

RISK MANAGEMENT IN THE DUTCH REAL ESTATE DEVELOPMENT SECTOR: A SURVEY

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ABSTRACT: Real estate development is considered to be the most risk taking enterprise in the construction industry. This paper presents the results of an explorative survey of the top representatives of the Dutch real estate development sector on the usage of risk management. The survey is based on in-depth interviews to gain insight of the real estate development process, the risks involved, and the risk analysis and control methods used. With regard to risk analysis, it was found that real estate developers do not make use of probabilistic techniques; scenario analyses are thought of as most applicable because of the complexity of real estate development; several methods to assess the total risk exposure are used; and intuition and experience are necessary for decision-making. The characteristics of the real estate development process and the best practices concerning risk management will be used to develop an improved risk management method for real estate development.

Keywords – real estate development, risk management, decision-making, interview survey

1. INTRODUCTION

Many people think of real estate developers as very risk taking organisations making lots of profit, while using their gut feeling to decide on the purchase of land or the design to be realised. All of these assumptions can be questioned, as little is known about how risk management is applied in the practice of real estate development. In the literature several studies are described on the application of risk management in the construction industry:

- Akintoye and MacLeod (1997) carried out a survey on risk analysis and risk management of 70 UK contractors and 30 project management practices;
- Uher and Toakley (1999) carried out a survey on risk management in the conceptual phase of a project of 200 Australian organisations in the construction industry, of which 37 were property developers;
- Baker, Ponniah et al (1999) carried out a survey identifying the most successful risk analysis techniques of over 100 large companies within the construction industry, and every oil and gas operator in the UK;
- Lyons and Skitmore (2004) carried out a survey on the usage of risk management techniques of 44 organisations involved in the Queensland (Australia) engineering construction industry comprising owners, property developers, consultants and contractors.

These studies focused mainly on the construction industry as a whole, not describing the specific risk characteristics of real estate development. However, it is clear that the risks taken by a property developer differ strongly from the risks taken by a consultant or a contractor. Therefore, it is interesting to conduct research specifically on real estate development. The objective of this study is to gain insight of the risk characteristics of real estate development and the best practices used to manage these risks.

The previous studies were based on a survey through a questionnaire, describing the usage of risk management in general. To gain deeper insight in the usage of risk management

explaining the reasons behind the different techniques and, as a follow up, being able to propose a more appropriate risk management method for real estate development, the research method used in this study is a survey through in-depth interviews. The results of this explorative survey are presented, conclusions are drawn and implications for a new risk management method are suggested.

2. THEORETICAL FRAMEWORK

2.1 Risk management

Risk management has been object of research in several industries and academic disciplines. With regard to real estate development, Byrne and Cadman (1984) identified risk as ‘the measurement of a loss, identified as a possible outcome of the decision’. Analysing other definitions (Cooper and Chapman, 1987; Raftery, 1994; Wang and Roush, 2000) it can generally be said that a risk is constituted of a probability and a magnitude component. The probability component is in each discipline equally measured. However, the magnitude or the effect of a risk can be expressed in different ways, for instance in terms of physical damage, but usually it is finally measured in economic terms. For example, in environmental studies a risk is expressed in social, economic, human health and other environmental costs. In this study risk is considered to be the exposure to the possibility of economic or financial loss from the perspective of a real estate development firm; an opportunity is the counterpart of risk resulting in economic or financial gain.

Risk management is usually described as a cycle composed of risk analysis, risk response, and risk control (Gehner, 2003). Most literature focuses on risk analysis techniques aimed at identifying and assessing risks. To assess or quantify risks people make use of objective or subjective estimations of the probability and magnitude of a risk. As real estate development is not like gambling in a casino, one has to rely largely on subjective judgements of the riskiness of an action, which is defined as risk perception (Sitkin and Pablo, 1992). The risk response or a decision is based on the risk propensity of people or the willingness to knowingly take risks’ (Simon et al., 2000). As for risk control one can take risk measures according to the four general types of risk response: avoidance, reduction, transfer, and acceptance of a risk.

