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Feasibility practices of types of property developers

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ABSTRACT

Purpose. The purpose of this study is to analyze the current relationships between developer characteristics in terms of dominant property type (residential, commercial, retail, industrial, tourism, 'other'), ownership (publicly listed, publicly unlisted, private, government), organizational structure (speculative - trader, investor developers, development managers), and size (small, medium, large) in the frequency of use and hurdle rate values

Design/methodology/approach. A questionnaire survey of 225 Australian and New Zealand trader developers, development managers, investors, valuers, fund managers and government/charities/other relating to the feasibility practices of different types of Australia/New Zealand property development companies.

Findings The most significant differences are (1) *residential developers* are more likely to use margin on development cost (MDC) as a hurdle rate and, with *'other' developers* (industrial and childcare), having a higher minimum percentage internal rate of return (IRR) than their *retail* and *mixed - use* counterparts; (2) *investor developers* are more likely to use the payback period as a hurdle rate, as are *trader developers* and *development managers* in their use of MDC as part of a go/no - go decision; (3) *trader developers* adopt a higher percentage of IRR than other key developer types, and deviate further from accepted financial theory in hurdle rate selection than *investors developers*; and (4) *national property development organizations* operating in multiple geographic regions have greater use of qualitative frameworks as a decision - making process and less use of MDC as a hurdle rate.

Originality. First study to examine the feasibility practices of different types of Australia/New Zealand property developers.

Keywords: real estate, property developers, feasibility, practices, hurdle rates, Australasia

Type of paper: academic

Category: research paper

1. Introduction

Property development can be defined as a sequence of steps that take a property development project from inception through to construction and completion, including the management of the asset over its lifecycle in order to derive value and achieve the objectives of the project. The act of conducting feasibility studies as part of a development appraisal is a necessary and critical initial stage of the overall property development process. The nature of this process is characterized by high levels of uncertainty and necessitates the assumption and use of variables across the entire development timeline.

A central aspect in assessing the feasibility of potential real estate developments is the use of *hurdle rates of return*, often referred to as a *target rate*. In the context of property development, a hurdle rate can be defined as a designated minimum level of return or profitability that is intended to include a developer's cost of capital and a premium commensurate with a subjective assessment of unsystematic project risk, and are used to measure a potential project's viability through conducting a feasibility analysis and inform decision making during the early stages of the undertaking. (Moorhead *et al*., 2021). It should be recognized that, whichever term is used, hurdle rates are expected returns based on forecasts and are not a measurement of past performance. In professional practice, there is a tendency for people to use the terms 'development valuation' and 'viability/feasibility analysis' interchangeably. To reduce confusion, when reading this paper, the distinctions between them are highlighted here. The term development valuation is the calculation undertaken from a market perspective to determine market value (MV) in accordance with the IVSC's definition (RICS, 2019b). However, a viability/feasibility study is a model used to forecast the profitability or viability of a proposed development scheme. The calculations are similar but differ in the perspective of the analyst and the intended use of the model output (Ratcliffe et al, 2021, p 403). A further clarification is that the authors use the terms 'viability study' and 'feasibility study' interchangeably as in practice in Australia: they are merely different terms for the same activity.

The various methods used for this process commonly include residual valuation, residual accumulative cash flow analysis, and discounted cash flow (DCF) analysis to determine the net present value (NPV) of projects, *margin on development cost* (MDC) or *return on cost* (ROC), and *internal rate of return* (IRR) and/or *return on equity* (ROE). However, the determination of hurdle rates in practice is known to be often based on industry and/or developer - specific 'rules of thumb' and industry - wide benchmarks (e.g., Crosby *et al*., 2018a; Diaz III, 2010; Havard, 2014; Rowley *et al*., 2014; Sah *et al*., 2010). Recent studies have also demonstrated that the use of common financial metrics from the wider investment financial literature are being used by real estate developers in converse to methods that would be expected (e.g., Hutchinson *et al.*, 2017). In addition, the methods are used by several types of developers in terms of specialty, size, organizational/ownership structure, tenure of the development, etc. To date, little is known of which methods are most suited to which developer type.

