

INFLUENCE OF PRODUCTION FACTOR MANAGEMENT ON FARMS EFFICIENCY: SYNTHESIS OF EMPIRICAL STUDIES

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Abstract: Management has always been considered to be an important factor of production. However, the inclusion of management into the quantitative analysis is problematic because it is an unobservable factor and for this reason it has been omitted from many production models. This may be a source of important problems because the omission of pertinent variable can lead to biased estimation of the parameters of the production function. The aim of the paper is observing and comparing studies, whose authors used management as a production factor, incorporating it into production function in different ways for estimation technical, allocative and economic efficiency. Because of its complexity, managerial capacity has often been represented only by a few aspects such as age and level of education of the manager; some authors try to explain efficiency differences in agricultural production through the decision-making process. Despite the fact that these studies move in the direction of a better understanding of managerial capacity influences on efficiency and account aspects of the decision-making process, much still remains unexplored. The research is financed from grant No.11110/1312/3143. „Inter- and intra-sectoral changes of efficiency and productivity in Czech food processing industry – systematic or idiosyncratic development?“ of the IGA, FEM, CULS.

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JEL Classification: M11, M21

1. INTRODUCTION

Management is recognized as an important source of agrarian production, proved by Marshall assumption about the existence of four main production factors: land, labour, capital and organization. The latter is the coordinating factor implemented by management, which connects other factors and conducts production activity. In whatever business, manager is responsible for making decisions that would be appropriate to the firm's growth and progress.

Kay and Edwards (1994) argue that in many instances, the difference in performance is due to variation in management. (cit. Wilson et al., 2001). However, unlike land, labour and capital, management is not directly observable. Subsequently, it complicates any analysis that attempts to explain management influence to the difference in performance. Technical and economic results of farms are influenced by management that is aimed to the optimization of technical and biological processes of farms, implementing their function in a certain environment and economic conditions. Analysis of management influence to the farm performance can be an important source of information for the elaboration of strategy of high level efficiency achievement. Transformation process of input into output is influenced by management quality.

2. SCIENTIFIC AIM AND METHODOLOGY

The purpose of this paper is to determine the way economists include production factor management into the efficiency analysis models and define influence of this factor on a farm performance.

The importance of management is not yet fully recognized in literature on production, productivity and efficiency. Some authors, for example, Bloom et al. (2011) argue, that there is no need to treat management

separately, because competition is able to weed out bad management. However there is no empirical proof for such assumptions, which showed mostly a significant role of management in a production process. The inability of a firm to adopt best management practice is likely the cause of its inefficiency in most cases.

Many empirical studies include management in production analysis as on observed or unobserved variable. Triebs and Kumbhakar (2012) discussed that the effect of management on productivity can be modelled empirically in many ways: (1) management as an input similar to conventional inputs such as capital and labour which affects productivity of the conventional inputs; (2) management is a technology shifter which can be either neutral or non-neutral; (3) management helps in efficient input usage enhancing technical or allocative efficiency.

The authors discuss different function specification, where management is incorporated as a traditional input or as an input changing the technology. To study the influence of management on efficiency level they used semiparametric model. This specification allows management to affect different input productivities differently, i.e. by neutral and non-neutral way:

$$y = A(z)f(x) \quad (1)$$

where z is management, x is a conventional input.

$$Y_i = X_i'\beta + g(Z_i) + u_i, i = 1, 2, \dots, n \quad (2)$$

In their study firms were surveyed on their management practices using a practice evaluation tool developed by a leading international management consulting firm. The tool defines and scores 18 separate management practices or categories. Each practice was scored using several questions. The authors concluded that better management decreases inefficiency but at a decreasing rate.

Another approach to management impact to efficiency is a model of Battese a Coelli (1995), where management is presented as a source of inefficiency.

$$U_{it} = z_{it}\delta + W_{it} \quad (3)$$

where the random variable, W_{it} , is defined by the truncation of the normal distribution with zero mean and variance, σ^2

3. FINDINGS AND DISCUSSION

3.1 Influence of management on farms efficiency

Three groups of factors can be proposed as influencing efficiency level (Puig-Junoy a Argilés, 2004). The first group indicates farm management capacity, represented by personal ability of a farmer and by practice and procedures used in the decision-making process. It is discussed in the literature, that these two components are connected, since personal managerial characteristics influence a manager's ability of decision-making (Wilson et al., 2001). The second group of factors are technical and biological processes. The third group represents the influence of institutional, physical and economic environment of the farm.

Passel et. al (2006) divided factors impacting technical efficiency into two groups: agent factors and structural factors. Both agent factors and structural factors influence farm efficiency. Agent factors are managerial characteristics of the farm such as education level and age of farm manager. We are interested more in the former group, because it is connected to management.

