

Internationalization of the Real Estate Appraisal discipline: Evidence from teaching and doctoral research in a sample of Italian Universities

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key words: real estate appraisal, property investment valuation, construction education, teaching topics, doctoral research

Abstract

This short essay outlines several prominent issues addressed by teaching and doctoral research in Real Estate Appraisal within a sample of Italian Universities. The purpose is to stimulate the debate by providing a discussion base as regards the evolution of the discipline, with a particular focus on the methodological framework, the topics dealt with, and the operating tools. The paper proposes a theoretical inquiry based on the authors' experience, on the review of the national literature, and on the interactions that arise with relevant international studies. As far as the results are concerned, the evolution of the discipline,

although partly due to changes in the concept of European Higher Education Area, is mostly fostered by the progress in the construction sector, the real estate market, and the planning practice. More to the point, an evolutionary path from appraisal - strictly speaking - to evaluation - broadly speaking - affects both teaching and doctoral research. As an original contribution, we try to outline further developments that may take place during the years to come, such as the establishment of stronger integrations with other technical disciplines, from architectural technology to building physics.

1. INTRODUCTION

This short essay focuses on the evolution of the Real Estate Appraisal in a sample of Italian Universities. The paper relies on the knowledge acquired by the authors during their Ph.D. at the Universities of Padua and Venice, as well as during the teachings held at the Architecture Faculties of Venice and Bologna Universities. The purpose is to stimulate the debate by providing a discussion base

as regards the development of the discipline, with a particular focus on the methodological framework, the topics dealt with, and the operating tools. The study consists of a theoretical inquiry based on the authors' experience and it benefits from a review of the national literature, as well as of the interactions that arise with relevant international studies. The inquiry concentrates on the topics treated during the undergraduate teaching and on the issues addressed by the postgraduate

research. The reason lies on the following remarks: undergraduate teaching and postgraduate research are characterized by temporal continuity and reciprocal relationships are commonly established between the two fields. Hence, the teaching activities may stimulate the exploration of new research strands and, vice versa, the results of the research activities may feed the teaching.

The Italian legal system identifies most of the Universities as public sector bodies (see Law 168/1989), but they have been recently entitled to become private foundations (Law 133/2008). The principle of autonomy has been established since the adoption of the Republican Constitution, in 1947, meaning that graduate education institutions are entitled to define their organization. More recently, a number of laws have confirmed this principle, clarifying that it applies to several fields, such as internal regulations and research (Law 168/1989), teaching (Law 341/1990) and financial management (Law 537/1993).

The principle of research autonomy states that Universities are main centers of scientific investigation. Hence, they must respect freedom of professors and researchers in the choice of topics and methods, even though within the scope of each scientific field. Meanwhile, autonomy in teaching, although within the boundaries of established educational models, is considered an essential premise to learning activities. Therefore, Universities may decide to distinguish the contents of the education they offer. However, formative paths must provide a set of mandatory training activities. Among others, Real Estate Appraisal has been confirmed as a fundamental subject (Ministerial Decrees 270/2004 et seq) of the degree courses in Architecture (Ferretti, 2011). Nevertheless, teaching and research have followed a kind of evolutionary path, mainly fostered by the advances in

the construction sector and real estate market (Bravi and Lami, 2009). Indeed, starting from the mid-nineties, the Italian real estate market underwent its fourth expansion cycle after the Second World War (Fig. 1). This cycle started with the peak reached in 1992 and the following downward price correction, in the wake of the economic recession of the early nineties. The new expansion period started with the introduction of the Euro-based monetary union in 1998-1999 (Muzzicato *et al.*, 2008). It has been characterized by about ten years of expanding market, with moderately growing exchanges and prices. Thereafter, the crisis that occurred in 2008 caused a turning point in prices, introduced by a strong downturn of transactions. This process has led to an increasing interest in the role of the real estate market within the economic and financial system. The main topics debated during the time span mentioned above were strongly related to the appraisal discipline, such as the reliability of property valuation for mortgage purpose, or else the ability of the estimation procedures to handle and tackle innovative financial tools. A guidance adopted by Bank of Italy (see memorandum 263/2006) as well as other guidelines published by the National Banking Association (Abi, 2011), in accordance with previous international valuation standards (Tecnoborsa, 2002; Tegova, 2012), confirm the trend.

