

Ćurčin, Natalija; Dulčić, Želimir; Mršić, Slađana Pavlinović

**Conference Paper**

## Communication Channels and Innovative Farmer Behaviour in South Croatia

**Provided in Cooperation with:**

Governance Research and Development Centre (CIRU), Zagreb

*Suggested Citation:* Ćurčin, Natalija; Dulčić, Želimir; Mršić, Slađana Pavlinović (2018) : Communication Channels and Innovative Farmer Behaviour in South Croatia, In: Tipurić, Darko Labaš, Davor (Ed.): 6th International OFEL Conference on Governance, Management and Entrepreneurship. New Business Models and Institutional Entrepreneurs: Leading Disruptive Change. April 13th - 14th, 2018, Dubrovnik, Croatia, Governance Research and Development Centre (CIRU), Zagreb, pp. 402-416

This Version is available at:

<https://hdl.handle.net/10419/180005>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

## Communication Channels and Innovative Farmer Behaviour in South Croatia Natalija Ćurčin, Želimir Dulčić, Slađana Pavlinović Mršić

University of Split, Faculty of Economics

[curcinnatalija@gmail.com](mailto:curcinnatalija@gmail.com)

[zelimir.dulcic@efst.hr](mailto:zelimir.dulcic@efst.hr)

[spavlino@efst.hr](mailto:spavlino@efst.hr)

### Abstract

*The aim of this paper is to explore innovation practices and communication channels used by farmers in south Croatia. Namely, this area is characterized by very sensitive karstic environment, and rural and agricultural abandonment. Given conditions call for introduction of agricultural practices which will reconcile requirements to protect this unique landscape and at the same time make better living for local farmers. In order to understand which factors can reverse the trends, this paper studies farmer decision-making and behaviour with respect to innovations in agriculture with a particular emphasis on communication channels which farmers use to obtain necessary information. Namely, innovations in agriculture may positively affect farmer competitiveness and in this way contribute to regeneration of rural areas. However, lack of relevant information and subsequent uncertainty about outcome of innovative behaviour may discourage farmers to introduce new practices. In order to reduce mentioned information asymmetry further knowledge on communication channels is needed. For this reason, this paper explores attributes and attitudes of local farmers with respect to their experience and decision-making about agricultural innovations, as well as communication channels which affects their behaviour. Results of a pilot survey of convenience sample of farmers from Split-Dalmatia and Dubrovnik-Neretva country are discussed. Insights about obstacles and advantages of innovative behaviour provide directions for further research and improvement of competitiveness of local farmers in vulnerable rural areas.*

**Keywords:** Agriculture, Attitudes, Communication channels, Competitiveness, Innovation

*Track: Entrepreneurship*

Word count: 5.256

### 1. Introduction

The aim of this paper is to explore innovation practices and communication channels used by farmers in coastal Croatia. Namely, this area is characterized by very sensitive karstic environment, and rural and agricultural abandonment. Given conditions call for introduction of agricultural practices which will reconcile requirements to protect this unique landscape and at the same time afford better living for local farmers. Recent trends in sustainable agriculture head towards increasing yields and productivity since demand for food increases (Loconto et al, 2016:1). Innovations are crucial since such a shift must threaten healthy environment (FAO, 2011 in Pavlinović, 2017).

A pilot survey was applied to convenience sample of farmers from Split-Dalmatia and Dubrovnik-Neretva County in order to explore decision-making of local farmers with respect to agricultural innovations and relevant communication channels. Existing knowledge and

literature about innovative farmer behaviour is limited (Lapple, 2015). Thus, an inductive approach was applied accompanied by primary data collection and analysis focused on exploration of the problem rather than on rigorous statistical testing. Insights about obstacles and advantages of innovative behaviour provide directions for further research and improvement of competitiveness of local farmers in vulnerable rural areas. Study is organized in four topics: (i) demography of farmers, (ii) networking, (iii) advantages and barriers to innovate, and (iv) communication channels, where topics (ii) to (iv) are compared with demography of farmers.

Relevant existing literature is discussed in the second section while research design is shortly presented in the third section. Analysed data are presented and discussed in the context of existing literature in the fourth section.

The aim of this paper is to investigate motives against and for innovation in agriculture, innovation diffusion channels, and how innovative behaviour varies with demographic profiles of respondents.