2.2 Real estate development

‘Real estate development is a multifaceted business, encompassing activities that range from the renovation and re-lease of existing buildings to the purchase of raw land and the sale of improved parcels to others. Developers are the coordinators of those activities, converting ideas on paper into real property’ (Peiser and Frej, 2003). The process through which this objective can be realized is described in general terms of the process, actors involved, and functional types of developments by several authors (Cadman and Austin-Crowe, 1991; Birrell and Gao, 1997; Miles et al., 2000; Peiser and Frej, 2003). Fisher (2005) contributes to the theory of real estate development by presenting seven major elements that define the complexity of the process; long-term trends, the economy, property markets, actors, government, the site and the events-sequence. In addition to these elements, Gehner (2005) mentions the unique character, the sensitivity to contexts and the life time of real estate as reasons for complexity and riskiness of real estate development.

A specific focus on risk analysis comes from Miles and Wurtzebach (1977) and Gehner (2003) who both propose a risk analysis framework exclusively adjusted to the real estate development process. Their research mainly focuses on the techniques of risk analysis in order to evaluate risks. However, the relationship with the next step of the risk management cycle is underexposed, whereas the applicability of the risk analysis is determined by the extent the risk analysis either supports decision-making or the daily project management practice. The individual and organisational aspects of risk management must be taken into consideration.

2.3 Risk management supporting decision-making

In the search for a risk management method that supports decision-making, it can be argued that the risk management perspective should correspond with the perspective in decision-making. Considering the risk analysis techniques, it is clear that the underlying paradigm is ‘a rational, engineering approach, that is based on the idea that the outcome and probability of a risk can be assessed more or less objectively and decisions are made in a rational way, that is following logical decision rules’ (Gehner, 2005). However, the leading perspective in decision-making is the bounded rationality theory saying that people act intentionally rational, but only limitedly so, as reality is complex and ambiguous, information is limited, and time pressure is often high (Simon, 1977). People base their decisions on their risk perception and propensity, which are influenced by cognitive biases and social processes. Therefore it is interesting to know the complexity and possibilities of making risks in real estate development explicit and more or less objective to prevent people from the negative consequences of irrational decision-making.

3. RESEARCH METHODOLOGY

To gain insight of the real estate development process, the risks involved, and the risk analysis and control methods used, an explorative survey is carried out based on in-depth interviews. The interviews are obtained from a selection of Dutch real estate development companies. In the Netherlands over 100 real estate development companies are active at a regional or national level with only a few of them operating abroad. As most developments are on national territory, the Dutch real estate development sector has adjusted itself to a large extent to the local characteristics of market, legislation, and spatial and land policy. This distinguishes it from the same sector in other countries.

To start with, a first selection is made that comprises of the 41 largest companies having an investment value of projects in portfolio over 400 million euro (Wessels, 2004). The research problem does not require a representative selection of the sample; it is more interesting to investigate real estate development companies which are 1) able to carry more risk because of their size in comparison to smaller companies, 2) supposed to be professionally organized and therefore are frontrunners in the field of risk management. From this first selection companies are excluded which are either subject to a merger or take-over, and companies that develop exclusively for owner/users and, in doing so, take no sales risks. A total of 31 companies were approached. The sample consisted of 13 independent real estate development companies, 4 financier related, 8 contractor related, 4 investor related, and 2 remaining categories (owner-user, housing corporation). The sample gives a representative distribution over the different backgrounds of the companies in the Netherlands.

A total of 15 companies took part in the interviews, thereby giving an overall response rate of 48% (see Table 1). The response rate varied over the different backgrounds showing the lowest response rate from the investor related companies. A possible explanation for this may be that these companies are restricted in their development activities by legislation and therefore are less interested in professionalizing the real estate development sector. However, the number of interviews per category is too limited to draw valid conclusions on the differences between the categories. The interviewees were general managers or directors (9), risk managers (2), project managers (2), or financial directors/controllers (3), all of whom were regarded as the specialist on risk management within their own organisation.

