.201	€ 8.173	€ 15.042	€ 5.370	€ 31.272	€ 46	€ 61.104
plaza	€ 8.927	€ 44.604	€ 57.488	€ 19.713	€ 16.412	€ 688	€ 147.832
restaurants	€ 11.669	€ 57.058	€ 50.722	€ 39.924	€ 16.182	€ 808	€ 176.362
offices	€ 5.572	€ 28.030	€ 40.665	€ 18.576	€ 10.371	€ 267	€ 103.481
public area	€ 5.589	€ 101.987	€ 68.104	€ 31.200	€ 11.820	€ 743	€ 219.442
total costs	€ 36.513	€ 272.798	€ 271.804	€ 124.053	€ 98.006	€ 2.738	€ 805.913

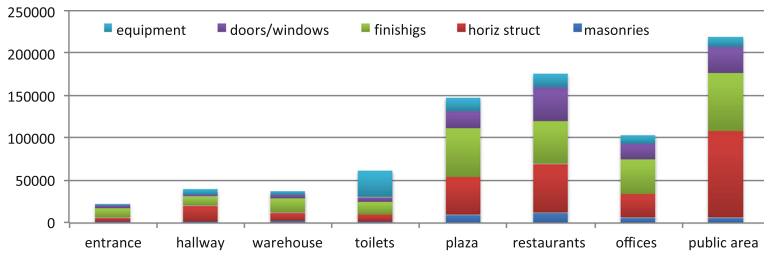


Fig. 3. Costs by functions and work type. (Color figure online)

The revenues r^* are given by the sum of the market values V_i of the several parts of the buildings depending on the dimension a_i , and the unit value v_i corresponding to the use f_i ; $v_i = n_i/r$ is the capitalization value at cape rate r of the Net Operating Income ($n_i = g_i(f_i) - e_i$) envisaged basing on the unit current market annual rents g_i for the new buildings, net of the owner's expenses (e_i), prudentially considered as the 50 %: $r^* = \sum_i v_i$; r is given by the medium rate r' corrected basing on the plus/minus-valuation coefficient, which takes into account the risk factors h indicated in paragraph 3.6: $r = r'h$ (Fig. 4). The residual value of the largest property – calculated at a cap rate of 3 % for the capital asset value, and at a WACC of 8,5 % supposing a construction period of two years – is 1,7 million, which is quite greater than the one defined by the independent valuer of the property funds. The same difference occurs in the case of the smaller property. A further in-depth analysis regarding the larger property is illustrated in the following paragraph.

4.3 Real Estate Finance: Scenario Analyses

The valuation of the investment is developed from a REIF point of view using a Financial Approach based on Discounted Cash Flow Analysis (DCF). The model aims to consider, from the perspective of a real estate fund, the opportunity of a participation

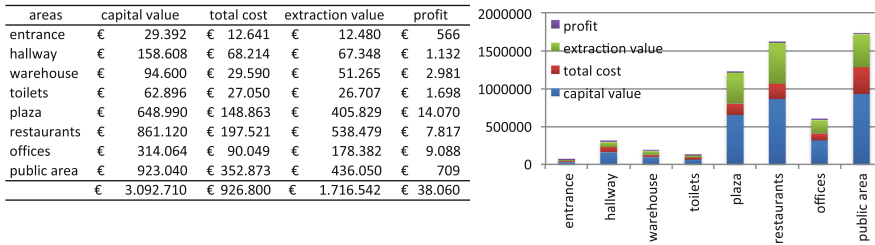


Fig. 4. Total costs, revenues, residual value and profit by functions and work type. (Color figure online)

in the process of transformation and exploitation of the area under study. The DCF, normally used for valuation purposes in real estate development operations [16], already analyzed over a span of life the trend of revenues (lease or sale) and costs (constructions and enhancement costs, as well as operational costs for the maintenance of the efficiency of the structures) discounting the different cash flows according to their respective discount factors. This more accurate valuation takes into account the developer/investor likely cash flow, so that the capital outstanding at any point in time is identified, and a precise estimation of finance charges can be made. The use of DCF analysis allows the valuer to reflect the different moment of refurbishment and selling period, as well as allowing for any change in value or cost over the period.

The model is based on certain required assumptions about the periods of time for the refurbishment and the sale of the properties; the investment costs; the calculation of the discount rates using the Weighted Average Cost of Capital (WACC), and using assumptions about equity and debt and their costs; property prices.

The DCF has allowed the fund to identify the fair value of the properties for the property funds, which is the most likely HBU (Highest and Best Use, assuming all technically possible uses, legally permissible and economically feasible). In this output (the fair value) it was conducted a sensitivity and risk analysis, because of the variation of this value caused by the independent variables. The risk analysis was developed regarding the capitalization rate, the rent, the profit of the developer and the WACC.