As an obvious start towards this end, the present study aims to shed light on hurdle rate selection practice by establishing the methods most used by each type of developer. This is addressed by the analysis of a survey of 225 Australian/New Zealand real estate developers.

2. Types of developers

Real estate property developers can range in form and scale from an entity run by a single individual (sole‐trader) to large public companies and multi‐national organizations (Reed and Sims, 2014), and with a wide range of, often context dependent, activities that can make it difficult to identify property development organizations (Coiacetto, 2009), as well as creating challenges when attempting to place boundaries around their decision-making characteristics (Reed and Sims, 2014; Wilkinson and Reed, 2005). In creating a typology of developers, the most common approach is through each's specialism in terms of associated *predominant property type*, as the broad range of possible such types means they usually specialize in only one or two (Kohlhepp and Kohlhepp, 2018). These can be either broad‐based, such as residential and commercial, or more specific, such as retirement living or childcare centers, although the primary classification includes residential, commercial, industrial, retail, tourism/holiday, aged‐care, land developer, infrastructure developer, institutional developer, and mixed‐use or a hybrid of the these (Brueggemann and Fisher, 2015; Kohlhepp, 2012; Peiser and Frej, 2003; Peiser and Hamilton, 2012).

An alternative by Rowley *et al.* (2014, p. 14) classifies developers based on the *end‐value* of the typical development projects they undertake, defining for residential property:

- low value – less than AUD 3 million – most developers in Australia are in this category
- medium value – AUD 3-20 million – involving small and medium scale projects, of which each is typically treated on its own merits and must stand alone regarding viability
- high value – over AUD 20 million – involving large‐scale projects that are often national or international in scale.

In contrast, Ruming (2010) lists three generally accepted *developer sizes* in Sydney, Australia, of

- small local – often family‐based 'mum‐and‐dad' firms that stay within a defined area
- medium local and regional – better financed, operate on a larger scale, and undertake many medium density projects but still generally stay within a local area
- large regional – often publicly listed, have access to substantial amounts of financial resources, national or international in scale, and complete large‐scale greenfield development on city fringes.

Organizational/ownership structure is another important characteristic of developers, which may be (Rowley *et al*., 2014):

- Public – a government organization tasked with a specific objective to create a property for a desired end‐use
- Private – a privately held or a publicly listed company that exists for the purpose of deriving value for shareholders
- Semi‐public/private – a mixture of public and private ownership. Such companies will have a private legal structure, but with the majority shareholder being a government body. The company is often directed to undertake development to increase a specific type of property, but also has the objective of deriving an economic profit for the government shareholder and also to drive social outcomes. Examples of hybrid developers include Economic Development Queensland (EDQ) in Queensland, Landcorp in Western Australia, and Urban Growth in New South Wales. The overarching purpose of these

organizations is to facilitate government plans for urban growth and housing supply targets.

Most property development organizations can also be described as either primarily *speculative - trader* or primarily *investor* orientated regarding the long - term tenure of the projects they create (Wilkinson and Reed, 2008). Due to capital budgeting and a limited resource pool of capital comprised of both equity and debt, many smaller property developers act as traders who sell the product they develop as they are not able to hold over the medium- and long - term (Reed and Sims, 2014). There are primarily two areas where profits can be derived from real property assets, including capital gains and rental income (Baum 2015; Rowland, 2010). Rental income can be either cash - flow based or include imputed rent as an owner - occupier. Speculative - trader developers initiate projects to make a profit via a capital gain from on - selling the completed property at a price higher than their cost base (Geltner *et al*., 2007). Generally, in Australia and New Zealand, these projects are of a shorter time horizon (less than three years) and do not cross multiple property cycles. Land - banking and large greenfield developments are an exception as these projects can span decades. Blocks of developed land are released in stages to the market and may span multiple cycles (Kohlhepp, 2012).

Investor developers, on the other hand, initiate projects to hold the completed property as an investment and derive rental income and long - term capital appreciation (Fisher, 1992). The development may become part of acquiring a larger portfolio of properties or for using the space as an owner - occupier. Rental income has an advantage over speculative capital - gains in reducing the volatility of income streams in the company's accounts (Baum and Hartzell, 2012). The reduced volatility leads to an altered risk outlook for a project and often would necessitate a different hurdle rate for project initiation (Ling and Archer, 2017). For this reason, many developers will have both speculative and investment motivations for completing a project and are referred to as hybrid developers in the present study. A common example of a hybrid development is creating a multi-family residential high - rise to sell as a speculative development while retaining the ground - floor retail space as an investment.