Table 1. Response rate of real estate development companies by background

	Independent	Financier related	Contractor related	Investor related	Remaining categories	Total
Number targeted	13	4	8	4	2	31
Number responding	7	3	3	1	1	15
Response rate	54%	75%	38%	25%	50%	48%

In depth semi-structured interviews were conducted, recorded, reported and returned for confirmation. The interview schedule comprised of a total of 20 questions focusing on four main aspects: the organisation structure related to the project teams and the decision-making process; the phasing and risks of the real estate development process; current and desired risk analysis techniques; and the decision-making process determined by information flows, decision criteria and decision behaviour. Respondents were asked to elaborate on these issues to gain on insight of the essence of real estate development and the dilemmas in strategic decision-making they face. The results in the next section are restricted to the relationship between characteristics of the real estate development process and the risk analysis techniques. The other topics are only treated slightly. The analysis of the results consists of finding similarities and differences within the responses and with existing theories. Similarities lead to general descriptions of real estate development, while differences might hint at best practices that can be put forward as exemplars for the development of a risk management method for real estate development.

4. RESULTS

This section provides insights in the phases of the real estate development process, the risks in real estate development and the current and desired use of risk analysis and control techniques. At first the main concepts are defined based on existing theories, second the results from the interviews are presented and some preliminary conclusions are drawn.

4.1 Phases of the real estate development process

Birrell and Gao (1997), like other authors (Cadman and Austin-Crowe, 1991; Miles et al., 2000; Peiser and Frej, 2003), describe the real estate development process as a list of phases, such as site selection, feasibility survey, design, and letting, all using different headings. However, these phases are functional descriptions of activities. In this study phases, or stages, are viewed as temporal groupings of activities, according to Miles and Wurtzbaach (1977) who describe the real estate development process as interactive stages, while at each stage in the process different aspects of development planning, financing, marketing, and construction

are accomplished. The process can roughly be divided into the phases: acquisition, development and construction (Oude Veldhuis, 1993). Gehner (2003) distinguishes the following activities:

- land acquisition: all activities concerning the acquisition of land, including site identification, investigation and purchase;
- planning application: all activities concerning the granting of all necessary building permits by following the planning procedures;
- design and construction: all activities concerning the management of the design, tendering and contracting, and construction process;
- marketing: all activities concerning the rental and sale of the real estate project, including a market analysis, feasibility studies and promotional activities;
- financing: all activities concerning the raising of necessary funds under the investments.

In the survey the interviewees were asked for their phasing of the process and for the most important decision moments. Looking at the process, nearly one third of the developers do not subdivide the three main phases, acquisition, development and construction. Just over half of all respondents subdivide the process following the traditional steps of the design and construction process, being sketch design, preliminary design, final design, specifications and working drawings, tender, site preparation, and construction. And two development companies divide the phases based on the planning and marketing activities, as they think of these activities as far more decisive factors concerning the critical path (in terms of time, quality and money) of the process. In their opinion, the advisors (architects, construction engineers, environmental advisors, etc.) in the Dutch construction market have reached such a high level of professionalism that they do not influence the critical path.

Despite the differences in phasing, the respondents were almost unanimous on the most important decision moments or gates in the process. A gate is defined as a 'project review point where continuation or termination decisions are made' (Schmidt and Calantone, 2002). Nearly everyone mentions two decision moments as most important because of their irreversibility. The first decision moment is the commitment to a project either by a site purchase or by an engagement with a municipality or client. It is only possible to go back on this decision by selling the site or dissolving the contract. This decision moment marks the step from acquisition to development. The second crucial gate we find at the start of the construction phase. Once construction has started, all financial obligations are committed so abandonment has become unrealistic. The decision of starting construction works is strongly related to the marketing process.

