Farmers' managerial thinking and management process effectiveness as factors of financial success on Finnish dairy farms

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The objective of the study was to analyze how farmers' managerial thinking and management process effectiveness contribute to profitability of farming. A structural equation model of these two elements of management capacity and financial performance was applied on survey data and bookkeeping results from 117 dairy farms. The model explained one-fourth of the varying profitability of sample farms. The results show that farmers' managerial thinking is connected to farm profitability, but management process effectiveness is not. It was concluded that it is essential for good performance that the farmer has a clear vision of developing farming with business and investment plans. Successful farmers also have a firm confidence in their managerial skills, a strong emphasis on instrumental and intrinsic values, and a high appreciation of farming as occupation. They also see the farm as an entrepreneurial business unit and intend to follow the corresponding principles of management.

Key words: agriculture, management capacity, decision making, management skills, gross margin, operating margin, profitability, bookkeeping, structural equation model

Introduction

Researchers and scholars in the farm management field widely agree that the farmer is one of the most important elements affecting farm performance (e.g. Westermarck 1951, Castle and Becker 1963, Muggen 1969, Barnard and Nix 1973, Bigras-Poulin et al. 1985, Olsson 1988, Tarabla and Dodd 1990, Nuthall 2009). The importance of competent management is emphasized also when the farmer's managerial capacity is seen as the fourth production factor (Rougoor et al. 1998), or when the managerial input is seen as a major resource with nature, labour and capital (Nuthall 2006). Efficiency studies in the farming sector essentially deal with comparing one farm with another. Variations in efficiency are partly due to misallocation of resources and can thus be seen as failures in managerial efficiency, which leaves plenty of room for improved managerial ability (Nuthall 1999.)

McBride and Johnson (2006) note that although the importance of the manager on farm performance is recognized, it has been challenging to measure. Ford and Shonkwiler (1994) state that in econometric studies managerial ability has most typically been defined through a set of demographic variables or proxies of production methods. McBride and Johnson (2006) and Solano et al. (2006) conclude that it is difficult to characterize farm management by basic characteristics of farm operator or proxies like efficiency of financing, solidity of the farm, and success in cattle breeding. Since management is difficult to measure, it has often been handled as a black box represented by limited factors, such as age, education, and drivers or motivations of the farmer (Rougoor et al. 1998, Hansson 2008). Textbooks about farm management focus heavily on production and cost theory to answer questions about resource allocation and optimal input and output mixes. Different management accounting tools that aid the manager in decision-making and in assessment of farm performance are also comprehensively covered. The manager and his or her capabilities and abilities is, however, the key factor in determining how well these formal tools and principles and information created with them can be used in practical decision making.

Rougoor et al. (1998) introduced a general framework of management capacity and environment, biological processes, and farm results. They defined management capacity "as having the appropriate personal characteristics and skills to deal with the right problems and opportunities in the right moment and in the right way" (p. 262). A manager with certain qualities makes decisions relating to the technical and biological processes and other farming issues, which determine the farm's technical and economic results. Stochastic elements, like weather, diseases, and market fluctuations and changes in the operating environment also affect the outcomes. Personal aspects of the manager determine the quality of his or her decision-making process, upon which depends the success of the production processes and the farm's financial performance. Even when a farmer has high personal skills and is running in favorable conditions, it is possible to go wrong with farming if the decision-making process is poor.

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This process is commonly divided into three phases: planning, implementation, and control. These phases are applied to various operational fields, such as finance, production, marketing, and human resources (e.g. Boehlje and Eidman 1984). Gray et al.(2009) note that the terms problem-solving process, decision-making process, and management process all appear in farm management literature, but they should be interpreted to mean the same process of deciding what and how to do on the farm.

The framework of Rougoor et al. (1998) has been applied in several studies (e.g. Wilson et al. 2001, Trip et al. 2002, Solano et al. 2006, Hansson 2008, Manevska-Tasewska and Hansson 2011). Despite the same theoretical framework, operationalization of management capacity varies from study to study. Management ability and management capacity have been used in some contexts as synonymous terms. However, the former deals with personal characteristics, the psychological make-up, of a person while the latter deals with having both the necessary personal characteristics and the skills to deal with the decision-making system. This may include such elements as the management tools being used, the information being processed and the various analyses being performed. Nuthall elaborated on managerial ability concept (Nuthall 1999, 2001, 2006, 2009), with the aim of studying ways to develop this ability. His results suggest that the most important determinants are personality, a person's true intelligence, and exposure to experiences, especially the early parental influence in managerial contexts.

Typically, researchers have analyzed farm management in specific contexts, such as "how do certain management practices affect performance?" (e.g. Puig-Junoy and Argiles 2004, Dinar et al. 2007, Lohr and Park 2006, Hansson and Öhlmér 2008) or "what aspects of farm or farmer can explain certain managerial behavior?" (e.g. Willock et al. 1999, Bergevoet et al. 2004, Ondersteijn et al. 2003, Wolf 2012). Further, the effect of farm management on productivity has been treated in many studies by using different models and analysis methods, but profitability of farms as the dependent variable has gained much less attention. Profitability of a business measures how well the returns cover the farm's long-term operational costs. Weak profitability in agriculture should be of concern, especially for farmers, but also for any institution that cares for the agricultural sector development. Weak profitability signals that something has to be done either on the farm level or policy level, or both, to ensure that costs of production can be compensated and continuity of production and attainment of goals can be secured. From the farmer's perspective, farm profitability controls the viability of the business. Possibilities to maintain good liquidity, to develop the farm, and to achieve other goals of farming in the long run as well as motivation to continue farming will all be endangered if profitability is weak. It is also necessary to notice that profitability, as measured in business economics, considers the entrepreneur's managerial and operational work as a production factor, where increased costs are associated with increased effort and workload. Profitability and productivity both deal within the same framework of profit maximization and cost minimization: improved productivity is a determinant of improved profitability (ceteris paribus). To remain profitable, a farmer has to perform as efficiently as possible (Grifell-Tatje and Lovell 1999, Sipiläinen 2003). While farm productivity is important for effective resource use, farm profitability and achievement of non-economic farming goals are more crucial to farmers and to farming sector development.

