Conceptualising Real Options Analysis for Risk and Uncertainty Management in Australian Property Developments

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Abstract

Property developments are inherently uncertain and risky. As a result, several risk management techniques are adopted by property developers in the Australian property development sector to mitigate the impact of potential downside risks. However, uncertainty can create potential upside opportunities for property developers during the property development process which can be explored through flexibility/real options analysis. Several quantitative models and applications have been executed in the literature on flexibility/real options analysis, but practical adoption is still lacking because practitioners are yet to fully understand the theory and its potential benefits. In this paper, a conceptual model is developed to capture flexibilities/real options and linked to the property development process to determine the exact stages within the property development process where real options could be embedded to retain the potential for capturing future upside benefits from uncertainty.

Through face to face semi-structured interviews with twelve different stakeholders in the Australian property development industry, thematic analysis and extensive literature review on real options theory, a conceptual model is developed.

There are several flexibilities/real options naturally embedded at different stages of the property development process. Other flexibilities can be embedded in the development process deliberately by property developers with the intention of capitalising on upside opportunities in future. These flexibilities embedded at different stages of the development process has the potential to serve as a risk mitigation tool for property developers in Australian property development sector.

The model can serve as a practical tool and a visual aid for property development practitioners and stakeholders to determine the exact stages in the property development process where real options are embedded and the specific types of options. It will also aid in deepening the understanding of practitioners regarding real options in property development and further enhance potential acceptance and adoption in the Australian property industry. The linkage to the property development process can enhance easy identification of flexibilities/real options at different stages of the property development process.

A model that links real options to the different stages of the property development process is new in the literature.

Keywords: Property development; Real options analysis; Conceptual Model

1. Background

Flexibility has become an important consideration across all economic sectors due to the pace at which changes occur and the direct impact on businesses. In the property and construction sector, these changes can have
serious financial consequences due to long investment horizons, and the difficulty and costly nature of retrofitting and adapting existing buildings to suit the changing needs of occupiers if such changes are an afterthought and not incorporated in building designs from inception of a project. As a result, flexibility in buildings has become an important issue in property developments and investments. This is heightened for major developers (for example property fund managers, pension funds, real estate investment trusts, real estate development and operating companies etc.) who instigate developments with the aim of either selling the properties, holding them as part of an existing portfolio to increase possible returns and provide access to quality property assets or offer a development revenue stream.

Uncertainty is pervasive during the property development process and since the process is infinitely flexible, circumstances alter cases due (Fisher and Collins, 1999). Therefore, managing uncertainties in Australian residential property development process require flexibility that can serve as both a hedge against future unfavourable outcomes for developments and at the same time enable property developers to capitalise on emerging opportunities when market conditions are favourable. The value of flexibility (s) embedded in Australian property developments are generally tied to uncertainty and the ability of developers to flexibly respond to changes in economic conditions during property projects execution. These flexibilities have become generally known as building flexibility or real options.

Flexibility in buildings (both in design process delivery and structure) that serves as strategic rights for risk mitigation and for capitalising on emerging opportunities can be termed as real options (RO). The term “real options” was coined by Stewart Myers in 1977 because of the application of options pricing techniques (OPT) to real assets (real estate, infrastructure etc). Therefore, RO theory has its roots from financial options and gained popularity after the seminal work of Black-Scholes (Black and Scholes, 1973) which was extended by Merton (1976). Myers (1977) referred RO to the adaption and application of OPT in finance to the valuation of investments in non-financial or “real” physical assets where much of the value of an asset is attributable to flexibility (managerial flexibility in decision making). Copeland and Antikarov (2001) suggested that when a property developer has the right but not the obligation to exercise such a right to defer, expand, switch, abandon, temporary shutdown until its expiration date, there is an embedded option/flexibility. As a result, an entire property development project can be considered as a series of flexibilities at different stages of the property development process.