4.2 Risks in real estate development

As real estate development comprises of such a wide scope of activities from the initiation of a project to completion, the risks involved are numerous. In the literature an exhaustive overview of risks in real estate development cannot be found. Most studies concentrate solely on construction management and contractor's risks (Ng and Skitmore, 2002), others have a much broader scope on large engineering projects in several industries (Miller and Lessard, 2001), or research focuses on risk allocation in PPP or PFI projects (Li and Akintoye, 2001). In general, a risk can be described in terms of its causes and its outcomes. Usually risks are described on the basis of causes, varying largely in the level of detail. Miller and Lessard (2001) distinguish at the lowest level of detail market-related risks, completion risks and institutional risks. Well-Stam et al. (2003) propose in their risk management method to

identify risks according to environmental, legal, political, technical, social, fiscal, organisational and spatial perspectives.

In the interview survey the respondents were asked to list the most important risks and indicate for what reasons these risks are highly prioritised. The risks are generally described in risk categories that can be subdivided in risks with a higher level of detail. These categories are either related to the main activities of the real estate development process or the above mentioned perspectives. In table 2 an overview of risks is given that is mentioned during the interviews varying in level of detail: this list is exemplary and not exhaustive, because the risks are not systematically obtained.

Table 2. Risks in real estate development

Risks	Respondents	Percentage
risks of planning procedure	15	100%
delay of development process	15	100%
marketing risks	15	100%
technical/construction risks	15	100%
legal/judicial risks	12	80%
risks of abandonment	10	67%
objection against building plans	8	54%
tendering: construction costs	5	33%
changes in politics	4	27%
changes in legislation	4	27%
design errors	4	27%
risks of site acquisition	4	27%
interest risks	4	27%
opposition of administrative machinery	3	20%
delay in construction time	3	20%
risks of making ready for building	3	20%
archaeological excavation	3	20%
land pollution	3	20%
protected flora and fauna	2	13%
liability risks	2	13%
financing risks	2	13%
fiscal risks	2	13%
risks of monumental building	1	7%
vacancy	1	7%
longer time to rent/sell	1	7%
risks in rental/sale price	1	7%
bankruptcy of advisors/contractor	1	7%
construction defects	1	7%

All developers consider the risk related to the procedures of area planning and building permits as most important. The reason they think of the procedural risk as most important is that it is hardly possible to influence the causes and it has many indirect effects. Some of the more detailed causes of the procedural risk are:

- changes in politics;
- resistance/opposition of administrative machinery;
- objection against the building plan by a citizen;
- changes in environmental legislation (land pollution, protected flora and fauna, archaeological excavation, conservation of monuments and historic buildings).

This risk will result in a delay of the project with many indirect consequences, such as an increase of interest costs, possible necessary changes in the design, and postponement of the start construction which accordingly leads to a delay of the completion date and thus influences the marketing process. Because of all the risks involved in the planning application procedure, it becomes clear that this procedure makes up the critical path for the whole process. All other activities should be geared to this process.

The marketing risk is thought of as the second most important by most developers, because it is dependant on the variations in the real estate market and therefore hardly controllable. The real estate market causes various effects on the variables determining the revenues of the project:

- decrease in rental/sale price;
- decrease in velocity of sales;
- higher vacancy rate;
- lower investment value (increase of gross initial yield).

Knowledge of the real estate market is essential for managing this risk: this knowledge is used in the feasibility study as well as in the marketing plan. If a plan turns out to be unprofitable, a real estate developer might consider changing the design: therefore the plan has to be flexible as well as the process. Process flexibility can be guaranteed by making as little commitment as possible.

Most respondents consider the risks affecting the construction costs as less important, because this risk is manageable. These risks include the categories: design risks, soil risks and construction risks, which can be caused by:

- design errors;
- construction market/tendering;
- construction defects;
- bankruptcy of contractor or designer;
- site pollution, archaeological excavations;
- delay in construction time.

