BARRIERS TO THE ADOPTION OF FLEXIBILITY/REAL OPTIONS IN AUSTRALIAN RESIDENTIAL PROPERTY DEVELOPMENT

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# Abstract

Despite multiple attempts to develop Real Options (RO) Valuation models devoid of mathematical complexity in efforts to increase its practical adoption, RO theory still lacks adoption in the property industry. To aid its practical adoption, this paper seeks to identify the barriers to the adoption of flexibility/RO theory in residential property developments practice in Australia practice. No study, to the best of our knowledge, has explored factors impeding the adoption of RO theory in the Australian property development sector.

Through a face-to-face semi-structured interview approach, several practitioners provided responses on barriers to the adoption of flexibility in practice, which were analysed using thematic analysis combined with quotes as evidence to determine the barriers to the adoption of flexibility for practical decision making. Multiple factors were emerged from our analysis including the cycle of blame, cost and financing issues associated with flexibility, planning issues and design obsolescence.

Keywords: Real Options, Property Development, Flexibility, Real Options Valuation, Barriers

# 1.0 Introduction

Flexibility to adapt to changing market conditions is increasingly becoming important across all sectors due to recurrent fluctuations, and the potential impact of such changes on business performance. Specifically, in the property and construction sector, market fluctuations can have serious financial consequences due to long investment horizons by stakeholders, and the difficulty and costly nature of retrofitting and adapting existing buildings to meet changing needs of occupiers (Mintah, Higgins & Callanan, 2018). The problematic nature of adapting and retrofitting of existing buildings becomes complicated when potential changes are not considered during building designs at inception stage. To this end, it is contended that for buildings to respond to changing market conditions and meet performance requirements, flexibility must be embedded during inception, and designed as part of the physical structure. In dealing with uncertainty in property development in a dynamic market, flexibility must be incorporated into buildings to enable buildings respond to required changes. This is particularly important for major property portfolio investor-developers (for example property fund managers, pension funds, real estate investment trusts, real estate development and operating companies etc.) who have a long-term objective for property development projects aiming to capitalise on increasing rental and capital returns (Mintah, Higgins & Callanan, 2018).

Managing uncertainties (changes in market conditions) in Australian residential property developments requires active decision making in the form of inherent strategic alternative decisions (flexibility), that can enhance the ability of residential property developers to mitigate losses against unfavourable outcomes and capitalise on emerging opportunities when market conditions are favourable. For example, Luehrman (1998) argued in favour of incorporating flexibility into property development projects with the potential to address uncertainties, and suggested that the value of flexibility in buildings are apparent in the face of uncertainties because the ability of developers to respond to such changing market conditions during the execution of residential property development projects is invaluable in mitigating risks and opening upside opportunities. Wang and de Neufville (2005) termed flexibilities created by changing the actual design of a development project to achieve design flexibility to meet future demands from a structure as options embedded “in” projects.

As noted in the literature review below, a growing amount of research argues that flexibility is valuable in the face of uncertainty in property projects. Despite the potential of building flexibility to mitigate uncertainty in property development and investment, Australian property developers are yet to embrace flexibility as part of property development/investment strategy. Therefore, the aim of this paper is to identify the barriers to the adoption of flexibility in buildings in the residential property development industry of Australia. The paper further presents solutions to these barriers for possible elimination to catalyse the adoption of the concept of flexibility in buildings in practice. The remainder of the paper is organised as follows; section two is devoted to the review of relevant literature, section three focuses on the methodology, section four presents the results and discussion, and section five concludes.

# 2.0 Literature Review

The concept of flexibility/real options has been applied to several case projects leading to either development of mathematical models for flexibility valuation or empirically applying some of the existing real option valuation (ROV) models to value flexibility. Beyond this, studies have focused on testing practical application of ROV and real options analysis (ROA) to property development projects. For example, 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), Williams (1991), Quigg (1993), Capozza and Li (1994), and Sing and Patel (2001) have all developed real options models of land development. Grenadier (1995) advanced the theory through a framework for valuing flexibility in lease contracts. Similarly, Grenadier (1995) and Buetow and Albert (1998) analysed the appropriate PDE which models flexibility to renew or purchase a property at the end of a lease. Thus, the evidence from the extant literature and as shown in section 2 (literature review) of this study indicates that quantitative derivation of models for valuation of flexibility has dominated the theoretical development of RO theory at the neglect of qualitative approaches that incorporates practitioners’ perspectives for practical significance.

