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An investigation of development appraisal methods employed by valuers and appraisers in small and medium sized practices in Brazil

INTRODUCTION

Patterns of economic development and investments in developing countries are increasingly influenced by exogenous forces of international finance and investment, a component of which is the evaluation and appraisal of commercial real estate development opportunities in an increasingly global market. This paper investigates how development appraisal is conducted for commercial real estate in Brazil, an emerging global economy and BRICS country, focusing primarily on the methods employed to appraise the viability of commercial real estate development by small and medium sized real estate companies and their appraisers. Whilst the practices of large national and international real estate companies which employ appraisal methods, that are similar to those employed in the UK, are relatively well understood (see Coleman, Crosby, McAllister and Wyatt 2013), little is known about how development appraisals are conducted by indigenous appraisers and valuers in Brazil. The research uses the long established and relatively transparent United Kingdom (U.K.) residual method of development appraisal as a template against which to compare Brazilian appraisal methods, guidance and practice. In order to understand how indigenous development appraisers operate the Brazilian development appraisal methods, it was vital that the research was conducted in Portuguese by a bi-lingual real estate expert who was familiar with both U.K. and Brazilian practice[1].

The Residual Method of development appraisal, widely used in the U.K. and in other countries (see Havard, 2014; Isaac and O'Leary, 2013; Ratcliffe, Keeping and Stubbs, 2009; Wilkinson and Reed, 2008), is the model against which other methods of development appraisal may be compared. A comparative study of commercial development appraisal in Brazil has, to the authors knowledge never been published, and offers a unique opportunity to reveal both differences and similarities between the two.

Five research questions were used to frame the inquiry (hereafter referred to as Q1-Q5):

1) How are commercial property development appraisals conducted in Brazil?

2) How are profits calculated by developers?

3) How are development land prices calculated in Brazil?

4) How are development risks managed and shared?

5) How do risks impact on Brazilian development appraisals?

Following this introduction, the structure of the paper comprises four main sections. Section two contains a review of the available literature on development appraisals in the U.K. and Brazil, and presents the framework of the residual method along with contemplation of independent and dependent variables. Section three describes the Delphi Method[2], employed by the researchers to capture data from real estate appraisers in Brazil. Section four analyses the results gathered by the two-phase Delphi Methods survey, examining participants' responses, presenting findings based on a synthesis of the critical analyses of the data and the literature, before presenting conclusions, answering the questions posed above, highlighting three key findings and identifying opportunities for further research.

THE RESIDUAL METHOD OF DEVELOPMENT APPRAISAL

UK origin and practice

The Royal Institution of Chartered Surveyors (RICS) describes the process of arriving at a residual value as follows:

> *'Where a residual approach has been followed, the valuer draws together the various elements, and having established the completed value by deduction of the various costs, determines the residual land value'*

> (RICS, 2008, VIP 12, p.16).

The Residual Method is the preferred method for appraisals of commercial development in the U.K.. Crosby, McAllister, and Wyatt, (2013) describe the method as the name referring to the element of residual or latent value which is released after development is implemented. After estimating the value of a proposed development, all costs including developer profit are deducted; the residual or available difference is taken as the value of the development site which is to be

purchased. Alternatively, if land costs are fixed or already known, the residual value is the difference available for developer return for facing development risks. The authors assert that:

> *'In principle, the residual model can be used to find the residual value of any of the inputs once the other inputs are fixed but residuals of either land value or profit are the normal outputs.'*

<div align="right">(Crosby, McAllister, and Wyatt, 2013, p.7)</div>

The Residual Method is one of five principle valuation methods used in the U.K., and much of the developed world, for property valuation, the other four other methods comprising the Comparative (Isaac and O'Leary, 2012; and Scarrett, 2008; Darlow, 1988)[3] the Investment (Baum, Mackmin, and Nunnington, 2011)[4], the Profit (Isaac and O'Leary, 2012)[5] and the Contractor's Test (RICS, 2012; Enever, Daley and Isaac, 2010)[6].

In the U.K., Darlow (1982) acknowledged three purposes of the Residual Method:

> *'There are essentially three main purposes for which a residual method may be undertaken and to some extent they correspond to the chronological sequence of the development process: To calculate the maximum value of a development site which is for sale in the open market. … to calculate the expected profit from undertaking development where the site is owned by the developer. …to calculate a cost ceiling for the construction where land has been acquire.'*

<div align="right">(Darlow, 1982, p.1).</div>

Newell (1989) recognised two key features of development appraisals:

> *'[A]n appraisal provides a framework from which a developer can obtain a measure of the likely profit to be obtained from undertaking a development scheme. Once all potential expenditures on such elements of the scheme as land purchase, building costs, fees and interest have been estimated, they are quite simply deducted from anticipated receipts …*

A second key feature of a development appraisal model is its ability to assist the developer in identifying the maximum price that can be paid for a site in order to achieve a fixed expected profit [for example] on cost return. This is the so called 'residual valuation' and is invaluable in helping developers determine their [land] bid prices for development sites.'

<div align="right">(Newell, 1989, p.123)</div>

Whilst the residual method can, in theory, be used to determine whether a project produces an adequate rate of return, in terms of trading profit or investment yield, by comparing total costs with total revenue (Topping and Avis 1991), in practice most appraisals 'simply' subtract the cost of carrying out a development from the value of the completed development in order to determine the amount of money (the residual) available to pay for the land (Isaac, 1996). Ratcliffe, Keeping and Stubbs (2009) suggest that when the landowner disagrees with the developer's land bid, calculated using the Residual Method, the land value should be calculated using the Comparative Method, provided that comparable[7] evidence is available.

