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# THE IMPACT OF NEW TECHNOLOGIES ON COMPETITIVENESS AND PRODUCTIVITY OF RURAL SMES: A CROSS-COUNTRY EXPLORATORY SURVEY

by *Rosa Maria Fanelli\**, *Matthew Gorton\*\**, *Pattanapong Tiwasing\*\*\**,  
*Jeremy Phillipson\*\*\*\**, *Francesca Cuna\*\*\*\*\** and *Giuseppe Cutillo\*\*\*\*\**

## 1. Objectives and methods

The adoption of technologies by small and medium enterprises (SMEs) that operating in several business sectors in rural areas is crucial issue because they often need financial and technical incentives and support from public and local authorities. The question whether and how innovation can be replicated and applied in a wider context is strictly connected to the understanding of those factors and mechanisms capable to determine success or failure of the introduction of innovation itself.

Our aims will be to present the impact of 12 new technologies suitable for rural economy SMEs, to identify the enablers and barriers for adopting each technology, to support rural economy, and to provide policy recommendations useful for the public authorities on how to establish favourable conditions and offer incentives to SMEs for integrating innovative solutions. We want to respond the following questions. What type of technology is adopted by rural SMEs? What aims are most crucial for them? What are the enablers and barriers for adopting each technology to support rural economy? How to establish favourable conditions and offer incentives to SMEs for integrating innovative solutions? At the end, we want to examine the effects of the socio-economic characteristics of rural SME respondents.

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The methodological approach to examine the impact of the selected new technologies will be based on desk research and field research evidence on a case study basis.

To select these technologies, we will take into account only the recent resources and research studies that have been implemented during the last years (Acs and Mueller, 2008; Autio and Hoeltzl, 2008; Autio and Acs, 2010; Bigliardi, 2013; Branzei and Vertinsky, 2006; Calvo, 2006; Delmar et al., 2013; Deschryvere, 2008; Fabling and Grimes, 2007; Forsman and Annala, 2011; Freel and Robson, 2004; Henrekson and Johansson, 2008; Hözl, 2009; Koellinger, 2008; Parker et al., 2010; Thornhill and Gellatly, 2005; Thornhill, 2006).

On base of these studies, we will select 12 disruptive technologies (i.e. organic farming, renewable energy, precision agriculture, crop resistance systems, novel crop, functional foods, e-platforms for products' promotion and exports, online orders and delivery tools, food traceability systems as marketing tool, smart meters and IoT, internal products traceability systems and traceability and selective breeding and cultivation processes as a supply chain management tool).

In the second step, the online questionnaire, will design to collect evidence and draw on the expertise of target respondents related to cases of innovative technology adoption by firm in remote and accessible rural areas. The questionnaire will structure into three main sections. The Section A will include questions to identify the region in which the enterprises operating, the main core business and the dimension of rural SMEs. The Section B will dealt with issues related to the use of particular innovation technologies, the type of innovation used, what barriers and enabling factors can hinder and support respectively the adoption and dissemination of new technologies. The last Section C will dealt with demographic characteristic that influencing the adoption of new technologies by rural SMEs

Using information on this exploratory sample rural SMEs across eight European countries (Bulgaria, Czech Republic, Greece, Hungary, Italy, Latvia, Slovenia and United Kingdom) we will explore the potential relationship among the variables to investigate innovative technologies impact on rural economy SMEs competitiveness and productivity. Descriptive statistics will apply to describe the case identity in Section A. Needs, enables and barriers of the case, in group different, will analyze, using Chi-Square Test and Mann-Whitney U Test. At the end, Discriminant Analysis (DA) will use to examine the effects of the socio-economic characteristics of rural SMEs respondents from eight countries.

The  $\chi^2$  statistic is strong with respect to the distribution of the data like all no-parametric statistics. To will draw out some of the key features of the main needs/objectives, which will lead rural SMEs to adopt the new technology, the questionnaires will design to give answers at the categorical level, so the  $\chi^2$  statistic will be appropriately used. To investigate the difficulties/barriers SMEs encountered during the integration or adoption of new technology, questions will design as a Likert-Scale. The scale to use will be 1-5, where 1 = no difficulties and 5 = most important difficulty. Data will measure on an ordinal scale, which are non-parametric, so we will apply MWU test to analyse the difference between rural SMEs with and without job generation, with and without improved ability to access new markets, and with and without improved profitability. The results of the MWU will be presented in group rank differences rather than group mean differences. For the section C, we will employ discriminate analysis (DA) to examine the effects of the socio-economic characteristics of rural SME respondents from the eight countries. DA is commonly designed to investigate the difference between two or more observed groups with respect to several underlying variables. We will use questionnaires because are the main method of data collection used in many previous innovation studies (Bouncken and Koch, 2007; Hult et al., 2004; Laforet and Tann, 2006).

## **2. Expected results of the impact and transferability of the case**

The study will promote the adoption of innovation by rural economy small and medium enterprises (SMEs), through sharing practices/experiences between regions and actors relevant to rural economy SMEs' competitiveness and integration lessons learnt into regional policies and action plans. Expected results should boost innovation support services for 5% of SMEs, increase the capacity of about 200 public administration employees to effectively implement policies to support the competitiveness of firms operating in rural economies and improve its horizontal and vertical cooperation. In this way, territorial capacity building and policy innovation involving all regional actors are critical factors for promoting the diffusion of innovation and, to maintain and strengthen SMEs' competitiveness and consequently regions' growth.

The key question underlying the research is the extent to which small and medium enterprises located in rural areas have distinctive support needs, associated with the characteristics of rural SMEs themselves, or their owners,

and/or the characteristics of the external operating environment for enterprises in rural areas.

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