Myers (1984) argued that RO theory could be used to complement DCF valuation as an attempt to link together financial and strategic managerial decision analysis. Kester (1984) after examining growth opportunities using RO framework summarised that options “integrates capital budgeting with long-range planning”. McDonald and Siegel (1986); McDonald and Siegel (1985) suggest that if the future is uncertain and an investment is durable and illiquid such as property, the ability to pursue a different investment or not to invest at all in the future has an economic value. Subsequently, leading researchers have extended the theory through the development of new models capable of evaluating values attached to flexibility/RO in specific contexts. For example, in land development, Titman (1985) studied flexibility application to land use decisions and used real options valuation (ROV) model to value land development as an option. Williams (1991) derived a partial differential equation (PDE) for determining the optimal density and time at which a developer may develop a vacant land. Quigg (1993) extended the model of Williams (1991) by adding fixed cost to the total cost of construction and empirically tested real option valuation (ROV) in practice. Capozza and Li (1994) applied ROV to determine the intensity and timing of land development. Sing and Patel (2001) developed a one factor contingent claim valuation model of land development. Grenadier (1995) advanced the theory through a framework for valuing flexibility in lease contracts. A generalized ROV model was developed by Grenadier (1995) for valuing a wide variety of leasing contracts, including the option to cancel, forward leases and lease insurance contracts. Buetow and Albert (1998) analysed the appropriate PDE which models flexibility to renew or purchase a property at the end of a lease. The quantitative derivation of models for flexibility has dominated the theoretical development of real options theory.
On the qualitative aspect of RO theory which involves strategic investments in flexibility, Trigeorgis (1996) developed a typology of flexibilities including flexibility to defer, contract, expand, temporary shutdown, abandon, switch input, switch output and compound option. This typology has become a dominant description of flexibilities existing in capital intensive projects. This typology of flexibilities was adapted by Lucius (2001) for the development of property specific flexibilities and argued that ROs can be distinguished in terms of flexibility options and growth options. Flexibility options include operative options to cope with a development project. For example, option to defer, switch input, temporary shutdown, contract, abandon, expand, stage investment, switch output and compound options are embedded in development projects and can be used to cope with a project under conditions of uncertainty (Lucius, 2001). Furthermore, Lucius (2001) indicated that growth options involve strategic flexibilities at the highest level of management, for example portfolio acquisition or business expansion. Despite the potential of building flexibility to enhance uncertainty and risks assessment, Australian property developers are still grappling with risk and uncertainties and are yet to embrace RO theory (flexibility) in decision making.

Another classification of flexibility developed by Wang and de Neufville (2005) focuses on flexibility embedded in both the process of design delivery of property development projects and structural flexibility of properties to adapt to changing market conditions. Wang and de Neufville (2005) referred to the general typology of flexibility including defer, expand, abandon etc. as options “on” projects which are mostly concerned with the quantitative valuation of development opportunities to determine viability of proposed property projects by delivering accurate value to make sound investment decisions. On the contrary, real options “in” projects are flexibilities created by changing the actual design of a development project in order to achieve design flexibility to meet future demands from a structure (Wang and de Neufville, 2005). Despite these quantitative applications, conceptualisations and categorisations, RO theory is still at the early stages with limited exploration into how embedded flexibility improves risk management in an entire property development process.

Leading researchers have focused on the development of quantitative models for determining values associated with flexibility. As a result, the qualitative part where RO theory could be conceptualised based on the views of practitioners who are potential users of RO theory for practical decision making in the property and construction sector in Australia is missing. This paper is aimed at developing another conceptualisation of flexibilities existing within an entire property development process using a flow network, which can serve as a risk management tool and simultaneously, a visual aid for practitioners in identifying exact stages of property development process where flexibility could be embedded for strategic purposes. The essence of the conceptualisation is also to deepen the knowledge of practitioners on RO theory for potential acceptance and adoption for decision making.

