

Farmers' perception on options for farm development in a situation of limiting nearby surroundings

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Abstract: Farmers are challenged to integrate changes in the biophysical and societal environment in the farm strategy. Scale enlargement is a dominant strategy for dairy farmers in The Netherlands and is a possible threat to vulnerable assets of regions. Regional development programmes aim to support farm development in such a way that vulnerable assets are protected. Stakeholders in regional development may differ in their perceptions on viability of options for farm development. New services and functions in rural areas are often seen as desirable options for farm development. The farmer as entrepreneur chooses a strategy based on the options perceived by him as viable for future farm income: the perceived Room for Manoeuvre (pRfM). For effective regional development programmes it is important to understand differences between (groups of) farmers in the pRfM. In a case study of 79 dairy farmers 4 clusters were found: 1) based on output (29 farmers), 2) based on the use of on-farm resources (21 farmers), 3) based on on-farm non-dairy activities (21 farmers), 4) based on off-farm income and ending dairy production (8 farmers). The clusters have a different focus on their location in relation to farm strategy. The clusters were related to current, planned and preferred activities using cross tabulation. 'Full-speed' dairy farming is preferred by 35 farmers of which 17 are outside cluster 1. Intensification of dairy farming is planned on 14 farms of which 9 are in cluster 2 and 3. Many farmers have a strong preference for more intensive dairy production, even when options for diversified farming are perceived as viable. Results may be influenced by the fact that all farmers in this case study were tenant farmers. This study shows that the construct perceived Room for Manoeuvre allows to distinguish between groups of farmers on their farm strategy in relation to farm location. In regional development this knowledge can be used in the design of support programmes for farm development, increasing the likelihood of a successful programme.

Keywords: farm development, strategy, room for manoeuvre, (agricultural) entrepreneurship, adaptive capacity, regional development, rural development, diversification

Introduction

Farming systems and farm production level have developed over centuries in a close relation to and in balance with the nearby surroundings (Bieleman 1987). After World War II the process of agricultural modernization started, involving specialisation, intensification and scale enlargement of production. Modernisation was successful in terms of production volumes, yet it loosened the connection between product, production and location (Wiskerke, 2009). An increase in production became possible by importing external inputs to the location of the farm. The intensification of production created negative social and environmental effects on the surroundings of a farm location and therefore a need for prevention of negative effects of farming (Marsden 2003; Wiskerke and Roep 2007). Prevention of negative effects is especially of importance in regions with assets of high natural and cultural-historical value (to be called vulnerable regions in this study) (de Bont et al., 2007). Regional development plans in vulnerable regions aim at supporting stakeholders in the region in developing their activities in such a way that it supports the quality of the assets of the region. In rural areas large parts of the land are in use by farmers (Berkhout & van Bruchem, 2006) making farmers important stakeholders in regional development (de Lauwere, Verstegen et al. 2006). The farmer in his role as entrepreneur has a primary focus on farm development to secure farm income. Farm income is under pressure from the 'squeeze on agriculture': the process of increasing costs and decreasing returns on agricultural products (Van der Ploeg & Roep, 2003). Scale enlargement is a dominant strategy for dairy farmers in The Netherlands (Meurink, 2013). The assets of vulnerable regions are protected by legislation on the effects of farming on the environment and landscape, this poses limitations to the increase of production as option for farm development. The assets of vulnerable regions may as well present new options for farm development from new services and functions in rural areas for urban dwellers (Roep, 2000 ; OECD, 2006 ; Horlings, 2010). These new options will support the assets of the region as they are often linked to the value of these assets (natural and cultural-historical value). Farmers implementing these new options on their farm is thus a desirable development in regional development. Farmers are however -to a certain extent- free to choose their strategy out of the options they themselves perceive as viable for future farm development. Perceptions on the viability and preferability of different options for farm development may differ between stakeholders in a regional development program. Differences between farmers in the perception on viable future farm development are likely as well. For this reason it is important to understand possible differences within the group of farmers on their perception of the viable options for farm development in a situation of limiting nearby surroundings.