The last cycle of property prices was characterized by a peculiar feature, consisting in the inclusion of several Italian real estate sub-markets into the global market. Offices in the downtown of major cities such as Rome and Milan, retail parks across the country, as well as holiday resorts located in the seaside have been increasingly acquired and operated by international players. Besides, global actors have stimulated the innovation of national

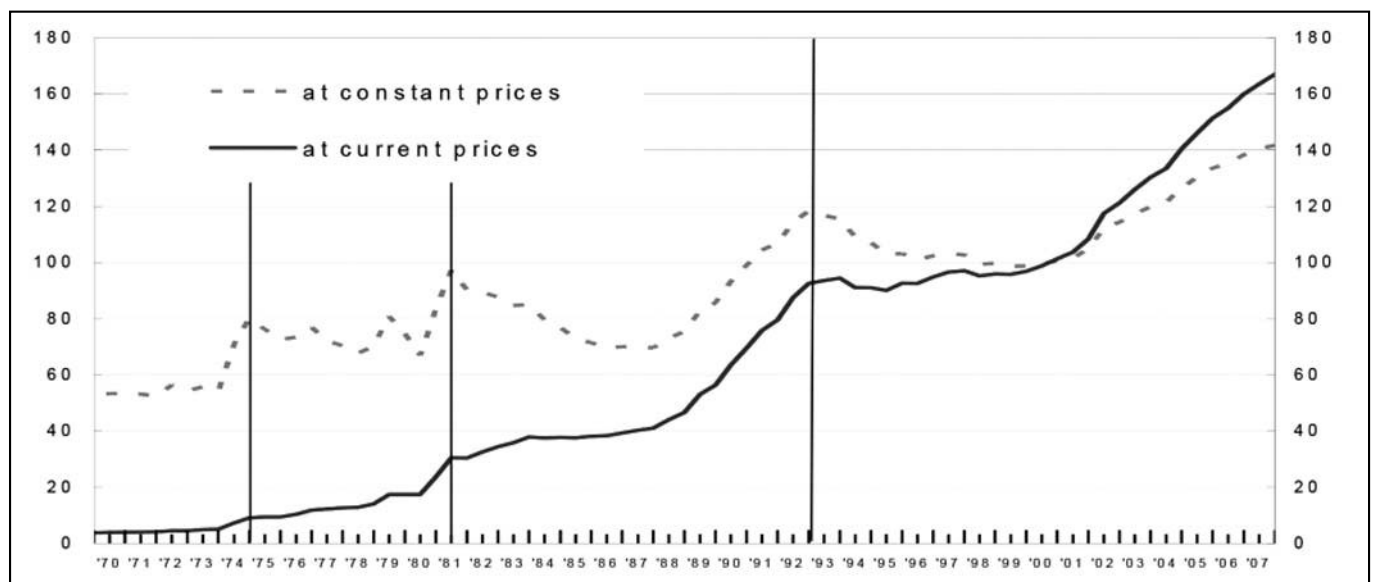


Figure 1 - Housing price cycles in Italy from 1970 to 2007 (source: Muzzicato *et al.*, 2008, p. 20)

entrepreneurial stakeholders and, as a side effect, an intensive use of advanced tools, such as special purpose vehicles or investment funds in order to acquire, develop, manage and operate single assets or property portfolios. They have further contributed to highlight the close integration, still underway, between the real estate and the capital markets (Schulte, 2002a; D'Amato, 2002). Additionally, in other countries and perhaps worldwide, the globalization process is now recognized as a development driver, which stimulates enhancements in real estate education and research (Koloman, 2001; Schulte *et al.*, 2005; Kashyap and Berry, 2007; Key, 2009).

Under the framework above, the following sections are meant to examine the evolution stages of the Italian real estate education and research. Specifically, Section 2 discusses the teaching topics and their changes. Section 3 analyzes the issues progressively addressed by doctoral research. Section 4 outlines the expected trends in both the fields; while some concluding remarks are presented in Section 5.

2. EVOLUTION OF REAL ESTATE RELATED TEACHING

2.1 From Real Estate Appraisal to Property Investment Valuation

Until the early twenty-first century, Real Estate Appraisal was usually a single course held during the fifth (and last) year of the degree courses in Architecture. Due to a reform of the Italian academic system (Ministerial Decree 509/1999), most of the degree courses are currently divided into two parts. The former is a Bachelor's degree, lasting three years as usual within the European Higher Education Area. The latter is a two-years-long Master's degree. Similar changes in undergraduate education have recently affected other European countries (Rock *et al.*, 2011). Consequently, in several Universities, the real estate related teaching is nowadays structured into two

modules, the former held during the first-level study course, the latter during the second level. Moreover, in addition to the traditional frontal teaching, the lectures are currently delivered through a range of methods, including seminars and workshops.

