Search for sustainable land use policy solutions: a regional case of municipalities in financial danger

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Abstract

Purpose - Dutch municipalities have an important role in the land market. They may act as an active stakeholder in land developments. At the same time, municipalities are entitled to set the land use policies. As a result, Dutch municipalities are the largest land owners present at the Dutch land market. The impact of the economic crisis badly damaged the financial situation of the municipalities due to their large land portfolio. Therefore, it is important to quantify those risks and test new land use policy solutions for the most risky cases.

Design/methodology/approach – First, to indicate which municipalities have the highest financial risk, this paper applies a multi criteria analysis with publicly available financial data from 67 municipalities in Noord-Brabant region, the Netherlands. Second, 3 relevant cases within the most vulnerable municipalities were selected in order to derive 2 sustainable land use policy and relevant criteria to estimate their application potential. To estimate the importance of the success criteria and rate the potential policies a fuzzy Delphi method is used. Additionally, we distinguish two groups of experts, municipality (13 participants) and independent consultants (15 participants). Fuzzy Delphi is considered an excellent method to gather such diverse panel data since it supports expert diversity in its procedure and calculation.

Findings - This paper benchmarks the municipalities with the greatest financial risks and investigates the applicability of sustainable land use intervention policies.

Originality/value – First, this paper reveals the severity of the financial situation of municipalities that took the active role in land market. In addition, this paper contributes to the larger pool of possible sustainable land use policies by identifying, structuring and rating the most relevant criteria to test the best applicable policy. For this purpose, we introduced the method that highlights the importance of rigorous procedure for the panel data collection and advances the weighting of the criteria and rating of potential new land use policies. This is of particular importance for the policy makers since the future land use influences the future marketability and cost of a development.

Keywords: sustainable transformation, land use policy, fuzzy Delphi method (FDM).

1. Land acquirement by municipalities and economic crisis

In the early 1990s the announcement of the locations of future development (*Vinex-wijken*) by the Ministry of housing and area planning (*Ministerie van Volkshuisvesting en Ruimtelijke Ordening*) made clear a residential construction output was wanted by the State. These *Vinex-wijken* were planned on the outskirts of cities, mainly on agricultural land. This governmental policy made the acquirement of land popular among commercial actors and municipalities. Also, the economic climate was very good whereby the available capital grew; a possible investment was land. Investments in land were mainly done by municipalities but also on large scale by developers, housing associations, contractors and investors.

In areas where a high construction output was demanded by governmental policy, the municipalities searched for commercial partners to help them reach their construction quota. For the commercial actors it was helpful to secure their future construction output as with the ownership of the land also comes the right to self-realization on this land. Hereby, municipalities often bought the raw land and were responsible for the land development (transformation of raw land to building land) and commercial actors had the intention to buy the building land for the real estate development. The municipalities acquired the raw land with the expectation of future development; the acquirement price for this land is between the value in the current use (mostly agricultural) and the value in the future use (residential). After the transformation to building land and the change in land use the municipality sells the building land to the developer and gained profit from this increase in land value.

This results in profit which can be used by municipalities to cover losses on other land developments: as example 1) the profit from these easy projects on outskirts of the cities can be used to cover losses on more complex, urban (inner city) developments or 2) the profit from the development of free sector dwellings can be used to cover the losses on the development of social sector dwellings in the same project (Segeren, 2007). When after this settlement still profit is made, it is used in the fund *Bovenwijkse voorzieningen* to finance the newly constructed infrastructure and sometimes also to finance social facilities as swimming pools, libraries or theatres (van Hoek et al, 2011).

In the summer 2007, a crisis in the financial markets arose and within two years the consequences revealed itself in the real estate market. A drop in demand and overplanning of spatial developments resulted in uncertainty about the scheduled plans; when will they be developed or will they be developed at all. The acquirement of the raw land is already partly done by developers, housing associations and municipalities. This is financed with loans; the delay results in increasing interest costs. In addition, the sale of the building land stays out because of the delay. It is uncertain how the price for building land will develop and if the projected revenues will be achieved. In some cases the profit is already evaporated and turned into losses on land developments. This uncertainty about the market value, projected revenues and the increasing interest costs result in losses on the land and a great strain on the budgets of municipalities. Due to these losses municipalities need to economize and thereby are shrinking in personnel, investing less in social facilities and postponing their ambitions on sustainability.

