

Training Interior Designers to Project Feasibility Studies

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Abstract – The proactive economic and financial sustainability estimation for the Interior Design must be centred on an organized structure of knowledge in the project planning and development. This need arises, on one side, in the light of the consciousness that the Project assessment science works in the hard field of the ex-ante calculation of prices. On the other hand, it is linked to the necessity for a shift to a practical estimation approach, that should be effectively integrated even in the teaching activities, to be better prepared to the challenges they will meet in their future professional field. The paper will revolve around the need of introducing a structured system of principles in this field, as the valuation process is a key element for the risk factors management and it is important to apply internationally recognized valuation standards.

Keywords – Economic and Financial Sustainability, Feasibility Analysis, Interior Design, Project Assessment and Evaluation.

I. TEACHING PROJECT FEASIBILITY TO INTERIOR DESIGNERS

After years in teaching to Interior Design students the need of including feasibility assessment tools from the initial stages of the project design workflow, it is clear that this field needs to **shift to a proactive economic and financial sustainability estimation approach**, that should be effectively integrated even in the teaching activities [1]. This would, for sure, enhance the level of participation of students in the effective knowledge sharing process they will meet in their future professional field [2] [3]. This becomes even more important, considering that working on practice groups discloses how the involvements and memberships slowly develop and change in the community, through participation in defining the common practices themselves [4] [1].

The need for a more practical knowledge and integration of the feasibility principles in the Interior Design students workflow comes from the fact that **the new challenges they will have to face in their future professional life are now broadly connected to the environmental shifts** [5] that enterprises deal with since the late 1990s [6]. The importance of integrating the feasibility measures in the design workflow becomes even more relevant, if we consider that most students, learning from a traditional behavioural technique [7] [8], show a reverse approach to the design stages, meaning they start from the concept and, then, try to adapt it to its context. In the light of the modern theories of education, the new challenges in the Interior Design field require a shift to a constructivist learning method, based on the theory that education should follow students in dynamically creating their own connotations by joining new data and informative contents to their prior

knowledge, considering that active learning is improved by social interaction within the constructivist approach [8].

Through a constructivist shift, the focus of education will be reallocated from a passive information sharing method to an active development of understanding and opportunities for students, that will learn how to structure their knowledge by themselves. The model based on transferring information will be, then, progressively swapped and replaced by a more constructivist approach to learning. This changes the motivation of what learners do, driving them from a training model based on listening and reading to the active participation. The **proactive economic and financial sustainability estimation** for the Interior Design becomes, then, a new need for the future professionals, based on an organized structure of knowledge, that will be applied in the project planning and development. This approach has recently become the new dominant educational methodology, focusing then on moving the central motivation in education from the teacher to the learner [8].

In this field, it must be considered that Economy is taught to be the science that studies the economic choices that people do to satisfy needs, that are practically unlimited, with limited (or even scarce) resources. Economic Evaluation of Projects, instead, is taught to be the science that aims to evaluate goods through physical and economic measures, based on specific postulates [9]. Considering this statement, working in the field of the economic and financial sustainability determination for the Interior Design means **developing a coordinated knowledge system in the project development**, considering that the Project assessment science operates on the hard ground of the ex-ante calculation of prices [10]. This will help professionals to integrate the valuation in the design process, as a key element for the risk factors management and it is important to apply internationally recognized valuation standards.

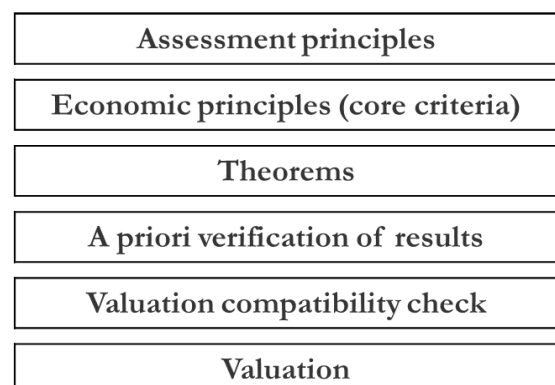


Fig. 1. The archetypal Project assessment workflow.

In the light of the need of determining a unique result at the end of the assessment process [9], it is important to teach students to refer to the general framework of the assessment principles, that are to be regarded during the evaluation activities [11], as recognized by the national and international professional field of reference.

Plus, the new communication tools (that also the International and European valuation standards suggest to use) and a project oriented approach [12] help students in learning in a more efficient way, as the new technologically mediated forms of communication in the educational context [13] enhance the direct interaction with learners and promote an insightful perspective on the new environmental challenges of the architectural field [5] [6].