During the design process many of these risks can be managed for instance by conducting a soil survey, changing the design, thus changing directly the construction costs, or hiring qualified advisors, thus preventing design and estimation errors and guaranteeing optimisation of the spatial design. With regard to construction, the real estate developer is able to transfer most construction risks to the contractor or by taking out insurances and to reduce risks by (hiring) good construction management. Though construction seems not that risky because of all possible control measures, outcomes can be very negative if construction is not adequately managed. Construction errors causing real damage to people or its surroundings will result in legal procedures about liability, which usually will be recouped either from the contractor or from the real estate developer.

Next to all mentioned risks respondents identify one exceptional risk, being the risk of abandonment. This risk occurs when one of the activities turns out not to be realisable.

4.3 Risk analysis

In risk management literature the term risk management is often used when it exclusively concerns risk analysis. Risk analysis is only part of risk management aiming at making risks

explicit either in a qualitative or in a quantitative way. Several risk analysis techniques are described in the context of project and construction management, such as a sensitivity, scenario, or stochastic analysis, the expected-monetary-value method, risk-adjusted-discount rate method and real options (Byrne and Cadman, 1984; Flanagan and Norman, 1993; Raftery, 1994; Leung and Hui, 2002). Evidently, real estate development companies carry a lot of risks and managing these risks is inherent to their daily practice. In this part of the survey respondents were asked to what extent they make use of risk analysis techniques to make risks explicit and for what reasons they use or do not use the available techniques. The general conclusion on the current use of risk analysis techniques that can be drawn is that probabilistic risk analyses are not established in the real estate development sector, but that risk management is approached in a far more qualitative way (see Table 3).

Table 3. Use of risk analysis techniques

Risk analysis technique	Respondents	Percentage
Intuition/experience	15	100%
Qualitative description	15	100%
Scenario/sensitivity analysis	12	80%
Risk premium	4	27%
Checklist	3	20%
Assessment of total risk exposure	2	13%
Probabilistic techniques	0	0%

All real estate developers make use of some risk identification technique as part of an investment proposal consisting of a financial estimation and a qualitative description of the project. The risk identification is not aimed at completeness, but at making the most prominent risks explicit. For this aim a checklist can be useful so as not to overlook risks, especially when it concerns inexperienced managers. Other instruments to identify risks, such as a risk matrix, are hardly used: obviously, intuition and experience play an important role in risk management of real estate development.

When it comes to quantifying risks, most respondents make use of sensitivity or scenario analyses. The input for this kind of a quantitative analysis is merely based on subjective estimates as there is a lack of statistical and objective data. For the same reason, added with the difficulty of modelling the interdependencies of all variables and risks, the respondents have no faith in the results of probabilistic techniques. The respondents think the benefit of the sensitivity and scenario analysis techniques is that people consciously assess a project by making estimates of the future and the possibility to model and evaluate risk strategies.

Next to these risk analysis techniques two respondents explicitly make use of a model to assess the total risk exposure of a project especially in the initiative phase of a project. The total risk exposure is the maximum loss one suffers when the project is abandoned at any moment during the project. The risk exposure or loss consists of the total of costs increased with the financial commitments already made reduced with the execution value of the site and the project (if this can be valued). In general a project is not abandoned after the start of construction as the commitments made exceed the effects of still present risks. The aim of this risk analysis technique is to weigh the risk exposure of all projects against the equity of the firm to assure the continuation of the organisation.

In the interviews the respondents were also asked for their future expectations regarding the usage of risk analysis techniques. Most respondents are satisfied with their best practices and are looking for a slight improvement on their current techniques. The general response as for risk analysis techniques is that they see no future for extensive quantitative and probabilistic techniques. They mention two reasons: in the first place because they think too

little objective, statistical data is available, and in the second place because they would rather focus on risk control measures.