2.0 Literature Review

The application of flexibility and the use of ROV models for valuation in property development and investment can be grouped into different areas. Vimpari (2014) suggested property specific groupings as vacant land valuation, general application to property markets, building flexibility, lease contracts and technology investments. On vacant land valuation, Chiang et al. (2006) studied embedded options in Hong Kong auctioned land prices by applying both hedonic pricing model and ROV. Leung and Hui (2002) examined embedded options in property projects in Hong Kong Disneyland. Yu et al. (2002) developed ROV model and empirically evaluated option premiums associated with five selected “white sites” in Singapore. Rocha et al. (2007) developed a model that determined the optimal strategy whether sequential or simultaneous to the development of a residential housing project in Rio de Janeiro. Grissom et al. (2010) integrated ROV approaches with land use decision in a case study of single and mixed use developments on same land. Geltner and de Neufville (2012) demonstrated the value attached to flexibility of horizontally phasing a large scale urban property development project using the certainty equivalence approach of the binomial option pricing method (BPOM) combined with Monte Carlo simulation analysis. Baldi (2013) adopted the BPOM to evaluate flexibility embedded in a greenfield
development in Italy, and quite recently, Shen and Pretorius (2013) constructed ROV model for property development by considering and incorporating institutional arrangements, direct interactions and financial constraints. Yao and Pretorius (2014) developed and tested a long dated American call option pricing model for valuing development land under leasehold. Mintah et al. (2017) evaluated a deferral option embedded in Australian high rise residential project. Similarly, Mintah et al. (2018a) evaluated staging flexibility embedded in large scale residential urban development in Australia and found positive results associated with embedded flexibility.

On flexibility embedded in real estate lease contracts, ‘an upward only review’ in UK leases has been evaluated through RO framework by first considering case study in UK and analysing from international perspective (Ward and French, 1997; Ward et al., 1998). Ashuri (2010) developed ROV model for valuation of flexible leases with option to expand, contract and cancel using possible changes in rents and firms required space as sources of uncertainty. Whereas Sing and Tang (2004) used a multi-period BPOM to examine the default risk options in office leases, Sing (2012) evaluated embedded flexibility in percentage lease agreements in the retail sector. Another area of application of RO theory is design of flexible spaces in property development. On the flexibility to switch use, Trigeorgis (1993b) applied ROV to a construction project and concluded that the value of flexibility to switch was almost 7% of the project’s gross value. Gann and Barlow (1996) argued that there is the need to incorporate greater flexibility in buildings to meet unforeseen changes in use in future. Patel and Paxson (1998) evaluated switching flexibility for a leisure centre development in a restricted sequential time context and found positive results. Leung and Hui (2002) evaluated several option types including the value of option to switch a part of hotel of Hong Kong Disney land project. Paxson (2005) also found similar results in an application of switching flexibility in property investments. Greden and Glicksman (2005) developed a model capable of justifying expenses in flexible design of a property that could be renovated into an office block at a specified cost in future.

de Neufville et al. (2006) evaluated flexibility of expanding a parking garage to meet future demand. Guma et al. (2009) using four case studies in the US, demonstrated the value of flexibility of vertically phasing a corporate real estate building. Fawcett (2011) indicated that a more systematic understanding of flexibility is offered by lifecycle options. Dortland et al. (2012) studied different kinds of flexibility and used qualitative analysis to argue that options and scenario analysis can aid in the management of uncertainties. Throupe et al. (2012) adopted a switching flexibility valuation analysis to compare the return on investment (ROI) for building as planned or switching to a different property mix conforming to allowable zoning codes. Throupe et al. (2012) suggested the use ROV to determine the exact time for a proposed development. Cardin et al. (2013) demonstrated that design flexibility has practical implications on the property industry with emphasis on development projects. Cardin et al. (2013b) suggested ways of achieving design flexibility and argued that such simple, intuitive and efficient procedures through flexibility can enhance life cycle performance of buildings. Vimpari et al. (2014) explored how real options analysis can be used for valuing flexibility in a real retrofit investment case. Recently, Vimpari and Junnila (2016) argued that physical adaptability of buildings are important but current investment analysis using DCF do not incorporate enough information on physical asset characteristics which leads to long term loss of competitiveness and imprudent use of built environment resources. Mintah et al. (2018b) also evaluated a switching output flexibility in a high rise residential project in Australia and concluded that flexibility is valuable because of the long-term nature of investments in the built environment sector.