This will help learners also to identify the real skills to develop in their education pattern [1] and to be better prepared to the challenges they will meet in their future professional field. In this framework, they will learn **how to use the assessment tools that can be applied in the different instances**, knowing which the limits of the paradigm, they are working in, are.

The **assessment principles** are to be based on the following postulates, as determined by the Assessment Sciences in the Italian tradition:

- An estimated value refers to the assessment goal(s),
- The prediction activity is intrinsically related to all the assessment actions,
- A price value is at the basis of the value judgment,
- Assessing means comparing,
- The value judgment must be objective and generally legitimate, this means it should be formulated referring to the principle of ordinary conditions,
- The value judgment must be transparent.

II. SETTING THE STRATEGY ON THE ACTUAL FEASIBILITY OF THE PROJECT

Strategy is a military word, referred to the explanation of attacking plans in a fighting campaign. Feasibility studies in the Interior Design field are strongly connected to the **strategic planning of the investments**, for it is through the initial budgeting choices and the determination of the relevant concept costs that most of the decision-making process is determined. Planning strategies can be both an action related to thinking to the future, or controlling it, for planning means deciding in an integrated way. It is a necessary tool, for **introducing an organized decision system in an economic action**.

Business and strategic planning activities, which help decision makers to take fast and effective choices, are an extensive part of feasibility analyses for investments, and they should consider the key missions of any project for the following 3-5 years in a specific business environment. After defining the goals, these activities should determine the main **timespan** in which these objectives should be met. The strategic decisions taken in the planning stage will, then, drive the definition of budgeting goals, being their guidelines in terms of business goals and strategies. The result of the strategic planning activities is, actually, the determination of the Key Performance Indexes (KPI) or

Key Success Factors (KSF), to be calculated considering the internal and external components.

Applying the principles of Strategic Planning Sciences to Interior Design activities is fundamental, for it helps designers to **take more conscious and effective decisions**, by elucidating the investment vision and its goals, which must be sustainable and will be assessed regularly, in order to fix any possible divergence that should be met in the operation period. The Strategic Planning Sciences, which were initially set in the Business Management field, have been extensively applied also to other sectors, such as the Urban Planning approaches, with significantly positive results, introducing a new way of envisioning the mission of Strategic actions in the strategic management of policies and urban planning tools.

In this way, the **theories about economic cycles** in the production field have been extended to the analysis of urban cycles, through the tools of the Strategic Planning, an approach that was extensively applied in military and business actions. This approach became an important tool for the Urban planning management in the late '70s, but it came to tangible effects only in the '80s, after the City Council of San Francisco adopted a Strategic Plan for its metropolitan area, introducing an actual revolution, compared to the tools that were used in that period (e.g. zoning, quantitative planning, traditional plans). After San Francisco, many other cities adopted this new approach to Planning Policies, including Barcelona, which envisioned the changes implied by the 1992 Olympic Games through a Strategic Plan.

The innovative approach of the Strategic Planning was related to the need of explaining citizens that cities were not developing anymore in a linear way. The new economic situation, which was facing the initial stage of globalization, implied a **new complex system of relations**, that would have had significant impacts on the city development, influencing the actions of economic and social actors (stakeholders) involved in the process.

The Interior Design theories and applications could obviously benefit from this kind of approach, though it is to be said that the Strategic Planning concepts are already sourced in this field, but only in an implicit way. Applying the concepts of Strategic Planning, developing a complex and complete design process, including investment strategies from the initial stages, could lead to more effective solutions.

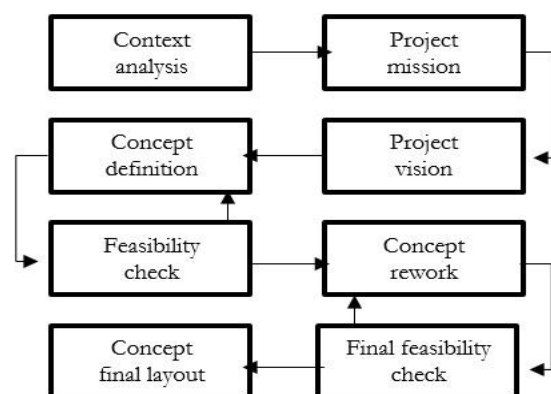


Fig. 2. The proposed Design workflow.

III. THE SCIENCE OF VALUES ASSESSMENT

The Project assessment science, instead, is a discipline that was created to reply to the need of controlling the economical unequal distribution referring to ancient cadastres, preceding the geometrical formulation of the registered goods [10]. It identifies different types of values for goods [11]:

- Costs values (referring to the production and carrying out activities concerning goods),
- Market values (referring to the most probable exchange activities concerning goods in a typical reference market),
- Prices (referring to actual exchange activities concerning goods in a market).