1.1 Reaching possible sustianble policy land solutions for municipalities in financial danger

As mentioned previously, in the times of economic growth the municipality was an active stakeholder on the land market. Thereby they invested extensively in land. Due to the economic crisis the financial risks are becoming clearer and result in losses on land developments. In particular, municipalities have bought much land with the expectation of area development. Because of the economic crisis area developments are delayed and in some cases even cancelled. Staying behind the allocation of building land, uncertainty about the market value and projected revenues resulted in significant losses. Some municipalities are already in, while others are close to, financial danger due to the losses on their land surplus.

The total problem (from a developers', housing association', investor' and municipal' point of view) of losses on land supply is very complex. Therefore this paper focuses on the financial problems of municipalities due to the losses on their land supply and the possible sustainable policy solutions to solve/minimize these financial problems. In this paper, only the area developments on the outskirts of cities with (future) residential land use are studied. The province Noord-Brabant is taken as a study case.

2. Methodological procedure to select municipalties in financial danger and suggest land policy solution

Generally, the methodological procedure to determina municipalities in financial danger and suggest land use policy solution consists obviously of two parts (Fig. 1.): (1) two different multi criteria analysis (MCA) to determine current municipal situation because of losses on land developments, (2) fuzzy Delphi method (FDM) was used to determine the applicability of possible sustainable policy solutions to minimize the losses on the municipal land supply and look sustainable towards the future again.