These descriptions of speculative - trader and investment - focused developers are examples of traditional development where the organization acquires land to conduct a property development project. In contrast, *development management* is where an individual or organization that possesses knowledge of the development process acts as a project manager or consultant for a third party. This form of development is on a fee for service basis and also has a significantly reduced risk profile. Larger specialist management consultancy agencies often fill this role and focus on taking a project from the initial conception phases through to project planning (Wiegelmann, 2012). Development managers act as consultants and usually assume the operational risk but do not bear the major financial capital risk of the project, which is usually born by the client and/or landowner as the primary contributor of equity and the borrower for the project (Gleibner and Wiegelmann, 2012).

In short, there are many motivations for undertaking property development and for engaging in viability studies, including public organizations and semi - public/private developers who have varying objectives and constraints guiding their development activity. Additionally, other professions engage in viability studies and the determination of the feasibility of development projects including property valuers and surveyors, fund managers, and financial lending institutions (Coleman *et al*., 2012).

3. Research method

A questionnaire survey of 225 Australian/New Zealand real estate developers is used for data collection and analysis. Given a population of approximately 3,000 developers in Australia, this is considered to be a sufficiently large sample. Participants were purposefully sampled from LinkedIn Premium, real estate industry events, and the researchers' own business and personal contacts. The highly selective and labor-intensive nature of this process resulted in the data being collected over a nine-month period.

This is part of a larger questionnaire survey, a copy of the instrument used being available on request from the lead author. The information sought includes the participants' organization type of business activity in terms of 'trader developer' (development of a product to on‐sell), 'investor developer' (development to retain ownership), 'development management' (development on behalf of a client), 'valuation firm', or an open-ended question where none of these apply (Question 5). Valuation firms are included because they are involved in actively facilitating an important link in the procurement of capital for development firms to undertake projects, and also form an integral part of the decision to commit to a project. In Australia and New Zealand, development finance lenders require independent valuation firms to prepare feasibility analysis reports on proposed development projects prior to their commencement and generally determine the loan gearing on a loan to cost ratio (LCR) (Bryant, 2012). Therefore, it is important to gain an understanding of the views of valuation firms, which have a major impact on whether development projects ultimately proceed. Additionally, valuation firms are included to gauge their required hurdle rates and risk perceptions, in comparison to the property developers whose projects they are analyzing. It should also be noted that financial institutions that provide capital for property development firms give instructions to valuation firms that may influence the hurdle rate used as a basis for feasibility analysis (RICS, 2008, 2019a).

Other questions include ownership type (public traded company, public company, private company, other) (Question 6), percentage property types involved (Question 7), size of company (Question 8), use of hurdle rates and their range (Question 22), to identify the differences in the selection of hurdle rate type (MDC, IRR, ROE, or NPV) and benchmarks as the basis for the go/no-go decisions of different developer types according to their *dominant property type* (residential, commercial, retail, industrial, retirement, infrastructure, and mixed‐use projects). In doing this, differences in the frequency of use of each hurdle rate type within each type of developer is first tested by the Chi-Square test for independence as well as Fisher's Exact test to accommodate small expected frequencies.

Differences in the MDC and IRR percentage hurdle rates are analyzed by a one-way analysis of variance (ANOVA) to identify the predictors of the hurdle rate type used; the hurdle rate type usage and specification across several dependent variables; and the actual specific minimum percentages and levels used.

The same process is used to analyze the hurdle rate selection and usage practices of respondent developers for their preferred project size and ownership structure. This involves a number of tests using either a one‐way or two‐way ANOVA between groups to investigate the differences in hurdle rate practices for public versus private respondent developers and also on the basis of the respondent developers' preferred project sizes, with large project sizes and defined as those where the end value or gross realization is greater than AUD fifty million (the large and medium‐large projects are condensed for statistical analysis), small project sizes defined as AUD five million or less in end value, and medium‐

sized projects in between. The hurdle rate practices analyzed include the use of NPV as a hurdle rate and the specific number of hurdle rates used as a basis for project go/no‐go decisions as well as the specific percentages of MDC, IRR, and ROE adopted.