Before the reform above, the learning topics were mainly focused on the appraisal procedures commonly used in the Italian context (Montagnana *et al.*, 1996). They were the following: statistical estimates of market value and construction cost based on the price distribution of comparables; depreciated replacement cost; complementary value; direct capitalization under the framework of the income approach; analytical appraisal of construction cost through the bill of quantities. These are still core themes characterizing the module held during the Bachelor's degree in the sample of Universities to which this study refers. Nevertheless, the teaching scope has gone beyond and has broadened out to other topics, which are internationally recognized as fundamentals within an appraisers' curriculum. For instance, it deserves mention an increased interest in the methods based on multi-parametric estimates such as Market Comparison Approach and Hedonic Price Model. Despite the lack of transparency in the Italian real estate market, the difficulty to gather a large amount of reliable data (Prizzon and Ingaramo, 2001), and the gap between offer and transaction prices (Curto *et al.*, 2015), these procedures are gradually acquiring importance (Gabielli *et al.*, 2012).

Upon closer inspection, the reason behind this phenomenon lies in the opportunity to address peculiar estimation needs, such as modeling the preferences expressed by consumers on the demand side (Curto, 1990; Curto *et al.*, 2012). Other strands relate to performing mass appraisals (Rosasco, 2010), assessing the impact of environmental assets or cultural heritage on the property values (Stellin and Rosato, 1998; Rosato and Rotaris, 2009), or else assessing the market premium for buildings energy efficiency (Massimo, 2011). Table 1 summarizes the key issues currently addressed in the appraisal teaching in the

Table 1 - Appraisal teaching: summary of key issues

Approach		Value	Procedure
Market	Market		Statistical estimates ⁽¹⁾
			Market comparison approach
			Hedonic price model
			Depreciated replacement cost
Income	Synergistic		Complementary value estimate
	Market		Yield capitalization
Cost	Cost		Statistical estimates ⁽¹⁾
			Bill of quantities

⁽¹⁾ Based on distribution of known prices or costs.

sample of analyzed Universities, in terms of approaches, values, and estimation procedures.

The broadening of the learning topics leads to deal with issues pertaining to the economic and financial valuation of projects, according to the ever-wider importance assumed by related fields such as investment valuation and real estate finance (Rock *et al.*, 2011). This trend came to light around twenty years ago. Already starting from the seventies, it was observed a growing interest in valuation methods based on cost-benefit approach, to be applied to both building projects and urban plans. Nonetheless, until the nineties, these methods played a marginal role in the appraisers' education, as evidenced by short chapters in academic textbooks (Grillenzoni and Grittani, 1994; Realfonzo, 1994).

Meanwhile, the scenario began to change. The aim of bridging the gap between public and private stakeholders in urban transformations has been recognized as a major challenge, fostered by the same nature and characteristics of urban development processes (Dalla Longa, 2011). In addition, Italian cities have been literally flooded with a number of real property transactions based on Public-Private Partnership (PPP) schemes. Such schemes were mainly used to carry out urban renewal transactions project: conversion of brownfields embedded in the urban fabric, rehabilitation of public facilities disused because of their physical and functional obsolescence, and recovery of peripheral residential settlements characterized by social decay. The Italian PPP experience has been boosted by two reasons, common to most European countries. The first is the lack of public non-repayable grants, due to cuts in public expenditure in accordance with the constraints posed by the EU budgetary policy. The second reason is the opportunity to attract not only private financial resources but also entrepreneurial and managerial ones (Copiello, 2009; Tang *et al.*, 2010). Consequently, the required knowledge concerning real property must deal with both private enterprise objectives and public policy concerns (Roulac, 2002). In turn, this entails the need for assessment tools suitable to express the results of urban transformations in terms of profitability for the involved private entities, as well as in terms of feasibility from the perspective of the affected communities (Copiello, 2011).

Some studies dating back to the mid-nineties were meant to introduce several internationally-recognized assessment models, in order to perform economic and financial evaluations of projects (Prizzon, 1995 and 2001). According to a well-established framework, starting from pioneering studies dating back to the sixties and the seventies (Downs, 1966; Dilmore, 1971), the above-mentioned studies led to the development and widespread of the Discounted Cash Flow (DCF) approach (French and Gabrielli, 2005) into the Italian context, in substitution of the previously used cost-income analysis (Prizzon and Ingaramo, 2000).