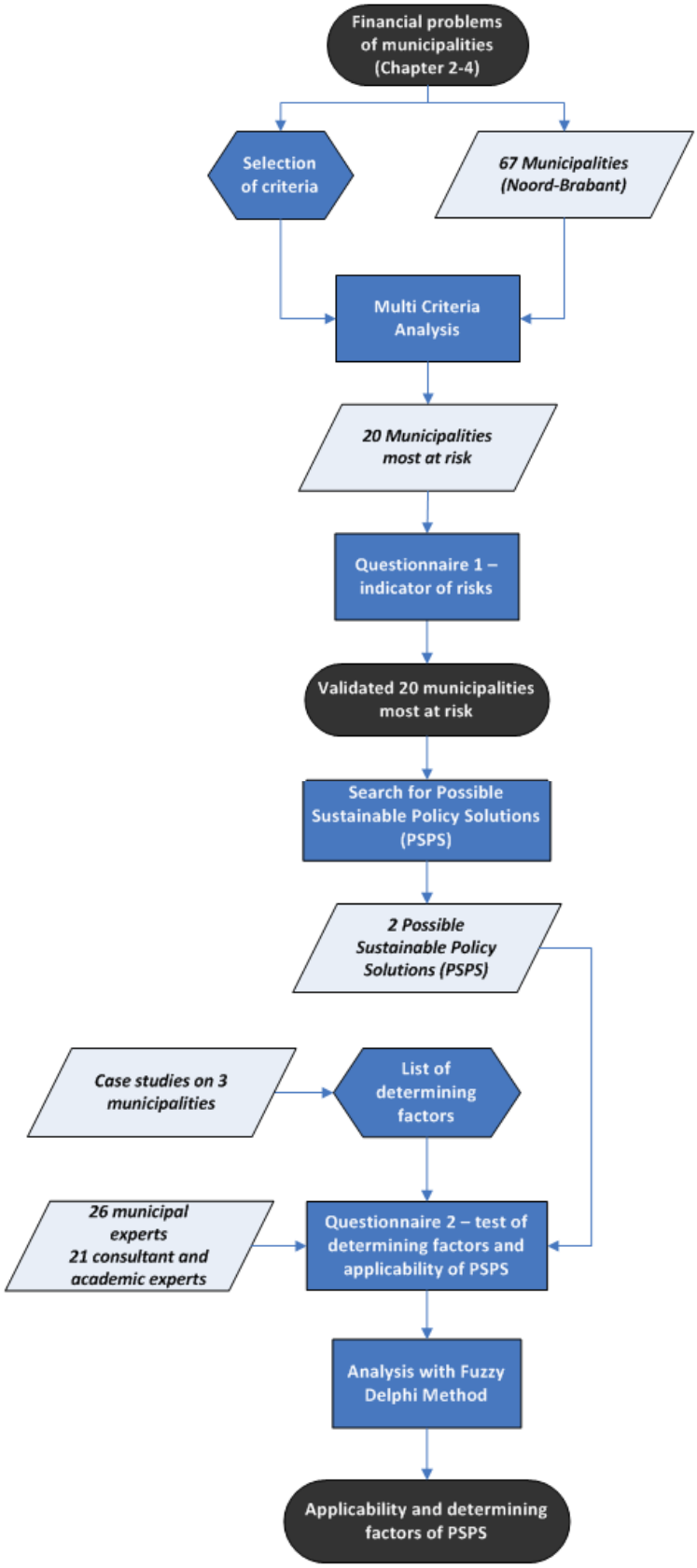

Figure 1. Methodological procedure to select municipalties in financial danger and suggest land policy solution

First, to indicate which municipalities have the highest financial risk, this paper applies a MCA analysis with publicly available financial data from each of 67 municipalities in Noord-Brabant region, the Netherlands. This analysis is done on the most recent data, the municipal balances and budgets of 2011 from their annual reports. Furthermore, for the 20 municipalities that are at most risk of financial danger their situation is further explored with questionnaire 1 to indicate current problems and handling of these municipalities.

Second, 3 relevant cases within the most vulnerable municipalities were selected in order to derive 2 sustainable land use policy and relevant criteria to estimate their application potential. To estimate the importance of the success criteria and rate the potential policies a FDM is used. The possible sustainable policy solutions are determined by means of expert meetings and desk research. Furthermore, the policy solutions are evaluated with questionnaire 2 among municipal, consultancy and academic experts on determining factors and applicability. The results are ranked and wighted factors but also the applicable land policy solutions.

2.1 Methods

Multi criteria analysis (MCA) is used in a variety of forms and ways in qualitative and quantitative research. The basic definition used in this paper follows: "MCA is a decision-making tool developed for complex multi-criteria problems that include qualitative and/or quantitative aspects of the problem in the decision-making process" (Voogd, 1983). The MCA in the used form consist of the ranking of the financial situation of municipalities by means of different criteria. This results in an overview of the financial situation of all municipalities in *Noord-Brabant* regarding their land supply. Every municipality in *Noord-Brabant* is scored on every criteria based on the quantitative data from the annual report of 2011. The maximum score of every criterion is 100 and the minimum score is 0. In that way, it is possible to compare these different criteria. On the level of one criterion the municipalities are compared mutually; it is aimed to determine the financial situation of a certain municipality in comparison to the other municipalities in *Noord-Brabant*. The maximum score of 100 is given to the municipality where the specific criterion has the most financial negative influence on the financial situation. The minimum score of 0 is given to the municipality where the specific criterion has the least financial negative influence on the financial situation. All municipalities in between are scored in comparison to the relative deviation from the absolute value of the maximum and minimum.

There are three basic types of information uncertainty, namely ambiguity, discord and fuzziness (Klir & Yuan, 1995) that are covered by numerous uncertainty theories. Due to the human factor in evaluation, in this case the importance of a certain factor, a type of the uncertainty is present. That is the fuzziness resulting from the lack of definite or sharp distinction. Therefore, the fuzzy Delphi method (FDM) will help to give an overview of the factors relevant for the applicability of the policy solutions. As recommended in Delphi literature, for homogenous groups, the expert groups should have a minimum response of 10-15 people to conclude reliable from the results. In both respondents groups (A and B) this minimum response is achieved. The following steps are taken. 1) Validate predefined list of factors: this done by means of three case studies and resulted in the determining factors for policy solutions 1 - regional and financial settlement and policy solutions 2 - temporary use by the placement of solar panels. 2) Collect opinions of expert groups A and B with questionnaire 2: the two policy solutions are described and subsequently the experts are asked to score (ordinal scale 1 to 10) these factors and conclusively determine the applicability of each policy solutions. 3) Analyse results of questionnaire with FDM: by means of the calculation of the trapezoidal fuzzy number and subsequently defuzzification of the experts' scores eventually the definite value (S_j) is derived per factor and per policy solutions.