The element that makes the assessment so problematic is that **no valuation can be performed without market data**, as the market analysis is mandatory [9], and it should be consistent [11]. Every assumption about the investment choice in the real estate market should preliminarily and essentially consider that the real estate market is sensibly different from the ideal model of the perfect and pure competition market [11]. The price evaluation is a typical market action (where demand meets supply), but, in some instances, prices cannot be determined by the market itself [9]. That is why the Project assessment sciences work on, on one side, the estimation methods and procedures, through which it is possible to determine the value of goods (real estate or not) and of rights on goods [10]. On the other side, it works on irreproducible goods, which are the typical objects of estimation procedures, as it is difficult to determine a market price for these goods as meeting point between demand and supply.

In the light of the fact that **valuation means determining a judgement**, a calculation, or a balance, the value of an economic good is related to its utility and to its rareness, and it could be expressed as [11]:

- **Use value**, meaning that the value of a good can be established in terms of utility, or better that it depends on the relative use of assets;
- **Exchange value**, determined in terms of actual or potential exchange activities that could take place in a specific market.
- **Estimated value**, that is strictly related to the valuation activities.

The use value includes the so-called affection value [14]: it is, then, subjective (it depends on the use that a person does of it) and it is related to the utility (extrinsic feature of assets). The exchange value is the price measured referring to money/other goods, during an exchange action (barter, sale, credit, and so on). The estimated value [9], or value judgment, as a final point, is strictly referred to the moment/period in which the assessment is happening [10].

The **estimated value**, as defined in the Italian traditional valuation methods, could be, then, assessed in terms of the most probable [15]:

- **Market value**, which is the most probable exchange value of a good in a typical market situation, or better, the predictable amount, for which an asset or liability should exchange, on the assessment date, during an

exchange happening between a willing buyer and a willing seller, in a so-called ‘an arm’s length transaction’, after proper marketing; in the deal, the parties must both act knowledgeably, prudently and without compulsion [16],

- **Cost value**, that is related to all the production or replacement costs of an asset; the replacement cost value is aimed at calculating the total cost of replacing an asset, generally in its present morphological appearance and in accordance with suitable regulations and legal requirements. The replacement cost value includes payments for professional fees and, for tangible assets, considers factors related to the construction process of a replacement asset (which may include expenses related to demolition, debris removal and other similar constructing factors) [16],
- **Capitalization or income value**, which is calculated through to the income approach, which delivers an proposition of value by translating future cash flows to a single present value. Using the income approach, the value of an asset is calculated by referring to the value of incomes, cash flows or cost savings generated by the asset itself [16],
- **Transformation value**, that depends on the transformation activities that could be related to an asset; it must meet three base requirements, as the redevelopment must be legally acceptable, technically feasible and economically convenient,
- **Substitution value**, which is estimated when the reference asset is unique or too rare, then, a substitute good (with the same utility level) is appraised and used to establish the value with an extensive approach,
- **Complementary value**, that represent the value of a part of a divisible property.

For a professional in the field of Interior Design, **assessing a project** in its initial stages means:

- Understanding if it is **legally permissible**, using the tools of a legal due diligence, to check all the documents available on the investment and define the permissible uses,
- Understanding if it is **technically feasible**, in terms of structural and technological activities, defining the main design features and timing,
- Understanding if it is **economically sustainable**, calculating the total costs and the construction costs and determining the market analysis and the market value of the investment.

Some of the main **evaluation techniques** that an Interior Designer can apply **in the initial stages** are:

- For the **sustainability analysis**: environmental, social and economic feasibility of the design strategies,
- For the **feasibility analysis**: technical and legal feasibility determination through specific assessment methods, related to the project specific features,
- The environmental impact assessment of the design choices and the determination of the **ecological footprint** of the project,
- For the **economic and financial performance** analysis of the investment:
 - Budgeting analysis,

- Business planning,
- Convenience analysis,
- Cost-opportunity analysis,
- Cost-revenues analysis,
- Cost-benefit analysis,
- Cost-utility and/or cost-effectiveness analysis,
- Life cycle costs analysis;
- For the **market analysis**: D&S, trends, stocks, absorption analysis and so on;
- For the **building performance analysis**: energy, resource use, maintenance, and other similar assessment methods;
- For the project management analysis: works scheduling, Gantt, and so on;
- For the **holistic evaluation**: multicriteria analysis, multidimensional analysis, and similar approaches.