Flexibility in a single building can be physical, functional and financial (Gibson, 2001). In terms of physical flexibility, Vimpari, Kajander and Junnila (2014) argued that it can be achieved through the introduction of mobile walls, flexible floor plates, new technologies, better planning methods and open building designs. This is affirmed by Harris (1996) who similarly suggested that physical flexibility is predominantly focused on building design, including useable areas, modular floorplates and the capability to alter the internal configuration of space in a building. All these potentially envisaged changes must be incorporated in the early design stages of investment by investor-developers (IDs) (Mintah, Higgins & Callanan, 2018). This has the effect of reducing future costs associated with extensive works to adapt a structure in future and extends the life span of buildings significantly (Israelsson & Hansson, 2009). In other words, to achieve building flexibility, buildings must be designed to maximize the potential for adaptation and to accommodate different uses as required (Gann & Barlow, 1996a).

On the flexibility to switch use of a construction project, for example, Trigeorgis (1993b) concluded that the value of flexibility to switch use of the project was almost 7% of the project’s gross value. Gann and Barlow (1996b) argued that there is the need to incorporate greater flexibility in buildings to meet unforeseen changes in the use in future. Patel and Paxson (1998) assessed flexibility of switching the use for a leisure centre development and found positive results. Leung and Hui (2002) considered several types of flexibility including switching a part of a hotel of Hong Kong development project. Paxson (2005) similarly derived positive results associated with the flexibility of switching the use of a building. As the cost of flexibility is upfront and part of the initial designs, 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, Scholtes and Wang (2006) evaluated the flexibility of expanding a parking garage project 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, Voordijk and Dewulf (2012) studied different kinds of flexibility and used qualitative analysis to argue that flexibility 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. 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, Kajander and Junnila (2014) explored how real options analysis can be used for valuing flexibility in a real retrofit investment case. More 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, Higgins and Callanan (2018b) also evaluated a switching of use 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.

# 3.0 Methodology

This study used face-to-face semi structured interviews to elicit data from key practitioners in the Australian residential property sector. The face-to-face semi structured interviews allowed for wide and comprehensive exploration of issues relevant to the focus of the study on flexibility in the Australian residential property development market. The study used purposive sampling technique for the selection of participants for the interviews. Experts who understand flexibility in property development and its integration in practical decision making in the Australian residential property development market were chosen on purpose for this study. Selected participants were well experienced and familiar with the use of property valuation models and decision making in property development. Moreover, most of the participants are at the forefront of decision making in property development, as a result, their views are paramount in examining potential barriers to the adoption of flexibility in the Australian residential property development sector. They were mostly at senior management level; hence, their views are highly relevant to the study.

Figure 1: Composition of semi-structured interview participants



**Source: Authors**

Figure 1 demonstrates the relationship between the different groups of participants in this study. Broadly, participants are grouped into two categories; leading property practitioners and property consultants. To ensure a balanced representation of views in the responses, participants were drawn 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. In qualitative research, selection bias is not relevant, because of the in-depth nature of studies that adopts this approach and focus on specific issues that requires specific participants to contribute. Therefore, qualitative studies generally select participants on purpose and not randomly, to collect relevant data on a specific topic of interest. Therefore, the twelve (12) participants used for this study is substantial in qualitative terms and deliver valid results for analytical and theoretical generalisations. This is similar to the studies of Wong et al. (2023), Moore and Higgins (2016), Mintah (2018), Mintah (2019) and Vimpari and Junnila (2015) who used 14, 14, 12, 12 and 12 key property stakeholders respectively.

In collecting the qualitative data, the researcher used an audio recorder and transcribed into text format for analysis. Transcripts were then analysed thematically using the qualitative software, NVivo.

# 4.0 Results Presentation, Findings and Discussion

## 4.1 Barriers to Adoption of RO Theory in Practice

In assessing the potential adoption of flexibility/RO in practice, participants provided responses to questions on the barriers to flexibility investments in Australian residential property developments. In addition to a visual aid of conceptualizing flexibilities in Australian property developments, participants had access to results of an ROV modelling application to a residential project. Through the analysis of the responses provided by participants during the interviews, it was discovered that there are several issues that pose as barriers to the adoption of flexibility and hence stifle the adoption of flexibility for property development decision making.