3. Results

3.1 Current situation at municipalities in Noord-Brabant

In this paper, the municipal land supply of all municipalities in Noord-Brabant is analysed in more detail from collected data from annual reports of 2011. The most important characteristics can be derived from the annual reports regarding land supply and the municipal financial situation can be looked up.

The supply of a municipal balance consists of land that is: not in development (LNID), land in development LID and other supply. They all have different characteristics (Table 1).

Table 1. Characteristics of municipal land supply in annual report

	LID	LNID	Other supply
Valuation based on	Future land use	Current land use	Current land use
Administrative status	All planning procedures finished (determined in zoning plan)	Council decision for future development	No council decision
Status of book value	Activated on municipal balance and financial estimate of land development is at least once a year updated	Activated on municipal balance and process and interest costs are annually added	Not activated
Actions when losses occur	A provision is arranged or amortized directly from book value when losses in land development occur	Amortized directly from book value or transferred to LID when book value is higher than market value	n/a

The general reserves of municipalities are freely disposable and used to cover possible financial setbacks. In some municipalities, a specific reserve for land development exists. This reserve specifically covers the risk of land development and can, when necessary, be supplemented by the general reserves. Other municipalities do not have a specific reserve for land development but cover possible losses directly from the general reserves. At least once a year municipalities update their land developments, in the annual report. When losses on land developments occur, as stated above, the municipality is obliged to cover this by the use of their reserves. This can be done in two ways: a) by taking the losses by amortizing these losses from the book value with the reserves. With this solution the book value decreases with the size of the estimated losses directly; b) by arranging provisions from the reserves to cover these losses. This way is most often used because these provisions can annually be adjusted and therefore it is possible to recover a certain book loss over time. Although the land development is estimated as best as possible it is variable over time and the result can change over time. With the arrangement of provisions the possible losses are covered and over time can be adjusted on the most recent developments.

The total book value of land supply per inhabitant (criterion 1) in the municipalities of Noord-Brabant differs strongly. Veghel and Maasdonk have the largest land supply with a book value per inhabitant of respectively € 4.974,- and € 4.765,-. A significant share of 44 of all (67) municipalities have a book value of land supply of < € 1.000,- per inhabitant. The total book value of supply as share of the total assets (criterion 2) is in 29 of all municipalities < 20% and in 29 municipalities > 20% but < 40%. In Maasdonk (70%), Veghel (64%), Boekel (56%) and Heusden (55%) the total land supply represents the biggest share in value of the total municipal budget. The global resistance capacity (criterion 3) shows major dispersion. In total 53 of all 67 municipalities have more reserves than land supply. It is plausible these municipalities are more able to cover possible losses on land developments. However, to state this with enough certainty further research is necessary on project level, as the possible losses depend on many different variables. Of the 14 municipalities which have more land supply than reserves in book value the highest scores are for Heusden, Veghel, Maasdonk and Gemert-Bakel. These municipalities thereby have the least reserves in comparison to their total land supply. The total book value of the land supply (criterion 4) showed the relatively large municipalities with the highest scores. However, also other relatively smaller municipalities scored very high on this criterion e.g. Veghel, Veldhoven and Heusden.

When looking at the outcome (Fig. 2) the score of the municipality Veghel is remarkable; a total score of 400 is the maximum and this municipality scored 391. Furthermore many municipalities in the south east of the province of Noord-Brabant scored high. And the most municipalities are relatively small as to number of inhabitants except Bergen op Zoom (65.845 inhabitants), Roosendaal (77.566) and Breda (173.299).