Still, some future prospects are given for risk analysis. Some respondents indicate that tools to support the planning of a project are desirable because data are lacking, estimates often turn out to be too optimistic, and the risks related to time aspects are numerous. A proper risk analysis could possibly lead to more accurate time schedules and therefore reductions in several other indirect risks. Furthermore, some respondents are especially interested in a method to determine the risk profile of a project in order to support decision-making by comparing projects. In determining a risk profile, qualitative as well as economic characteristics need to be expressed in comparable figures, which can only be done by making use of historical data of projects and experience of real estate developers.

4.4 Risk management

In accordance with the risk management cycle a risk analysis is followed up by risk response and risk control. The risk response is part of decision-making and is supported by a risk analysis. From a narrow perspective, risk response aims at deciding whether to accept, reduce, transfer or avoid a risk and adding a risk measure to this response. In a broader perspective, risk response aims at deciding whether or not to accept the total of risks in a project. Similarly, risk control can be seen as the execution of specific project-related risk measures in a particular project or, in a broader perspective, as the total of methods or systems in an organization to manage risks. During the interviews the respondents mentioned several methods to manage the real estate development process, which in literature on risk management is not directly considered to be risk management, but happens to be best practice.

In the first place, all respondents make use of some process protocol in which criteria are set in terms of temporary results for each of the activities in the real estate development process to decide on the continuation of a project. These criteria can be seen as decision criteria as well as risk measures to keep the development process under control. For each decision moment different criteria are set in terms of qualitative results. For example, at the start of development the following criteria are set:

- the first survey on ownership, soil, and zoning plan of the site indicate a positive prospect;
- the market analysis is positive for the proposed functional program;
- the functional program can be transformed in a spatial concept that meets the specified level of quality;
- the project is financially feasible.

And at the start of construction suchlike criteria have to be met:

- to be owner of the site;
- to have reached a fixed percentage of pre-rental/sale agreements;
- to have obtained an irrevocable building permit;
- to have arranged financing.

By using these qualitative criteria a lot of risks are reduced or even avoided. However, in practice the actual decisions have to be made when a project does not meet all criteria. When reaching this dilemma the risks of deferring must be weighed against the risks of proceeding: these risks can be analysed either qualitatively or quantitatively, but at least the risk is taken consciously. In practice intuition plays an important role in summing up all risks in different

activities and weighing them. A process protocol helps to weigh the risks by making explicit the ideal relationships between the different activities.

Furthermore, some risk management methods are used that go beyond specific projects. The application of a risk premium as a part of the budget is one of these instruments: although a risk premium sometimes is considered to be a risk analysis technique, it does not actually reflect the effect of the risks in a particular project as the percentage is usually standardised. Another risk management method mentioned by the respondents is document administration in which, for instance, standard contracts are regularly updated with improved clauses. In this way prior experiences of an individual become accessible for everyone within the company and risks might be prevented. Yet another form of managing risks is knowledge management: hiring people with the right competences and updating people's knowledge on hot topics by workshops, lectures or courses also contribute to the management of risks due to increased awareness of the risks and availability of knowledge of how to prevent or reduce risks.

5. CONCLUSIONS

The results of this explorative survey indicate some similarities with existing studies and give some new insights in real estate development. The phases and activities mentioned by the respondents can be found in several previous studies as described in the previous section. However, in the literature activities are presented as independent activities, whilst the activities are interdependent. Moreover, not the activities concerning design and construction, but the planning procedures and marketing activities determine the duration of phases. As for the risks of real estate development, the existing literature does not provide a list of risks. This study does not provide an exhaustive overview of risks, but determines the three most important risk categories, namely the risk concerning the planning procedure, marketing risks and construction risks. The importance depends on the extent to which the risks can be objectively evaluated, and can be influenced and thus controlled.