### 4.1.1 A Vicious Cycle of Blame?

The first theme that emerged when stakeholders were asked why flexibility has a low adoption rate in Australia. Essentially, each interviewee category places the ‘blame’ on (an)other group(s). The financial advisors, on one hand, indicated their willingness to offer financing for investments in flexibility embedded in property projects. In their view, lending for property development is fundamentally dependent on the profitability of flexible investments in residential property developments. Since costs associated with flexibility occur at initial stages of development, it leads to relatively higher initial costs for projects embedded with flexibility. The indication given was that banks would not provide funding for the extra costs associated with flexibility unless developers take on those costs as part of their equity contribution to the specific project (this is dependent on the financing/capital structure for the development). In doing so, lenders (commercial banks) do not provide support for property investments that seem unprofitable at the initial stages because the value of flexibility is contingent upon upside uncertainty in the market. In essence, financial advisors are pushing the responsibility of embedding flexibility into projects to residential property developers. The quotes below are sample evidence in support of the above argument.

*“Unless you structure it someway that your equity becomes the sunk cost” (Local Independent Financial Advisor).*

*“There is so much cost sunk into infrastructure for such developments. So, you’ve got to have the financial capacity to do it because debt funding will be too expensive” (Financial Advisor-Bank).*

The developers, on another hand, suggested that opinion of value expressed by independent valuers on the value of embedded flexibility is fundamental, because during the sale of a property, valuers usually advise clients on its potential market value. As a result, the developers suggested that if there is value associated with flexibility, valuers have a responsibility to provide clarity in this sphere. The argument of the developers is that if values are ascribed to flexibility by independent valuers in practice, it will provide a justification for investments in flexibility in residential property developments. Thus, once value would be ascribed to flexibility during sale of a property, it would be worthwhile executing embedding flexibility in a project to capitalise on future upside in the property market. In effect, the developers have shifted the responsibility for investments in flexibility to property valuers. As far as the interviewees (developers) are concerned:

*“The air space above the existing structure has value and it is something worth understanding and having an analysis that helps us form a value opinion understandable by everyone” (Small independent developer).*

*“It's most certainly worth the consideration because, the air space above this structure has value. The question is how you find the value, and that's what you have to work on to prescribe that” (Representative from Large Development Company).*

The valuers, on the other hand, passed on the burden to “the market”. Valuers are generally interpreting the behaviour of the property market with respect to certain components of properties and how market participants value those components. Therefore, it is not surprising that the valuers suggested they would consider the value of flexibility if the market accepted it. In essence, valuers are similarly shifting responsibility of determining value of flexibility to market forces as the main determining factor. In some cases, valuers can use the residual valuation approach to arrive at a value of flexibility embedded in a building. Surprisingly, none of the valuers mentioned that approach as a possible method to arrive at an opinion of value for embedded flexibility. The valuers stated that;

*“The question is, will the market? And if the market does, we would and if the market does not, we would not” (Independent Property Valuer).*

*“The role of the valuer is to interpret the market” (Global Property Valuer).*

*“Well you have to compare, obviously you need to look at comparable sales of 30 level properties and find out what it's worth, so you can analyse what this property would be worth if it was 30 levels and then obviously take into account the cost. But there certainly is value in future development potential” (Local Property Valuer).*

For property advisors, the blame lay with the investor-developers. The assertion was that they, property advisors, could see the plausibility of the adoption of flexibility, the challenge is that the final decision lies with investors. Investors who are engaged in property developments and hold assets on long-term basis must be able to produce a feasibility report on a project that delivers superior return considering the riskiness of a project, in addition to cost of flexibility. Based on the superior return, lenders may provide funding for investments in flexibility. They argued that flexibility certainly has value and can give such an advice, but the ultimate decision to embed flexibility is in the purview of investor-developers. According to the property advisors interviewed:

*“They are not gonna want to see that and they are not going to recognise that” (Global Property Advisor).*

*“The only thing with that development is that it's at a huge expense and typically even institutions need to get in a lot of finance and it’s just a matter of whether the feasibility are that because at the end of the day, that's what someone is going to lend on; because would somebody be able to produce enough revenue out of this to make the deal stuck up”* *(Local Property Advisor).*