Even if the overall process of expansion to new fields of

interest has been gradual, quite slow, and perhaps nonlinear (Lombardi, 2009b), investment valuation methods are currently common to most Italian study courses in Architecture. The latest academic textbooks clearly show this (Del Giudice, 2010), so property investment now represents the core topic characterizing the module held during the Master's degree, alongside with other teaching strands, such as the sustainability evaluation in the project life-cycle, the multiple-criteria decision analysis, and the project management approach.

2.2 Property Investment Valuation and Projects Evaluation: framework and aims

As regards the sample of analyzed Universities, the main goal of Property Investment Valuation lectures is to enhance the students' awareness that financial capital is not a passive participant in the processes that lead to building urban landscapes, but an active player with its own behavior and objectives (Wharf, 1994). In other words, the purpose is to familiarize students with the essential methodological tools useful to deal with problems linked to project performance, both regarding feasibility (concerning the investment power) and profitability (in comparison to alternative investments). The industry players already employ financial professionals who learned some real estate skills; nonetheless, there is still an unfulfilled demand for real estate professionals, namely architects and engineers, who have enough financial literacy and related capabilities (Key, 2009). We are essentially striving to fill this gap (Rigby *et al.*, 2012).

Currently, the lecture contents lie within the methodological framework of Feasibility Study (French and Gabrielli, 2006). It is a document specifically required by laws on public contracts, especially concerning design and implementation of PPP transactions (Public Contracts Code, former Legislative Decree 163/2006, s. 128 and 153; now Legislative Decree 50/2016; Presidential Decree 207/2010, s. 14). The Feasibility Study can be described as a kind of technical and economical due diligence, carried out on a project or a master plan. Indeed, in several other countries, the due diligence usually precedes the stages of preliminary and detailed design. Technical aspects concern town-planning rules, building features and environmental compatibility. Economic aspects relate to the financial viability for private developers, as well as to the sustainability from the community point of view.

The teaching topics follow the sequence of valuation techniques adopted as references for feasibility studies. This means, firstly, the need to analyze the estimation procedure based on the Investment Value approach. Indeed, real estate appraisal requires addressing the fundamentals of financial mathematics that are in turn preparatory to the methods based on discounting.

Subsequently, the teaching program points to the life-

cycle cost analysis. In the Italian context, the global cost's estimate has been used for specific purposes, such as the choice of the optimal construction method of large industrial plants. After being disregarded for several years, it is currently experiencing a renewed interest, following a well-established methodological framework (Marshall and Ruegg, 1976; Bagatin *et al.*, 1984) and a considerable amount of international research (Gustafsson, 2000; Goh and Sun, 2016). The life-cycle cost analysis is useful to judge the monetary worth of alternative building energy efficiency measures (Verbeeck and Hens, 2010; Ouyang *et al.*, 2011; Ingaramo *et al.*, 2013), but it is also applied in related fields to embed environmental aspects into the assessment of construction solutions (Copiello and Bonifaci, 2015).

Finally, the teaching program provides for the discussion of cost-benefit and DCF analyses (Bottero and Mondini, 2009), because they are suitable to perform the assessment of property investments (Ratcliff, 1972; Kishore, 1996), such as renewal interventions of whole sections of the urban fabric implemented through PPP (Copiello, 2011). Table 2 summarizes the key issues of the Property Investment teaching in the sample of analyzed Universities, with regard to approaches, values, and procedures.

Comparing at a glance the former Tables 1 and 2, two approaches clearly emerge. The former mainly answers to particular needs expressed by construction firms (Bhattacharjee *et al.*, 2013), which represent traditional operators on the supply side of the real estate sector. Hence, it exhibits major connections with the UK approach that characterizes the schools of built environment (Roulac, 2002; French and Palmer, 2002). On the contrary, the topics discussed within the scope of the latter course try to meet the skills required by newest market players, such as real estate investors and development companies. Therefore, since "property industry has moved from a transaction orientation to a strategic orientation" (Roulac, 2002, p. 5), the advancement of the real property discipline in Italy confirms an ongoing shift towards the US paradigm, which features the predominance of business and finance topics (Webb and

Smith, 2002).