Since the advent of spreadsheets and software packages in the late 1980's, valuers and appraisers in the U.K., and elsewhere, have a range of techniques at their disposal:

1. Traditional (Simple) Residual Method
2. Residual (Accumulative) Cash Flow approach
3. Discounted Cash Flow (DCF) approach in which the cash flow of each period is discounted back, resulting in a Net Present Value (NPV) that estimates a land bid or the NPV of a projected profit.

<div align="right">(Havard, 2014)</div>

Under the Simple Residual Method residual land value is calculated as follows:

Equation 1

$$LV_0 = (1 + i)^{-t} \left[\frac{DV_0}{(1 + p)} \right] - DC_0 - I$$

Where,

LV_0 = residual land value at time zero

i = annual interest rate

t = development duration

DV_0 = development value estimate at time zero

p = profit on as percentage of development value

DC_0 = development cost estimate at time zero

I = finance cost

(Coleman et. al, 2013 p.146)

One of the drawbacks of such 'simple' residual models, according to Byrne, McAllister, and Wyatt (2011), is that they make a number of simplifying assumptions that can lead to inaccuracies in estimations of costs and revenue, even if the estimation is conducted by sophisticated software[8].

Brazilian Standards and Guidance

Brazilian development appraisal standards have undergone rather complex and convoluted evolution since the first standard for property valuation (ABNT NB-502/1977 Norma Brasileira NB-502) was published in 1977. It was subsequently renamed NBR 5676/1977 (Norma Brasileira NBR 5676 / 1977), before being revised in 1989 to become NBR 5676 /1990 (Norma Brasileira NBR 5676/1990), and replaced by Brazilian Standard NBR 14653/2001 (Norma Brasileira NBR 14653/2001). The prevailing Brazilian property valuation standard is ABNT NBR 14653/2011 (Norma Brasileira NBR 14653 / 2011).

Norma Brasileira NB-502 (ABNT, 1977) adopted a 'simple' residual method, in which land value is obtained by subtracting construction costs, profit, financial expenses and contingency from property value[9]. Moreira (1991) suggested in "*Técnica do Terreno Residual*" (Residual Land Value Technique), that when land residual value is estimated using a DCF, it reflects the site or land value at the current date. It is notable that residual valuations of Brazil and the U.K. share similar origins, suggesting that despite contextual and time differences in the literature, both countries have same residual valuation roots (Isaac, 1996; Moreira, 1991; Darlow, 1982; ABNT, 1977).

In harmony with standards of Brazilian Association of Technical Norms (ABNT - Associação Brasileira de Normas Técnicas) and the professional body for qualifications and standards, the Brazilian Institute for Valuations and Engineering Legal Expertise (IBAPE - Instituto Brasileiro de Avaliações e Perícias de Engenharia de São Paulo), there are five main valuation methods, which include the Residual Method although not in name.

A residual approach to calculate land value for *redevelopment* of existent buildings is specified by IBAPE SP (Brazilian Institute for Valuations and Engineering Legal Expertise of Sao Paulo), as follows:

Equation 2

$$Vt = (Vo \; x \; Ff) - Vb$$

Where,

Vt   = residual land value

Vo   = offer price

Ff   = elasticity coefficient

Vb   = total construction cost

(IBAPE SP, 2011, Section 11.1 p.25)

However, the Residual Method approach is not specified by Brazilian standard NBR 14653-2 (ABNT, 2011 and IBAPE SP, 2011) for calculating either developer's profit or land price.

Table 1 maps valuations methods of both countries against each other.

Table 1 - Comparing U.K. and Brazilian Valuation Methods

Similarity	Brazilian Valuation Methods	U.K. Valuation Methods
High	Method of Direct Comparison of Market Data	The Comparative Method

High	Capitalization of Income Method	The Investment Method
High	Method of Involution	The Residual Method
High	Method of Direct Comparison of Cost	The Comparative Method
Medium	Method of Cost Quantification	The Contractor's Method
Low	Method of Evolution	The Profit Method
Low	Method of Evolution	The Residual Method

The five Brazilian valuation methods described below, are regulated by Brazilian standard NBR 14653-2/2011 (ABNT *Norma Brasileira* NBR 14653-2 / 2011):

a) *Method of Direct Comparison of Market Data* (Método Comparativo Direto de Dados de Mercado) - commonly known as the Comparative Method (Método Comparativo), is the preferred method of Brazilian valuers when a sufficient number of comparables exists (Dantas, 2005);

b) *Method of Involution* (Método Involutivo) and *Vertical Method of Involution* (Método Involutivo Vertical[10]) - are employed when there is either no or insufficient comparable evidence to use the Comparative Method. Whilst both methods adopt a residual approach to calculate and value land, neither are described as such residual approach by ABNT *Norma Brasileira* NBR 14653-2 / 2011. Vertical Method of Involution is derived from the Method of Involution (Alonso and D'Amato (2009), and from an external perspective, appears a rather arcane method that is employed in the appraisal of high and medium-rise residential, commercial and mixed-use blocks. According to (Dantas, 2005) the most common Method of Involution calculation is: total income of the development minus total costs of the implemented development minus expected profit of the developer equals land value;