As all municipalities are scored in comparison to the other Noord-Brabantse municipalities it is clear the twenty highest scoring municipalities (Table 2) are more at financial danger than the other Noord-Brabantse municipalities. In table 2, all scores of Noord-Brabantse municipalities is shown whereas the threshold $S_j>130$ for the twenty highest scoring municipalities is applied. However, due to the limited publicity of data on municipal finances the MCA is not comprehensive. Therefore more information on land supply and project level

is needed.

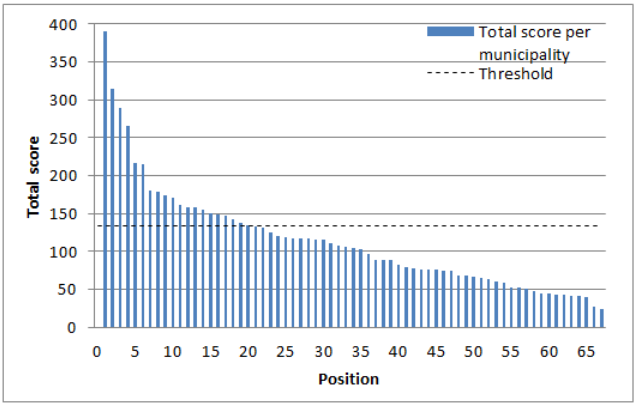

Figure 2. All scores from MCA

	The twenty highest scoring municipalities in Noord-Brabant	Number of inhabitants	Total score
1	**Veghel**	37.303	391
2	**Maasdonk**	11.268	315
3	**Heusden**	42.995	290
4	**Veldhoven**	43.243	266
5	**Nuenen, Gerwen en Nederwetten**	22.213	216
6	**Boekel**	9.772	216
7	**Gemert-Bakel**	28.763	181
8	**Bergen op Zoom**	65.845	178
9	**Uden**	40.536	174
10	**Halderberge**	29.291	170
11	**Dongen**	25.061	161
12	**Bernheze**	29.655	158
13	**Deurne**	31.526	158
14	**Gilze en Rijen**	25.975	155
15	**Best**	28.953	151
16	**Breda**	173.299	148
17	**Boxmeer**	28.575	147
18	**Geldrop-Mierlo**	38.117	142
19	**Bergeijk**	18.061	137
20	**Roosendaal**	77.566	134

Table 2. Highest scores MCA of twenty municipalities

Due to the limited publicity of data on land developments and the sensitivity of this information for municipalities it was difficult to validate the positions of the municipalities. It generally gave more insight in the situation and handling of municipalities in Noord-Brabant. Based on the experts, the interviewed municipalities and questionnaire 1 the current situation and handling of municipalities to minimize losses on their land supply can be summarized as:

- Municipalities are trying to monitor the risks of the land developments more constantly. In the past this was done only once a year; now municipalities update the land developments more times a year.
- Municipalities are reprioritizing and when possible cancelling developments. The *LIND* supply is more revaluated and when development is not possible in the near future the book value is devaluated to agricultural value.
- The phasing of land development is stretched and the making of land costs is postponed as much as possible in anticipation of better market conditions.
- Active land use policy is only used for locations were municipalities have land; for new locations

municipalities are shifting towards facilitating land use policy to minimize risks.

- Municipalities are trying to stimulate the land allocation by actively offer the available land to contractors, developers but also individuals. And some (3) municipalities have started to decrease the land prices.
- For industrial and office areas regional coordination is more and more applied to decrease the number of projects, but for residential areas this is in an early stage.

3.2 Possible sustainable policy solutions

In general, from the MCA and questionnaire 1, there can be concluded municipalities are solely minimizing the losses on land developments and are not looking for sustainable, innovative possible solutions. From scientific publications and expert meetings two possible sustainable policy solutions are derived:

1. Regional and financial settlement (PSPS_R): due to the oversupply in planned residential development the projects do not reach the presale requirement and are thereby delayed (De Zeeuw et al, 2012). The different residential developments in a region need to be prioritized to induce realism in the number of residential developments. That would lead to a decrease in supply to come to the supply and demande equilibrium. In that way, the number of residential developments will be more in balance with the number of dwellings possible to sell.