Analytical framework

To study the perception of farmers on farm development the construct perceived Room for Manoeuvre (pRfM) is introduced (figure 1). The pRfM is defined as: 'the set of options perceived viable by a farmer to obtain future farm income for his situation on his farm'. The pRfM is the result of a (continuous) process of assessing endogenous and exogenous developments that affect for farm development. The verb 'to perceive' emphasizes that pRfM is highly influenced by the frame of thinking and the specific situation of the farmer at that moment. Exogenous developments are 1) societal developments, 2) market & technology developments in the dairy sector, and 3) 'nearby biophysical and societal surroundings' affecting the farm. The endogenous elements are 1) work experience, 2) networks, 3) personal preferences, 4) entrepreneurial competences, and 5) involvement of the household. When selecting a strategy (explicit or implicit) the farmer chooses the options he will put in practice. This may in turn lead to changes in farm practices. By adding the factor income to the construct pRfM the role of the farmer as entrepreneur is put in the centre.

Research questions

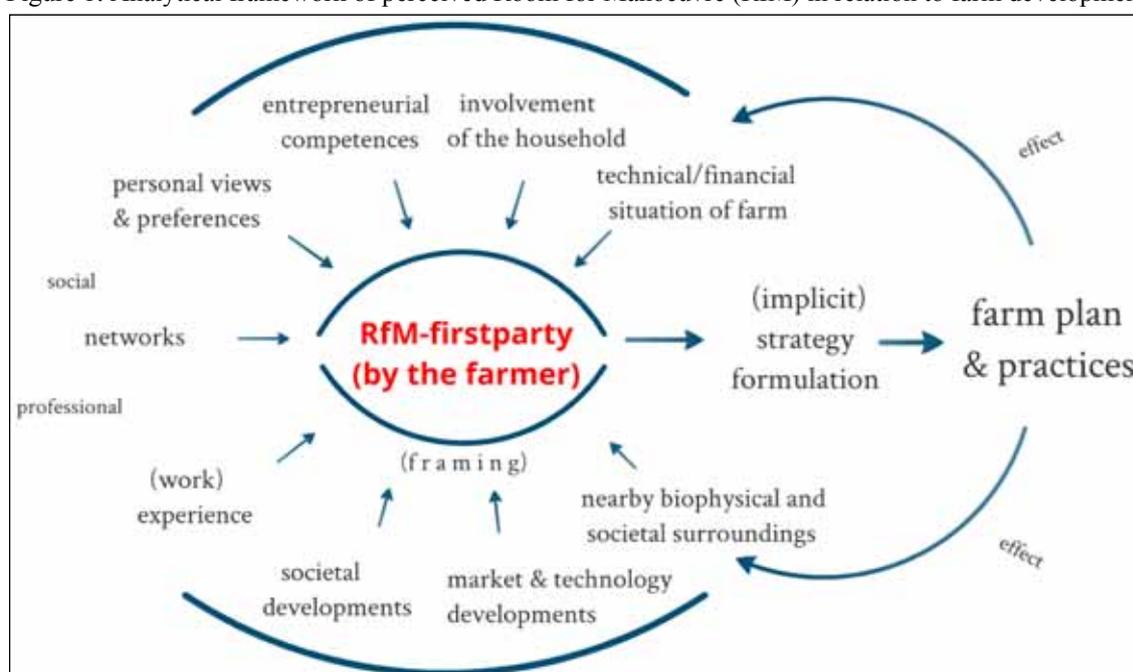
- 1 Are there differences between farmers in the pRfM for farm development in the context of a region with limitations on farm development
- 2 How does the construct pRfM relate to current, planned and preferred activities
- 3 Can the construct pRfM provide insights for a regional development program
- 4 Can the construct pRfM add to farm development and entrepreneurial discourse

We expect that there are differences between farmers in the pRfM and that will reflect in differences in current, planned and preferred activities. We expect that the differences between farmers in pRfM enables to link different groups of farms to policy goals in regional development programmes. We expect that differences in perceived Room for Manoeuvre between farmers will support a further understanding of the entrepreneurial part of farming.