Artificial Neural Networks or ANNs are a useful technique for testing the relationship between independent variables (Lippmann, 1987; Demyanyk & Hasan, 2010), predicting variables when there are many groups (Lapedes & Farber, 1987), and also as a predictor of commercial property values (Connellan & James, 1998). ANN analysis using *Multilayer Perceptron* is used here to determine the key differences between respondent attributes, and specifically in relation to the predictors of hurdle rate selection.

The different types of ownership structure are analyzed to determine the significantly different practices used in the selection of hurdle rates, go/no‐go decision processes, and the risk analysis techniques used to determine which projects should proceed beyond the pre‐commitment stages of the development process. In particular, the practices of private company developers are characterized against development organizations that are publicly listed on an exchange, as it is anticipated that such organizations would have more robust decision‐making practices when selecting property development projects due to their larger size, access to more resources, and higher reporting requirements and market scrutiny. For the purposes of statistical analysis, this variable is also condensed into an alternative condensed ownership structure variable by combining the public unlisted and government organizations with the 'other' category to increase the minimum number of responses for each category and focus on the differences between property developer organizations with a public or private structure.

Differences in the use of NPV based on preferred project size and ownership structure are also analyzed, with project size limited to medium and large project sizes because of the small number of small organizations using NPV as a hurdle rate: a Fisher's Exact test is used to test between groups. The specific levels used for MDC, IRR, and ROE as well as the number of hurdle rates used in decision‐making are tested to determine differences along the basis of preferred project size; a one‐way ANOVA is used to investigate the minimum ROE percentage hurdle rate and the specific number of hurdle rates used by respondent groups in decision‐making; and a two‐way ANOVA is used to analyze the difference in the number of hurdle rates used as a project go/no‐go decision basis for public versus private developers as well as whether they undertake large project sizes. As there has been very little research into the decision‐making practices of small developers, a one‐way ANOVA's is also used to test for differences between groups of small developers.

Finally, direct binary logistic regression (LR) is used to ascertain the impact of key variables on the likelihood of developers that undertake larger projects incorporating more sophisticated and complex quantifiable decision making methodologies when deciding whether to proceed with a project. It is particularly advantageous in not requiring the assumption of normality and linearity within the distribution of independent variables that is present in discriminant based LR, both binary and multinomial calculations allow for the use of categorical dependent variables, and is often used when dealing with firm decision models (Cybinski, 1995). It is used more frequently in recent times as it often produces superior results to traditional regression methods when describing the relationship between response variables and one or more explanatory variable (Hosmer et al., 2013). It can be also used as a classification method to fit categorical data to a logistic function and "for predicting the

outcome of a categorical criterion variable based on one or more predictor (independent or explanatory) variables" (Liu at el., 2014, p. 197). The binary form is used to predict a categorical variable with only two possible outcomes (Anderson et al., 2008). In the present study, the model contains 10 independent variables, comprising a specialized board or other that must approve all decisions to commit to a project, specific go/no‐go processes, utilizes specific hurdle rates, number of hurdle rates incorporated, utilizes qualitative frameworks, types of feasibility methods adopted, number of risk analysis methods, and risk tolerance scale.

4. Results and analysis

4.1. Developer type

Most respondents belong to trader developers (32%), followed by developer managers (26%), investor developers (18%), government/charity/other (11%), and valuation firms (8%).

The results using both the Chi-Square test and Fisher's Exact show there is no significant association between developer type (residential, commercial, retail, industrial, retirement, infrastructure, or mixed‐use) and its usage of hurdle rate type (MDC, IRR, ROE, and NPV) in the go/no-go decision process. However, as the expected frequency is less than five responses for several categories (which violates the main assumption of the Chi-Square test), industrial, retirement, and infrastructure are condensed to a single "other" category. The analysis of the condensed variables indicates the sole significant difference in the go/no-go decision process to be the residential developers' greater use of MDC ($\chi^2_{1,205}$ = 18.704, p<.001).