With regard to the use of risk management in real estate development the results are in line with the results of the studies mentioned in the introduction. Lyons and Skitmore concluded an overall preference 'for the use of qualitative methods of risk analysis ahead of quantitative and semi-qualitative methods' (2004) and the most frequently used risk assessment techniques are intuition, judgment and experience (Akintoye and MacLeod, 1997; Lyons and Skitmore, 2004). Moreover, 'the main obstacles to applying risk management in the conceptual [or initial] phase of a project life cycle were identified as inadequate knowledge [of risk assessment techniques] and the lack of understanding of its potential benefits' (Uher and Toakley, 1999). These conclusions also count for real estate development.

From these results some suggestions for risk management in real estate development are made. In the first place it can be concluded that the phasing of activities in the real estate development process, the risks involved and the usage of risk analysis techniques are joined together at the gates in the decision-making process. Schmidt and Calantone (2002) remarked that gates 'are crucial for maintaining a reasonable level of risk during an NPD [New Product Development] project' and also that 'although gates are a prominent feature of NPD processes, they have received little research information'. Both remarks apply to real estate development. Therefore, in future research it is relevant to develop a risk management method that concentrates on supporting the decision-making process in real estate development.

The risk management method should address the most important gates in the real estate development process, being the start of development and the start of construction. These

gates are distinctive with regards to the amount of information available as well as the measures that can be taken to control risks. Moreover, the decision problems move from a continuation/termination decision towards a satisficing decision, since the amount of commitments makes the process irrevocable. This distinction asks for a different type of risk analysis. At the start of development there is more need for assessing whether the total risk exposure is acceptable in relation to the firm's equity, while at the start of construction one is more interested in analysing which risk management strategy leads to the most satisfying result.

Next to differences in decision problems, differences in risks also ask for a particular risk management method. Analysing the results, the risks in real estate development can be classified in two categories. The first category consists of risks relating to the unique characteristics of a project, for example the technical and functional program of the design, the site, and the actors involved. These project specific risks can be quantified with several known risk analysis techniques, for example sensitivity or scenario analyses, and can be managed by several risk measures. The second category consists of risks originating from the parallel sequence of activities and the interdependency of these activities. Time is crucial for this category of risks. As one of the real estate developers characterised these risks: 'if time was no constraint, I would not run any risk'. Managing these risks comes down to harmonising the parallel activities with each other at the gates by formulating qualitative decision criteria. This means that part of the risk management method is a process protocol in which the real estate development process is generalised and decision criteria are formulated taking account of decisive project features.

Finally we can conclude that a risk management method should not be a normative decision model in line with the rational engineering approach and the rational choice theory. On the contrary, many variables determine the success of a project, just as many decision criteria determine a decision. These decision criteria are not solely based on an economic perspective, but also derive from behavioural and cognitive processes (Tversky and Kahneman, 1974; Janis and Mann, 1977; March and Shapira, 1987; Sitkin and Pablo, 1992). Therefore, future research on risk management in real estate development should not only concentrate on analysing the risks of a project, but also take account of the organisational setting of the decision-making process.

6. REFERENCES

- Akintoye, A.S. and MacLeod, M.J. (1997). *Risk analysis and management in construction*, International Journal of Project Management, **15**(1), pp 31-38.
- Baker, S., Ponniah, D. and Smith, S. (1999). *Risk response techniques employed currently for major projects*, Construction Management and Economics, **17**(2), pp 205-213.
- Birrell, G. and Gao, S.B. (1997). *The UK property development process: its phases and their degree of importance to profitability*. RICS Cutting Edge Conference, Dublin, RICS Foundation, pp 1-23.
- Byrne, P. and Cadman, D. (1984). Risk, uncertainty, and decision-making in property development Spon, London.
- Cadman, D. and Austin-Crowe, L. (1991). Property development (3rd edition), E. & F.N. Spon, London.
- Cooper, D.F. and Chapman, C.B. (1987). Risk analysis for large projects (Models, Methods & Cases) John Wiley & Sons, Chichester.
- Fisher, P. (2005). *The property development process; Case studies from Grainger Town*, Property Management, **23**(3), pp 158-175.