Operationalization

Farmers were presented a list of 15 options for farm development based on an expert view on general and specific developments in the region. The descriptions used were tested in the

Figure 1: Analytical framework of perceived Room for Manoeuvre (RfM) in relation to farm development



trial phase. The options were related to (1) dairy production strategies, (2) obtaining additional income (off-farm job, energy production, nature preservation, processing of milk to products, on-farm customers, care, recreation, other on-farm companies next to dairy) and (3) options related to terminating dairy activities on the location (relocation outside the region, starting another company on location or transfer to residential use only). Dairy production strategies were split in (1) 'steady on dairy': main feed source from own farm land, limited concentrated feeds and by-products, (2) 'full power dairy': high milk production per cow and per ha, high inputs in concentrated feeds and by-products, (3) 'organic dairy': complying to the production standards of organic agriculture and (4) 'joint farming': operating together with other dairy farms as 1 dairy farm. Farmers were asked to select for each option on a 5-point Likert scale their perception on the viability to obtain a relevant part of their income on their farm with this option. The scale ranged from 'certainly not possible' to 'certainly possible'. Farmers were asked to select for their farm (1) the options currently in operation (multiple options possible), (2) the options they plan to put

in practice (multiple options possible), and (3) the option they prefer to do in a situation without limitations (one option to be selected).

Research methodology

The area of Kampereiland was selected as a case study. A questionnaire was designed and tested with dairy farmers and both experts on dairy farming and on questionnaire design. Farmers were given a hardcopy and a personal code to access the digital version on the internet. All non-respondents were contacted after two weeks via e-mail and phone. On closing date, 85 farmers had responded and 79 farmers had completed the questionnaire.

Description of the case study

Kampereiland (The Netherlands) is owned by the city of Kampen since 1364 and covers 4800 ha of which 4200 ha is farmland. The owner enlarged islands in the delta of the river IJssel by land reclamation. The land is used by 108 tenant farmers of which 102 are dairy farmers. Kampereiland is part of a National Landscape due to its river delta landscape with a high natural and cultural-historical value. Two Natura 2000 nature reserves border the area. The owner wants to preserve the natural and cultural-historical value and to increase the area's use by residents of the city of Kampen. This creates limitations to intensification and scale enlargement of dairy farms. Farm income is on average 25,000 euro per year less as on reference farms outside Kampereiland (Methorst, 2013). A regional development program aims to support farmers in increasing their income in a way that respects the vulnerability of the area (Prins & de Hoop, 2010). The goals of the program are: 1) a broadening of the income sources for farmers, 2) increasing margins on production, and 3) decreasing the negative environmental effects of farming.

Statistical analysis

Data reduction was performed using principal component factor analysis with Varimax with Kaiser Normalization. Three components were extracted based on eigenvalue higher than 1 and a minimal variance explained of 50%. The first step of the cluster analysis was performed using Ward's hierarchical cluster. Based upon the agglomeration schedule 4 clusters were determined. The centroid values were used as starting values for the non-hierarchical K-means cluster analysis in the second step.

Results

Four groups of farmers were found which differ in the average scores on the 15 options presented (table 1). The scores were measured on a 5-point Likert scale ranging from 1 as 'certainly not possible' to 5 as 'certainly possible'. Two options score independent from the other options chosen: 'dairy and energy' and 'dairy and off-farm job'. The scores for additional on-farm income related to diversification (care, recreation and on-farm customers) are low with an exception for group 3. Even in this group the average score is hardly above the level of 'maybe'. Experts in the field of farm supported the content validity of the results.