This article tries to advance understanding of management capacity composition and its role in achieving the financial goals of farming. The objective is to measure farmers' managerial thinking and effectiveness of the management process as elements of management capacity and to analyze how they contribute to financial success of farms. The theoretical and practical framing and definition of concepts are presented at the beginning of the materials and methods section. The representations of gathering data, operationalization of constructs and structural equation modeling follows. This article later presents the results of data analysis, followed by research discussion and conclusions.

Materials and methods

Rougoor et al. (1998) defines management capacity broadly and generally. Farm management literature has not presented a comprehensive proposal of dimensions for assessing management capacity. Earlier studies have researched only a subset of possible elements, which fit within the framework for a special purpose. Equally, thoroughly tested survey questionnaires or definitions of other indicators necessary to assess different management capacity dimensions have not been introduced (see Willock et al. 1999). In this study, there are two possible elements of management capacity: managerial thinking and management process effectiveness. These terms are defined and their contribution to financial success is analyzed within the framework of Rougoor et al. (1998).

Managerial thinking relates to farmer's personal aspects: it is a question of how farmers think and position themselves as regards to business activities and decision making. Managerial thinking is hypothesized to reflect on farmer's instrumental and intrinsic goals, attitudes towards management, business orientation on farm, trust in the future of farming, and locus of control. The concept of managerial thinking has not been introduced in earlier studies of management capacity, but its definition was inspired by those of Wilson et al. (2001), Trip et al. (2002), Al-Rimawi et al. (2006), Solano et al. (2006), Hansson (2008) and Manevska-Tasewska and Hansson (2011).

Management process effectiveness was defined as the activity that farmers express in decision making. This article hypothesizes that if a farmer is an effective manager, this reflects on his or her amount of planning, controlling, information use and analytical work. The construct definition was inspired by articles referred above and by farm management textbooks that typically present planning, implementation and control as the main management process phases. These are introduced as management tools for enabling correct decision-making to achieve financial and other farming goals. Strategically, recognition of vision, setting goals, and strategic planning are equally presented as a base for successful farm management. Thus, it is hypothesized that farmers' managerial thinking and management process effectiveness are interconnected, and they both have a positive effect on farm profitability. This study focuses only on planning and control management process phases. The implementation phase in a typical family farm, where the owner-operator performs most running tasks, is inseparable from routine work. Thus, it is difficult to measure it adequately with a survey questionnaire (see Trip et al. 2002). Survey questions assessing implementation should also be tailored to each farm according to its farming system properties and strategic and technological choices undertaken by each farmer. A good decision or implementation on one farm is not necessarily suitable for another. Therefore, planning and control activities can be much more universal in nature.

Financial success of farms was measured with two constructs: operating margin and profitability. Operating margin measures the monetary surplus of returns and direct costs of operation without considering costs of investments connected to growth and continuity. Operating margin is crucial in short-run, because it closely connects with the liquidity of the business and forms the base to cover capital costs in the long-run. Technical and biological production processes, which are part of the original framework, are not included in this proposition. Instead, operating margin partially serves at that place too. Profitability is the most important measure of financial success in the long-run since it considers all returns and costs of production that eventually decide viability and continuity of farming. The theoretical proposition of the study is presented in Figure 1. The farm operating environment and biography of a farmer are not included in the proposition. This is because the study's aim is to highlight the roles of managerial thinking and management process effectiveness as elements of management capacity and analyze their possible effects on financial success.

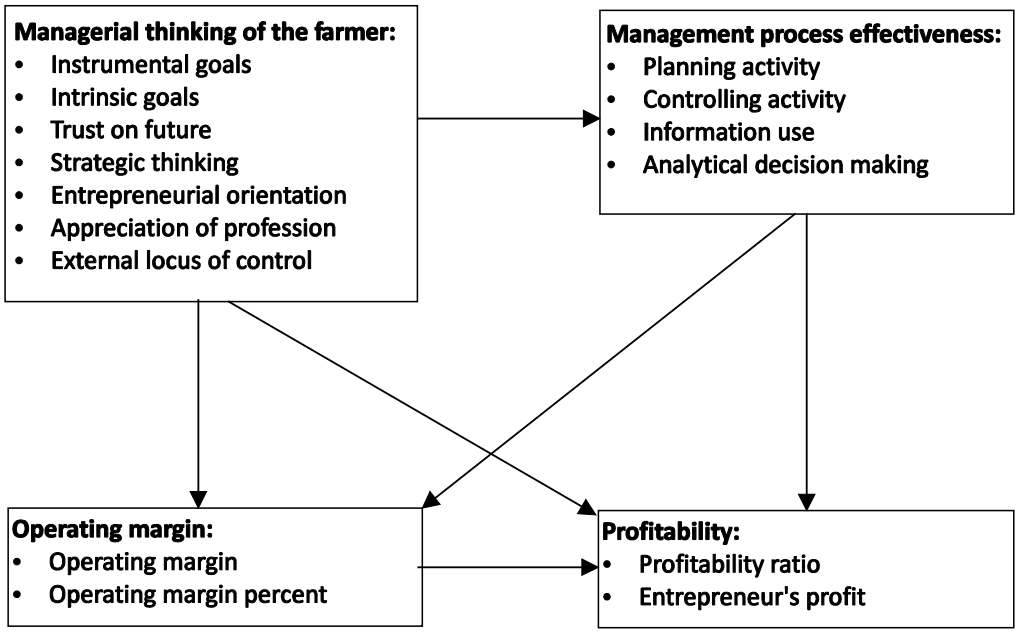

Fig. 1. The theoretical proposition of the study: how managerial thinking and management process effectiveness affect financial success of farms.

