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# **Contribution of Supports to Modernisation for Enhancing Competitiveness of the Czech Agricultural and Forestry Holdings**

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# Contribution of Supports to Modernisation for Enhancing Competitiveness of the Czech Agricultural and Forestry Holdings

Marie Pechrová

**Annotation:** Specific weaknesses of the Czech agriculture are “longstanding under-capitalization and credit burden on business, low level of support and market protection in comparison with other European countries prior accession to the EU and low level of financial means in the agricultural sector during the transformation process.” (Ministry of Agriculture, 2010) These factors are limiting the competitiveness of Czech farms. One of the ways how to combat these disadvantages is to invest to the modernisation of the agricultural sector, support innovations and their transmission into practice. Czech Republic can benefit from the European Agricultural Fund for Rural Development (EAFRD) under established Rural Development Programme (RDP). First priority axis of this program is devoted to increasing of competitiveness of agriculture and forestry. Measure *1.1.1 Modernisation of agricultural holdings* is aimed on investment promoting and improving the overall performance of the farm to increase its competitiveness. Measure *1.1.2 Increasing of the economic value of forests* has the same objective, but aims on forestry companies. The mid-term evaluation of the RDP evoked the question if the subsidised investments had contributed to the introduction of new products or services and technologies by the enterprises.

The aim of this article is to answer the question if the subsidies on modernisation from the EU’s funds have statistically significant impact on the introduction of new technologies or products by agricultural holdings and thus enhancing their competitiveness. On the basis of performed statistical hypothesis testing, the author came to the conclusion that subsidies into modernisation of the agricultural and forestry holdings statistically significantly contributed to the introduction of new technologies and innovations.

**Key words:** Rural Development Program, agricultural and forestry holdings, modernisation, competitiveness, innovation

## 1 Introduction

The term competitiveness was originally used for economical subjects only, but the meaning has broadened overtime and is currently applied on states, regions and other territories. “International competitiveness refers to the ability of a country to produce goods which would be able to face foreign competition, and has the potential to maintain or (and) to increase held quotas on foreign markets.” (Hagiu, 2011) Competitiveness in the EU is defined as “the ability to resist the market pressure.” (Tomšík, 2009) In the case of a particular farm, its ability to compete is affected by the level of technology modernisation and innovation of technological approaches used in the production process. “Companies are trying to achieve competitive advantage in order to help them obtain a better and a stable position in the marketplace. The best way for companies to achieve a competitive advantage is through innovation.” (Ramadani, Gerguri, 2011)

“Innovation is widely held to be a key driver of economic growth at the heart of the knowledge economy.” (OECD, 1996 in Dargan, Shucksmith, 2008). Supporting of the knowledge transfer, modernisation and innovation throughout food chain is one of the main objectives of Czech RDP. “Restructuring of the agriculture, enhancing the competitiveness of the agricultural subjects and stabilization of the jobs in rural areas” (Ministry of Agriculture, 2010) are understood by the policymakers as the contribution of the Axis I to the achieving of Lisbon’s strategy targets. This is in line with Steiner et al’s (2011) conclusion that “stimulating innovation is a major route to reaching the Lisbon targets.” “To implement the

Lisbon Strategy, the agricultural production must be continually developed (to increase competitiveness).” (Ramanauskas et al., 2010).

Competitiveness in the 21st century is closely related with the research and implementation of its results into practice. In the agrarian-food processing sector, the competitiveness lays on the speed of transferring innovations into practice. In the strategic document Vision of the Czech agriculture after 2010 (Ministry of Agriculture, 2010) there is declared that "from the internal factors to enhance competitiveness of the Czech agriculture are in particular important: raising of the work productivity, maintain high level of investment and increased emphasis on investment in advanced technology.“

Ramanauskas et al (2010) recommend “stimulating innovation in the proposed investment projects that require support from the EU to establish the level of innovation and giving priority to the projects with a large level of innovations.”

Axis I of the Rural Development Programme is concentrating on the support of competitiveness of agriculture, forestry and food processing industry. Allocation of financial means on the axis I is 22.53 % of the financial means available in the European Agricultural Fund for Rural Development (EAFRD). The majority of subsidies (85.5 %) are granted to the priority *I.1 Modernisation, innovation and quality*. This measure was included in the previous subsidy programme and has integrity since 2004. The aim of the measure is to help farmers to renew, reconstruct, modernise, finish or rebuild agricultural and non-agricultural buildings and innovate, modernise, acquire and improve their technologies.

Measure *I.1.1 Modernisation of agricultural holdings* is aimed on investment promoting and improvement of the farm overall performance to increase its competitiveness. Measure *I.1.2 Increasing of the economic value of forests* has the same objective, but aims on forestry companies. The question is if the supports for modernisation of agricultural and forestry holdings make significantly easier to implement the innovations which could help to enhance entrepreneurs’ competitiveness.

## 2 Methods

The primary research was not needed as the relevant data have been already available from the secondary sources. Particularly mid-term review of the RDP (Association of DHV and TIMO, 2010) contains the answers on the evaluation question: Have the subsidised investments contributed to the implementation of new technologies and/or products? Not only supported agricultural holdings, but also these who did not benefit from the EUs’ grand, were questioned. Therefore the counterfactual analyses are possible. For assessing the statistical significance of the contribution of the subsidies,  $\chi^2$  square test of independence was used.

Firstly, the data must be displayed in the association table, where particular cells were marked with letters (see Fig. 1.).