c) *Method of Evolution*[11] (Método Evolutivo): is used when there is some comparable market data but it is insufficient to permit use of the Method of Direct Comparison of Market Data. The Method of Evolution requires land value to be calculated either by Comparative Method or Method of Involution, the construction cost to be calculated by Direct Cost Comparison or Cost's Quantification, before using a market coefficient to calculate market value (Dantas, 2005). The market coefficient is a ratio that can be greater or less than 1, indicating the tendency of a commercial property to increase or decrease its market value depending on market conditions (ABNT, 2011). The specification of the former ABNT- NBR5676 /1990 exposed a residual approach of the Method of Evolution (Steiner et al., 2009) but the method is not described as a Residual Method by ABNT NBR 14653-2 / 2011). The main output of the Method of Evolution is development value, but it may also be used to calculate land value by rearranging the standard equation, as follows:

Equation 3

$$Vt = \frac{Vi}{FC} - CB$$

Where,

Vt   = Land Value

Vi   = Market Value

FC   = Market Coefficient

CB   = Construction Cost

d) *Capitalization of Income Method*[12] (Método da Capitalização da Renda), also known as *Income Method* (Metodo da Renda) - is used in commercial development appraisal to calculate the development value when neither the Comparative Method nor the Method of Evolution can be applied (IBAPE SP, 2011);

e) *Cost Method* (Método do Custo) - allows two approaches, firstly, the *Method of Cost Quantification* (Método da Quantificação do Custo), used to identify projected construction costs in accordance with ABNT NBR 14653-4 / 2002, and secondly, *Method of Direct Comparison of Cost* (Método Comparativo Direto de Custo) which follows the same procedures as the Comparative Method (ABNT, 2011; IBAPE SP, 2011).

The interaction of one method with the other is not unusual in valuation. For example, in the U.K., the Comparative Method interacts with the Investment Method (Enever, Daley and Isaac, 2010). In contrast, the approach for valuing properties in Brazil employing, for example, the Method of Evolution requires the Comparative Method or the Method of Involution to determine the land value, and the Cost Method to determine the construction cost (ABNT, 2011), however, the option for the valuation methodology (see RQ3) depends not only on the purpose of the valuation but also on the nature of the subject property and available data (IBAPE, 2011).

Development Variables

According to Wyatt (2007), there are independent and dependent input variables with different degrees of interdependence.

> *'An independent variable is unaffected by any other variable in the model whereas a dependent variable is determined in full or in part by one or more other variable in the model'*

(Wyatt, 2007, p.293).

Table 2 shows variables required to conduct development appraisals. *Rent* and *Investment Yield* are major variables establishing development value with significant impact on the appraisal model and the sensitivity of profit (Isaac and O'Leary, 2011; Ratcliffe, Keeping and Stubbs, 2009; Wilkinson and Reed, 2008; Millington, 2000).

Table 2 - Typical U.K. Major and Minor Variables

United Kingdom	Relevance of the variable	Variables to which profit

	Major	Minor	is most sensitive
Land price	x		
Investment yield	x		x
Contingency		x	
Rent	x		x
Building costs	x		x
Professional fees		x	
Development duration	x		
Interest rate	x		

Adapting Millington (2000); Ratcliffe, Keeping and Stubbs (2009)

The six major variables: *land price, rent, building costs, development duration, investment yield and interest rate* are reviewed as follows:

i. *Land Price* is one of the most significant variables, affecting profit and development risk. Ratcliffe, Keeping and Stubbs (2009) discuss how refinement and delay of the agreement can lead to increases or decreases in price between the assumed land market price and the actual selling price. Determining the likely land price is often the reason for conducting a residual valuation; in other circumstances the cost of the land is known or assumed[13].

ii. *Rent*: the estimated rent is an independent variable which is based on a detailed analysis to establish the rent at the current date, and must be determined by the developer as a result of discussions with valuers or agents (Wilkinson and Reed, 2008);

iii. *Building Costs*: the cost of construction depends on the interplay between a number of related factors, including development size, site servicing and layout, quality of materials, type and design of building, and additional costs to overcome constraints, as well as all additional project costs that

attract higher capital costs to decrease operational costs that will occur during the building's life span (Isaac, O'Leary and Daley, 2010);

iv. *Development Duration:* the development period includes planning, building construction and void periods (Isaac, O'Leary and Daley, 2010). Ratcliffe, Keeping and Stubbs (2009) acknowledge that delays adversely impact on finance costs;

v. *Investment yield*: change with investor demand or expected rental growth and income risks (Wilkinson and Reed, 2008). Ratcliffe, Keeping and Stubbs (2009) suggest that market derived investment yields should not be indiscriminately applied to estimate a capitalisation rate for assessing development viability, but should incorporate aspects of the development appraisal such as rental growth, flexibility of use, likely economic life of the building, ease of leasing, management responsibility;

vi. *Interest Rate:* development finance is traditionally sourced by equity funds, subdivided into internal equity funds owned by the developer, and external equity funds owned by another company or companies to which the development has been presold and debt finance (Havard, 2014). Subject to economic conditions, lenders typically provide between 60 to 75% of development costs depending on the agreement; sources include major investment banks, merchant banks and specialty lenders. The rate of interest is combined with duration of lending in a compound interest calculation using Amount of £1.