In the initial stages of the design process, the fundamental outcome to reach is the **determination of the feasibility and the convenience** of the proposed solutions, comparing them with the possible alternatives and options available in each specific instance. Training Interior Designers to ponder these elements as initial conditions of the design process, instead of considering them only after the preliminary proposal is set, to validate their choices, could significantly change the way a project is developed. In the actual practice, Interior Designers consider just few legal, technical and economic parameters as possible drivers of their choices: starting from a wider set of project factors can reduce the recursive need of changes and modifications, that the following design stages usually imply. Such an approach could also reduce the need for possible modifications to the design strategies and the official documentation, that are usually implied during the construction stages, for a wider informative base in the initial stages can help reducing the uncertainty levels, that any design process involves.

The need for assessment tools is usually related also to the following stages, when monitoring the progress levels can be a crucial factor in the determination of the final success. The **main evaluation techniques** that a professional in the field of Interior Design can rely on **in the construction and pre-operation stages** are:

- Construction costs analysis and control (during and after the construction stages),
- Design development control techniques,
- Variances from the feasibility analysis,
- Final testing.

The role of the Interior Designer during the construction stages can be determinant, though it is usually the Project manager that is called to check that the design strategies are correctly executed. The important contribution of the Interior Designer is related to the capability of adapting the design original strategies to any modification that the contingent instances might require. This is the reason why a solid training towards the topics of feasibility can be determinant for the education of future professionals, since this will **reduce the uncertainty** level during the planning of the investment, the design process and the construction period, but it will also help the designers find immediate and efficient solutions to any change that should be required

in the construction process. Training Interior Designers to react with immediate and conscious answers to any contingent instance, that should rise during the construction process, is another positive outcome of teaching them the feasibility concepts and principles.

The role of the Interior Designer can be even more significant **during the operation and maintenance stages**, considering that, as professionals, they could be called to use their knowledge background to manage the actual use of properties and adapt any elements to the needs of their users, that should rise during these phases. The main evaluation techniques, that they can use in these stages, are:

- The operation costs analysis and control,
- The operation performance control,
- The maintenance operation analysis and control,
- The maintenance operation timing analysis.

Another basic moment in the life cycle of the built environment, in which the capability of an Interior Designer to apply the principles of feasibility could be determinant, is the tricky steps related to the decision-making process, when a property needs refurbishment. It is a crucial moment, when the investor is called to **decide, whether it is more convenient to invest in the refurbishment** of the existing structure, or to fund a new development. The main evaluation techniques, that an Interior Designer can apply in the refurbishment stages, are:

- The end of operations analysis, to determine whether the project is:
 - Legally permissible: concessions and permits, remediation operations, and so on,
 - Technically feasible: safety, and so on;
- The demolition phase analysis: demolition plan, costs, disposal program, impact assessment reporting, and so on;
- The disposal/recycling/re-use feasibility analysis, , to determine whether the project is:
 - Legally permissible,
 - Technically feasible,
 - Economically sustainable.

In this sense, the Feasibility assessment should consider also the **complex relations between Micro and Macro parameters**, checking that the Project scales are correctly considered and that the different levels are properly integrated in the final layout. This will result in a more conscious determination of the actual feasibility of the concept, that should ensure an higher level of effectiveness to the decision-making process, reducing the chance of any potential change that should arise during the construction and outfitting stages.

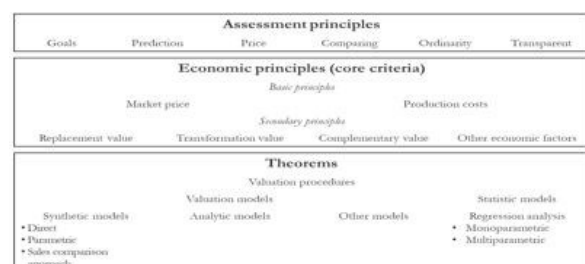


Fig. 3. The decision-making process in the Project assessment workflow.

IV. THE NEED FOR A UNIQUE METHOD

The International Valuation Standards Council (IVSC) is an autonomous, non-profit, private organization. Its aims are to underpin the global assessment sciences and professions and the related activities by [9]:

- Emerging high-quality international standards and reinforcing their acceptance and practice,
- Helping partnership and support among the member associations,
- Cooperating and conjoining with other international institutes,
- Operating as the international representing organization for the Appraisal professionals.