Characteristics of the 4 groups

The groups were described in words based upon the average scores of the options (table 1) and explorative interviews with 13 farmers at the start of the research.

1: Production based – optimizing production

Strong focus on ‘full-speed dairy’ (maximizing production per ha, high imports of feed), joint farming is seen as ‘maybe possible’, energy production may add to farm income: Farm location is the place where I try to reach the highest possible production of milk. Limitations are minimized via external inputs or technical input within a frame of economic optimization

2: Resource based – optimizing the resources

Strong focus on ‘steady-on dairy’, (mainly feed from own land), off-farm job is seen as a possible option as is energy production: Farm location is the place where I try to produce as much milk as possible within the limitations of the land and environment. The amount of feed harvested from my land determines to a large extent the amount of milk produced

3: Location based – optimizing the location

Strong focus on ‘steady-on dairy’, comparable to resources based farming, with a positive perception on diversification as possibility, organic dairy has the highest score in this group: ‘The assets of the farm on this location offer possibilities for income from other activities next to dairy farming by using the assets of the location and the people present on the farm.

4: Off-farm based – optimizing off-farm

Focus on steady-on dairy combined with off-farm job or another company. Orientated towards terminating dairy farming with income from other activities (possibly retirement): Farm location is mainly the location where I live, milk production is likely to end in the (near) future and my income will come from either pension funds or activities elsewhere

The characteristics of the groups fits with the development of milk production per ha in 1985 and 2012. Group 1 has the highest production per ha in both 1985 (14,300 kg/ha) and 2012 (17,900 kg/ha) with a large standard deviation in 2012 (7,700 kg/ha). In 1985 group 2, 3 and 4 were very similar with a production of 12,300 kg/ha. In 2012 group 4 was the least intensive (10,700 kg/ha), group 3 was relative extensive (11,900 kg/ha) and group 2 was the most intensive of these three groups (14,100 kg/ha).

Table 1: Average scores for the clusters on the options presented, 1 = certainly not possible, 3 = maybe possible, 5 = certainly possible. Names for the options are short versions of words used in the questionnaire. The most distinguishing results are highlighted in **bold**.

| Options ¹⁾ \ Groups | 1 Production based | 2 Resource based | 3 Location based | 4 off-farm based |
|--------------------------------|--------------------|------------------|------------------|------------------|
| | n = 29 | n = 21 | n = 21 | n = 8 |
| Steady on dairy | 2.34 | 4.19 | 4.19 | 3.50 |
| Full speed dairy | 4.24 | 2.38 | 2.52 | 1.75 |
| Organic dairy | 1.34 | 1.67 | 2.48 | 1.63 |
| Joint farming | 3.28 | 1.81 | 2.67 | 2.63 |
| Dairy & off-farm job | 2.90 | 3.24 | 3.00 | 3.88 |
| Dairy & energy production | 3.55 | 3.05 | 3.67 | 2.25 |
| Dairy & nature conservation | 2.52 | 2.81 | 3.52 | 2.38 |
| Dairy & processing | 1.69 | 1.48 | 2.71 | 1.13 |
| Dairy & customers | 1.48 | 1.14 | 3.24 | 1.75 |
| Dairy & care | 1.34 | 1.19 | 2.57 | 1.13 |
| Dairy & recreation | 1.66 | 1.19 | 3.10 | 1.63 |
| Dairy and another company | 1.93 | 1.52 | 2.86 | 3.00 |
| Relocating outside area | 2.55 | 1.62 | 2.19 | 3.13 |
| Stop milking, other company | 1.34 | 1.24 | 2.05 | 3.50 |
| Stop milking, residential | 1.45 | 1.62 | 1.76 | 3.25 |

1) A longer description was used in the questionnaire

Current, planned and preferred activities

Farmers were asked the following questions (table 2):

- 1 Can you select the options in practice on your farm '**DO**' (multiple options possible)
- 2 Can you select the options you will or consider to do '**PLAN**' (multiple options possible)
- 3 Which option would you most like to do in a situation of no limitations '**PREFER**' (one option possible)