The relationships and hypothesized causes (arrows) presented in the proposition can be summarized as follows

1. A farmer's managerial thinking affects the effectiveness of the management process.
2. A farmer's managerial thinking affects the farm's operating margin and profitability.
3. The effectiveness of the management process affects the farm's operating margin and profitability.
4. The farm's operating margin affects, or is a part of, the farm's profitability.

Data for this study were collected from Finnish bookkeeping farms. About nine hundred farmers participate in the comprehensive bookkeeping system a year. The system is maintained by MTT Agrifood Research Finland, and it is a part of the EU-wide Farm Accountancy Data Network (FADN)[1]. The system produces a detailed view of the financial process and financial situation of participating farms. In 2010, a survey was performed among the bookkeeping farms. The survey contained a set of questions that were formed to measure farmers' managerial thinking and management process. It was mailed to farmers in May with the choice to answer either on paper or by completing an electronic survey. Two reminders were sent during the summer, and the survey was closed in September 2010. 302 farmers in total answered the survey. Only dairy farmers' responses were selected for this study, to avoid heterogeneity in management work and financial performance, which is caused by different production lines. Of the survey population, 117 dairy farmer responses were usable, while 345 of them were in the bookkeeping panel. This leads to response rate of 32%. Survey data were merged with financial statements of farms.

Financial success of farms

Financial success of farms was measured by using key figures readily available from the FADN data. To decrease random variation, averages of years 2008 and 2009 were used. Descriptive statistics for the indicators are presented in Table 1. For the liquidity and short-term related financial success, operating margin and operating margin as a percentage of turnover were used. Operating margin is calculated by subtracting all immediate direct costs of production, including the family's wage claim, from the total income of the farm. It shows how many euros are left to cover the capital costs of the farm, which is the depreciation of assets and interest of the farmer's own and borrowed capital. Farm long-term profitability was measured with the profitability ratio and the entrepreneur's profit. The profitability ratio is a relative measure calculated by dividing the family farm income with the required compensation of the farming family's labor and capital. It is commonly used in profitability analyses of Finnish agriculture. Its strengths include the possibility of comparing different kinds and sizes of farms and their profitability development over time, and including opportunity costs of work and the family's capital resources. A possible drawback is that it does not show whether the income received from farming is good enough to ensure a desired standard of living. For such purposes, the profitability ratio should be assessed with an income indicator, such as family farm income. The entrepreneur's profit is an absolute measure of profitability, which shows the net profit that is left after subtracting all operating and capital costs, including the family's wage claim and all capital interest from the total income.

Table 1. Descriptive statistics for farm size and financial success indicators

	Minimum	Maximum	Mean	SD
Turnover (€)	30 352	848 107	202 274	12 767
Herd size of cows	6.5	140.5	33.3	22.8
Operating margin (€)	-78 655	228 503	36 763	53 317
Operating margin percent	-79.03	50.36	11.13	20.62
Profitability ratio	-1.14	1.33	0.65	0.39
Entrepreneur's profit (€)	-146 685	30 418	-26 817	32 628

The average size of farms in the sample, measured with a turnover, was 202 274 € in 2009, which is larger than the average 159 200 € of all dairy farms in Finland. The profitability ratio of farms in the sample is rather low: the average of 0.645 is clearly below the aspiration level of 1.0. The sample farms are more profitable than all Finnish dairy farms as their average profitability ratio in 2009 was 0.56 (Economy doctor 2012).

[1]For more information on FADN, see http://ec.europa.eu/agriculture/rica/.

Managerial thinking of the farmer

The managerial thinking of farmers was assessed as multivariate measurements. Several previous research articles with surveys on farm management were used when the survey questions were developed. The most important ones were those of Al-Rimawi et al. (2006), Hansson (2008) and Willock et al. (1999). Some of the attitude-related scales presented by Willock et al. were applied. almost as such, but most of the survey questions were compiled with logical, intuitive thinking, considering the general idea of a measurement model of latent constructs with manifest variables. Answers to the questions were asked with five or seven-step Likert scales. The scales were "totally disagree – totally agree" or "not important – very important", depending on the nature of each question group. Originally, the survey was planned so that the theoretical proposition concepts could each have been included in a structural equation model as a latent construct. The number of responses (117) was, however, so low that the structural equation model applied had to be simplified, and the count of variables had to be reduced, resulting in using summated scales. Before calculating the values for the summated scales, initial screening of survey items was performed with explorative factor analysis and correlation analysis. At this phase, some of the original questions were removed due to low loadings on the expected factor or high cross loadings on several factors. Scores of negatively loading items were reversed. The survey questions are listed in the appendix of this article. Values for summated scales were calculated as the arithmetic mean of the values of items (Table 2). Reliability of the scales was assessed with Cronbach's alpha reliability coefficients. For all but one of the scales, the alpha exceeded the level of 0.7, and the internal consistency of the scales was thus considered good enough to allow their use as the measures of managerial thinking.

Table 2. Descriptive statistics for summated scales measuring managerial thinking of farmers.