To reach its goals, the IVSC gives top significance to defending the public interest. Considering the increasing need for assessment standards in many areas and markets of the last two decades, the IVSC decided that its sections and organizations became unable to provide the acceptability and the tools, needed to meet these new challenges [9]. Why is valuation so vital even for the Interior Design? **The valuation process is a key element for the risk factors management in the project planning and development** and it is important to apply worldwide recognized standards (even if they are not directly related to this field), for it is crucial to have an organized and structured set of data for the funding decision [17]. The next advances in this course is the determining of Automated Valuation Models (AVM), a technology that can simulate the work of a valuer to an acceptable reliability degree for certain purposes [11].

One of the most significant elements of shortage in the Interior Design field is **the lack of connection between the project concept and the determination of its economic and financial sustainability** [10]. The ideal process should revolve around a feedback scheme, in which the concept is determined and then analysed in terms of legal, technical, and economic feasibility, to fix any possible setback. This recursive activity should last as long as the final concept is determined to be perfectly feasible [17].

One of the most powerful tools in this sense is the **Discounted Cash Flow Method**, as the designer should always refer to the need of creating value through the project development [11]. This is true in the light of the fact that all real estate properties should be valued using the market value, that is the assessed sum to which an asset or liability should exchange, on the appraisal date, between willing buyers and sellers in an ‘arm’s length transaction’, after appropriate negotiation, in which parties had each acted ‘knowledgeably, prudently and without compulsion’.

V. A POSSIBLE MODEL FOR THE PROACTIVE PROJECT PERFORMANCE DETERMINATION

The Discounted Cash Flow (DCF) Approach can be used for determining the potential net incomes (resulting from renting a property in a convenient period of use), the market value of an asset (considering the regular continuous capitalization of net incomes in the useful stage of the investment), and on the discounted return of net incomes (cash flows) on the assessment day. This same method can

be used, also, for the determination of the hope value of properties [9], that be used only if the land being valued have permits approved, in accordance with the “Phase 2 Manual” edited by the European Central Bank [18].

The **Discounted Cash Flow (DCF)** analysis is, then, based on the **following activities**:

- **Investment costs and revenues appraisal**, for the verification of all the entries about costs and revenues that will intervene on the entire extent and implementation of a project/investment;
- **Cash Flow representation**, in the reconstruction of the cash flow, or rather capital flows (inputs vs. outputs) of a project in its implementation;
- **Discount rate calculation**, to actualize the intervention costs and revenues, influenced mostly from money costs, inflation, and the project risks (e.g. WACC);
- **Determination of the economic performance criteria** (e.g. NPV, and IRR),
- **Final choice** in terms of convenience judgment.

The Unlevered Discounted Cash Flow Analysis (represented by incoming streams that promoters and investors can benefit from) is aimed at determining operating incomes, that are calculated on the cash flows, after deducing the financial fees payment and the liquidity coming from the investment development, concerning all the funding potential components (equity and debt). In details, on one hand, to **discount cash flows**, the Weighted Average Cost of Capital (WACC) can be introduced, corresponding to prospect capital revenues (both on equity and debt) and, on the other hand, net values for the operating capital for promoters can be determined, calculating the capital rate for all the investors, deduced of the market price of all the debts [19].

This method was tested in different regular Bachelor of Science courses, but also in a workshop experience offered during the sessions of the Athens Programme. In these **intensive courses**, students with no background in the design and in the financial fields were called to develop a DCF model, based on an Interior Design project, they created under the supervision of the teaching team. The recursive approach to the development of an Interior Design concept helped student to understand how the economic and financial parameters can significantly influence the result of their project activities.

The Athens workshops are usually planned on a week basis, offering students intensive courses in which they can learn how to develop significant scientific experiences. In this case, the week program was aimed at **providing students with the basic concepts of business strategic planning for the Interior Design**. Therefore, after a quick introduction to the main topics of the course, students were immediately called to develop a concept (starting from a simple situation, designing a new layout for an office property provided by the teaching team) and, concurrently, to create spreadsheets models for the business planning activities, starting from a given template. In this way, students could experience a more conscious way of deciding the main factors of their concepts, for choices were made and tested starting from their budget assessment,

considering that the initial factors (e.g. investment sources and potential income flows) were firstly predetermined by the teaching team. The initial layout was developed after learners were introduced also to the basic elements of Interior Design theories for office properties, through their main principles and some case studies, including the most important methods of costs and revenues computation.

After completing the first layout draft, students were, then, called to **improve their concepts**, by recalculating the possible revenues, after a proper market analysis, considering factors, like the average demand level in the area, main absorption times for office properties, normal renting fees in the relevant market segment, and so on. After redetermining the initial potential revenues, students could use the collected data, in a feedback process, to redefine some elements in their concepts, such as the initial costs computation, after improving their layout selections.