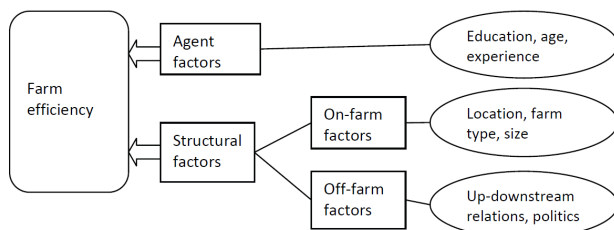


Figure 1 Factors affecting technical efficiency
Source: [15]

Age The age of a farm manager can be an indicator of his experience. However a lot of authors including Battese and Coelli (1995), Thirtle and Holding (2003), Khan and Saeed (2011), Lambarraa (2011) concluded that older farmers are more inefficient than the younger ones. Their explanation was that older farmers are unwilling or unable to adopt technical innovations. (Parikh a kol., 1995). On the other hand, Wilson et al. (2001) argued that older farmers are more experienced and take profit of their knowledge to use inputs more efficiently. Gorton and Davidova (2001) discussed that influence of a farmer's age is not proved, because their analysis showed a negative influence in Bulgaria but the positive influence in Hungary.

Education Education can be seen as an investment, as a strategy to improve agricultural productivity. Farmers with more years of schooling tend to be more efficient, which was confirmed by empirical studies. The effect of higher education is positive as better educated farmers are expected to have more skills for more effective running their farm (Solís et al., 2009, Hambrusch et al., 2006, Parikh et al., 1995, Battese and Coelli, 1995. However, Mazvimavi et al. (2012) found out that demographic factors (gender, education, labour availability) have no effect on inefficiency.

Management characteristics. Rougoor et al. (1998) mentioned that including the aspects of decision-making process in explaining differences in the efficiency is one of the important steps of the analysis. Wilson et al. (2001) explored farmers' motivation and purposes, the source of information used in the decision-making process.

Other agency factors. Other important indicators are, for example, following extra trainings, attending workshops, reading special literature.

Most empirical studies that seek to quantify the influence of management on farm technical efficiency generally attempt to explain differences in the efficiency through the incorporation of biographical variables to the analysis. However Rougoor et al. (1998) discussed, that the inclusion of only such type of variables necessary but it is not a sufficient condition for a correct measure of management influence. A farmer possessing good skills is considered likely to achieve good results. Nevertheless, the result need not be positive if the decision-making process is poor. Therefore explaining the differences in farm technical efficiency through managerial characteristics and abilities of a manager to provide the decision-making process in the best way is a logical step of analysis.

3.2 Manager in the decision-making process

The quality of a decision-making process is an important factor influencing making logical and organized decisions in a farm production process. Every manager attempts to optimize the technical and biological farm process using decision-making practice (Figure 2). These processes, influenced to a certain level, are able to determine farm performance. Random unexpected inventions (weather, diseases, inappropriate climatic conditions, fluctuations of market prices of input and output) influence farms results. The manager environment, which is characterized by unpredictable rapid changes, can contribute risk and uncertainty in the decision-making process. Bezlepina et al. (2005) mentioned that Boehlje and Eidman (1984) distinguished four major dimensions of the environment: (1) institutional, including ownership, capital structure, subsidies and other, (2) social prescribing labour conditions and social network, (3) physical such as seasonal weather conditions and their variability, soil quality, technology, infrastructure, farm size and other, (4) economic including market conditions, level of prices and wages.

Rougoors et al. (1998) extended the definition of management capacity into two components: personal aspects and aspects of the decision-making process. Kay and Edwards (1994) use a well-known division of decision-making process into planning, implementation and control.

Wilson et al. (2001) simultaneously explored the influence of personal and decision-making aspects of management. Particularly, they studied manager's motivation and purposes and their influence on the efficiency. They identified four purposes: the maintain way of life, maximize annual profits, maintain the environment and increase the farm size. The farmers were asked to rank these purposes in the order of importance to them. The authors found that the farmers who rank the objectives of profit maximization and maintaining the environment high are more efficient than those who do not. Further, they discussed, that while the positive significant influence of the

profit maximizing purpose on efficiency is expected, it is less immediately clear why this should also be the case for those farmers who rank maintaining the environment as an important objective. One possible explanation is that farmers, who are environmentally careful, practise a more efficient use of inputs than those who are less environmentally conscious.