	Mean	SD	Alpha
Instrumental goals	5.07	1.07	0.82
Intrinsic goals	5.92	0.68	0.72
Trust in future	4.67	1.20	0.94
Strategic thinking	4.97	1.05	0.70
Entrepreneurial orientation	5.05	0.89	0.59
Appreciation of profession	4.99	0.97	0.76
Locus of control	4.80	1.04	0.71

Management process effectiveness

Survey questions to measure management process effectiveness were based on articles of Trip et al. (2002), Harrison (2006), Hansson (2008), and on farm management textbooks. Amounts of planning and control activities were measured similarly to variables measuring managerial thinking of the farmer through summated scales, which included items on a seven-step Likert scale. Analytical decision making and information use were measured with five-step Likert scales by asking how much (from "not at all" to "very much") the farmers use listed analysis tools and information sources. For each one, summated scales were calculated as direct sums of item scores. Reliability coefficients for these two scales were not calculated, because rather than being latent constructs with manifest variables, they are sums of the amount, where the items need not be correlated. Descriptive statistics of summated scales are presented in Table 3.

Table 3. Descriptive statistics for summated scales measuring management process effectiveness.

	Mean	SD	Alpha
Planning activity	4.05	1.06	0.79
Controlling activity	5.36	1.09	0.73
Analytical decision making	20.29	5.35	--
Information use	54.97	8.88	--

Structural equation modeling

The theoretical proposition of this study contains several connections between different variables and constructs. Therefore, structural equation modeling (SEM) with reflectively measured latent constructs was considered to be a suitable analysis method. In a reflective SEM model, the correlating manifest variables are considered to be reflected by the latent construct so that the causal relationship is from the construct to manifest variables. The construct exists regardless of the manifest variables that are available to measure it. The construct can be measured with any subset of the manifest variables, and the core of the construct does not change if some of the manifest variables were removed. In a formative model, manifest variables need not be correlated with each other. Causality between a construct and manifest variables is reversed so that manifest variables are seen to impact the construct. Manifest variables, as a group, make up the conceptual and empirical meaning of the construct. The construct is changed if any of the manifest variables are removed or new ones added. (e.g. Jarvis et al. 2003, Roy et al. 2012).

In model selection, it is essential whether the construct exists, regardless of the set of manifest variables used to measure it. Managerial thinking construct in this study captures to what extent the farmer sees himself or herself as a manager. This is measured by how much he or she thinks in a management perspective and how largely he or she sees his or her role as a manager of a business, setting objectives, making decisions, and affecting operational results. The core meaning and magnitude of such a feature or thinking does not change if some of the manifest variables were removed. The management process effectiveness construct measures how actively and effectively a farmer works in the management process. The extent of this effectiveness is manifested through the variables used. The variables are caused by this activity, and the effectiveness as a trait or construct would not be altered if other manifest variables relating to decision-making effectiveness, such as the use of extension services or if attending farmer networks were added to the model. The constructs measuring financial performance were also modeled as reflective. The idea was that financial performance is a feature of the farm. It is a result of a farmer's decisions and operations using inputs and producing outputs on the farm. If farmer's decisions are correct and the operations are successful, the ratio between inputs and outputs is favorable, and the profitability is good regardless of which set of financial indicators are examined. Different indicators of financial performance are typically highly correlated, and several indicators are used in analyses of financial statement to ensure a rich and extensive financial image.

The measurement part of a SEM model deals with latent constructs and manifest (observed) variables that are supposed to be reflections of the constructs. The structural part of a SEM model consists of theory-implied causal relations between the latent constructs. The strengths of SEM modeling lie in its capability to handle several different relations simultaneously, to incorporate unobservable constructs and to account for measurement error of manifest variables (Hair et al. 2006). The hypothesis on relations between observed variables and latent constructs are set a priori based on theory, and a recursive algorithm is then applied to find out whether the covariance matrix of observed variables fits the theoretical covariance matrix implied by the model (e.g. Schreiber et al. 2006). SEM modeling is theory testing by nature, but it is typical to use SEM models also as an explorative tool to change the theoretical model and to develop a new model based on data (Kline 2005). In a general form, a SEM model can be presented with the following three equations:

$$x = \Lambda_x \xi + \delta \quad (1)$$

$$y = \Lambda_y \eta + \varepsilon \quad (2)$$

$$\eta = \mathrm{B}\eta + \Gamma\xi + \zeta \quad (3)$$

The first two equations form the factor analytical measurement part of the model. Equation 1 presents the exogenous manifest variables (x) as reflections of latent constructs (ξ), where Λ_x is a matrix of factor loadings, that is, the effects of latent constructs on their manifest variables, and δ denotes the measurement error associated with manifest variables. The second equation, respectively, combines the endogenous manifest variables (y) to the endogenous latent constructs (η) via a matrix of loadings ($\Lambda_{y)}$ and measurement errors (ε). The third equation is the structural part of the model. It represents the endogenous latent constructs as linear functions of exogenous and other endogenous constructs, and residual effects (ζ). Effects between latent constructs are in the diagonals of matrices B and Γ.

SEM requires that the data follow multinormal distribution and be relatively large, when a complex model is analyzed. The study data set used (n=117) was near the lower bound of what is generally considered a practical minimum. For that reason, the analytical model had to be kept simple and managerial thinking of the farmer and effectiveness of the management process were modeled as two constructs that are manifested through summated scales presented earlier in Tables 2 and 3. To avoid mathematical problems in parameter estimation due to ill-scaled covariance matrices (Kline 2005), the variables getting high absolute values, such as financial success indicators, information use, and analytical decision-making, were converted to normalized scores. Normality of manifest variables was assessed with histogram plots. Few of the variables were normally distributed, but they all followed the bell shape of normal distribution closely without severe outliers. Maximum likelihood (ML) estimation was thus considered justified, especially since ML estimation is relatively robust against small deviations from multinormality assumptions (Diamantopoulos and Siguaw 2000, Kline 2005, Iacobucci 2010). Structural equation analysis was performed with LISREL 8.8.