Greden et al. (2005) evaluated the flexibility of converting a naturally ventilated building into a mechanically ventilated building. Fleten et al. (2007) presented a methodology for evaluating investments in decentralized renewable power generation under conditions of price uncertainty. van der Maaten (2010) evaluated whether policy incentives to invest now, rather than tomorrow can be designed to compensate for any option value to defer. Ashuri and Kashani (2011) used ROA/ROV to evaluate “Solar Ready Buildings” that can easily adopt PV panels later in future at the optimal time by incurring initial investments and waiting until the right time. Hillebrand et al. (2014) applied ROA/ROV to a university building retrofit and found that the energy, ecological and economic efficiency evaluation shows that a generally preferred retrofit option cannot always be identified.
Vimpari and Junnila (2014) also applied ROA to evaluate green building certificates as real options and argued that ROV methods are appropriate to assess the monetary attached to green certificates.

General applications to real estate market dynamics exist in the literature. Lai et al. (2004) used ROV to examine the risk-return relationship of the presale system of residential property developments. Wang and Zhou (2006) also derived a closed-form solution for equilibrium real options exercise model with stochastic revenues and costs for several property markets. Lai et al. (2007) showed that developers’ exercise strategies can be affected by the size and the type of property markets using ROV model. Bulan et al. (2009) examined the extent to which uncertainty delays property investment and the effect of competition on this relationship. Ott et al. (2012) presented ROV model that estimates the optimal phasing and inventory decisions for large-scale residential development projects. Clapp et al. (2012) examined the value of flexibility to redevelop and found positive association between option values and drift in house prices. Clapp et al. (2013) analysed the relationship between house price dynamics and option to rebuild or enlarge established dwellings. Clapp et al. (2014) similarly analysed the determinants of expansions and contractions of shopping centres and showed that expansions and contractions of gross leasable area are less likely for large shopping centres. Vimpari and Junnila (2014) also evaluated flexibility to wait embedded in the active management of a residential real estate fund divestment. In a more recent study, Geltner et al. (2017) empirically estimated development asset value index (DAVI) for commercial property and compared it with a corresponding traditional transaction based hedonic property asset price index (PAPI) which has been corrected for depreciation. Geltner et al. (2017) argued that the difference between DAVI and PAPI reflects the realized value of timing flexibility embedded in land development.

On the qualitative side, Vimpari and Seppo (2015) adopted a qualitative approach to examine executives perspectives on flexibility for decision making in the property and construction sector. Baldi (2013) developed a conceptual framework on real options in property using a matrix-like approach combined with the timing of specific flexibility. Mintah (2016) also developed a conceptual framework using a quadrant-like approach to categorise flexibilities existing in property and construction sector. It is evident that theoretical development of RO has mainly focused on the quantitative models for evaluating the value of flexibility at the neglect of qualitative aspect which can potentially enhance practical adoption of flexibility for decision making by practitioners. The current study extends literature on the qualitative aspect of RO theory by developing a conceptual framework using a flow network approach combined with the generic property development process developed by Reed and Sims (2015) to improve risk management in property development projects. The originality is the use of flow network approach combined with an adapted property development process as a risk management tool.

3.0 Methodology

The main objective of this study was to conceptually analyse flexibility and connect it to the property development process to develop a visual aid that captures all flexibilities in an entire property development process for the benefit of practitioners. Therefore, the study was divided and completed in two main stages. Firstly, through a review of various studies published on real options/flexibility with a focus on the property sector, pertinent information was collected for further analysis. This involved examining and identifying leading research databases and Journals including Property Management, Pacific Rim Real Estate Society Journal, Journal of Property Investment and Finance and others, Journal of Corporate Real Estate and a host of others (see table 1.). The information gathered from the search was used for initial analysis of the existing conceptualisations and categorisation of flexibility and property development. This was consequently followed by a critical analysis to determine the exact stages of a property development process where flexibilities are embedded and ability of real options theory to resolve uncertainties and aid in risk management. The linking of different flexibilities and the stages of the property development process resulted in a flow network-like conceptual framework which demonstrates flexibilities at different stages of the property development process.
After developing the conceptual framework, a face to face semi-structured interview was organised with practitioners to validate the framework from the perspective of practitioners. Since practitioners are the ultimate users of the conceptual model, their views and perspectives were vital to shaping the model to make it relevant to practice. To ensure a balanced representation of views, participants were selected from groups of valuers, long term property investors, property advisors (financial and property) and property developers (investor-developers and trader-developers). There were three (3) participants each from developers and valuers, and two (2) participants each from the large investors, property advisors and financial advisors. This resulted in twelve (12) key participants whose views were sourced and used for the study.