4.1.1. Comparison between developer types and minimum MDC percentage hurdle rate

The one-way ANOVA shows there to be no statistically significant differences between developer types and their minimum MDC percentage hurdle rate ($F_{5,74}$ = 1.380, p = 0.242).

4.1.2. Between-groups comparison of developer types and minimum IRR percentage for viability

The one-way ANOVA reveals a significant difference in the mean minimum IRR percentage hurdle rate between the different developer types ($F_{4,61}$ = 5.453, p = 0.001). Eta squared is 0.27 which, being more than 0.14, denotes a large effect (Cohen, 1988, p. 284).

Table 1: ANOVA comparison of the minimum IRR percentages hurdle rate by developer type

				Tukey's HSD Comparisons			
Group	*n*	Mean	*SD*	Residential	Commercial	Retail	Mixed-use
Residential	16	19.85	4.56			.004	.027
Commercial	3	15.67	4.04				
Retail	8	13.69	3.65	.004			
Mixed-use	11	15.36	3.44	.027			
Other	8	20.12	4.48			.030	

The mean difference is significant at the 0.05 level

Table 1 summarizes the results of the *post hoc* analysis using Tukey's HSD comparisons, indicating that the 'other' category has the highest mean minimum IRR percentage hurdle rate, followed by the commercial/mixed - use and retail categories. These results reflect the developer's perception that the residential, mixed-use, and the 'other' property types should have a higher IRR return as a benchmark for proceeding with a project and a higher required risk/reward trade - off than for retail and commercial property development projects.

4.1.3. Artificial Neural Network (ANN) as a predictor of hurdle rate selection

There are no statistically significant results between the developer types in their use of specific hurdle rate types. This result demonstrates that the type of property has no significant effect on the primarily quantitative or qualitative method used for making project decisions at the acquisition or commencement stages of the property development process.

4.2. Development company ownership, size, and publicly listed and private developer types
Table 2 lists the response numbers and percentages of each ownership category of survey respondents.

Table 2. Ownership structure by the organization of survey respondents

	Responses	Response %
Publicly traded company (listed)	56	29%
Public company (unlisted)	8	4%
Private company	117	61%
Government	9	5%
Other	3	2%
Total	*193*	*100%*

A similar result is obtained for the use of IRR as a hurdle rate for decision - making in the pre - commitment stages of the development process, but not for the use of NPV by publicly listed developers. A Mann - Whitney U test confirms a statistically significant difference (95%) between the use of IRR as a hurdle rate for publicly listed developers ($Md = 0.39$, $n = 64$) and non - publicly listed property developers ($Md = 0.25$, $n = 123$, $U = 3169$, $z = -2.01$, $p = .039$, $r = 0.15$). Conversely, private developers are less likely to use IRR as a hurdle rate (Md = 0.51, n=128, $U = 3828$, $z = -2.00$, $p = .046$, r = 0.14) than their non - private counterparts ($Md = 0.66$, $n = 64$). Additionally, private developers are also less likely to incorporate specific hurdle rates in general than non - private developers ($Md = .57$, $n = 145$, $U = 3749$, $z = -1.65$, $p = .099$, $r = 0.12$).

In terms of the use of NPV for hurdle rates, Fisher's Exact test reveals no significant differences between their preferred project sizes ($\chi^2_{1,157}$, $p = .767$). Likewise, a Chi - Square test of independence also indicates no significant association between the use of NPV as a hurdle rate and the condensed ownership variables of public, private, or other structures ($\chi^2_{3,184} = 562$, $p = .755$).

The results of the one-way ANOVA tests for differences in small, medium, and large project sizes show there is a statistically significant difference between the sizes for the number of specific hurdle rates used ($F_{2,179}$=4.14, p=0.02) and ROE percentage hurdle rate

($F_{2,18}$=8.87, p=0.00). The percentage level specified for MDC and IRR, however, is not statistically significant.

The results of the *post hoc* analysis using Tukey's HSD comparisons, indicates the mean required number of hurdle rates used for larger project sizes is greater than that of medium-sized projects (Md=0.648, p=0.01). There is also a significantly higher minimum percentage ROE hurdle rate for organizations preferring small - sized projects ($F_{2,205} = 67.763$, $p < .001$).