Ratcliffe, Keeping and Stubbs (2009) observe that variables, such as rent and investment yield, are prone to change between development to completion, and carry associated risk and uncertainty. The authors state that for reasons of demand and supply, anticipated rental income can be adjusted several times before income starts to flow. Investment yield can fluctuate in the property investment market in accordance with market conditions. Construction costs can increase because of difficulties with the labour market or supply and cost of materials. The development

duration, including periods of building construction, marketing, selling or leasing and the void period, depending on market conditions, may be longer than expected. Interest rates and finance charges can change and are time dependent on the funding agreement, thereby affecting developer's profit.

RESEARCH METHODOLOGY

A two phase Delphi Method was employed to gather empirical data from experts in the field of commercial development appraisal in Brazil. The reason for choosing this method was its potential to elicit expansive, open and honest reflection and refine expert judgments, minimize bias such as the opinions of rhetorical and charismatic individuals and replace traditional debate and counterproductive dynamics of groups that might affect the objective of the research (see Kauko and Palmroos, 2014; Dalkey, 1969). All participants remain anonymous so that whilst they share a summary of the group's response, no-one knows who the other participants are or to whom the responses belong. This arrangement creates opportunity for anonymous feedback and interaction to achieve a group consensus by the final phase. The literature review framed the interview questions used in the first phase, the responses to which were used for inform the second phase survey questions.

In advance of the roll-out of the Delphi Method, scoping interviews were conducted in Belo Horizonte, the capital of Federal Estate Minas Gerais, and Brazil's third largest city, which identified the City of Sao Paulo, capital of Sao Paulo State and Brazil's largest City, as the optimal location in which to focus data collection because it is home to numerous small and medium sized real estate enterprises (Mead and Liedholm,1998), the largest real estate professional body, the IBAPE SP and the headquarters of Brazilian real estate professional body IBAPE NACIONAL, and also the greatest number of members holding professional certification. Of 71 nationwide members holding professional certification, 23 are based in Sao Paulo State, 13 of whom are based in the City of Sao Paulo itself. Of 2187 nationwide member, 494 had their membership with Sao Paulo State, ahead of the Sates of Rio de Janeiro and Federal State Minas Gerais, with 365 and 271 members respectively. The City of Sao Paulo alone has 230 members (IBAPE NACIONAL, 2015). When the

research was undertaken in 2013, the City of Sao Paulo had 106 IBAPE members who specialised in property valuation, 74 of whom conducted commercial property appraisals, including 24 who conducted development appraisals (IBAPE SP, 2013).

Following preliminary scoping interviews and approaches to potential participants, empirical material was initially generated via a series of elite semi-structured interviews (conducted between November and December 2013) with ten participants who were recruited to the Delphi study. The expert panel comprised civil engineers, property valuers and appraisers and an architect (hereafter referred to as appraisers), except one lecture and one public worker, all of whom are employed by, or are owners of small and medium sized real estate valuation, development or real estate consulting companies operating in Sao Paulo.

Elite interviews are not without methodological controversy, Harvey (2011, p.432), states that there is an 'under theorization of the term elite', within methodological discourses. In this research, our definition of elite refers to the status of the interviewee within the real estate development profession as represented by the level of professional qualifications held by the individual, the duration of their career in real estate development, their professional networks and connectivity (e.g. membership of professional bodies). Such a definition is purposely narrow as it was intended to focus the empirical stage of research on targeted interviews with practitioners conducting commercial development appraisals in Brazil (for further details about elite interviewing see Harvey, 2011; Aberbach and Rockman, 2002).

In Round 1, participants were asked eleven face to face interview questions, a summary of the responses to which was sent to each participant as part of the roll-out of Round 2 which comprised a further eleven questions. The second round was used to validate findings from the first phase using Likert scale responses to statements and explore in greater depth key issues revealed by Round 1. One participant withdrew from the panel between Rounds 1 and 2, representing an acceptable attrition rate.

In the next section, data obtained from the responses of the participants to the Delphi Survey are analysed, evaluated and presented to deliver comprehensive

reporting of findings resulting from the synthesis of the outputs of the Delphi Method Rounds 1 and 2 and the literature.

Key findings from Delphi Survey

Methods

There was near unanimity amongst participants that a variety of different methods are used in Brazil to appraise commercial development opportunities and that the Comparative Method is the most commonly employed method for development appraisals when there is sufficient market and land price transaction data available. Most participants agreed that DCF techniques are employed for the appraisal of commercial development (see RQ1), to calculate profit and determine development viability, *when the land price is known*. Before undertaking DCF appraisal, valuers will obtain site and rental values using the Comparative Method; development construction costs are calculated using the Brazilian Method of Direct Comparison of Cost, provided that there is a minimum amount of comparable evidence (ABNT, 2011); and an expected profit is determined by the developer. The Method of Evolution is used when comparable market data is insufficient. The Method of Involution is used to calculate the value of land, comprising one or more plots, without the support of the directly comparable market transaction data. The Residual Method is rarely used by valuers as the principal appraisal approach, other than international or large real estate corporations.

The research also revealed that Brazilian valuers prefer to write their own Excel spreadsheets, raising concerns about their consistency and accuracy because, while 'off-the-shelf specific' software packages are heavily tested and quality controlled, in-house and bespoke spreadsheets are susceptible to undetected errors and accidental alteration of formulae (Havard, 2014; Enever, Daley and Isaac, 2010).