Table 1 Sample list of Journals with information on real options

<table>
<thead>
<tr>
<th>Name of Journal</th>
<th>Focus of Journal</th>
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<tbody>
<tr>
<td>1. Journal of European Real Estate Research</td>
<td>Real Estate</td>
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<tr>
<td>2. Journal of Urban Economics</td>
<td>Real Estate</td>
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<tr>
<td>3. Journal of Property Valuation and Investment</td>
<td>Real Estate</td>
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<tr>
<td>4. Pacific Rim Property Research Journal</td>
<td>Real Estate</td>
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<tr>
<td>5. Journal of Real Estate Finance and Economics</td>
<td>Real Estate</td>
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<tr>
<td>6. International Journal of Strategic Property Management</td>
<td>Real Estate</td>
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<tr>
<td>7. Journal of Property Investment &amp; Finance</td>
<td>Real Estate</td>
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<tr>
<td>8. Regional Science &amp; Urban Economics</td>
<td>Real Estate</td>
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<tr>
<td>10. Real Estate Economics</td>
<td>Real Estate</td>
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<tr>
<td>11. International Journal of Housing Markets &amp; Analysis</td>
<td>Real Estate</td>
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<tr>
<td>12. Construction Management &amp; Economics</td>
<td>Management</td>
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<tr>
<td>14. Journal of Business and Management</td>
<td>Business and Management</td>
</tr>
<tr>
<td>15. Academy of management review</td>
<td>Management</td>
</tr>
<tr>
<td>18. Journal of Applied Corporate Finance</td>
<td>Finance</td>
</tr>
<tr>
<td>20. Journal of Finance</td>
<td>Finance</td>
</tr>
<tr>
<td>22. Financial Management Science</td>
<td>Finance</td>
</tr>
<tr>
<td>23. Emerging Markets Review</td>
<td>Finance in Emerging markets</td>
</tr>
<tr>
<td>24. Harvard business review</td>
<td>Business Strategy and Technology</td>
</tr>
<tr>
<td>25. CFO magazine</td>
<td>Banking, Finance, Accounting and Risk</td>
</tr>
<tr>
<td>27. The American Economic Review</td>
<td>Economics</td>
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Source: Author, 2017
Unlike quantitative methods, qualitative research tend to use very limited number of participants because of the in-depth nature of the data (O’Leary, 2014). Responses from two participants from the same group were very similar suggesting repeatability of information. Thus, at the saturation point, the interviews were completed (Small, 2009). To de-identify the participants and protect their anonymity, the researcher assigned identifiers to the various participants. Transcripts obtained from the audio transcription were analysed based on themes using the qualitative software, NVivo version 11. The conceptual framework embodying all flexibilities in the property development process was shown to practitioners during the face to face semi-structured interview process and their views sought on the validity of the model for practical purposes. The views of the practitioners were incorporated into the conceptualisation of flexibilities in property development. Besides, their responses aided in analysing and shaping the conceptual framework from the perspective of a specific unit of analysis for appropriate contextualisation. This paper is part of a broad enquiry into empirical application of ROV models to high rise residential property developments in Australia.