The process was repeated different times, **progressively adding different elements of recursive recalculation of costs and revenues in the procedure**, to give students the chance and the time for learning by doing how to use the most important decisional factors. Essentially, learners returned the concept 4 times from the initial layout, including, time by time, a more accurate market analysis for the calculation of revenues, some different uses and investment choices (to promote the comparison with some possible alternatives to the initial statement), setting different options for the budget given by the teaching team and offering alternative layouts to the future customers.

VI. CALCULATING COSTS FOR A COMPLETE PERCEPTION OF THE PROJECT EFFICIENCY

For every project concept, it would be interesting to **create different development scenarios**, to determine when the economic and financial balance is met in different conditions, considering costs and management alternatives [20]. Calculating the cash flow model can imply different approaches to determine costs and revenues [15].

In terms of **costs**, the factors to be calculated, to determine the cash flows, are:

- The total value of the investment, assumed as the aggregate value of construction costs, based on the specific function and typology (residential, commercial, offices, hotels, museums, convention halls, industrial, schools, social, parking places, paved areas arrangement, green areas arrangement, demolitions), using a synthetic procedure for the comparative assessment of costs;
- Maintenance costs for ordinary and extraordinary operations, computed after setting a proper plan;
- All sort of taxes in the local system, applied on property, added value, incomes, and any other likely pertinent duty, raising from revenues/assets; the Value-added tax (VAT) should be calculated concerning the proper taxation level in the area;
- Direct management costs, to be assessed considering any specific operational alternative, shaped for the designed concept, using a pertinent approach;
- Operating costs, referring to the whole investment

useful time.

Referring to this last set of factors, **total operating costs** should be considered both in the construction phase, in the management stage and in the intermediate phase between construction and management. **For the construction period**, total operating costs should be calculated by assessing values connected to (predicted using the probable work progress function):

- Urban planning fees, charges and taxes during the construction period, when applicable after the specific regulation;
- Construction permit costs, calculated referring to the relevant local parameters;
- Professional and Project management costs (design, legal issues, safety, contracts and works supervision costs), calculated in a proportional way, or considering the allocation usually stipulated in comparable activities (e.g. project financing), concerning the relevant laws [21] [22] [23];
- Unpredictable costs, appraised as bearable share of the construction costs [21] [22] [23].

In the management phase, total operating costs are to be determined as the assessment of charges connected to (considering separately a proper volume of sales and rents):

- Asset management, linked to the property value, intended as its construction costs, except of demolitions, external works and the occurrence of the costs of land;
- Property e Facility management, in proportion to the total value of rents [21] [22] [23];
- Insurance costs, consistently based on the asset values (defined as its construction costs, without demolitions, external works and the occurrence of the costs of land) and linked to the value itself;
- Brokerage fees for sales (with or without internal layouts, based on the concept development), proportionally computed to the transaction price, or to the total value of the investment, including demolitions, external works, the occurrence of the costs of land and any operating costs in the construction phase;
- Brokerage fees for rents, to be assessed as a percentage on the new rent contract.

In the intermediate phase between construction and management, total operating costs are calculated as sum of the related percentage, composed by the proper proportion of work progress, or sales and rents of assets, concerning the management expectations.

VII. CALCULATING COSTS THROUGH A SYNTHETIC METHOD

Total construction costs can be calculated using **analytic or synthetic methods**. The first group is typically represented by building costs estimations and bill of quantities, and the second one is, instead, referring to all the techniques that can determine by comparison the calculation starting from an aggregate price reference (total or partial construction costs).

Choosing the right method depends mainly on the source and the kind of information available, referring to the

concept stage, and to the goals and the tools that can be used, with a final consideration on the time that the two different technique families require.

In the second techniques group, it is interesting to consider the so-called method of '**buildings typologies**', that is referred to the use of specific price lists, divided into different building categories, depending on the relevant features of structures and final works. These lists usually include also data on the number of years of construction for the annual percentage of work progress.

Determining the Economic Value of concepts in the initial stage can refer to the **comparative analysis of prices of buildings typologies**. In this field, the primary tool available in Italy is the price list provided by the Board of Engineers and Architects of Milan. It is printed in a specific hardcover book, edited by the Typography of the Italian Civil Engineering Authority (Tipografia del Genio civile italiano, DEI), and regularly updated. This prices list covers the main typologies, allotted in functional groups (residential, offices, industrial, public, extraordinary maintenance, urbanization, green areas, plots).

The primary target of this book is offering a tool for the assessment of the economic appeal of investments, thanks to a preliminary estimation of costs and timesheets, using the approach of parametric cost indexes. The **key data on construction costs**, included in this prices list, refers to:

- Construction costs and some related factors, that are detectable and accessible, concerning a specific time, in a determined related geographical and technical context;
- The reference sample, which represents the main function in the property and the basic technical and construction features of the structure;
- The comparison parameter, that is used to describe the intrinsic features of the concept.