Risks and Contingency

To compensate for higher levels of development uncertainty and risk than those prevailing in developed countries, Brazilian developers and investors expect higher rates of return than might be accepted in the U.K. (see next section). The main reason for this appears to be the lack of a contingency in Brazilian development

appraisals. Havard (2008) suggests that the provision for a contingency is a realistic risk for items that are difficult to assess prior to work commencing. If a contingency is not used then, *ceteris paribus*, higher profit will be expected to compensate for greater exposure to the vagaries of development that are traditionally covered by a contingency. The main reason for higher development risks (and returns) in Brazil is due to uncertainty surrounding construction cost.   Appraisers confirmed that contingencies are rarely used by Brazilian developers and builders, despite high volatility of construction costs, particularly labour.

Profit

In the U.K., the residual method is used by investors and developers to calculate the level of profit that may be delivered from a project if the land price is known; if it is the land price that is being calculated then a level of 'reasonable' profit is assumed (see Table 3 below). In contrast, according to participants, despite the Methods of Evolution and Involution adopting a residual approach, valuers in Brazil rarely speak about residual profit.   This is because profit is determined by developers and investors, the land price having already been negotiated and agreed. Because land price is known, the DCF Method, as the core of the Capitalisation of Income Method (Método da Capitalizaçao da Renda), is employed to calculate development profit (see RQ2), combined with the Comparative Method and other methods, depending on the development to be appraised.

Table 3 - Comparing U.K. and Brazilian representation of Profit

United Kingdom		Brazil		
Provided that the land price is known, there are two ways of representing developer's profit (Ratcliffe, Keeping and Stubbs, 2009).		According to participants the research revealed that:		
Firstly	**Secondly**	a)	b)	c)

as a proportion of Gross Development Value (GDV), normally between 10-15%,	as a proportion of Total Development Costs (TDC), typically between 15 to 20%.	profit levels in Brazil regularly exceed 30% of GDV due to high development risks and exacerbated by lack of contingency	'Super-normal' profits, in excess of 50% of GDV, are not unheard of	The main reason for the prevalence of high levels of profit are developers compensating for high inflation, economic volatility, risk of voids and an apparent lack of expertise at managing costs.

Adapting Ratcliffe, Keeping and Stubbs (2009) and analysis of data collected by Delphi-Method

Variables

The majority of participants identified the following six variables, in order of significance, as having the greatest influence on profit:

1.   Building cost
2.   Land price
3.   Development yield
4.   Plot ratio
5.   Rent
6.   Duration

All but one of the participants agreed that volatility of major variables represents significant additional risk for real estate developers. Construction costs in Brazil are particularly prone to fluctuation, compromising pay-back and requiring concerted cost management measures particularly in respect of materials and labour. Surprisingly, one of the six major development variables in the residual method, interest rate (see Table 2) is not recognised as a major variable by Brazilian appraisers.

It appears that construction costs in Brazil are reallocated to the investor, who manages construction and other development costs by referencing against anticipated rents to ensure profitability. Construction costs appear not to be agreed in advance (there was no evidence of the use of fixed price contracts), exposing commercial developments to serious risk of cost increases, overruns and diminishing

quality of construction (see RQ5), with adverse impact on profit and rates of return. The need for a fundamental review of contracting and procurement arrangements in Brazil is more apparent than ever following the widely reported problems around timely and cost efficient delivery of infrastructure and stadia for the 2014 World Cup (see Boadle, 2014; Panja, 2014; Zimbalist, 2014).

Land Price

In Brazil, land prices may be reduced by an investor or developer offering the landowner a share of the development, comprising one or more properties, or cash, or a combination of both. The landowner may share both development risks (see RQ4) and land value uplift by entering into a fair 'plot exchange' partnership. Developers often do not pay landowners in cash, but instead use 'plot exchange' agreements, which operate on the basis of the developer buying the potential development land for its market value excluding the expected capital value of the development on the plot, and paying the landowners on the basis of the projected selling price of units, including the expected capital value of the development on the plot.

A developer typically buys land after a negotiation in which the landowner may sell the land for one of three prices:

1) market price
2) price of 'permuta física' (plot exchange within the built area);
3) price of 'permuta financeira' (plot exchange involving a landowner's share of the selling price).

With regard the second option, the developer transfers the ownership of two or three units, depending on negotiation, to the landowner. With regard the third option, the developer usually pays a deposit to the landowner who becomes a partner of the developer, sharing the selling price or acquiring two or three units depending on negotiation.

The research has revealed that the choice of method employed to calculate land price is not bound to a residual approach (see Equations 1 and 2 and Newell, 1989) but depends on negotiation of the development land price. For example, if the land has hope value attached to it, because it is close to the Central Business District (CBD) of a major city, the land owner may be best advised to employ land price calculation determined by comparable evidence. Profit will be an independent input and the development value will be the output. If the land is prone to undervaluation, for example because it is remote far from the CBD, and there is no or insufficient comparable data, the landowner may be advised to employ the Method of Involution or Evolution. When the development value is calculated, profit would be an independent input and residual land value the output. It should be noted that if landowners and developers negotiate 'plot exchange', the calculation of the land price will be the NPV equivalent of one or a number of apartments, units or floors in a building, which the landowner will receive from the developer in the future. The land price continues to be an independent input. If profit is known, development value is the output.