4.0 Conceptualising Flexibilities Based on Property Development Process

4.1 Four-Stage Property Development Process

Property development is a staged activity. Reed and Sims (2015) argued that there are eight stages in property development based on the event sequence approach. The stages include initiation, evaluation, acquisition, design and costing, permissions, commitment, implementation, and let/manage/dispose. For the purposes of this study, the eight-stage approach is grouped into four: initiation, design, construction and marketing. This is based on critical examination of the stages where flexibilities are embedded in the process of property development for the purposes of the conceptual framework. In Figure 1, the eight stage property development process (Reed and Sims, 2015) has been reorganised into four stages including initiation, design, construction and marketing as can be seen in Figure 1. The main reason for the reorganisation is to enable the grouping of flexibilities according to the stage in which a specific flexibility occurs in the property development process. The unit of analysis is investor-developers who hold property assets over a period before disposing of. Similarly, firms that own corporate real estate can adopt it for managing risks and uncertainties in their operations, particularly relating to space needs and requirements.

Figure 1 Modified Property Development Process
4.2 Flexibilities Embedded in Property Development

Using the four-stage property development process in Figure 1, there are several flexibilities embedded in property development projects. At the initiation stage, a developer may decide on the timing of a development as an option to achieve optimal profit. This allows a developer to decide whether to wait and invest or commence execution depending on economic conditions in the Australian property market at a time. Furthermore, a developer may decide to calculate the value of land for development as an option whose value is dependent on the price of the potential asset to be built on the land taking into consideration construction costs and developers’ profit. This type of option has been evaluated by several leading authors including (Quigg, 1993; Sing and Patel, 2001; Titman, 1985; Williams, 1991). The waiting/deferral option/flexibility can be used by developers to observe possible changes in property market conditions to decide the next course of action. In instances where the option or flexibility value is at optimal, there is immediate commencement of a project. However, the delay option is not exercised when the option value is lower than expected profit. Thus, instances where potential profitability may not be achieved, a project is paused until conditions are favourable for execution. This enhances uncertainty and risk management of property development projects because potential downside is prevented through deferral flexibility.

Design flexibility affords long term property developers opportunity to alter development strategy mid-course through developments to adapt to changing economic conditions during project execution phase. For example, changing the use of a building during economic downturn in property market to an alternative building use. During the designing phase of a property development project, an input and output switching flexibilities can be embedded and exercised at the construction stage. The switching input and output require developers to make financial commitment at inception of a project to retain the right to capitalise on emerging opportunities in future. This type of flexibility has been evaluated by several leading authors including (Mintah et al., 2018b; Patel and Paxson, 1998; Throupe et al., 2012). For example, there are times when certain classes of use may be recording varying performances. Student hostels may be performing poorly than high rise residential units and as such, embedded flexibility could be capitalised upon to convert use to capitalise on the upside benefits in the residential market and vice versa. This occurs during the designing phase of a property development project by investing in flexibility at inception stage and realising the benefits later. In this instance, uncertainty and risk is
managed through flexibility to capitalise on emerging opportunities. Therefore, rather than seeing changes in
the performance of assets as risky, long term developers can embrace flexibility and use it to manage asset
performance over its life cycle.

Building flexibility including project expansion either during construction when demand for space is surging or
later in response to growth in demand for space requires initial investments in flexibility. Expansion flexibility is
normally embedded in property projects where owners expect increase in space requirements in future due to
business expansion. As argued by Gibson (2001), investments in flexibility would be imprudent if analysts do not
forecast appropriately to determine specific space and flexibility requirements. The value of expansion flexibility
in a mixed use building has been demonstrated by (Balda, 2013; Cardin et al., 2013), in a parking garage (de
Neufville et al., 2006) and in a public private project (Vimpari et al., 2014b). Using the expansion flexibility
enables developers to prepare for a future occurrence which emanates from uncertainty.

Once construction begins, a developer may decide to execute a property project in stages by developing it via a
horizontal or vertical phasing. The phasing serves as a strategy for a developer to continue with a pre-determined
strategy or alter the scale of a development in tandem with economic conditions. The staging gives a developer
the opportunity to ensure there is certainty regarding the potential outcome of a specific phase of property
development project before deciding to continue, suspend or temporary shutdown at a specific stage pending
resolution of uncertainties. Thus, under favourable market conditions, a property developer would proceed with
an original strategy for a development in terms of strategy and size. On the other hand, when market conditions
are unfavourable, a developer has the right to abandon phases that are deemed unprofitable. Abandoning some
parts of a property development project is termed as the option to contract the scale of development.

