IS INNOVATION ATTITUDE A MEDIATOR IN RESEARCH AND EXTENSION SERVICES?

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Abstract

The aim of this research is to analyze the influence of farmers' innovation behavior on the use of research and extension services. Formulating a structural equation model, the authors examined the relationship between key factors of innovation behavior (market orientation, learning orientation, innovation attitude) and the use of research and extension services.

Keywords: Market orientation, learning orientation, innovation attitude, research and extension services, agricultural innovation.

1. Introduction

Prospects of farmers about extension and advisory services, which can be considered as knowledge intensive services (KIS), are not commonly investigated [1]. The present contribution explores the ability of small and medium-sized (SMEs) agricultural holdings managed by farmers to adopt the instruments of knowledge transfer supplied by available research and extension services (RES). Through a case study in the region of Spain (Valencia), we evaluated this topic by investigating a sample of farmers (253)[1], with strong a presence of SME farms. A survey was carried out to explore the relevance of farmers' strategy and cultural variables such as market orientation (MO) and learning orientation (LO), their link with their innovation attitude (IAT), and if such factors affect the farmers' decision of using RES.

Following a methodology based on a theoretical framework, we designed a Structural Equation Model (SEM) to generate a discussion establishing a connection between factors that affect farmers' use of RES.

2. Conceptual framework and Hypotheses

2.1 Relationship between innovation behavior and its antecedents

The Valencian farmer innovator profiles were defined by MO, LO and IAT [2]. MO has been studied extensively since the 1990s. Narver and Slater [3] observed MO as an organizational culture. In contrast, Kohli and Jaworski [4] consider MO as a behavioral process. Recent works indicate that MO can be significantly boosted by the business ecosystem and national contexts [5]. Several hypotheses can be proposed.

> a) *H1: MO has a positive effect on IAT.*

LO refers to a broad organizational activity that uses knowledge to enhance competitive advantages [6], also LO has an impact on the firm's organization using information and active learning [7]. Previous research has suggested a relationship between LO and MO [8]. Cohen and Levinthal [9] proposed that LO is significantly associated with innovative thoughts in firms, while Trice and Beyer [10] asserted that MO and LO are very closely associated in the innovation process.

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[1] For SEM, samples above 200 are understood as a provider of sufficient statistical power for data analysis (e.g.: Hoelter, 1983; Garver and Mentzer, 1999; Sivo et al 2006)

> b) **H2: LO has a positive effect on IAT.**
>
> c) **H3: LO has positively correlated with MO.**

2.2 The relationship between innovation behavior and RES

Previous research has indicated that interpreting the innovation behavior of agricultural holdings is a crucial step in designing rural development strategies [11]. In this paper we consider some core characteristics of KIS [12]. They reflect an interactive relationship between suppliers and customers and play a crucial role in the creation and commercialization of new products, processes and services [13]. EU agricultural policies tend to positively assess measures that enhance innovation in agricultural holdings [14].

> d) **H4: IAT has a positive impact on RES.**
>
> e) **H5 (a): IAT mediates the positive relationship between MO and RES.**
>
> f) **H5 (b): IAT mediates the positive relationship between LO and RES.**

3. Method

The agricultural sector in Spain has been described as a low R&D intensive [15] [16]. In this context a survey was designed for the Agrinnova Project[2]. The set of items from the questionnaire were adapted from previous extensive research and well-accepted scales. Our SEM framework is controlled for age and education level [17], as well as for farm size in terms of gross margin turnover, which can explain the effect of available resources on farmers' choices [18][19]. (**Table 1**).

Table 1. Characteristics of respondents

Characteristics of respondents (n= 253)		
Variables	**Mean**	**Standard deviation**
Age	48,43	11,52
Education Level(*)		
No regulated education	21	
Basic Education	102	
Higher education	130	
Gross Margin(*)		
Over 20,000 euro	87	
5,000-20,000 euro	130	
Below 5,000 euro	36	

Notes: (*) Education Level and Gross Margin are reported in frequencies.

4. Results

The results from SEM general estimation and the fit indices: $Chi-Square = 159.37 ; df = 121; p-value = 0.011; \ x^2/df = 1.315; CFI = 0.977; GFI = 0.936; RMSEA = 0.35,$ are considered adequate to proceed to estimate the theoretical model [20]. The correlation estimated for MO and LO: $coefficient = 0.756, \ p = ***$; confirming *H3*. Direct effects results indicate a significant and positive relationship between MO, LO and IAT; supported support/supported by H1 and H2. However, the direct effect is not significant between IAT and RES, rejecting H4. For control variables, only education showed a significant effect, and farm holder's age and gross margin were not significant. For mediation relationships, we evaluated the results for the direct effect with and without a mediator [21], also resulting from indirect effects [22].

The result was significant only for LO without the mediator (*Coefficient=0.501; p=0.011*). The results from direct and indirect effects were not significant in both cases, rejecting H5 (a) (b)[3] (**Table 2**).

Table 2. Parameter estimates for the model path: mediation and indirect effects

Path	Direct effect without Mediator	Direct effect with Mediator	Indirect effect
MARKET ORIENTATION--->INNOVATION ATTITUDE--->RESEARCH EXTENSION SERVICES	0,085(0 ,644)	,034 (0,853)	0,273
LEARNING ORIENTATION--->INNOVATION ATTITUDE--->RESEARCH EXTENSION SERVICES	0,501 (0,011)	,456 (0,269)	0,164

*The quantity in brackets refers the p-value;   **p<0.05*

5. Discussion and Conclusions

Even in context of agricultural systems dominated by SMEs, MO and LO, they appear to be positively related, which confirms that synergies between both factors provide a background for innovativeness [23]. MO and LO also show positive and significant effects on IAT, indicating in our case study that SMEs are likely to knowledge, in contexts where resilience is enhanced by MO and LO as cultural values and considering knowledge as a determinant of innovation; by contrast, IAT does not appear to be a mediator in any of the relationships tested. Considering results from regression analysis, a significant relationship between 'imitation' (one of the items measuring IAT) and use of RES was found. This result may be supported by the SME's behaviour, where imitation is a common way to expand knowledge [24]. LO and level education keeps a significant direct effect on the use of RES, suggesting that education and learning as cultural values remain the key factor for SMEs to use RES in the studied region. Previous research suggests that young farmers and large holdings are more inclined to innovation activities [25], which points to the need for further research, perhaps in other regions where there is a wider range of ages and farm sizes than in Valencia where SMEs and older population farmers are dominant. These results call to reflect on the way RES are functioning as knowledge providers rather than entrepreneurship accelerators. Our study seems to indicate a possible gap between RES users and providers of public services. Ongoing work within the present programing period for RDP should focus on bridging such a gap by promoting operational groups, networking, and reflecting on the future role of regional technological centers.

6. References

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[3] We decide to explore the relationships in specific way between IAT y RES, implementing a lineal regression, taking RES as one composite indices (RE_S), only IAT2 coefficient was significantly (*** p < 0.01).

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