- Flanagan, R. and Norman, G. (1993). *Risk management and construction* Blackwell Scientific Publications, Oxford.
- Gehner, E. (2003). *Risicoanalyse bij projectontwikkeling* Uitgeverij SUN, Amsterdam.
- Gehner, E. (2005). *A cognitive perspective on risk management in real estate development*. International Conference on Construction and Real Estate Management, Penang, pp.
- Janis, I.L. and Mann, L. (1977). *DECISION MAKING; a psychological analysis of conflict, choice, and commitment* Free Press, New York.
- Leung, B.Y.P. and Hui, E.C.M. (2002). *Option pricing for real estate development: Hong Kong Disneyland*, *Journal of Property Investment and Finance*, **20**(6), pp 473-495.
- Li, B. and Akintoye, A. (2001). *VFM and Risk Allocation Models in Construction PPP Projects*. Doctoral research workshop: Simulation and modelling in construction, Edinburgh University, ARCOM, pp 16-21.
- Lyons, T. and Skitmore, M. (2004). *Project risk management in the Queensland engineering construction industry: a survey*, *International Journal of Project Management*, **22**(1), pp 51-61.
- March, J.G. and Shapira, Z. (1987). *Managerial perspectives on risk and risk taking*, *Management science*, **33**(11), pp 1404-1418.
- Miles, M. and Wurtzebach, C.H. (1977). *Risk analysis in the real property development process: a conceptual framework and a computer simulation model*, *Journal of Business Research*, **5**(4), pp 325-357.
- Miles, M.E., Berens, G. and Weiss, M.A. (2000). *Real Estate Development: Principles and Process* (third), ULI - the Urban Land Institute, Washington D.C.
- Miller, R. and Lessard, D. (2001). *Understanding and managing risks in large engineering projects*, *International Journal of Project Management*, **19**(8), pp 437-443.
- Ng, S.T. and Skitmore, R.M. (2002). *Contractors' risks in Design, Novate and Construct contracts*, *International Journal of Project Management*, **20**(2), pp 119-126.
- Oude Veldhuis, M.C. (1993). *Wat is projectontwikkeling?* Neprom, Voorburg.
- Peiser, R.B. and Frej, A.B. (2003). *Professional Real Estate Development; The ULI Guide to the Business* (2nd), Urban Land Institute, Washington.
- Raftery, J. (1994). *Risk analysis in project management* E. & F.N.Spon, Londen.
- Schmidt, J.B. and Calantone, R.J. (2002). *Escalation of commitment during new product development*, *Journal of the academy of marketing science*, **30**(2), pp 103-118.
- Simon, H.A. (1977). *The new science of management decision* (3rd), Prentice-Hall, New Jersey.
- Simon, M., Houghton, S.M. and Aquino, K. (2000). *Cognitive biases, risk perception, and venture formation: How individuals decide to start companies*, *Journal of Business Venturing*, **15**(2), pp 113-134.
- Sitkin, S.B. and Pablo, A.L. (1992). *Reconceptualizing the determinants of risk behavior*, *Academy of management review*, **17**(1), pp 9-38.
- Strien, P.J.v. (1986). *Praktijk als wetenschap* Van Gorcum, Assen.
- Tversky, A. and Kahneman, D. (1974). *Judgment under uncertainty: heuristics and biases*, *Science*, **185**, pp 1124-1131.
- Uher, T.E. and Toakley, A.R. (1999). *Risk management in the conceptual phase of a project*, *International Journal of Project Management*, **17**(3), pp 161-169.
- Wang, J.X. and Roush, M. (2000). *What every engineer should know about Risk Engineering and Management* Marcel Dekker, New York.
- Well-Stam, D.v., Lindenaar, F. and Kinderen, S.v. (2003). *Risicomanagement voor projecten; de RISMAN-methode toegepast Het Spectrum*, Utrecht.
- Wessels, P. (2004). *Top 101 projectontwikkelaars*, *Property NL Magazine*, **4**(17), pp 36-59.