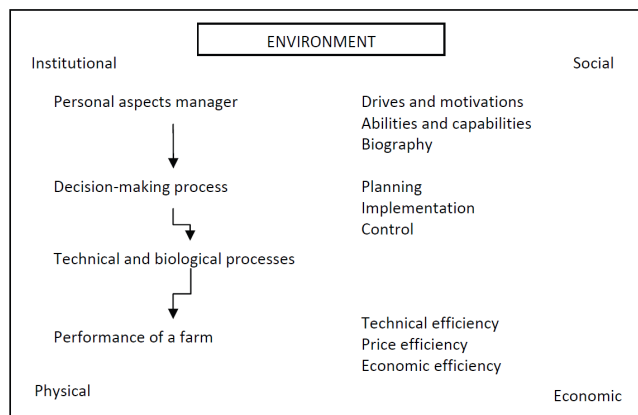


Figure 2 Management capacities in relation to environment, biological processes and farm results
Source: [17]

Besides that, to capture the aspects of the decision-making process, farmers were asked to identify the sources, from which they obtained technical information about crop husbandry practices. All possible sources were grouped into four categories: personal (independent advisor, merchant's advisor, other farmers, others), written (farming press, literature of state organizations, commercial literature), electronic (internet, others), others (conferences, local agronomy groups, farmer meetings). This variable was constructed by summing the number of the sources that farmers used. (Wilson et.al, 2001)

However, Puig-Junoy a Argilés (2004) discussed that the decision-making process and the use of accounting information in the decision-making process were not explicitly considered in the study of Wilson et.al. The former authors used the division of the decision-making process into planning, implementation and control, and they concluded that fully integrated management involving planning and control phases and based on reliable accounting information is a significant factor influencing farm efficiency.

As a variable, explaining the influence of the planning phase on the farm's efficiency a dummy variable was incorporated reflecting the use of accounting information in the decision-making process. The phase of implementation was expressed quantitatively by the Herfindahle concentration index. The phase of control was represented by a dummy variable equal to 1 if the farm carries out control, and 0 if it does not.

Trip et al. (2002) explored the decision-making process influence on the farms' efficiency excluding the personal managers' ability (age, experience, education, social skills, intelligence) from the model. According to Trip et al., these factors are likely to influence the firm results through the efficiency of the decision making. Four elements of a firm's

decision making were distinguished: goals and policy, planning, data recording and monitoring, evaluation.

The goals and policy were evaluated by clearness of the goals. The more distinctive and the more specific the more points were assigned. The second element, planning, was evaluated under the condition of having certain planned dates for harvesting and subsequent replanting and keeping them. For higher performance achievement managers should provide data recording followed by their analysis. According to Trip et al. (2002) the evaluation element could be based on a comparison with the results in the previous year, or a comparison with the results of colleagues in the same year. The results showed statistically significant associations between the planning and data recording elements and the efficiency of firms. Goal setting and planning were not found to be associated with higher levels of efficiency.

4. CONCLUSIONS

A lot of studies focused on farms' efficiency analysis exist. However most of them do not consider important production factor management. Management is an unobservable factor which impacts productivity of conventional factors, that are land, labour and capital, helps to use inputs efficiently. Dropping of significant variable can lead to the specification bias problem and therefore estimation will be biased.

The most often used model in the field of technical efficiency analysis is Battese and Coelli (1995), where managerial abilities incorporated into the model through a biographic variable (age, farmer's education) and through an approach to decision-making process.

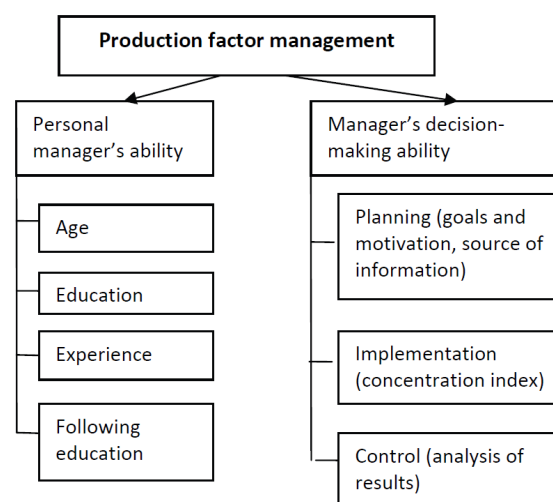


Figure 3 The methods of management incorporation into the efficiency analysis.

Source: own processing

In our opinion, the most suitable approach to evaluation of management impact to farms efficiency is Battese a Coelli model (1995), that investigates the sources of inefficiency. Variables that can be incorporated into the model are either personal manager's ability at small farms or abilities of decision-making proces at larger farms.

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