The views of the long-term investors who are capital providers suggested that value should be ascribed to flexibility embedded in an asset. This should be determined by valuers or clarity should be given by the valuation community on these values in order to drive such investments. For the long-term investors, flexibility investments would be considered if value is ascribed to it during sale of the asset in question. This is also important for long term investors because investments in flexibility would have to be accounted for in the valuation of portfolios. Thus, costs associated with flexibility must be reflected in the valuation. The investors argued that,

*“Valuers’ interpretation is also important because they provide an independent assessment of property” (Large Superannuation Fund).*

*“If I do this, will someone pay me more for the building because of its future upside? I will be happy to see that I could get some value ascribed to the undeveloped portion. So, the air rights if you like” (REIT).*

In effect, this becomes a cycle where key practitioners are avoiding responsibility and passing on the blame to each other. This can be likened to a vicious cycle of blame where the key practitioners are unwilling to take responsibility for initiating action on embedding flexibility in residential property developments.

Figure 8-2 illustrates the cycle of blame developed from the interviews. Starting from financiers to the property advisors, there is a blame game of pushing responsibility of embedding flexibility in residential property development projects to a specific stakeholder by another.

Figure 2 The Cycle of Blame in the Adoption of Flexibility/ROV in Practice

**Source: Authors**

### 4.1.2 Financing and Costs of Flexibility

Financing investments in flexibility is a major issue that can negatively affect the adoption of flexibility in practice. Property developments are generally capital intensive. As a result, most residential property developers take on debt funding. Debt lenders, mostly banks, thus exert considerable influence on the ability of residential property developers to execute projects. The financial advisors indicated that the banks normally offer funding based on the potential revenue achievable from a property development scheme because the banks expect to recoup their investments after completion and settlement of a residential project. Therefore, the potential revenue achievable is crucial to attracting a specific amount of funding. This poses a challenge to the adoption of flexibility in practice, because the associated costs are seen to reduce the profitability.

*“The only thing with that development is that it's at a huge expense and typically even institutions need to get in a lot of finance and it’s just a matter of whether the feasibility are that because at the end of the day, that's what someone is going to lend on; because would somebody be able to produce enough revenue out of this to make the deal stuck up?” (Local Independent Financial Advisor).*

*“So, you’ve got money out of the door as sunk cost, you won’t get bank funding for it” (Financial Advisor-Bank).*

The property advisors, who perform feasibility analysis and provide advisory services to residential property developers and investors on the viability of development proposals were skeptical about the potential of achieving the projected revenues from flexibility because staging projects vertically over a period may not be feasible in the residential sector. This is compounded by the finding that banks do not accept escalations in financial models developed by practitioners because of the volatile nature of the local market. The cost of investments in flexibility was also a concern to both the local and global property advisors because, staging projects come with enormous cost implications. Having flexibility embedded in projects may lead to further cost implications which can potentially render feasible projects economically unviable.

*“So, it's still definite advice that we could give: doing development in stages is always costlier anyway, I wonder how often it would happen like this. Imagine buildings that get built specifically in stages because of the funding point of view; but they always not going to get there in the end” (Local Property Advisor).*

No escalation in projected revenues in financial feasibility models means that flexibility may not have value because the value is tied to uncertainty in the market and the associated changes in property values over time. In effect, given that it is these changes in potential revenues that drive the values embedded in flexibility, their exclusion from feasibility analysis would render any investment in flexibility unviable. The reason is uncertainty in feasibility analyses is usually captured through escalation of income and costs. This view is corroborated by both developers and valuers who suggested that escalations have been discarded and variables in financial models use actual figures obtained from market information at the time of preparing financial feasibility models.

The valuers agreed with the position that cost would be a determining factor for investments in flexibility embedded in projects due to uncertainty. Whereas one of the valuers argued that cost of flexibility today is enough to deter investments, another suggested a comparative cost analysis of investments in flexibility today as opposed to cost of flexibility at a specific time in the future. The potential cost savings or otherwise could influence decisions involving investments in flexibility. The cost, as a deterring factor for investments in flexibility, is compounded by the fact that the industry does not consider cash flow escalation in property development financial feasibility modelling. The reason is that values associated with flexibility are derived through uncertainty, hence, no escalation means that there is no attempt to capture potential future upside.