In some cases, during construction, there is also the possibility to shut down temporary pending the resolution
of uncertainties. When uncertainties are resolved and there is potential for profitability regarding a project,
developers have the embedded right to commence execution again. The difference between temporary shut
down and abandonment is that in the former case, a developer has the intent to revisit a project depending on
market condition, whereas in the latter case, a project is completely discarded without any intent to execute
again. The overall effect is that phases that are unprofitable can be abandoned to prevent potential losses and
there is certainty of profitability before specific phases of projects are commenced or executed. Regarding the
staging of property development projects and embedded value of staging flexibility, Mintah et al. (2018a) has
recently evaluated the value of staging using a large scale urban residential development project. Similarly,
Geltner and de Neufville (2012), Rocha et al. (2007) and Guma et al. (2009) have all demonstrated the value of
staging in property development projects from different contexts and perspectives.

Upon completion of a project, a developer has the right to use flexible approach to sales to increase the value
of assets over time because of value appreciation opportunities. Similarly, if a developer decides to hold onto a
project for a period as an investment asset, usage of flexible leases to maximise profitability in favourable
markets and limit losses in unfavourable markets can be valuable. For example, a dynamic sales approach to the
divestment of properties in a real estate fund that has come to the end of its investment horizon was proven to
be valuable (Vimpari and Junnila, 2014) and presale contracts in residential developments have also been
evaluated (Lai et al., 2004). Different flexible lease contracts have been evaluated by leading authors. For
example upward only leases (Ward and French, 1997), flexible leases (Ashuri, 2010; French, 2001), retail leases
(Vimpari and Junnila, 2017) and percentage lease agreements in retail lease (Sing, 2012).

In summary, the discussion suggests that all these different types of flexibilities/options can be used for
managing projects actively for better decision making at the right stages of the property development process.
This is dependent on a developer understanding the strategic importance of adopting flexibilities as a tool for
decision making. In practice, because different types of flexibilities are embedded at different stages of the
property development process, these flexible decisions can be captured in a process/flow network format shown
in Figure 2 beginning from initiation stage of a project until marketing/disposal/let.
4.3 Flexibilities as Risk Management Tool-A Conceptual framework and Discussion

In Figure 2, the diagram begins with the initiation stage where a developer acquires a site for property development, but due to uncertainty, the waiting flexibility is triggered to resolve uncertainties. As the waiting period is endured, a developer gathers information on the prevailing market conditions for the specific property project intended to be developed on the site. At the end of the waiting period, if conditions in the market are favourable, a developer evaluates the profitability and starts construction. At this stage of construction, it is further argued that the staging flexibility where property development projects are divided into phases can be adopted. If market conditions are not favourable after the waiting period, a developer may decide to hold the land as an opportunity for development in future. Some property developers may however choose to execute develops under conditions of uncertainty as an entry strategy into a new market.

Similarly, it is argued that developers adopt the staging strategy whereby the first phase can be developed initially and based on the profitability outcome, the project is executed or discarded. In a favourable market, if a property development project is successful during the first phase as shown in Figure 2, then it serves as an option based on which the project can be expanded to meet increasing market demand for space. The expansion flexibility is dependent on the planning permit and a developer’s foresight to make provision for the expansion by building the foundations stronger than required initially to be able to capitalise on future favourable market conditions. This is also applicable to all systems that make a building functional in terms of walls, reinforcements, lifts, slabs, columns and other services as demonstrated in a case study (Guma et al., 2009). On the other hand, if a developer is unsuccessful after the first phase as shown in Figure 2, a developer can exercise the flexibility of temporary shutdown, contraction or an outright abandonment of a project to salvage the value of the land and other related assets if a project has no possibility of generating profits in future. The abandonment option is important in cases when the land value and other related assets may be valuable as compared to developing the land. During the global financial crisis for example, some developers abandoned their projects due to lack of demand for property products.