Commentators in the U.K., such as Stephen Hill (2013), have long argued that in order to unlock land markets in developed countries, landowners should be encouraged to participate in consortia, in which they become involved with a planning permission development system called the 'plan-led system'. This allows landowners to obtain a minimum price for the potential development land which relates to a share in the investment which they own after the development is accomplished (similar to 'permuta financeira') on condition that landowners participate in a Voluntary Partnership Agreement (VPA) with private and public developers. In effect, the landowner reduces the price they get for their land by taking an equity stake in the development.

Summary

The Residual Method may be the valuers' methods of choice for conducting commercial development appraisals in the U.K. and other developed countries (Ratcliffe, Keeping and Stubbs, 2009), but small and medium sized indigenous Brazilian valuers and appraisers employ a variety of different methods, sometimes in

combination. Fundamentally, indigenous Brazilian real estate appraisers adopt a binary approach to commercial development appraisal, as set out in Table 4, the choice of method depending on the availability of comparable market data.

Table 4 - A Brazilian approach to commercial development appraisal

Type 1		Type 2		
Sufficient quantity of comparable evidence In the same locations as proposed development Comparable recent transactions		Some comparable recent transactions BUT insufficient comparable evidence in the same location as proposed development		
Option A	Option B	Option C	Option D	Option E
• *Income Method* to capitalise income • *DCF* approach for development appraisal • *Cost Method* to calculate construction costs • *Comparative Method* to provide land value.	*Comparative Method* used provided adequate level of comparable evidence is available and the access to data is not restricted.	*Method of Evolution,* calculating the sum of land and construction cost, adjusted by a market coefficient, used if few comparables.	*Method of Involution* used if no comparable evidence OR *Vertical Method of Involution.*	*Depreciated Replacement Cost* approach using comparable evidence from different locations. Market research undertaken to calculate land's price, to which the cost of construction, and developer's profit is added OR *Residual Method.*

When sufficient comparable data is available, appraisers would use the Comparative Methods to provide land value, in combinations with the Cost Method, to calculate construction costs, and the Capitalisation of Income Method (DCF). If the quantity of comparable evidence is limited, due to the specific characteristics of a development or issues of confidentiality, appraisers use the Comparative Method, to estimate development value and development profit.

If there is insufficient comparable data available, appraisers have three options:

i. the Method of Evolution when there are some market comparables but not sufficient to use the two methods described above;

ii. the Method of Involution if there is no or insufficient comparable evidence;

iii. Depreciated Replacement Cost approach

ABNT (2011) acknowledges that whether to employ Comparative Method, DCF, Method of Evolution, Method of Involution, or another method depends on the characteristics of the development in a specific location.

The research reveals that, despite differences between Brazilian and United Kingdom development appraisal methods and practice, the calculation of land value by the Residual Method (Havard, 2014) and Method of Involution (Dantas, 2005) share similar principles. It confirms that if sufficient comparable evidence is available, the Comparative Method is the Brazilian appraisers' method of choice to calculate land price (see RQ3); the Method of Involution is employed to calculate land price when comparable evidence is not available.

CONCLUSIONS

The review of literature highlighted an absence of comparative studies regarding U.K and Brazilian methods of commercial development appraisal. A two phase Delphi Method survey, was employed to engage with ten practising indigenous development appraisers working for small and medium sized practices in the City of Sao Paulo, Brazil. The research questions posed at the outset of the paper have been answered as follows:

1) Commercial development appraisals in Brazil are typically conducted using Income Capitalisation within a DCF model, with the Comparative Method employed to determine annual rental income and land price, and Cost Method to provide construction costs;

2) Developer's profit (NPV) is calculated using the above methods, by subtracting the total development costs from gross development value (PV);

3) Land price is commonly estimated using comparison of land transaction data; where sufficient comparable evidence exists; the Method of Involution is used, when insufficient comparable evidence is available or does not exist, as specified by Brazilian standard NBR 14653-4 ABNT (2002);

4) Development risks are often shared between the developer and landowner on the basis of 'permuta física' (plot exchange within the built area) or 'permuta financeira' (plot exchange involving a landowner's share of the selling price);

5) Development risks are greater in Brazil, in part due to a lack of contingency in development appraisals and uncertainty over constructions costs; consequently expected levels of profit are higher than those expected in the U.K..

The key finding of the research is that, despite the Methods of Involution and Evolution sharing similarities with the Residual Method of development appraisal, valuers and appraisers in small and medium sized practices in Brazil rarely use the Residual Method. Instead, they employ a range of methods, the choice of which is heavily influenced by the availability of comparable market data, with Direct Comparison of Market Data when sufficient comparable evidence is available, and the Capitalization of Income being the methods of choice.

The research also revealed that, in order to achieve desired rates of return on investment, developers' profits often exceed 30% of GDV. Such relatively high levels of profit are required in order to compensate for higher levels of risk and uncertainty than might be accepted in the U.K., to which Brazilian developers are often exposed; typically associated with inflation, currency volatility and cost management. A characteristic of the latter is that construction costs in Brazil are rarely fix or agree costs in advance, due to the incidence of additional costs that occur during project implementation, most often associated with fluctuations in costs of labour and materials.

Finally, one of the most compelling findings of the research is that land prices are not commonly negotiated with reference to calculated residual land values based on expected gross development values, but are often reduced by developers and investors offering landowners an equity stake in the development using 'plot exchange' agreements. Landowners who negotiate 'plot exchange' are remunerated through increases in development land values and a share of development overage but bear some of the risk.