'Steady-on dairy' is most in practice with 48 farms of which 5 in group 1. 'Full-speed dairy' is in practice at 28 farms of which 21 in group 1. An off-farm job is in practice at 34 farms with an emphasis on farmers in group 1 and 2 (each 11 farms). On-farm energy production is in practice at 16 farms of which 7 in group 1 and 6 in group 3. Dairy combined with nature conservation is in practice on a total of 27 farms (respectively 9, 8, 9 and 1 farms). Joint farming is most in practice in group 1 with 8 out of 11 farms. Farms which have options diversification (on-farm additional income) in practice are all but 1 in group 3. Looking at significance of differences the options 'steady-on', 'full-speed', 'customers' and 'stop milking' are highly significant at $p < 0.01$. Differences in 'joint farming', 'recreation' and 'residential' are significant at $p < 0.05$ level. The main differences between farms concerning current activities is the orientation on either 'full-speed dairy' or 'steady-on dairy' and the orientation towards activities for on-farm additional income (diversification). 'Full-speed dairy' is mainly group 1 and diversification is mainly group 3.

Looking at future strategies ('plan' in table 2) 1 farmer selected 'steady-on' (group 1) and 14 farmers selected 'full-speed' (divided over group 1,2 and 3), intensification is more often

planned as a more extensive production. ‘Energy production’ is selected by 23 farms, divided over group 1, 2, and 3. Activities with diversification (processing, customers, care and recreation) are planned on 9 farms, of which 8 in group 3 ($p < 0.15$). Organic farming is selected by 3 farms in group 3 ($p < 0.05$). Joint farming is selected by 8 farmers of which 4 in group 1 and 3 in group 3. To relocate the farm outside Kampereiland is selected by 4 farmers in group 1 and 1 farmer in both group 3 and 4. Four farmers in group 4 selected the options related to terminating milk production ($p < 0.01$). The number of farmers who do not know yet is highest in group 2 with 5 farmers (significant at $p < 0.15$).

Table 2 presents as well for each of the four groups the preferred option in a situation without limitations. Strongly preferred is ‘full-speed dairy’ with 35 farmers selecting this option of which 18 farmers in group 1. But also in group 2 nearly half the farmers and in group 3 a third of the farmers prefer ‘full speed dairy’. ‘Steady on dairy’ is selected by 14 farmers of which 9 are within group 2 and 3 within group 3. The other 30 farmers have chosen different options, with 5 farmers selecting on-farm diversification. Two farmers have not selected an option of which 1 is in group 1 and 1 in group 2.

Table 2: Number of farmers per cluster on perceived Room for Manoeuvre in relation to current activities (**do**), planned activities (**plan**) (both multiple answers) and preferred activities (**prefer**) (single option).