New products and/or technologies			
Subsidies	Yes	No	Sum
Yes	a	b	(a + b)
No	c	d	(c + d)
Sum	(a + c)	(b + d)	n

**Fig. 1.** Association table, **Source:** Wisniewski, 2002

This test is based on the chi-squared ( $\chi^2$ ) probability distribution. The format of testing is following: defining of null and alternative hypotheses, calculating of the test statistics according to Fig. 2 and its comparison with critical table value.

$$\chi^2 = \frac{n(ad - bc)^2}{(a + b)(a + c)(b + d)(c + d)}$$

**Fig. 2.**  $\chi^2$  square test statistics, **Source:** Wisniewski, 2002

As it is non-parametric tests, if the calculated value is smaller than the tabled one, null hypothesis has to be rejected. I performed  $\chi^2$  square test to test the association between the answers of two groups of farmers to the given question. The strength of association was measured by Yule coefficient of association according to Fig. 3.

$$Q = \frac{ad - bc}{ad + bc}$$

**Fig. 3.** Yule coefficient of association, **Source:** Wisniewski, 2002

### 3 Results and Discussion

#### 3.1 Assessment of the success in introducing new technologies and/or products

##### 3.2 Measure I.1.1.1 Modernisation of agricultural holdings

Success of the first axis's measure *I.1.1 Modernisation of agricultural holdings* is assessed by prior defined evaluation questions which are asked to the farmers who were successful in application for support and who were not. Both groups were asked the same question, if they managed to introduce new technologies and/or products or not. Analysis was performed on a selected sample of respondents from both groups.

The data are available in the evaluation mid-term report (Association of DHV and TIMA, 2010). Fig. 4. shows the results. 287 of 367 farmers who were granted the financial means were able to introduce new technologies or products, while 80, despite obtaining the support, were not. Comparison group consisted of agricultural firms who were not subsidized, but despite that fact, 46.3 % of them were able to achieve innovation. The percentage of the farmers who were able to introduce new technologies and/or products is higher (78.2 %) in the group of subsidised farms.

It might be clear that the subsidies had positive impact on modernisation of the enterprises and its capability to deliver new products and/or technologies. However, the statistical verification must be performed to verify this hypothesis. Usage of  $\chi^2$  square test for testing reveal the fact if the subsidies statistically significantly influence introducing of new products and/or technologies. Null hypothesis expects nonexistence of the interdependence. ( $H_0$ : there is not association between subsidies and introducing of new products and/or technologies).

New products and/or technologies	
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Subsidies	Yes	No	Sum
Yes	a = 287	b = 80	(a + b) = 367
No	c = 170	d = 197	(c + d) = 367
Sum	(a + c) = 457	(b + d) = 277	n = 734

$$\chi^2 = \frac{n(ad - bc)^2}{(a + b)(a + c)(b + d)(c + d)} = 79.37 > \chi^2_{0,05(1)} = 3.841$$

**Fig. 4.** Answers on the evaluation question, **Source:** Association of DHV and Timo, 2010, own calculations

Calculated test criterion is higher than tabular value of  $\chi^2$  – square test on the level of significance 0.05, therefore we reject null hypothesis. Subsidies with 95 % probability significantly influenced introduction of new products and/or technologies in the agricultural companies.

Association coefficient measuring the strength of association between variables is positive and points out to relatively strong dependency (Q = 0.76).

### 3.3 Measure I.1.2.1 Increasing of economic value of forests

Another measure from Axis I which desirable results are introducing of a new product or service or technology is *I.1.2.1 Increasing of economic value of forests*. The output indicator is number of holdings which are introducing new products or new approaches. The data collected shows that thanks to this support 58 % of the questioned enterprises were able to introduce new products or technologies. 30 firms from sample of 70 were unable to do so. In the comparison group, there were only 17 % of respondents able to introduce new products or technologies. The positive impact of subsidies is clearly visible.

Null hypothesis of the  $\chi^2$  square test states that there is no association between subsidies to the forestry firm and its introducing of new products and/or technologies.

New products and/or technologies			
Subsidies	Yes	No	Sum
Yes	a = 40	b = 30	(a + b) = 70
No	c = 12	d = 58	(c + d) = 70
Sum	(a + c) = 52	(b + d) = 88	n = 140

$$\chi^2 = \frac{n(ad - bc)^2}{(a + b)(a + c)(b + d)(c + d)} = 23.99 > \chi^2_{0,05(1)} = 3.841$$

**Fig. 5.** Answers on evaluation question, **Source:** Association of DHV and Timo, 2010, own calculations

Calculated criterion is higher than critical value on the level of significance 0.05, therefore we have to reject null hypothesis and conclude that with probability of 95.0 % the support from EAFRD under measure I.1.2.1 has positive impact on introducing of new products or technologies by forestry enterprises. The association of introducing of the new products and/or technologies and subsidies is lower in case of this measure, as the coefficient of association is 0.73.

## 4 Conclusion

Introducing new technologies and products to the food production process is one of the important features to enhance agricultural and forestry companies' competitiveness. Or in other words, the best way how to achieve competitiveness is through innovation. The modernisation of the farms in the Czech Republic had been neglected for a long time due to the under-capitalization during previous political regime. To speed up the process of modernisation, financial means from the EU can be used.

Under Rural Development program, axis I, priority *I.1 Modernisation, innovation and quality* are implemented measures aimed on innovations in agricultural sector in the Czech Republic. The statistical analyses of the efficiency of these grand revealed that they are significantly supporting farms' (or forestry companies') ability to introduce new technology or place a new product on the market. The association between subsidies and introduction of the new technology and/or product is positive and relatively high, however, in case of forestry companies, it is slightly smaller.

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