Project inputs and outputs can also be switched depending on market demand for specific property assets. Project input switching may not be difficult as most contracts between property developers and investors or buyers are generally embedded with such clauses. The output switching flexibility is generally dependent on the flexibility a developer has in changing the use of a particular land in relation to planning permit. This means that developers ought to make provision for such changes during planning permit approval process to make switching output easy and quick without unnecessary objections from planning objectors in future. In view of this, it is argued that similar uses such as hotels or serviced apartments may be contemplated for a switch to residential as opposed to retail, commercial or industrial property because of compatibility and ease of switch. As a result, planning permit approval process should incorporate potential future switching flexibility.

Upon successful completion of a development project, a developer can use dynamic sales strategy approach to dispose of the units (assuming an apartment). It is argued that putting the whole apartment structure on the market (all the units in case it is an apartment building) has the potential to decrease the price of the units due to excess demand. Therefore, a sequential release of apartment units in specific quantities based on demand can be a dynamic sale strategy to maximise profit and mitigate risks. On the contrary, if the project is an office, flexible leases can be valuable due to constant movement in rent levels for the office sector. In the retail sector, rents are fixed in relation to sale turnover which is a great source of uncertainty. As a result, such flexible percentage lease agreements can be adopted to maximise profitability as shown in Figure 2. A developer retaining the right to adjust contract rent in line with changing market rents can keep the positive upside potential for a developer whiles limiting potential downside losses.

In summary, Figure 2 has demonstrated that the different types of flexibilities such as defer, contract, expand, switch and abandon are all embedded in the property development process. Through the conceptual framework, other flexibilities that are also valuable including flexible designs (operating options), flexible leases and flexible sales of completed developments have been captured and categorised. These flexibilities though
have been proven to have value, are now captured in a conceptual framework as a visual aid to deepen the understanding of practitioners. This fills the gap proposed by Lucius (2001) that there was no systematic categorisation of real options making it difficult to identify the exact location of flexibility in property investments and development. This extends practical application of different types of flexibilities at different stages of the property development process by property practitioners and developers as a way of strategically managing projects for long term benefits.
5.0 Conclusion

This study aimed at developing a conceptual model that captures all flexibilities embedded in a property development process from the perspective of investor-developers. Through a combination of critical analysis of literature and practitioners validation, a conceptual framework has been developed that captures flexibility in an entire property development process with the aim of creating a visual aid required to deepen the understanding of practitioners on real option theory. The framework was developed on the backdrop of a flow network because of the linkage to the generic property development process for practitioners to appreciate flexibilities within the process of executing a project.

It was argued that real option theory has the potential to mitigate risks and uncertainties in property development through strategic initiatives such as contracting the size of a development to cut down losses due to uncertainty and complete abandonment to salvage value. If uncertainties surrounding a project are expected to resolve and result in a positive market outlook, a temporary shutdown pending a favourable market can be adopted to manage development projects. Based on the conceptual framework in this paper, practitioners have a much better understanding and guidelines to determine the exact stages of flexibilities embedded in property development. Furthermore, practitioners have valuable insights regarding the types of real options they should focus on at different stages of the property development process.

Since it has been demonstrated that flexibility has the potential to mitigate risks and uncertainties in Australian property development (investor-developers), it is suggested that property developers begin to embrace flexibility and adopt it in decision making. Using the conceptual framework, identifying the different flexibilities embedded at different stages of the property development process is made easier. Moreover, it is better for property developers who are long-term investors to have an embedded strategy such as flexibility to deal with risks and uncertainties than adjust discount rates which are incapable of dealing with risks.

It is proposed that further research can be conducted into the value of flexibility from the perspective of practitioners. During the face to face semi-structured interviews, practitioners were sceptical about the value of embedded flexibility because legislation requires that independent valuers do valuation of investment properties. Application of ROV models are still at the early stages and it is suggested that further work is done in this area to improve upon ROV methods proposed for the valuation of flexibility.

References


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