| Option ¹⁾ / groups | 1 Production | | | 2 Resource | | | 3 Location | | | 4 Off-farm | | |
|-------------------------------|------------------|-----------------|------------------|--------------|------|--------|--------------|------|--------|-------------|------|--------|
| | based n = 29 | | | based n = 21 | | | based n = 21 | | | based n = 8 | | |
| | Do | Plan | Prefer | Do | Plan | Prefer | Do | Plan | Prefer | Do | Plan | Prefer |
| Steady-on dairy | 5 ²⁾ | 1 | 1 ²⁾ | 20 | 0 | 9 | 18 | 0 | 3 | 5 | 0 | 1 |
| Full-speed dairy | 21 ²⁾ | 5 | 18 ³⁾ | 5 | 4 | 9 | 2 | 5 | 7 | 0 | 0 | 1 |
| Organic dairy | 0 | 0 ³⁾ | 0 | 0 | 0 | 1 | 1 | 3 | 2 | 0 | 0 | 0 |
| Joint farming | 8 ³⁾ | 4 | 2 | 0 | 0 | 0 | 2 | 3 | 0 | 1 | 1 | 1 |
| Dairy & off-farm job | 11 | 2 | 1 | 11 | 2 | 0 | 6 | 2 | 0 | 6 | 0 | 1 |
| Dairy & energy production | 7 | 9 | 2 | 3 | 7 | 0 | 6 | 7 | 0 | 0 | 0 | 0 |
| Dairy & nature conserv. | 9 | 1 ⁴⁾ | 1 | 8 | 0 | 1 | 9 | 3 | 1 | 1 | 0 | 0 |
| Dairy & processing | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 |
| Dairy & customers | 0 ²⁾ | 0 ⁴⁾ | 0 | 0 | 0 | 0 | 4 | 2 | 0 | 0 | 0 | 0 |
| Dairy & care | 0 | 0 ⁴⁾ | 0 ²⁾ | 0 | 0 | 0 | 2 | 2 | 4 | 0 | 0 | 0 |
| Dairy & recreation | 0 ³⁾ | 0 ⁴⁾ | 1 | 0 | 0 | 0 | 3 | 2 | 1 | 0 | 0 | 0 |
| Dairy + other company | 3 | 0 | 0 | 0 | 1 | 0 | 2 | 2 | 1 | 0 | 0 | 0 |
| Relocating outside area | 1 | 4 | 1 ³⁾ | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 2 |
| End milk, other company | 0 ²⁾ | 0 ²⁾ | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 2 | 1 |
| End milk, residential | 0 ³⁾ | 0 ²⁾ | 0 ³⁾ | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 1 |
| Other option | 1 | | | 2 | | | 0 | | | 0 | | |
| I will not change | | 7 | | | 5 | | | 5 | | | 1 | |
| Do not know yet | | 1 ⁴⁾ | | | 5 | | | 2 | | | 2 | |

¹⁾ A longer description was used in the questionnaire, ²⁾ $p < 0.01$, ³⁾ $p < 0.05$, ⁴⁾ $p < 0.15$, ns - not significant

Discussion

In the discussion five points of view are important: 1) the usefulness of the concept pRfM to study farmers' perspectives on farm development, 2) interpretation of the results from an entrepreneurship perspective, 3) interpretation of the results from a regional development perspective, 4) the general validity of the findings outside this case study, and 5) further questions arising from the results found.

Usefulness of the construct pRfM

The results show that the concept pRfM allows to distinguish between farmers on their perception of options for future farm development. The high content validity is supported by both experts and the coherence in the characteristics of the farms within and between the groups found. The construct pRfM enables a further study on the relation between farm development and its nearby surroundings. Farm development of the groups between 1985-2012 and the current, planned and preferred activities create a coherent picture. The pRfM is not to be interpreted as the actual farm strategy chosen by the farmer as the concept spans all options deemed viable by the farmer. Out of these options a farmer selects a strategy. The concept pRfM adds to farming styles research as it specifically includes farm location and surroundings in the perception of the farmer on future farm development.

Entrepreneurship perspective

pRfM can be interpreted as 'the total of all viable options for future farm development as perceived by the farmer. A larger pRfM means he perceives more opportunities as viable options for farm development. More opportunities mean a higher adaptive capacity; the flexibility to adapt the farm to changes in the nearby surroundings. This links as well to the literature on opportunity identification and opportunity recognition (McMullen & Shepherd, 2006). A more in-depth analysis of the factors influencing the pRfM of farmers is needed for this aspect. Farmers in group 3 are more positive about options for on-farm diversification. However, 10 out of 21 of the farmers in group 3 prefer to be 100% dairy farmer of which 7 prefer 'full-speed' dairy farming. These farmers do see an opportunity that is supported in the regional development programme but prefer another option. This relates to the motivation to change as described by McElwee (2006) with a difference in 'push' (reactive strategy) or 'pull' (pro-active strategy). The other 11 farmers in group 3 do prefer combinations of dairy with other on-farm activities (a pull strategy). Group 3 thus seems to consist of two sub groups.