The two-way ANOVA of the number of hurdle rates used as a project go/no - go decision basis for public versus private developers shows the interaction effect between developers who undertake large project sizes, and whether they are public or private in nature is statistically significant ($F_{1,170} = .566$, $p = .453$), with a small, but significant, difference between developers who undertake large projects and the use of a higher number of hurdle rates as a basis for proceeding with a project ($F_{1,170} = 3.919$, $p = 0.049$, partial ETA Squared = .023).

The one-way ANOVAs show no significant differences between groups of small developers (project size <= $5 million) and the specific use and MDC, IRR, and ROE percentage hurdle rate.

The direct binary logistic regression model completed over 5 steps to incorporate all the predictors ($\chi^2_{6,164} = 41.89$, $p < 0.001$) indicates that the model is statistically significant and able to distinguish between developers that undertake large projects (>= $ 50 million) and developers whose projects are smaller (< $ 50 million). The model as a whole explains between 22.5% (Cox and Snell R^2) and 30.1% (Nagelkerke R^2) of the variance in developer project size, and correctly classified 71.3% of cases. As Table 3 shows, the independent variables make a unique statistically significant (95% confidence level) contribution to the model (specific go - no go processes; no decision-maker; other approval type; board approval; utilizes specific hurdle rates; utilizes qualitative frameworks; feasibility method – residual accumulation cash flow method). All but one of the significant variables has a positive *B* value, except for the use of the residual cash flow accumulation method, indicating that larger project developers are less likely to use this indicator. The strongest indicator as a predictor of larger project size is whether board approval is required to commit to a project (12.780 odds ratio), indicating just under 13 times more likely, controlling for all other factors in the model. An additional strong indicator includes whether the organization utilizes qualitative frameworks as a decision - making requirement (11.748 odds ratio), indicating just under 12 times more likely to undertake large projects (> $50 million), controlling for all other factors in the model. It is also notable that property developers that undertake larger projects are four times (4.125 odds ratio) more likely to have a formalized go/no-go decision - making process.

Table 3. Binary logistic regression as a predictor of developers who undertake large project sizes (variables entered in the equation on step 5: Q18 GO/NO GO Decision Basis)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 5	Q18 GO/NO GO Decision Basis	1.417	.707	4.014	1	.045	4.125
	Q14_1BoardorOther_R			14.370	2	.001	
	Q14_1BoardorOther_R(1)	2.025	.746	7.376	1	.007	7.576
	Q14_1BoardorOther_R(2)	2.548	.682	13.939	1	.000	12.780
	Q19 Specific hurdle rate use	1.358	.554	6.012	1	.014	3.889
	Q20-11 Qualitative hurdle *Rate Approach*	2.464	.837	8.656	1	.003	11.748

Q23-Residual Cashflow	-1.605	.753	4.547	1	.033	.201
Accumulation method						
Constant	-4.561	1.053	18.751	1	.000	.010

5. Discussion

5.1. Developer type

With a combined total of 58%, the two most frequent respondents from trader developer and development management organizations indicate that a predominant motivation for engaging in property development activity is to derive economic profit, with most development activity undertaken also being of a speculative nature. The 'investor developer' type, at 18% of responses, also includes the motivation of economic profit, the difference being the intention to derive cash flows from collecting rent and with the secondary goal of obtaining capital gains over a longer time horizon.

In terms of hurdle rates and benchmark selection as the basis of go/no‐go decisions, the lack of any significant association between developer types indicates their homogeneity in the primarily quantitative or qualitative basis of their decision making. However, the mean minimum MDC percentage hurdle rate used by the residential, commercial, retail, mixed‐use, and other categories of property type are very close to the Australian and New Zealand industry standard 20% MDC hurdle rate. This result, regarding property developers in Australia and New Zealand, is in line with prior studies from other geographic regions that identified a heavy reliance on intuition and rules of thumb in the decision‐making practices of property developers and investors (e.g., Atherton *et al*., 2008; Loizou and French, 2012; Sah *et al.,* 2010; Young, 2007). For IRR, the results demonstrate the developers' perception that residential, mixed-use, and the other property type categories should have a higher IRR return as a benchmark for proceeding with a project and reflect a higher required risk/reward trade‐off than for retail and commercial property development projects. One possible explanation for retail property developers having a lower required IRR is due to the propensity of these projects lasting longer than other property type development projects. The longer timeframes would lower the IRR of many projects.