The authors have identified the following research opportunities that merit further study:
1. How are construction timescales predicted and managed in Brazil and how is their impact on development duration and costs modelled and managed?
2. How might affordable 'off-the-shelf' development appraisal software products be made more widely available to indigenous Brazilian valuers and appraisers working outside large international real estate consultants and companies?

3. Detailed comparison of the Brazilian Methods of Evolution and Involution and the traditional residual method of development appraisal;

4. What lessons can be learnt from the Brazilian 'permuta física' and 'permuta financeira' plot exchange models for the sharing of risks between landowners and developers in the U.K. and other developed countries?

5. How can the accuracy of estimates of construction costs be improved in Brazil?

FOOTNOTES

1. Field work in Brazil was conducted in Portuguese by a member of the research team who is of Brazilian origin and bilingual; documents written in Portuguese and data collected by the 2-phase Delphi Method were translated into English for analysis and synthesis with documents written in English.

2. The Delphi method was developed by the RAND Corporation, Santa Monica, USA, in the 1950s.

3. Comparative method entails analysis of recent transactions to determine price and rental value of similar properties located in the same area where the property to be valued is located (RICS 2012).

4. Investment Method, also known as the Income Approach, estimates the present value of the right to future income that an interest in property will provide under specific market conditions.

5. Profit Method is used when there is little comparable evidence available, based on the profit-generating potential of a unique subject property such as a bar, restaurant or hotel.

6. The Contractors Method, or Depreciated Replacement (DRC) Method, is used for bespoke buildings that are unique and for which no market exists for example power stations.

7. When similar properties are available in the vicinity of the property subject to valuation, the market value placed on this property relies upon the analysis of comparable evidence in accordance with RICS 2012.

8. Enever, Daley and Isaac (2010) identified two software categories: 'Off-the-shelf stand-alone' packages such as spreadsheets that can be customized and are flexible; and 'Off-the-shelf specific' packages, produced by software companies for specific tasks.

9. Contingency margins in the United Kingdom for construction cost are typically around 5% of construction costs or 3% of gross development value (Ratcliffe, Keeping and Stubbs, 2009). The lack of contingency in Brazil appeared to be off-set by the high profit margins adopted to compensate for high levels of uncertainty and risk.

10. Vertical Method of Involution (Método Involutivo Vertical) is currently regulated by *IBAPE/SP: 2011 Norma para Avaliação de Imóveis Urbanos,* but not by ABNT (2011) *NBR 14653-2 Avaliação de bens Parte 2*

11. Brazilian standard NBR 14653-2/2011 specifies that with the Method of Evolution (Método Evolutivo), the market value of the property is calculated by the following standard equation: $Vi = (Vt + CB) \cdot FC$, where Vi stands for Property Market Value (Valor de Mercado do Imóvel); Vt stands for Land Value (Valor to Terreno); CB stands for Construction Cost less Depreciation (Custo de Reedição da Benfeitoria); and FC stands for Market Coefficient - literally Commercialisation Ratio (Fator de Comercialização).

12. The Capitalization of Income Method, also known as Income Method, is used in development appraisals based on commercial real estate, such as shopping centres, that comply with NBR 14653-4/2002 requirements.

13. Land cost is either determined by the land price already negotiated with the landowner or is the price sought by the landowner, including stamp duty and legal fees (Wilkinson and Reed, 2008). The first variable aspect of land cost affecting profit can be considered to be whether the land price will be quoted by market asking price or whether the present land price will be the final bid. If equity is used for funding land costs, opportunity costs, which are related to equity funds, can be included in the developer's land cost; if the scheme is financed, the interest charged by a financial institution on money borrowed to purchase the site and cover costs related to the acquisition will also be included (Millington, 2000).

REFERENCES

ABNT ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS (1977) *NB-502 Avaliação de Imóveis Urbanos*. Rio de Janeiro: ABNT.

ABNT ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS (1990) *NBR 5676 Avaliação de Imóveis Urbanos*. Rio de Janeiro: ABNT.

ABERBACH, J. B. AND ROCKMAN, B. A. (2002) 'Conducting and Coding Elite Interviews', *Political Science and Politics*, 35(4), pp. 673-676.

ABNT ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS (2011) *NBR 14653-2 Avaliação de bens Parte 2: Imóveis urbanos*. Rio de Janeiro: ABNT.

ABNT ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS (2002) *NBR 14653-4 Avaliação de bens Parte 4: Empreendimentos*. Rio de Janeiro: ABNT.

ALONSO, N.R.P. AND D'AMATO M. (2009) *Imóveis urbanos Avaliação de terrenos Método involutivo vertical*. Sao Paulo: PINI.

BAUM, A.E., MACKMIN, D., AND NUNNINGTON, N. (2011) *The income approach to property valuation.* 6nd ed. Basingstoke: Palgrave Macmillan.

BOADLE, A. (2014) *World Cup leaves Brazil costly stadiums, poor public transport.* [Online]. Available at: http://uk.reuters.com/article/2014/06/05/uk-brazil-worldcup-infrastructure-idUKKBN0EG24F20140605 (Accessed: 26.02.15).

BYRNE, P., MCALLISTER, P. AND WYATT, P. (2011) 'Precisely wrong or roughly right? An evaluation of development viability appraisal modelling', *Journal of Financial Management of Property and Construction*, 16 (3), pp. 256-257.