The 4 groups of farmers found can be related to an entrepreneurship perspective. Production based farmers relate to 'the agricultural entrepreneur' rationale with a strong focus on product maximization with a high input strategy. Resource based farms relate to 'the traditional farmer' with a focus on balanced growth, limited use of external inputs and a risk averting approach to investments. Location based farmers are the 'diversified farmers' who combine farming with activities to creating income such as care, recreation or nature preservation. This group is in some studies referred to as the 'portfolio' entrepreneur. The off-farm based group refers to farms either terminating the production or replacing dairy production with a different kind of economic off-farm activity. Future development strategies are heavily related to the development of the farm in the past, the so called path-dependency.

Regional development

The results of this study underline the importance of farmers' individual perspective on farm development. Acknowledging these differences supports a diversified approach. The 4 groups found each relate in a different way to the location and the region. Supporting and strengthening vulnerable assets in a region is possible via farmers. Farmers can incorporate these assets in their strategy for farm development using regional identity for branding of food products or the rural setting for care or recreational activities. Location based farmers are most likely to adapt these strategies. Off-farm based farmers may create possible new room for manoeuvre for other farm-

ers by supporting the termination of their activities. Resources based farmers can be supported to sustain farm production levels using a low external input strategy. This type of farming is less likely to pose a threat to vulnerable assets of the region. Nearly half of this group (9 out of 21) would prefer full speed farming, meaning they may not feel really comfortable with the options they perceive viable. The focus on dairy production with a preference for a more intensive approach is important to note (table 2).

Validity of this study

In this case study all farmers were dairy farmers and tenant farmers which may affect the general validity. Experts recognized the 4 groups for its content validity in dairy farming in general. The (relative) number of farms per group may differ between regions due to differences in background of the farmers and the region. Tenant farming has aspects which may set it apart from farms owned by the farmers: 1) external capital, 2) the number of active farms, and 3) effect on culture and personal preferences. In aspect 1, external capital, tenant farmers have less financial security to offer leading to higher interest rates higher required repayments to the bank (Methorst, 2013). For aspect 2, the number of active farms is high compared to other regions (Methorst, 2013). This is related to the lower monetary value of the farm assets. A farmer cannot create funding for a retirement by selling assets and farm succession is more easy since the need for investment capital is lower (Methorst, 2013). Looking at aspect 3, the regional culture and preferences, it is important to note that Kampereiland used to be a regional 'example of modern and big farms' until the 1980's. This might support the tendency to have a focus on a more intensive milk production and it may affect expectations by the farmers to fit in the frame of farm development. The policy of the lessor to redistribute land and milk quota of a farm that stopped among other farmers may have induced a tendency to look mainly at the lessor for possibilities for farm development.

Further questions arising from this study

The construct pRfM is influenced by exogenous and endogenous factors (figure 1). More knowledge on their influence on the pRfM is needed. Knowledge on the pRfM of farmers as perceived by third party stakeholders in the region is needed to see if third party stakeholders see different options for farmers as farmers do. What kind of support programs are effective or successful to increase the pRfM of farmers.

Conclusion

The construct pRfM allows to differentiate between farmers on their perception on viable options for farm development. The current and planned activities of the farmers are in line with the characteristics of the groups. Farmers tend to prefer The number of farmers engaged in diversification or organic farming is low. Full speed dairy is preferred by 35 farmers of which 17 are not in group 1. Diversification of on-farm activities outside dairy farming is preferred by only 6 farmers. Farmers in this region have a high preferences for 'farming' in the meaning of food production, the preference for diversified farming is low. For regional development programs the construct of pRfM supports a diversified approach towards the 4 groups as each of the 4 groups has a different view on farm development in relation to the developments in the region. The construct pRfM offers potential for a better understanding of farm development in relation to opportunity recognition and the adaptive capacity of farmers.

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