A possible explanation for the lower required IRR for retail projects is their extended project timeframes compared to the other property types lowering the IRR.

5.2. Development company size and ownership; publicly listed and private development companies; and large, medium‐large, medium‐small, or small projects

In terms of the proportions of respondents, as the majority (61%) are private companies, the results may be biased towards less sophisticated decision‐making methodologies. Hutchison *et al.* (2017, p. 7), for example, found that UK larger publicly listed organizations were more likely to use IRR and NPV hurdle rates and smaller private companies relied more 'on subjective criteria and 'gut feel''. Similarly, the majority of Preller's (2009) sample of Queensland property developers, most of which are large organizations, use MDC, IRR, and NPV. The result that private developers are less likely than non-private developers to use IRR also resembles Hutchison *et al.* (2017), in that small and private companies are more likely to rely on subjective criteria, which, as they discuss, is to be anticipated as the use of NPV as a

decision-making hurdle rate would be high due to the prevalent recommendation and use of this financial metric in the financial investment literature.

The greater mean required number of hurdle rates for larger preferred project sizes is in line with expectations, as smaller property development projects often have higher levels of debt in terms of LVR percentage, which necessarily increases a project's required ROE (Sharam, Bryant, and Alves, 2015). Larger-sized projects often have more restrictions and covenants regarding capital facility providers than those of smaller projects where more funding opportunities exist (Sharam, Bryant, and Alves, 2015). In addition, smaller projects typically receive a higher LVR as the debt capital providers are assuming less risk, which would necessarily drive up the ROE percentage hurdle rate given the use of such other hurdle rates as MDC and IRR that are not as heavily influenced by project gearing.

The results of the logistic regression analysis demonstrate that developers who undertake large project sizes do utilize more sophisticated methods of feasibility analysis and have a higher number of specific hurdle rates as a basis for project selection. This is what was expected, as those that undertake larger projects typically have more capital at risk and it is anticipated that more resources would need to be dedicated to the determination of project viability. However, ownership structure, and particularly public versus private structures, does influence the respondent developers' choice and the number of types of hurdle rates used as a decision basis. It is also anticipated that publicly listed developers would use more specific financial metrics, both in number and complexity, to determine project viability, but this is not found to be true here.

The results also demonstrate that developers who undertake smaller projects adopt a higher ROE percentage as a hurdle rate. One explanation for this is that smaller projects have more access to debt capital, which would necessarily drive up the ROE percentage hurdle rate given the use of other hurdle rates such as MDC and IRR that are not as heavily influenced by project gearing. Additionally, the strong association between the use of ROE as a hurdle rate and using multiple hurdle rates in decision‐making indicates this to be a secondary hurdle rate metric in addition to the use of MDC or IRR. For respondents that use ROE, the mean number of specific hurdle rates was 3.5 versus 1.15 for respondents who do not use this metric.

There is only a small incidence of use of NPV as a project decision-making hurdle rate, and preferred project size and ownership structure has no significant association with the use of this type of hurdle rate: this is a surprising result given the prominence of NPV in the financial decision‐making academic literature.

6. Conclusion

6.1. Summary of findings

Towards the aim of identifying the real estate property developer characteristics associated with the most appropriate hurdle metrics (MDC, IRR, ROE, and NPV) to use in determining project feasibility, we present the findings of the current situation from our survey of 225 Australian/New Zealand practitioners. These are that

- residential developers are more likely to use an MDC
- residential developers and 'other' (industrial and childcare) are required to have a higher minimum IRR percentage hurdle rate than their retail and mixed‐use counterparts.
- investor developers are more likely to use the payback period as a hurdle rate, as are trader developers and development managers in their use of MDC and specific hurdle rates as a part of a go/no‐go decision