*“You have to make an analysis. And like I said, look at the cost now and what the cost is going to be in future” (Local Property Valuer).*

*“Yeah, but it really has got to do with cost”* *(Independent Property Valuer).*

*“For some reason and I don't necessarily agree with it but for some reasons when the industry is looking at development cash flows, it tends not to inflate future revenues as the land gets developed. I don't know why, it's just the practice that has become common in valuation work” (Global Property Valuer).*

Similarly, the investors had reservations about the potential additional cost resulting from investments in flexibility. Their sentiments were based on the impact of additional costs on profitability. Without due consideration to benefits of flexibility, a developer argued that a decision to invest in flexibility will be based on cost-benefit analysis which is a method of project evaluation. Moreover, another investor examined the cost aspect of flexibility from a perspective of market competitiveness of a project. In this light, the possibility of investments in flexibility rendering projects uncompetitive due to increased costs which results in higher rents/sales than market rates become a disincentive to invest in flexibility.

*“There is a cost obviously. It’s impacting on the performance of just doing this (building to a certain level despite the embedded flexibility in the foundation, which may not be viable due to extra cost)” (REIT).*

*“We look at the cost impact and we will then do a cost benefit analysis basically to say look, the cost is 2 million dollars. How is that addressed if it's future proven? We are a long-term investor and what we want to do is invest today for the future. So, if we can invest in flexibility or the opportunity for flexibility in buildings, we will do it. It depends what the cost is” (Large Superannuation Fund).*

*“It has to be considered in terms of cost impulse. Because if it is costing a developer $10m more to build that into the structure of the building or whatever and it becomes uncompetitive, you can’t market it in terms of enticing tenants or occupants, it becomes redundant” (Large Superannuation Fund).*

In summary, costs associated with flexibility investments is a major issue for all practitioners across the property sector. This is evident in the responses provided by the participants. Though the views were expressed in different ways by different practitioners, this is due to the nature of the different services and tasks such practitioners perform within the sector.

### 4.1.3 Planning Issues and Disturbance to Existing Tenants

In demonstrating flexibility in residential development, a residential tower that could be constructed in phases was used as a visual aid, as shown in Appendix 1. Participants provided feedback on the potential of embedding flexibility in the sub-structure of a residential tower with the aim pf expanding the tower vertically during favourable market in future. Exercise of the flexibility may occur in future when the timing is right depending on market conditions. Participants raised concerns about potential disturbance to occupiers at the time of construction when the flexibility is exercised in future. This is important due to the regimented nature of the planning system in Australian housing development. Two key things can be deduced from the responses given by participants; that the planning authorities may not give consent to such a development and even if they do, there is the possibility of the market rejecting such an idea due to disturbance of tenants’ quiet enjoyment in future.

*“There will be a lot of concern about this. The concern will be disturbing the existing tenants when it comes to time to do that” (Large Superannuation Fund).*

*“I would think that will be an issue because one of the main things you’ve got is what is the planning permit and “buildability’’ of the structure (REIT).*

The property advisors also concurred that planning consent could pose a threat to investments in flexibility, especially vertical phasing of residential projects. In a nutshell, if planning consent is impossible, then the entire argument of embedding flexibility in projects is defeated. As a result, planning laws would be extremely important in achieving flexibility investments in residential property projects.

*“So, design flexibility, is still depending on planning” (Local Independent Financial advisor).*

*“There is going to be a planning issue because the whole argument moves if you can’t do that” (Financial Advisor-Bank).*

Similarly, among the property developers, concerns regarding planning issues was raised as a key factor to achieving adoption of flexibility strategies in residential property development. The responses suggested a unanimous agreement that planning permission and the views of statutory planners regarding vertical staging would be paramount.

*“Yeah, okay. Probably, it wouldn't hurt to speak to a council planner. So, you can get their side of how this would have to play out. You need to talk to someone like a statutory planner to understand what he would do. Can you get a staged permit? It has to be just this and nothing else?” (Representative from Large Development Company).*

*“We had a design of a building which was much taller initially, when we went for the planning process, we experienced some complexities with planning and the building got reduced in height due to shadow, plane concerns, so planning is key” (Large Fund developer).*

The property valuers shared similar concerns about adoption of flexibility emphasising the impact of planning permission on the value of flexibility, because without planning permission, flexibility would not be considered in the valuation of assets. This view was unanimous by all the property valuers who were interviewed. They argued that the property valuers considered planning approval to be critical because valuations are generally underpinned by highest and best use analysis which is highly dependent on zoning and planning regulations.