Goodness of fit for the models was assessed with several different fit indices provided by LISREL. While there are a plethora of fit indices available and much discussion of their properties (e.g. Hu and Bentler 1998, Shah and Goldstein 2006, Iacobucci 2010), following Kline (2005), the ones used in this study were χ^2, root mean square error of approximation (RMSEA), standardized root mean residual (SRMR), comparative fit index (CFI) and akaike information criterion (AIC). Chi-squared (χ^2) is the traditional measure of model fit. The null hypothesis of the test states that the model fits the data perfectly, and thus, a well-fitting model is one where the test statistics do not suggest rejection of the null hypothesis. The χ^2 test is sensitive to violations of multinormality assumption and sample size. In addition, its use is based on the implausible assumption that the model fits exactly in the population, which is known not to be true: any model in a practical research design is only an approximation of the reality. A model may fit reasonably well, even if the χ^2 test suggests model rejection. χ^2 statistics is, however, useful in comparing nested models. According to Iacobucci (2010), there is some consensus in the psychometric literature, that a model fits reasonably if the χ^2 statistic divided by its degrees of freedom is below 3.0.

RMSEA is an index that reflects the view that the model is only an approximation of reality. Typical guidelines to judge goodness of fit state that values below 0.05 indicate a close fit and values larger than 0.10 suggest a poor fit. The degree of uncertainty associated with RMSEA is assessed with its 90% confidence interval. CFI assesses the relative fit of the analyzed model by comparing it with a null model which assumes zero population covariance among the observed variables. A general rule says that CFI values greater than 0.90 indicate a relatively good model fit. SRMR is based on analyzing residuals between observed and model predicted covariances in a standardized form. Values below 0.10 are usually considered to indicate a good fit. AIC is a predictive index that is useful when non-hierarchical models are compared with the same data. It is the model with lowest AIC that has the best relative fit and fewer parameters in comparison to the competing ones.

Results

The empirical analysis was performed in three phases. At the first phase, the two elements of management capacity, managerial thinking (MT) and management process effectiveness (MPE), were examined in a measurement model to confirm a theoretically acceptable, well-fitting and parsimonious latent structure. The constructs of financial performance were then added to the measurement model, and finally, causal dependencies between the constructs were analyzed in a structural equation model.

The measurement model was first defined to have seven variables, the summated scales of Table 2, loading on the MT construct and four variables (Table 3) loading on the MPE construct. Fit measures showed a poor model fit: χ^2 = 101.95 (df=43, *p*=0.000, χ^2/df=2.37), RMSEA= 0.109, CFI= 0.86, SRMR= 0.107 and AIC= 148. Loading of the external locus of control variable on the MT construct did not differ significantly from zero. Instead, modification indices suggested that the model would fit better if this variable loaded on MPE construct. This change would be difficult to justify since the locus of control is more a personality trait than a manifestation of managerial activity. This variable was thus removed from the measurement model, which improved model fit to a reasonable level: χ^2=57.27 (df 34, p= 0.008, χ^2/df=1.68), RMSEA=0.078 (0.0428, 0.112), CFI=0.94, SRMR=0.0792, and AIC=100.6. Modification indices now suggested that the measurement errors of variables trust in future and appreciation of the farming profession are correlated, which means that they have some common variance that cannot be explained by the MT construct. Letting this parameter to be freely estimated would have led to a better fitting model, while the complexity of the model would have increased. To achieve a good fit before advancing to the second phase of analysis, the variable trust in the future was removed from the model. Although this variable can be seen as a

reflection of managerial thinking, it may also be seen as a consequence of the performance. If the financial result of the farm is good, the farmer regards his future possibilities favorably and the other way around. After this removal, the model consisted of five variables loading on the MT construct and four variables loading on the MPE construct with a good fit of data (χ^2=34.28 with df=34 and χ^2/df=1, p=0.126, RMSEA= 0,053 with 90 percent confidence interval of 0.0 – 0.096, CFI=0.972, SRMR=0.066, AIC=72.4). This model was considered to be a reasonably good depiction of analyzed elements of management capacity.

At the second phase of analysis, the constructs of operating margin and profitability, both measured with two manifest variables (Table 1) were added to the measurement model. Model fit was now reasonable (χ^2=87.05 with df=59, χ^2/df=1.48 and p=0.01, RMSEA=0.064 with 90 percent confidence interval of 0.032 – 0.091, CFI=0.931, SRMR=0.078). Further changes were not considered. Model parameters with associated t-test values are presented in Table 4.

Table 4. Measurement model of elements of management capacity and financial performance.

Observed variable	Latent construct	Unstandardized loading	Standardized loading	t-value*
Instrumental goals	Managerial thinking	0.64	0.37	2.93
Intrinsic goals	-"-	0.35	0.20	3.82
Strategic thinking	-"-	0.95	0.55	4.23
Entrepreneurial orientation	-"-	1.0	0.58	--
Appreciation of profession	-"-	0.61	0.35	3.31
Planning activity	Management process effectiveness	1.27	0.89	5.48
Controlling activity	-"-	1.0	0.70	--
Information use	-"-	0.95	0.67	5.15
Analytical decision making	-"-	0.75	0.52	4.38
Operating margin percent	Operating margin	1.0	0.92	--
Operating margin	-"-	0.94	0.86	9.05
Economic profit	Profitability	0.84	0.88	10.56
Profitability ratio	-"-	1.0	1.05	--

(*)To enable estimation of model parameters, one manifest variable of each construct must have a fixed loading and cannot be tested.