The capitalization rate and the rent were extrapolated through an analysis of the local property market, which produced average prices of 8 Euro/m²/month for services, 12 Euro/m²/month for office and 15 Euro/m²/month for the commercial sector. A similar analysis of the property market was undertaken to ascertain the cap rate, which is set at 2,25 %. Using an income approach, the cap rate, and the rent has been used in order to identify the sale price of the completed refurbishment and this input was used in the DCF model. The expected profit from the development has been identified with a market analysis, which shows that the expected the profit on a net present value (NPV) basis is around 15 % of the GDV, the gross development value.

A multi-factorial approach, well established and widely adopted, was used for determining the WACC using different component of risk. Specifically, the “liquidity risk” is a function of all those factors (level of asset marketability, size, etc.) that potentially hinder the selling of the assets. The “sector or investment risk” expresses the specific investment risk, thus, it is a function of both the characteristics of the area

(location, local market...) and the real estate and economic characteristics of the buildings (type, functional mix, conditions of lease and maintenance). Finally, the “urbanistic risk” is an expression of the urban framework (presence of planning permission, planning process, uses that do not comply with the urban law). All these components have been added to the risk-free rate (Government Bond). Thus, the cost of equity to be used in the WACC construction, with the ratio Debt/Equity 50/50, is 8,15 %, considering a Government Bond rate of return of 5 % and an urbanistic risk of 3 %. The cost of debt is 3,70 % (considering a Euribor, six months adding up a spread of the bank).

The following steps of the model look at how uncertainty can be accounted for in the DCF model. This can be achieved by recognizing that the variables used in the DCF are not single values, but they are a possible range of figures that can be represented, statistically, by a probability distribution. In order to consider uncertainty within the development process [2, 3, 8, 15].

The idea that a valuer can exactly estimate price is sophistry [7]. Conventional development appraisal models that give single point outcomes fail to direct the user to understand the importance of the inputs, and the uncertainty of each, in the overall process. In the Monte Carlo simulation, the same underlying analysis is undertaken, but adding the identification of the characteristics of the uncertainty that applies to each of the inputs. The end effect of such an analysis is a better understanding of the process and the interaction during the development process, of the developer’s and investor’s preferences and move towards a more informed choice.

There are advantages and disadvantages of adopting the Monte Carlo Simulation, even if it helps optimizing design specification, identifies the proper project, and helps the developer and/or investor to understand and compare the risk involved in carrying out a specific project [18]. Among the criticisms, most of the issues arise from the fact that information is not always appropriate and sometimes subjectivity plays a great role in the definition of probability distribution between variables. In our model, the ascribed inputs were ascertained with a market analysis but during the real estate market crisis, which is still ongoing, the amount of direct comparable information falls in number and quality, so that the input are less certain, and it is possible to ascribe a degree of uncertainty to the model. The sensitivity and the simulation analysis tests the robustness of the single point estimates and produces a range of possible results, the mean of which can be considered the expected value of the investments.

All the variables have been described by a normal distribution, using a minimum and maximum value, which have been defined by the market analysis. The distribution of the rent has been set as a triangular distribution, providing three absolute figures: the most likely, the minimum and the maximum. Although the normal distribution is statistically more robust, French and Gabrielli [7] argued that the triangular distribution was a more appropriate approximation of the thought process of an appraiser. A negative and positive correlation have been introduced in the simulation, defying the interrelationships between the variables. All those parameters are shown in the Table 1.

The program Crystal Ball was used to run the DCF 10.000 times, using the Monte Carlo simulation. This simulation produced the outcomes as illustrated in Fig. 5.

The expected value of 1.592.879 € is not that different from the 1.562.065 € that we get using the discrete DCF but the figures provide additional information about the

Table 1. Inputs, distribution and statistics.

Input	Distribution	Mean	SD	Minimum	Maximum	Correlation
Cap rate	Normal	2,75 %	0,30 %	2,25 %	3,35 %	Rent
Rent	Triangular	92.781	–	83.503	102.059	Cap rate, Profit, WACC
Profit	Normal	17 %	1,50 %	10 %	25 %	Rent
WACC	Normal	8,15 %	0,82 %	5 %	10 %	Rent