“*Yeah if it's a permitted option then yes it's valuable because planning could be an issue” (Local Property Valuer).*

*“You would have to look at okay, what is the planning? What is the zoning and assuming it allows you to go up to that height**?” (Independent Property Valuer).*

The last group of participants was the property advisors, and they also agreed with the views of other participants regarding planning permission as a catalyst for the adoption of flexibility in Australian residential property developments.

In summary, all participants agreed that planning permission is an important factor which could hinder the adoption of flexibility in property development. This represents 100% response on the importance of planning permission because without fulfilling legal requirements regarding flexibility, any attempt to embed it in projects will lead to rejection by planning authorities. In view of this, there is the need to focus on examining the practicality of flexibility in Australian property development projects in the residential sector in Australia to understand the views of planners on flexibility/RO theory.

### 4.1.4 Design Obsolescence

It is widely accepted that consumer tastes and preferences change over time. Flexibility embedded in property developments has a long-term perspective. As a result, any design that considers flexibility using current designs may experience design obsolescence.

Among the financial advisors, obsolescence was a major issue due to the long-term nature of investments in property. Concerns over obsolescence of flexibility are legitimate as any advice provided to property developers is time-bound. It is possible for a sound advice to become a mistake in future due to lack of demand which could affect the reputation of such property advisors in the industry.

*“What is the likelihood of my product that I designed based on feasibility doesn’t become obsolete? (Local Independent Financial Advisor).*

The property developers also shared similar concerns as the other participants regarding obsolescence of a structure embedded with flexibility. In some cases, developers found it difficult to predict the expectations of the property market in about 20 years when flexibility may be exercised.

*“Then another issue is that this opportunity might be relevant for a time period: the design obsolescence for the balance of the building, whether the rises are adequate for new technology and changes and the bits and pieces. So, there are considerations that are related to the building design specifically” (Representative from Large Development Company).*

The property valuers also suggested that obsolescence is a major issue and their argument focused on changing demand in the marketplace which may affect investments in flexibility. This is important for property valuers as they need to include current property market performance report, in addition to a forecast of the potential performance of a market, in residential property valuations. Therefore, flexibility embedded in projects may be viable today but not in the future.

*Let’s remember also the market is constantly changing. It is not a static thing, they do move all the time, so your product may not be in demand in future” (Independent Property Valuer).*

*“Okay I'm going to upgrade this property now and ..."I mean it's still a risk obviously because how do you know what's going to happen in two years’ time and whether the upgrade will meet market demand at the time?” (Local Property Valuer).*

Investors interviewed were also concerned about market acceptance and later exercise of flexibility to generate the required returns. Obsolescence, they noted, could negatively impact on flexibility. Again, the investors interviewed were worried about gauging the market in 10-15 years’ time when flexibility may be exercised to recoup investments.

*“What is feasible and what is acceptable to the market at the time of converting the use is critical” (Large Superannuation Fund).*

*“Flexibility for a period of about 10-15 years might then become functionally obsolete” (REIT).*

In summary, all the participants agreed that obsolescence could be a major impediment to the adoption of flexibility in practice. Chiefly, obsolescence could affect the values attached to flexibility due to the long-term nature of maturity of investments in flexibility and potential market changes in future.

# 5 Conclusions

The determination of barriers to the adoption of flexibility in practice is a significant step forward towards its potential acceptance. Researchers have mainly focused on quantitative applications of flexibility, with the aim of delivering evidence of the superiority of results in order to encourage practitioners to use it in decision making. As a result, studies exploring the views of practitioners on the issues impeding the adoption of flexibility in practice has been limited. This study has revealed the issues that are confronting practitioners in their quest to use flexibility for residential property development/investment decision making.

The factors identified include the cycle of blame, cost of embedding flexibility, planning approvals for embedding flexibility and deign obsolescence of embedded flexibility. The results indicate that there are other issues impeding the adoption of RO theory in practice aside the complexity of flexibility/ROV models and non-transparency of results derived from ROV applications (Lander & Pinches, 1998; Oppenheimer, 2002). These issues have added to the literature on real options for the attention of experts on the subject and researchers to delve deeper for possible solutions.

These barriers were gleaned from the responses provided by practitioners which were mostly unanimous. As a result, these factors identified are deemed as the pertinent factors that should receive the attention of experts and researchers for possible solutions. The determination of these factors enhances potential adoption of flexibility in practice because if researchers and experts derive solutions to these barriers, it will lead to practical adoption.

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