One Heywood-case appeared in the solution. The standardized factor loading of the profitability ratio was larger than one, and the associated measurement error was negative, although not significantly different from zero. This was not considered to pose a problem, since the loadings can be interpreted as regression coefficients between the constructs and manifest variables rather than correlations, when constructs in the model are correlated (Jöreskog 1999). The negative measurement error in this case is likely due to the highly correlating manifest variables that are not normally distributed, combined with only two manifest variables per latent construct, and a relatively small sample size.

Especially on the MT construct, the factor loadings were small in comparison to measurement error, which raised a concern of reliability and validity of constructs. Reliabilities were assessed by calculating composite reliabilities (CR), and the validity of the factor solution was assessed by calculating the average variance extracted (AVE) as presented e.g. by Diamantopoulos and Siguaw (2000). The composite reliability of the MT construct was 0.60, and the MPE construct was 0.74. Neither of these is especially high, but since Diamantopoulos and Siguaw suggest that values above 0.6 are desirable for a reliable measurement, it can be concluded that the MT and MPE constructs were measured at a reasonable level of reliability. AVE for the MT construct was as low as 0.24, and for the MPE construct, it was as low as 0.43. Rather low values signal that substantially less variance of the manifest variables was captured by the constructs than was accounted for measurement error. A two-factor solution, thus, seems to be a too simple solution in this regard. The MT construct especially probably is a more multidimensional phenomenon. These dimensions, however, correlate with one another so much that the MT construct can rather reliably catch their common variance.

The analysis was continued to the third phase, the structural model, by determining the hypothesized causal paths between latent constructs of the measurement model. As presented in the theoretical proposition (Fig. 1), a causal path was added from MT to MPE and both of the financial success constructs, from MPE to financial success constructs, and from the operating margin to profitability. This model fitted the data reasonably with the following fit indices: χ^2=87.05 (df=59, χ^2/df=1.48, *p*=0.0102), RMSEA=0.064 (90 percent confidence interval 0.032 – 0.091), CFI=0.931, AIC=151 and SRMR=0.0799. The standardized path coefficient from the MT construct to the MPE construct was 0.61, and from the MT construct to the operating margin 0.59. The path coefficient from the operating margin to profitability was 0.58. Other structural parameters were statistically non-significant. Trimming the model by removing the non-significant paths did not increase the model fit. The final model is presented in Table 5 and Figure 2.

Table 5. Results from structural equation modeling: the structural parameters.

Path	Estimate	Standardized Estimate	SE	t-value
Managerial thinking –> Management process effectiveness	0.74*	0.61	0.20	3.66
Managerial thinking –> Operating margin	0.93*	0.59	0.31	2.96
Managerial thinking –> Profitability	-0.47	-0.26	0.32	-1.47
Management process effectiveness -> Operating margin	-0.25	-0.19	0.22	-1.11
Management process effectiveness -> Profitability	0.03	0.02	0.21	0.16
Operating margin -> Profitability	0.66*	0.58	0.14	4.87

* Statistically significant at least at the 0.05 level.

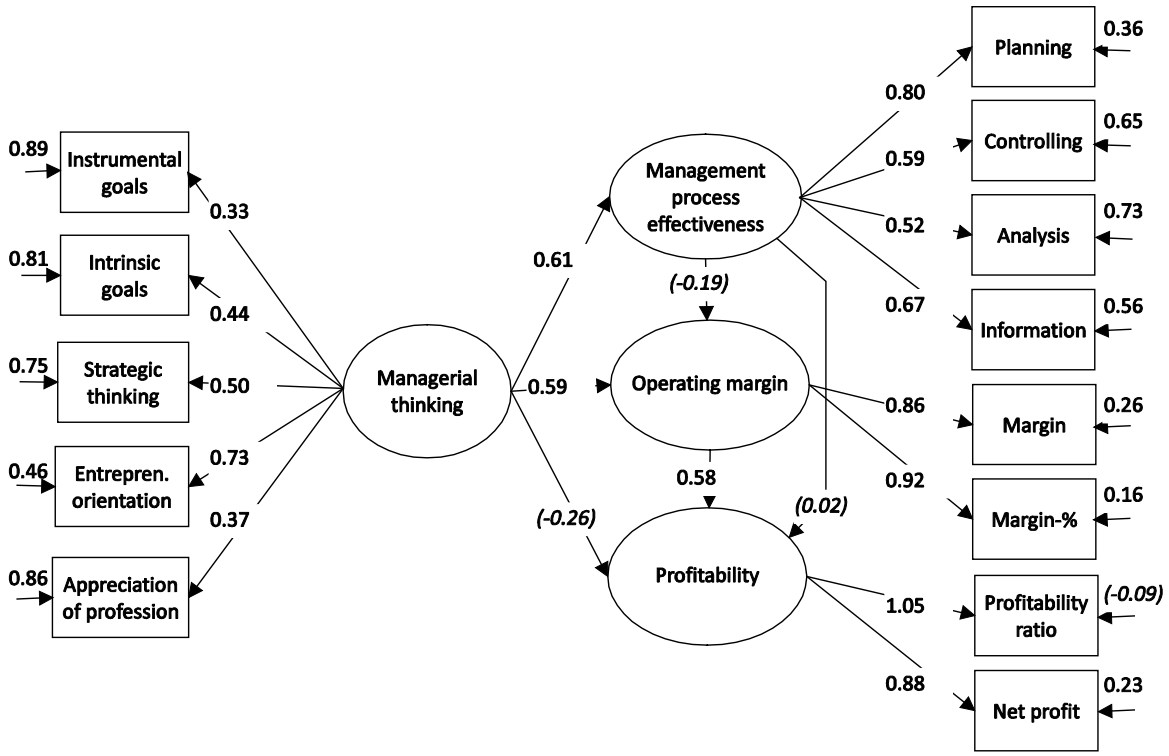

Fig. 2. The structural equation model of constructs of management capacity and financial success of farm (values in the parentheses are non-significant).