COLEMAN, C., CROSBY, N., MCALLISTER, P., AND WYATT, P. (2013) 'Development appraisal in practice: some evidence from the planning system', *Journal of Property Research,* 30 (2), pp. 144-165

CROSBY, N., MCALLISTER, P. AND WYATT, P. (2013) 'Fit for planning? An evaluation of the application of development viability appraisal models in the UK planning system', *Environment and Planning* - Part B, 40 (1), pp. 3-22.

DALKEY, C.N. (1969) *The Delphi Method: An Experimental Study of Group Opinion*. Santa Monica, USA: Rand Corporation.

DANTAS, R. A. (2005) *Engenharia de Avaliações: uma introdução à metodologia científica.* 2nd ed*. São Paulo: Pini*

DARLOW, C. (1982) *Valuation and Development Appraisal*. London: Estates Gazette.

DARLOW, C. (1988) *Valuation and Development Appraisal*. 2nd ed. London: Estates Gazette.

ENEVER, N., DALEY, M. AND ISAAC, D.J. (2010) *The valuation of property investments*. 7th ed. London: Estates Gazette.

HAVARD, T. (2008) *Contemporary property development.* 2nd ed. London: RIBA Publishing.

HAVARD, T. (2014) *Financial Feasibility Studies for Property Development: Theory and Practice.* New York: Routledge.

HARVEY, W. S. (2011) 'Strategies for conducting elite interviews', *Qualitative Research,* 11(4), pp. 431-441

HILL, S. (2013) 'It's the land economy stupid! Part 2: Sustainable land market in the public interest', *Town & Country Planning*, 82 (1), pp. 29-36.

IBAPE NACIONAL Instituto Brasileiro de Avaliações e Perícias de Engenharia (2015) *Profissionais certificados.* [Online]. Available at: http://ibape-nacional.com.br/site/profissionais-certificados/ (Accessed: 26.02.15)

IBAPE SP Instituto Brasileiro de Avaliações e Perícias de Engenharia de São Paulo (2013) *Contato.* [Online]. Available at: http://www.ibape-sp.org.br/contato/Default.aspx (Accessed: 27.11.13)

IBAPE SP Instituto Brasileiro de Avaliações e Perícias de Engenharia de São Paulo (2011) *IBAPE/SP: 2011 Norma para Avaliação de Imóveis Urbanos.* São Paulo: IBAPE SP.

ISAAC, D.J. (1996) *Property development: appraisal and finance*. Basingstoke: Macmillan.

ISAAC, D.J., AND O'LEARY, J. (2011) *Property investment.* New York: Palgrave Macmillan.

ISAAC, D.J., AND O'LEARY, J. (2012) *Property valuation principles.* 2nd ed. Basingstoke: Palgrave Macmillan.

ISAAC, D.J., AND O'LEARY, J. (2013) *Property valuation techniques*. 3rd ed. Basingstoke: Palgrave Macmillan.

ISAAC, D.J., O'LEARY, J., AND DALEY, M. (2010) *Property development: appraisal and finance*. 2nd ed. Basingstoke: Palgrave Macmillan.

KAUKO, K. AND PALMROOS, P. (2014) 'The Delphi method in forecasting financial markets - An experimental study', *International Journal of Forecasting*, 30 (2), pp. 313-327.

MEAD, D.C. AND LIEDHOLM, C. (1998) 'The Dynamics of Micro and Small Enterprises in Developing Countries', *World Development*, 26 (1), pp. 61-74.

MILLINGTON, A. (2000). *Property Development*. London: Estates Gazette.

MOREIRA, A.L. (1991) *Princípios de Engenharia de Avaliação*. 2nd ed. São Paulo: Pini.

NEWELL, M. (1989) *'Development appraisals',* Journal of Property Valuation and Investment, 7 (2), pp. 126-133.

PANJA, T. (2014) *Corruption to Blame for Some Brazil World Cup Cost Rises* [Online]. Available at: http://www.bloomberg.com/news/articles/2014-05-22/corruption-to-blame-for-some-brazil-world-cup-cost-rises (Accessed: 26.02.15).

RATCLIFFE, J., KEEPING, M., AND STUBBS, M. (2009) *Urban planning and real estate development*. 3rd ed. London; New Work: Routledge.

ROYAL INSTITUTION OF CHARTERED SURVEYORS (2008) *Valuation Information Paper No. 12 - Valuation of development land*. London: RICS.

ROYAL INSTITUTION OF CHARTERED SURVEYORS (2012) *Information Paper No. 26 - Professional Information: Comparable Evidence in Property Valuation* London: RICS.

ROYAL INSTITUTION OF CHARTERED SURVEYORS (2012) *Professional Standards (the 'Red Book') Incorporating the International Valuation Standards*. London: RICS.

SCARRETT, D. (2008) *Property valuation: the five methods*. 2nd ed. London: Routledge.

STEINER, M.T.A., CHAVES NETO, A., BRÁULIO, S.N. AND ALVES, V. (2009) 'Pattern Recognition Techniques applied to Evaluation: Engineering Problem', *IJCSNS - International Journal of Computer Science and Network Security,* 9 (11), pp. 190-198

WILKINSON, S. AND REED, R. (2008) *Property development*. 5th ed. London: Routledge.

WYATT, P. (2007) *Property valuation in an economic context.* Malden, MA: Blackwell.

ZIMBALIST, A. (2014) Get Ready for a Massive World Cup Hangover, Brazil*. Time Magazine 27 June 2014.* [Online]. Available at: http://time.com/2930699/world-cup-brazil-spending/ (Accessed: 26.02.15).