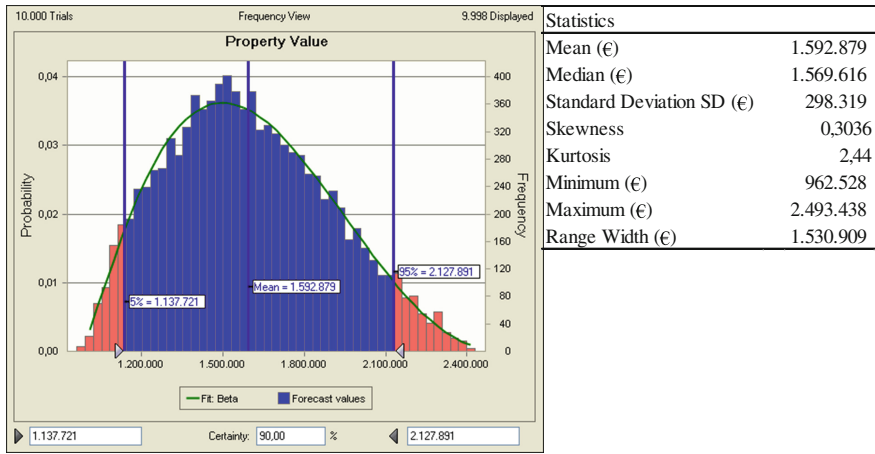


Fig. 5. Output distribution and statistics (Color figure online)

uncertainty of the results. The skewness (0,30) represents the degree of asymmetry (positive): in this case, the distribution (and so the output) is moderately skewed right, as its right tail is the longest and most of the distribution is on the left. Mean and median are different, showing that there is a higher probability that the expected value could be less than 1.562.065 € and the standard deviation (298.319 €) is a representation of the uncertainty.

As expected the outcome of this simulation is to provide the real estate fund with a display output range from € 962.528 to € 2.493.438. Statistically, the majority of outcomes (95,45 % percent) lies within two standard deviations of the mean. In this case, the important range is from € 972.978 to € 2.166.254 and it is a distribution that helps the fund to assess the uncertainty.

In terms of the sensibility of the inputs, a Tornado analysis has been performed in Fig. 6 and it shows a Tornado representation. The variables with the widest ranges are listed at the top of the diagram. These variables will likely cause the greatest variability in the possible property value (represented by the scale at the top). The property value is most sensitive to changes in the top two: capitalization rate and rent. Therefore, these variables can be defined as assumptions in Monte Carlo.

The other variables have less impact on the analysis, and they will not significantly affect the results.

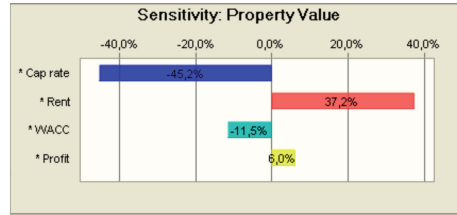


Fig. 6. Sensitivity analysis.

5 Conclusions

The proposed study involved the case of the application of a PPP process for the implementation of some addresses for Sustainable Development Plan of Syracuse. The study is particularly interested in the comparison of two different approaches to the valuation of public assets that can be involved in urban development policies through the implementation of the typical tools of real estate finance.

The context studied gets through a gentrification process started from the previous one and quite successful that affected Ortigia. As a result, the set of risk factors implemented in the robust financial tests assessing the investment's risk/return profile in the shadow of the logic of the discount rate, can be relaxed with reference to the future perspectives in the light of the spirit of the enhancement rate taken into account by the capitalization rate.

The dialectic between the discount rate and capitalization rate has been well known in the economic literature and the theory of capital since the Keynesian approach. The law of the propensity for investment focuses on the difference between interest ratio (the cost of capital) and marginal efficiency of an investment (more like to cap rate as a general category). Such an approach is addressed by Hicks [13], assuming the difference between the standard stream and the expected stream interest ratios as “crescendo” if positive, as “diminuendo” as negative.

In our case study regarding the redevelopment of two public properties, it is typically “crescendo” because of the positive difference between the value of the financial analysis (DCF) and that attributable by a more immediate property valuation (residual value). In fact, the residual value is reported to be 1.7 million euros. This value, in the DCF analysis and in its integration with a sensitivity analysis amounts to 1.57 million, then lower than that previously estimated. In addition no doubt that the developer is influenced by the best information available on the real estate market and the ability to analyze such information to define his strategic behavior in the future.

The valuation process was divided into two basic steps: one is the valuation, focusing on the costs-revenues surplus given a set of eight scenarios, ranging from the conservative to transformative, reported in a sample consisting of 89 buildings. This valuation provided the relation between the volume increase in the sample area and the self-financing ratio of the program. On this basis, the valuation of the two public properties has been carried out basing on the residual value, which provided early information about the value of the properties, in a general optimistic perspective.

The entire proposed assessment procedure has been referred to the theoretical and methodological contributions on the valuation of the most current and significant investments. In particular, the contribution focused on the risk and its modeling of the entire financial valuation.

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