The dualism between UK survey-based approach and US finance-based model has been further deepened by literature: a kind of third way is the interdisciplinary approach followed in Continental Europe (Schulte *et al.*, 2005). A worldwide comparison may be biased due to several reasons, such as a rather recent evolution of real estate education in fast developing countries, or the progressive matching of teaching paradigms (Key, 2009), not to mention the wavering demand for real estate training according to economic cycles. Nonetheless, our current approach exhibits a body of knowledge characterized by a not negligible interdisciplinary rate, which is consistent with some evidence coming from Western countries (Schulte, 2002b; Gunderson and Gloeckner, 2006) and part of Eastern European transition economies (Belniak, 2002; Trifonov, 2002).

3. EVOLUTION OF DOCTORAL RESEARCH

3.1 Organizational aspects of Ph.D. courses in Real Estate Appraisal

Owing to the principle of financial autonomy, Universities may finance scholarship relating to specific topics within their Ph.D. courses (Ministerial Decree 45/2013). Alternatively, funding could be allocated to other Universities, in order to hold doctoral courses in association. One of the first Ph.D. courses in Real Estate Appraisal and Land Economics was established at the University of Padua in 1987, by the Department of Innovation in Mechanics and Management, and has always been organized jointly with other Universities. At the beginning, the Ph.D. course was referred to as Land Economics and Management, but, in a couple of years, it turned to real estate. Now as then, it is one among the few Ph.D. courses focusing, almost exclusively, in real estate appraisal and property valuation. As a peculiar feature, it aims to combine and integrate different kinds of expertise coming from disciplines such as engineering, architecture, and agronomy.

Table 2 - Property Investment Valuation: summary of key issues

Approach	Value	Procedure
Transformation	Transformation	Highest and best use's value estimate
Life-cycle	Global cost	Life-cycle cost assessment analysis
Discounting	Net present value	Cost-benefit analysis Cost-income analysis Discounted cash flow analysis Financial plan

3.2 Topics of doctoral research on real estate: first and second phases

The research performed within the Ph.D. course in the University of Padua has faced a development process common to the teaching evolutionary path. The theses discussed from 1992 to date outline both the evolution of the issues addressed and of the methods and techniques used by researchers. Such evolution consists of three phases.

The first phase lasted from the mid- to the late nineties and was focused on theoretical and empirical issues strictly developed within the boundaries of the national appraisal discipline and practice. The topics mainly belonged to the field of agronomy and forestry sciences. Therefore, the questions addressed by the theses pertained to appraisal fundamentals applied to the agricultural environment: analysis of interactions between urban and rural systems; management of rural areas; factors influencing land values; operational models of agricultural waste management; influence of agricultural activities in regional and environmental planning (Table 3).

The second phase developed by the mid-years of the last decade. Its main characteristic laid in expanding the research themes to the topics of project valuation and real estate finance. A closer look brings out specific questions addressed by the theses: cost-benefit analysis applied to environmental goods; Feasibility Study of urban renewal interventions; use of real option theory and fuzzy logic methods to perform property investment valuation, deepened in subsequent studies (D'Alpaos and Marella, 2014; D'Alpaos and Canesi, 2014); use of mathematical and statistical methods, such as resampling procedures, in order to contribute to property portfolios construction (Table 4).

The evolution process characterizing the previous two stages can be interpreted as part of a broader change involving planning paradigms. Indeed, during the nineties, Italy faced a crisis of the traditional urban planning model, which led to the so-called planning

reform carried out by several Regional Governments. Two different planning instruments replaced the former Piano Regolatore Generale (Urban Development Plan), namely the Piano Strutturale (Structure Plan), defining urban and environmental strategies in the medium to long term, and the Piano Operativo (Action Plan), managing public and private urban developments in the short term. Meanwhile, the first Italian strategic planning experience was carried out in Turin (Vanolo, 2015), based on the previous Barcelona's experience (Sanchez, 1992). Strategic plans are not mandatory in Italy, but local authorities can adopt them alongside ordinary planning instruments. As highlighted by Monclús (2003), the strategic planning notion is based on the identification of specific interventions able to improve the economic and functional efficiency of cities, by catalyzing investments. Similarly, the valuation models suitable for the purpose of zoning-based land-use planning (Albrechts, 2004) have been replaced by market-oriented methods, which are better suited to the new planning paradigms.