The standardized total effect of MT on the operating margin was 0.474. This contains both the direct effect of MT on the operating margin and the indirect effect that goes through the MPE construct. The total effect can be interpreted so that a change of one standardized unit in the MT construct leads to a change of 0.474 standardized units in the operating margin construct. The total effect from MT to profitability was not statistically significant due to a non-significant direct effect, but the standardized indirect effect through the operating margin was 0.287 at a ten percent confidence level. The standardized effect of MT on the MPE was as high as 0.609, but the effects of the latter on both constructs of financial success were non-significant. The model's performance on explaining the variation of financial success can also be examined by the degree of determination (R-squared), which shows how much of the variance of dependent constructs can be explained by the variance of independent constructs. Of the variance of MPE, 37% could be explained by MT. Of the operating margin, MT and MPE together explained 25%. Of the profitability, MT, MPE, and the operating margin together could explain 26%. The last figure is rather high, because the association between the operating margin and profitability is naturally very strong, and the operating margin is a good predictor of profitability. Without the effect through the operating margin, MT and MPE could not explain the variation of profitability.

Discussion

The objective of this study was to analyze how farmers' managerial thinking and management process effectiveness as elements of management capacity, contribute to the financial performance of farms. The results clearly show that the MT construct is connected to financial success. The connection to profitability that is an important measure of long-term success goes through the short-term and liquidity-related measure, operating margin. About one-fourth of the variation of financial success constructs could be explained by the analyzed constructs of management capacity, which can be regarded as a rather strong connection.

To be able to argue for a causal relation between the analyzed constructs of management capacity and financial success of farms, it is necessary to consider the mechanism by which they possibly interact. This is not straightforward, since the MT construct was considered as a trait, a co-varying set of features of the manager. It is not a single action or set of actions or decisions but rather the properties of the farmer behind the decision making and implementation of decisions. The best indicators of MT construct were strategic thinking and entrepreneurial orientation of the farmer. Thus, the effect on profitability can be enlightened by looking back to contents of these indicators (Appendix). Essential for good performance seems to be that the farmer has a clear vision of how to develop farming, has a recognized business plan with plans for investments, and has identified short-term goals. The farmer's firm confidence in his or her managerial skills, the idea of a farm as an entrepreneurial business unit, and the plan to follow the corresponding principles of concise business management, signal a strong entrepreneurial orientation. Other important features of MT include a strong emphasis on the instrumental and intrinsic values of farming with both economic and farm life related goals, and high appreciation of farming being occupation that the farmer can be proud of. This mindset contributes to decision-making and farming actions so that it advances profitability. Farmers scoring high on the MT construct probably are capable of recognizing and focusing on the most crucial aspects of farming in the perspective of financial success.

The second analyzed element of management capacity, management process effectiveness, was clearly connected to the first element, managerial thinking. In other words, farmers with a high level of MT were also active in tasks within the management process: information gathering, data analyzing, planning of actions and controlling of outcomes. In this regard, it was surprising that the MPE construct was not significantly connected to the financial success of farm. This finding is in line with Hansson's (2008) conclusion that actions derived from the farmer's management system influence efficiency less than actions derived from their personal characteristics. Results of Tarabla and Dodd (1990) also stress the importance of the human factors in explaining variation in farm performance in comparison to the group of management variables. On the other hand, results of Manevska-Tasevska and Hansson (2011) suggest that production planning supported by monitoring farm outcomes, use of bookkeeping and budgeting practices, and economically oriented objectives, facilitate technical efficiency of farms. Results of Wilson et al. (2001) support the importance of profit maximization goals of farmers, and relating to the MPE construct of this study, active search of information as variables that are connected to increased efficiency. Results of Trip et al. (2002) also suggest that active recording and evaluation of production data were an important factor of efficiency, while goal setting and planning were not. The management capacity of farmers has been operationalized in different studies in so many different ways that generalizations must be made with caution. It is, however, rather safe to argue, that the personal aspects of a manager especially play an important role in management capacity and success of farming. According to Öhlmér and Lönnstedt (2004), it is evident that analytical and

intuitive processes are both present in problem detection and problem-solving procedures of farmers. Therefore, a possible conclusion is that the amount of analytical thinking and working alone, which was represented in this study by the MPE construct and examined also in many earlier studies do not necessarily make significant differences in farm performance, unless the intuitive part of decision-making is also considered.

Other explanations for the weak connection between MPE and farm performance can also be considered. First, there is the quality dimension. The effectiveness was essentially analyzed as a quantitative variable: how much do the farmers acquire, analyze, plan, control, etc. The amount of doing will not, however, guarantee the correct outcomes of these actions. It is more important to perform the decision-making correctly and with carefully selected input information. A small amount of conscious planning or use of few information sources may be enough if the analyses are carried out properly. Second, there is the life cycle of the farm business and the long-term development of farming and farm performance that may puzzle the picture. For a farmer who has recently started the farming business or who has recently invested many funds, or made other notable changes in the farming system, it is typical to meet a period of decreased performance due to high investment costs and delayed returns of operations. At the same time, the developing farming system requires much managerial activity at all phases of the management process. Age and experience of the farmer may strengthen that effect. Younger, less-experienced farmers in the start-up and growth phases of farming possibly need to be especially active and analytical in the management process. Their more experienced colleagues can rely more on intuition and rules of thumb in decision-making, and thus, devote more time to implementation of decisions and operations of the farm. Third, increased managerial activity may also be a consequence of poor performance of the farm. When a farmer detects that the performance of the farm is not as good as expected, it is necessary to find out the reasons and search for solutions to the problems (see Lunneryd and Öhlmér 2009), which leads to a combination of low performance and high managerial activity.