Through these 'type structures', which represent some different structures and typologies, the appraiser can calculate the main economic factors of the investment convenience in the preliminary stages, using a **standardized parametric cost index**, concerning the archetypal size unit for the concept. The nature of the data included in project diagrams, with the relevant tables of costs, is such that reading it is very swift and intuitive.

The **available structure typologies** concern: residential buildings; office properties; industrial assets; public constructions (schools, hospitals, and so on); religious buildings; urbanization works (parking places, streets, and so on); external layout works (green areas, and so on); naturalistic engineering works (reclamations, slopes stabilization, and so on); extraordinary maintenance works (for residential buildings, industrial assets, and so on). Every typology is described using: a technical report with the main structure features, including area and volume parameters and technical drawings, describing the kind of works; time programming of the investment (GANTT); costs percentage of the main classes of works (structural works, finish works, and so on); parametric costs of works, concerning the archetypal size parameter, from which its validity limits can be determined.

VIII. ASSESSING REVENUES AND FINAL INDICATORS FOR UNDERSTANDING THE ECONOMIC CONVENIENCE OF PROJECTS

After applying the computation techniques for the cash flow model to costs [15], the method will be completed calculating **revenues**, whose factors can be determined as:

- Revenues determined by rented assets, appraised for the specific concept, using average renting fees available in the local databases, or a specific Market value calculation using the Market comparison approach [16]; plus, for applicable contracts, the appraiser should use a proper calculation approach to determine the sales volume progress;
- Revenues determined by sold assets, assessed on the base of each concept option, using average selling prices available in the local databases, or a specific Market value calculation using the Market comparison approach [16];
- Annual incomes determined by the direct management of assets;
- Any other potential source of income;
- Value-added tax (VAT), to be applied using the reference percentage.

Revenues for assets that are directly managed must be computed on the base of the selected use, promoting different models based on the specific requirements of each function. Basically, assets that can be directly managed refers to functions that can create actual economic inflows to be inputted in the cash flow model, such as commercial activities, leisure enterprises, and so on. Based on the different kind of function, the elements to be calculated should include:

- Potential income volumes, estimated using the possible total number of users that could access the facility and the actual coverage percentage of the whole potential offer in the opening times of the year (e.g. for a restaurant, this refers to the total number of seats, multiplied by the number of serving shifts per day, then, the actual vacancy ratio should be assessed, considering average working says, in order to determine the actual volume of assisted customers in a year);
- Average revenues level, considering the kind of offered services and their average price, to be calculated as a single reference, or by determining different prices levels based on the main kind of available facilities;
- The total revenues volume will be, then, the multiplication of the total number of potential users in a year and the average price of the relevant services.

To define **weighty comparisons amid the economic and financial performance of multiple scenarios** [24], it is remarkable to identify development units and construction periods, determining shared progressive proportions for sales and rents from the first year of operating activities. It is also to be considered the chance of selling assets before the and during construction.

About results, the judgement should detect the **most profitable solution**, considering the economic and

financial sustainability of investments, by calculating the relevant specific indexes: the Internal rate of return (IRR), and the Net present value (NPV). The pure index appraisal can be improved considering the results of parameters, computed subsequently and counting the analysis of economic trends, including inflation measures and the incidence of financial fees on the cash flows performance.

The same judgement should, then, consider, also, other issues, such as the acceptability of the conceived solutions. It should, then, consider, on one hand, the planned functions, that were described in the management assumptions for the Strategic Planning of the investment, and, on the other hand, the concept overview, based on efficiency measures, considering its capability of meeting the economic and financial sustainability of the intended investments.

In conclusion, another significant feature to be measured is the **effectiveness** in compensating the total economic and financial sustainability of investments, meeting the economic and financial balance, and the answer to the needs of all the possible shareholders. Essentially, the economic and financial sustainability of investments is a key factor for selecting the most suitable option between different alternatives: it is an effective measure, that is able to define the most performing configurations for investments, though it is not the only factor to be considered in a decision-making process.

IX. CONCLUSIONS

Assessing the economic and financial sustainability through a proactive approach is one of the challenges that will change the definition of the actual Interior Design trends in the future. The actual common needs, that emerge from a **3 decades experience in teaching** the Interior Design principles at the Politecnico di Milano, revolve around the demand for a systematized structure of knowledge, principles and standards, to be applied in the project planning and development, through ex-ante methods and approaches. The **subsequent development of the teaching method** will be established by promoting a more active approach in the Economic Evaluation courses, testing the efficiency of the learning skills of students.