In this policy solution, the assumption is made, a part of the developments in a region are cancelled and thereby the chance of achieving the presale requirement in the remaining developments is improved. Also, the profit from the completed residential developments is used to compensate the cancellation of the other residential development. This is schematically shown in figure 3. Municipality A cancels its development and municipality B achieves its presale requirement. Furthermore, in figure 4 the payoff matrix in the different situations is shown. The assumption is made when no regional settlement is implemented the presale requirement is not achieved. It shows that for the region the regional settlement is the situation with the least losses.

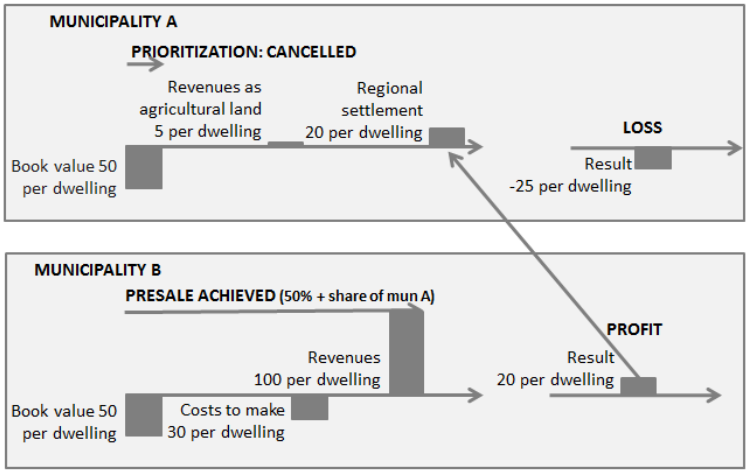

Figure 3. Regional settlement

		Municipality B			
		No regional settlement		Regional settlement	
Municipality A	No regional settlement	-50	-50	-50	-50
	Regional settlement	-50	-50	0 or -25	0 or -25

Figure 4. Payoff matrix of regional settlement

2. Temporary use of the land by the placement of solar panels (PSPS_T): the temporary vacant land can be used for the placement of solar panels. For different scenarios the feasibility of the placement of solar panels is calculated. The investment in the panels is done by an energy company therefore the municipality only gains a lease hold for the use of the land. This lease hold is residually calculated and can be €1,30 per m^2 up to € 3,30

per m^2 land and results thereby in at least two times and up to almost seven times more possible revenues than agricultural use. The annual lease hold per m^2 can be used to cover the annual interest costs on the book value. In this case, the interest costs (with an interest rate of 4%) of a book value from € 32,50 up to € 82,50 per m^2 can be covered.

There can be concluded from the FDM (Fig. 5) that the more applicable is the regional and financial settlement of residential developments (A=6.15, B=6.48) and less applicable policy is the temporary use of municipal land by the placement of solar panels (A=5.56, B=5.78).

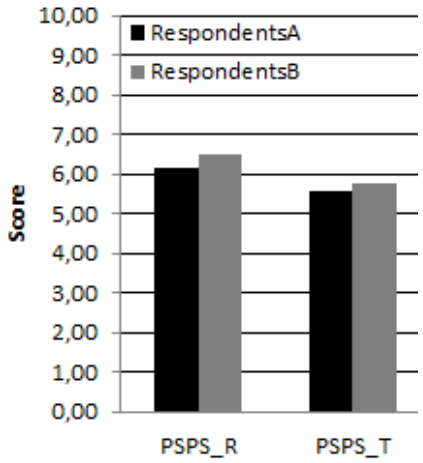

Figure 5. Applicability of policy solutions

For the regional and financial settlement the municipal experts see the administrative aspects such as political cooperation (S_j=*7.27*) and certainty that all municipalities will cooperate (S_j=*7.27*) as the most important factors for applicability. Among the consultancy and academic experts the most important factors for applicability were the financial aspects. The share of the profit that should be donated by municipality B (S_j=*7.00*) and the compensation which is gained by municipality A for cancellation of the development (S_j=*7.15*) are evaluated as most important. As threshold for this policy solution (S_j>*7.00*) is used and the other factors are scored lower and therefore less important.