It can be concluded that farmer's managerial thinking is an important reason for the financial success of the farm. The role of management process effectiveness in this regard was not supported. However, it cannot be rejected as a possible success factor either, since it is a major element of management capacity and clearly connected to MT of the farmer. Lack of correlation between MPE and financial success may be a logical finding: high values of management process effectiveness may be connected to a good performance gained through active management, to challenges on the development phase of farming, or to an acute need to solve the problem of poor performance. The importance of management and farmer's role as a manager should be stressed in education and extension of current and future farmers. Results of this study support the idea that it is not enough for a farmer to be a proficient producer or agricultural worker. Instead, if good financial results and viability of the farming business are wanted, much attention should be paid to such things as strategic thinking, entrepreneurship, management skills, and goal recognition and definition. The results also suggest that the concept and composition of management capacity in farm management research still needs enlightenment. Especially the role of actions relating to the phases of management process needs to be evaluated better, because their impact on farm performance has not been established clearly in this or earlier studies. Further, a more comprehensive definition of the elements of management capacity is needed with thoroughly tested measurement operationalizations. These would be necessary steps to take before management capacity could be analyzed in a more holistic research setting beside other possible factors, such as operating environment, properties of the farm, and production technology, which are other determinants of farms' financial success over time.

The framework that was used in this study provides a good base for analyzing the role of management capacity. Reliability of the results is slightly hindered by an excessively simplified structural model due to a small data set. It would have been more fruitful to model the manifest variables of both managerial thinking and management process effectiveness as individual latent traits instead of reflections of these two constructs. The analysis and conclusions would also benefit from data that spans over time. This would enable consideration of long-term development of financial performance. Conversely, as Gloy et al. (2002) and Latukka (2010) note, in the long-run, some farms are constantly performing better than others. Part of this supremacy should be addressed to better management. The development of management capacity of a farmer should not be forgotten either in a long-term study, since it is a feature that evolves and shapes up along the individual's experiences and learning (Nuthall 2009). The use of bookkeeping farms as the data set is worthy of a remark, too. Farmers who voluntarily participate in bookkeeping with MTT do not form a representative sample of Finnish farmers. A notable portion of variance unique to financial performance and characteristics and managerial behavior of farmers was not detected in this study. Participation in the bookkeeping system suggests that the farmer has a rational, positive attitude towards entrepreneurship and management (Vandermersch and Mathijs 2004), and analysis based on bookkeeping

farms and farmers are not truly representative. Responding to surveys may further increase such a bias. Farmers who are inclined to scientific, analytical thinking may be more willing to return the survey form. The research results presented should thus be interpreted as providing evidence on the existence of dependencies between the measured items, but the exact sizes do not necessarily apply to dairy farms and farmers in a larger population.

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Appendix: Survey questions to measure managerial aspects and management process effectiveness.

Constructs	Survey questions
Instrumental goals	How important are the following in your farming: - high income - increasing farm equity - high return on investments
Intrinsic Goals	How important are the following in your farming: - safe and steady income - possible to be a full time farmer - leisure time and hobbies - working with plants and animals - good place to raise children - ensuring welfare of animals
Trust in future	I am expecting better economic conditions for farming in 10 years I am expecting better financial result for the farm in 10 years I am expecting better livelihood for the family in 10 years
Strategic thinking	I have a vision how to develop the farm in the long run. I have plans for investments on machinery and buildings. I can describe my business plan easily with few sentences. As an entrepreneur, I have clear goals that guide the way of farming. It is difficult to set goals for a period of a couple of years. (reversed)
Entrepreneurial orientation	A farmer today can be regarded as a business manager. A farm should be managed like any other business. My managerial skills are good. I follow business principles in managing my farm.
Appreciation of profession	A farmer can be proud of his job. Agriculture is appreciated in Finland. Young people should not be encouraged to a farming career. (reversed) To quit farming is an attractive option. (reversed) Farming in Finland does not pay. (reversed) It is depressing to be a farmer. (reversed) It is rewarding to be a farmer
Locus of control	Agricultural policy is the key limiting factor in succesfull farming. Success of my farm is very much dependent on the companies that buy the products. Success of my farm depends very much on the development of the surrounding region. Natural conditions largely determine how well farms can perform. Uncertainty of agricultural policy is a problem in making decisions about farming. Financial situation of my farm depends more on agricultural policy than my own decisions.
Planning activity	I make different calculations to aid decision making for the coming year operations. Planning of farming activities and finances are based on long-term financial plan. It is necessary to think what the ultimate goals of farming are. Interim financial statement is an important part of farm planning and control. I make gross margin calculations for different production lines. I usually make a budget for the coming year. I actively search for new information that may relate to farm development. I think ahead and prioritize tasks of the near future.
Controlling activity	I compare latest bookkeeping results with earlier ones. After implementing a decision on farming, I try to analyze how successful it was. I compare the budget with actual outcomes of farming. I try to find reasons for different financial outcomes between years.
Analytical decision making	How much do you utilise the following in your decision making: - Computer and common software - Bookkeeping software - Field plot management software - Other agricultural software - Information systems integrated into machinery - Pen, paper and calculator
Information use	How much do you use the following information sources in your decision making (17 different sources to assess).