Nevertheless, the evolution process characterizing the doctoral research may be identified as oriented mainly towards the inside: the relationships between real estate appraisal and other disciplines were rather poor, mostly limited to Town Planning and Design, Financial Economics and Statistics, especially intended to solve assessment issues by adopting different points of view.

3.3 Topics of doctoral research on real estate: third phase

The third phase reveals the attempt to establish a greater amount of high-quality interactions with other technical disciplines. Moreover, it is possible to notice a novelty, namely, the shift in the research interests from the appraisal of real properties to the evaluation of decisional processes and policies. This phenomenon is probably due to the increased number of stakeholders involved in urban renewal transactions. In particular, it arises a strengthening of the spatial approaches aimed to bring together the "strategic perspectives on land development,

Table 3 - First phase of doctoral research: selection of thesis titles

Student (Tutor)	Year	Thesis title
G. De Fano (G. Grittani)	1993	Agriculture in the processes of urban and regional planning: the case of the central system Puglia ⁽¹⁾
R. Canu (M. Prestamburgo)	1993	Environmental Impact Assessment and land consolidation ⁽¹⁾
M. Canavari (M. Grillenzoni)	1997	Determinants of rural lands market value ⁽¹⁾
M. Thiene (D. Agostini)	1997	Interaction between urban and rural in a metropolitan area ⁽¹⁾
R. Amabile (G. Stellin)	1999	The contribution of artificial intelligence to real estate valuation ⁽²⁾

⁽¹⁾ Thesis in Italian, title translated by the authors; ⁽²⁾ Thesis in English.

Table 4 - Second phase of doctoral research: selection of thesis titles

Student (Tutor)	Year	Thesis title
A. Faggiani (G. Stellin)	2003	Economic and financial evaluation of real estate investment. An innovative methodology for decision makers ⁽¹⁾
V. Zanatta (P. Rosato)	2003	Non-use values in cost-benefits analysis of environmental preservation programs ⁽²⁾
C. D'Alpaos (G. Stellin)	2004	Real options theory and investment evaluation: the case of water service ⁽¹⁾
L. Gabrielli (S. Stanghellini)	2004	Property portfolio construction with uncertainty: an innovative bootstrap approach for better asset allocation ⁽²⁾
S. Copiello (S. Stanghellini)	2006	Economic evaluation in urban renewal feasibility studies ⁽¹⁾

(1) Thesis in Italian, title translated by the authors; (2) Thesis in English.

environmental concerns, resource use, transport, economic development, social infrastructure, and similar concerns" (Allmendinger, 2007, p. 1478). As highlighted by Healey (2004, p. 46), academic discussion on strategic spatial planning is devoted to involving the significant stakeholders and their concerns in a process "cohesive enough to develop collective actor power." Whilst the main stakeholders previously involved in urban transformation were private investors, later the number of actors has broadened, and their ability to affect urban choices can be identified not only in the financial power but also in the creation of a network of different agents and multiple interests. Consistently, multi-criteria approaches used during the third phase originate from decision-making support models and operational research (Bottero and Mondini, 2008; Lombardi, 2009a).

Therefore, the questions addressed by the doctoral research may be summarized as follows: evaluation approaches of public policies trying to overcome limitations related to cost-benefit analysis; decision theory; use of multi-criteria methods as real estate appraisal tools; evaluation models supporting decision-

making concerning planning, design, and implementation of eco-industrial parks (Table 5).

3.4 New topics of doctoral research

The shift in doctoral research is much more pronounced within the Ph.D. course in regional planning and public policy held at the University IUAV of Venice, which includes a scholarship concerning real estate. The issues presently addressed foreshadow relationships among various disciplines, and particularly Town Planning, Design, Building Physics, and so forth.

Part of the ongoing research aims to investigate the viability of building energy retrofits. Under this framework, several studies have been recently published. One of them concerns the impact of energy labels on market value estimated with a hedonic price model (Bonifaci and Copiello, 2015a; 2015b). Another one analyzes the financial viability of energy retrofits investigated through a DCF analysis (Copiello and Bonifaci, 2015). Both studies reveal that a contingent increase of building values, on the one