For the temporary use by the placement of solar panels the financial factors are evaluated as important by the municipalities. The financial feasibility of the business case depends highly on legislation regarding collectively net metering and there is nowadays uncertainty about the development in legislation. The evaluation scores of the respondents, on legislation regarding collectively net metering (S_j=*6.38*), endorse this. Furthermore the run-time period (S_j=*6.43*) is evaluated as important, this is in line with the interviews where was stated that it can be difficult to put the residential development on hold for twenty years. The process of implementation of the temporary use may evoke resistance from municipal politics. Overall the dispersion in evaluations of the factors by the respondents is significantly higher (σ>*2.00*) than in the previous policy.

3.3 Data collection

The two policy solutions as described before are tested on applicability and determining factors among two respondents groups. Among the municipal experts (expert group A) 13 of the contacted 26 experts responded thus making a 50.00 percent response rate. Among the academic and consultancy experts (expert group B) 15 of the contacted 21 experts responded thus making a 71.43 percent response rate.

4. Conclusions & Discussion

The MCA resulted in a ranking of Noord-Brabantse municipalities which are most at risk of financial danger to least at risk of financial danger. This resulted (with threshold S_j > *130*) in twenty municipalities that are most at risk in comparison to the other municipalities. The losses on land developments have resulted for two municipalities in total evaporation of the general reserves over 2012. These municipalities, Nuenen Gerwen en Nederwetten (no. 5) and Gemert-Bakel (no. 7), are now under pre-emption of the province. These municipalities

are thereby directly in financial danger. Furthermore, the general opinion among municipalities, province and experts is when the current economic conditions continue (or worsen) the losses will only increase and more municipalities will come in direct financial danger. In addition, especially the smaller, rural municipalities with relatively large land supplies and small reserves position are the most at risk of financial danger. Thereby the municipalities are now mainly minimizing losses by short-term accounting measures. The need to look for sustainable, long term policy solutions is not present at municipalities. At the same time the number of municipalities in financial danger will only increase as the most recent forecasts do not show improvement in the economic conditions.

The experts are acknowledging that temporary use of municipal land is interesting and the generation with renewable energy sources is one of these uses but still see difficulties in the financial feasibility. Furthermore, regional settlement in residential developments should be the direction of future land use policy in general. This also resulted from the questionnaire among all experts by FDM. The regional and financial settlement is evaluated as better applicable ($S_j = 6.45$) followed by the temporary use of the land by the placement of solar panels ($S_j = 5.68$). Both policy solutions can minimize the losses on municipal land development but more importantly help using the land in a more sustainable way. Additionally, the applications in sustainability (e.g. renewable energy sources) can be part of that sustainable land use.

Further research can be done by modelling the policy solutions (e.g. game theorethical model) and thereby explore the decision making process in more detail. Adding the other stakeholders would also improve the overview of the possible land use policy solutions. In addiiton, more comprehensive overview of the financial danger among municipalities in different areas in the Netherlands can be explored to be able to build up a relavant policy solution concepts tha are applicable on the country level.

This research mainly improved the awareness among municipalities for sustainable, innovative ways of land use (policy). From this research can be concluded municipalities do not exchange views on this subject; the view is mainly limited within the own municipal borders. Therefore it is recommended to cooperatively, by sharing knowledge, learn from the different situations. It is necessary the municipalities share their knowledge to cooperatively limit the losses and look sustainable to the future again. This can be done by sharing knowledge in the first place on administrative level thereby excluding the influence of the municipal politics. And eventually come to a regional land use policy whereby the possibility of financial settlement needs to be further investigated.

Acknowledgements

Ernst van der Leij, Brink Groep

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