This consideration is related to the need for a change in the actual estimation approach, which is taught as separate topic from the typical design workflow: **economic and financial evaluations should be effectually included in the process from the initial stages**, even in the teaching activities. Introducing the Economic feasibility consideration in the initial steps of the design workflow will result in a recursive process, based on the concept of feedback. This can be an efficient answer to the challenges that professionals meet in their actual practice, considering that the assessment approaches are key factors for the risk factors management in an investment planning.

Including feasibility parameters in the design workflow since its initial stages, reverting the actual student approach, is fundamental to improve the traditional technique they are taught, **adapting to the new conditions that markets are now facing**. In this sense, as modern education theories

illustrate, these new challenges could be better taken on through a constructivist process of active learning, which benefits from the social interaction and the new modern technologies of communication, included in the teaching experiences. This will result in **passing** from a passive approach, based on simply sharing information, **to an active method**, creating a system grounded in understanding data and comparing knowledge and experiences through a group work.

This approach will change the driving factors in learning experiences, passing from an educational model, built on listening and reading activities, to an active technique, using participation to knowledge building and acquiring as main approach. The **focus** is, then, relocating the central drive in education **from teachers to learners**, letting them build up their own knowledge system.

This will help students of today, that will be the professionals of tomorrow, to integrate the assessment approaches and results in the design process, considering them as Key Performance Indexes or Success Factors. This is a fundamental element to recognize which are the skills any student needs to acquire in an interactive education path, to be better equipped to face the challenges that a professional can meet in his/ her practice.

The innovation in the traditional Interior Design approach could also benefit from applying the principles of the Strategic Planning. The reference to this approach is based on the consideration that the actual situation of markets implies a new attitude towards the design workflow. This means considering **the new complex system of relations that the actual system of stakeholder infers**, considering the new roles that economic and social stakeholders are called to play in the process. The benefit, that the explicit reference to this kind of approach can offer to the Interior Design field, is related to including investment strategies from the initial design stages, determining the main concept parameters and goals, leading to more effective solutions.

Therefore, in the courses, students were directly taken into the topic, and asked to create an initial concept, thought as a simple draft, including the main elements and functions determined by the intended mission and vision. This led to the design of a new layout for a property, whose main parameters were given by the teaching team. At the same time, students are called to prepare and compile spreadsheets models (using a given template), in which the business planning parameters were included.

This method enables students to conceive layouts in a more conscious way, immediately determining the feasibility of their choices, checking costs and revenues, while the concept is built up. They must **test the main factors of their concepts**, by comparing each choice parameters (mainly, costs) to the given budget, in a recursive approach, based on the need of continuously verifying each decision suitability.

After the budget test, they are called to check the initial factors of the concept, **measuring investment sources and potential income flows**, using the initial project data given by the teaching team. This will help them reworking their initial layout, by refining the rough information they

received, including the basic elements of Interior Design theories for the related function. Theories are taught starting from significant case studies, from which through the main principles are deduced, together with the most used approaches of costs and revenues computation. Any concept must be, then, created with a parallel alternative solution, a sort of ‘backup plan’, that should include elements and components replying to the main functional and technical requirements of the concepts, having a different economic impact on the final budget.

Both in the preliminary and in the final project stages, students were taught to **act with a fixed budget**, changing the qualitative and technical components of materials, or building and furnishing elements, according to the new qualitative needs, related to the different levels of prices corresponding to similar components, having different prices. This is generally one of the main duties in the role of the Project Manager, as main professional called to manage the design, construction and development stages in an Interior Design project.

The qualitative and technical components of a building or furnishing element must be considered lock, stock and barrel, including, therefore, their overall complexity. Professors must immediately teach students, as future professionals, that replacing a component in a concept must not be a superficial choice, based on colour or comparison, but it is a decision implying different intrinsic features of the finishing materials, or of the furnishing components. As conscious answer to contingent factors, it must reply to a functional check list, including performance, resistance to output in time, and economic parameters.

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The course of “Business planning with Excel for interior designers” (POLI26) was conceived as an intensive overview about the topics of Project feasibility basics for Interior Designers, using the experience developed during regular BSc courses offered in the Interior Design program of the Politecnico di Milano. During regular courses dealing with feasibility, students learn and apply the theories and the approaches related to viability of design concepts, creating their own spreadsheets and models for the economic planning of investments, through practical

exercises specifically elaborated for their level of education. In this experience, students were given all the relevant information to be able to develop a concept, though they were not studying Interior Design in their education program.

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