Table 5 - Third phase of doctoral research: selection of thesis titles

Student (Tutor)	Year	Thesis title
M. Dalla Valle (P. Rosato)	2007	Sustainability assessment of economic reuse of historic houses ⁽¹⁾
C. Martin (G. Stellin)	2008	Economic efficiency and conservation of natural systems in the allocation of land resources among alternative uses: a multi-criteria model for decision support within sustainable land planning ⁽¹⁾
V. Ruaro (S. Stanghellini)	2011	Eco-Industrial Parks: valuation models ⁽¹⁾
P. Damian (P. Rosato)	2011	Multi-criteria analysis for support of real estate assessment ⁽¹⁾
G. Lucentini (C. D'Alpaos)	2012	Evaluating Public Policies. Normative Models Beyond Cost Benefit Analysis ⁽²⁾

(1) Thesis in Italian, title translated by the authors; (2) Thesis in English.

hand, and savings to be achieved by reducing energy supply requirement, on the other hand, are unable to justify the adoption of multiple energy efficiency measures, in new constructions as well as in refurbishment interventions. Nevertheless, the results so far obtained are not satisfactory, since they clash with the difficulty to obtain a large amount of consistent data, not only due to the lack of transparency still typical of the Italian real estate market, but also because of the fairly recent adoption of the regulations on the energy labels.

A major concern arising from the studies mentioned above is how to assess all the parameters that the stakeholders take into account in an energy-driven project. The question has a multi-criteria nature: as many as are the actors involved, so many are the interests and objectives to be considered (Olander and Landin, 2005; Marques *et al.*, 2011). Hence, proceeding along the path that oversteps the boundaries of the appraisal discipline, multi-actor multi-criteria analysis appears to be an effective tool allowing to deal with issues posed by the growing complexity of choices relating to the urban environment and real properties (Bonifaci *et al.*, 2016).

4. OPPORTUNITIES AND FUTURE TRENDS

In the two previous sections, the evolution of real estate-related teaching and doctoral research has been discussed by referring to a sample of Italian Universities and to the changes occurred in the last two decades (for a summary, see Table 6).

For years to come, further developments may take place. According to the recent literature, a specific trend concerns the opportunity to achieve a tighter integration

with other subjects (Ivanitskaya *et al.*, 2002; Buchbinder *et al.*, 2005) – as a matter of fact, a long-since debated issue (Parker, 1986) – while another relates to a more extensive recourse to case study analysis (Holley, 2009). Several studies already recognize the interdisciplinary nature of real estate education, but they also emphasize the difficulty in structuring strong and wide academic networks on real estate topics (Bahn and Loepe, 2008). During the next years, we expect to experience growing relationships with the disciplines of Architectural Technology and Building Physics. In particular, as witnessed by the growing research in the field, we anticipate an increasing demand for evaluations to support the definition of energy-efficient policies in the real estate and construction sectors (Fabbri *et al.*, 2011; Lombardi and Trossero, 2013; Copiello, 2015), as well as to identify cost-efficient and cost-effective building retrofit solutions (Boeri *et al.*, 2011; Antonini *et al.*, 2016; Fabbri *et al.*, 2014; Barthelmes *et al.*, 2016).

5. CONCLUSIVE REMARKS

In this paper, a common evolutionary path of teaching and doctoral research, leading to an enlargement of the disciplinary boundaries, has been identified. Its most prominent feature lies in the broadening of the real estate appraisal topics towards approaches drawn from business and finance disciplines. Moreover, beyond the regulations, the evolution is driven by emerging needs due to advances in construction sector and real estate market. Currently, another evolution is still underway. The new frontier for both teaching and research is a tighter integration with other technical disciplines, particularly according to the transition towards sustainable buildings.

Table 6 - Evolutionary paths: comparison of market, planning, teaching and research

Real estate market	Planning paradigms	Teaching	Research
1992-2008: fourth real estate market cycle; 1992-1996: downturn of prices.	1995-to date: crisis of planning models; abandonment of traditional land-use planning; Structure Plan and Action Plan.	Before 2000: single cycle degree course in Architecture, learning topics focused on real estate appraisal.	1994-2000: theoretical and empirical issues developed within the boundaries of Italian real estate discipline.
1997-2008: price growth; globalization of Italian real estate market; widespread use of financial tools; increase of PPP in urban development processes.	2000-to date: strategic planning experiences; increase of stakeholders' involvement in urban renewal.	2000-to date: Bachelor's degree (introduction of multi-parametric estimates); Master's degree (property investment valuation; DCF based procedures within Feasibility Study).	2000-2006: economic and financial valuation of projects and real estate finance.
2008-to date: fifth real estate market cycle; downturn of transactions and prices.			2006-to date: increasing concern in evaluation of decisional processes and policies.

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