- trader developers adopt a higher percentage of IRR as a hurdle rate metric than do the other key developer types
- trader developers deviate further from the accepted financial theory of using cashflow-based metrics in hurdle rate selection than do investors developers. It was found that trader developers, and particularly residential developers, preferred non-cashflow ratio-based metrics such as MDC and RLV rather than the traditional DCF and NPV decision tools. Crosby et al (2018, 2020) and Coleman et al (2012) found a similar result in surveying UK based developers. The typical cashflow pattern in projects by trader developers involves large capital outflows at the outset and throughout the construction stage, with large inflows upon practical completion. Discounting techniques will be most aggressive at the point of the realization of revenue. Crosby et al (2018) found the development period had the highest impact on IRR for development projects. Longer projects resulted in a lower IRR which is inverse to the accepted capital budgeting literature and may indicate that cash flow measures may not be appropriate for trader developers.
- national property development organizations operating in multiple geographic regions have greater use of qualitative frameworks as a decision ‐ making process and lower use of MDC as a hurdle rate: this is the opposite to Australian/New Zealand developers operating in their domestic markets.

6.2. Recommendations

It is important to recognize the contribution of this research in terms of why the findings are interesting, what they add to the literature and the practical, real-world implications. A large quantity of data has been collected, analyzed, and then synthesized from the perspectives of the background literature, focused property development decision making literature, and from the empirical data collected. The synthesis and analysis of these elements, of which this study is comprised, allows the formulation of several recommendations for the Australian/New Zealand property development industry in respect of determining the feasibility of potential projects. More specifically, the research confirms the reliance on heuristics across the range of developer types investigated in Australia and New Zealand. The empirical findings contribute to the literature by confirming previously unvalidated perceptions of generally held assumptions of where the hurdle/target rates' genesis arose. The practical implications for the property developer are that:

- property developers need to utilize a pre ‐ determined process and method of altering or adapting the chosen hurdle rates and benchmarks along the basis of several criteria including:
    - the level of risk and uncertainty concerning input variables which must be forecasted
    - the type of planning approval already obtained or required for the potential project
- to incorporate the recommendation of having a pre ‐ determined process and method of adapting hurdle rates, property development decision ‐ makers, if using simple MDC, ROC, ROE, or return on revenue (ROR) decision metrics, also need to utilize a time value of the money hurdle rate. This allows for varying risk premiums commensurate with the anticipated risk and uncertainty in a potential project.
- developers need to incorporate more modern and sophisticated models of risk analysis to determine the uncertainty of, and risk in, a change of input variables in their financial

viability appraisals. In recent times there have been advances in proprietary feasibility analysis programs and Microsoft Excel add‐ins that are readily available, and which offer the use of Monte‐Carlo stochastic simulations and other probability‐based quantitative techniques. Property development organizations in Australia could utilize these specific techniques in the pre‐commitment stages of the property development process and, specifically, in the site acquisition process to support decision‐making.

- in practical real-world implications, property development organizations, in conducting a feasibility analysis to determine financial viability in the precommitment stages of the development process, need to utilize specific debt and equity structures in their modelling, as these are more practical and realistic for their purposes than relying on the 100% finance method often represented in the literature and employed by valuation firms to determine site value.

6.3 Limitations and further research

The study is limited to a sample of property practitioners working in Australia/New Zealand at the time of data collection in 2016. While there are some prospects for generalization beyond these physical constraints, further empirical research is needed spatially and temporally to determine the extent of these prospects. The need for further research has also signaled the finding of the same heuristic bias industry property types, developer typologies, and differing ownership structures and project sizes. It would be beneficial to conduct further research into small- to medium-sized development organizations' decision‐making practices and, in particular, the extent to which these organizations should use different metrics in project selection than those currently adopted when undertaking larger projects.

An additional factor is the survey results indicating a very low level of adoption and use of sophisticated quantitative techniques including Monte Carlo simulation, probability analysis, qualitative risk matrix, and real option theory. This corresponds with Hutchinson *et al*.'s (2017, p.10) finding of very low levels of use of sophisticated decision‐making models for property investors and developers in the UK. While they attribute this to the perceived difficulty in applying models to heterogeneous assets, senior management reluctance to accept new approaches, and gaps in the knowledge and human capital required to incorporate sophisticated modelling techniques, it seems that the prospects for improvement in feasibility practices currently rely on an improved understanding of these technical and attitudinal difficulties and their possible resolution.

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