## **2. Literature review**

Innovative farmer decision-making is determined by farmer personal characteristics, but as well by external circumstances such as legal framework, uncertainty and property of social and professional network. Literature overview is conducted in order to identify relevant factors for farmer innovative behaviour. Several branches of literature may contribute to their understanding:

- innovative behaviour of small producers in general
- farmer behaviour in general
- organic agriculture
- information diffusion
- communication and social networks

General literature on behaviour of innovative producers may be insightful for the problem under consideration which is focused on a specific type of producers, small farmers in south Croatia. Furthermore, additional prospective about particularities of farming production is needed since purpose of this study is a contribution to the implementation of sustainable agricultural practices in south Croatia.

In economic literature, innovations are often treated as ideas which spread across business entities. New ideas (solutions) which turn out to be fruitful are adopted by the whole population. According to the Websters New World Dictionary innovation is something newly introduced like new method, custom, device or change in the way of doing things.

Innovation diffusion represents vigorous branch of innovation studies which is very often closely linked to problems of social learning (information sharing), social coordination and externalities. The aim of this study is not to provide thorough review of the mentioned studies, but to exploit their basic insights and to improve understanding of innovative farmer behaviour in the given context. This section proceeds with presentation of the relevant findings across four topics mentioned in the introduction.

### **2.1 Innovation and demographics**

In order to improve innovation policy-making it is necessary to understand how innovation behaviour varies with different traits of innovators such as age, sex and education or material status. Existing literature identifies relevant traits of innovators.

Meijer et al (2015:47) studied agroforestry innovations by small farmers in Africa and finds that males are more inclined to introduce innovation. However, since gender may determine material status of a farmer, for instance her resource endowments, such a finding needs to be further tested and taken with caution since difference in sex may simply result from difference in material status. Results of our empirical study will be compared with this literature finding.

Several studies indicate that education might be significant factor for adoption of innovations in agriculture. Rijn et al (2012 in Tomaš Simin and Janković, 2014:520), and May et al (2011:12) detect positive relationship between education and adoption of innovation, which is in line with conclusion of literature review in Zabala (2015:93). May (2017:41) confirms such results but in a turbulent business environment, while Lapple (2015) confirms it in a case of agricultural education. On the contrary, Pratiwi and Sudrajat (2010) in Suasih et al (2017:100) find that education of farmers does not affect significantly their innovative behaviour. Thus, literature provides scarce and ambiguous results which call for further investigation of the correlation between education and innovative farmer behaviour.

Furthermore, material status of farmers may determine their inclination to innovation. Namely, Meijer (2015:47) points out that the poorest people cannot afford risk-taking. Zabala (2015:99) and Lapple (2015) find that farm size significantly affects innovation decisions while innovative farmer behaviour is negatively correlated with farm's size in a turbulent business environment (May, 2017:41). Furthermore, meta-analysis (Pattanayak et al, 2003 in Meijer, 2015) indicates that resource endowment plays very important role in adoption behaviour as well as access to credits (Lapple, 2015).

Farmer innovation is negatively related with age (Lapple, 2015) which is explained by shorter time horizon and larger risk-aversion. Lioutas and Charatsari (2017) do not find statistically significant effect of age and other demographic factors on green innovativeness which is in line with Zabala (2015:93) who also concludes that the effect of age is unclear and context-dependent.

## **2.2 Networking**

More recent economic studies extensively elaborate influence of social interactions on economic behaviour (such as Jackson, 2008). Social interactions can simply serve to obtain necessary information about innovation, may enable positive or negative neighbourhood effects, or may serve to coordinate activities. In a specific context these sources of interaction overlap and become hard to disentangle. For example, participation in a workshop enables interaction among farmers which can serve for exchange of experience, but as well as for coordination and planning complementary activities. Such interaction can positively influence implementation of innovation due to information sharing, coordination, and reduction of uncertainty. May (2017:41) and May et al (2011:12) find that "belonging to the farming community" reduces farmers probability to innovate in a stable business environment. Also, Cisi et al (2016) conclude that firm participation in formal networks may positively affect value and export, particular in south of Italy. On the contrary, positive effect of farmer groups and social embeddedness on adoption of innovation is recognized by Meijer

(2015:47). Small farmers in south Dalmatia are usually involved in group interactions through various workshops which are usually organized by public institutions which promote rural development. Thus, participation to the workshops is considered in the empirical analysis as an indicator of social interactions and networking.

A useful theoretical elaboration of innovation diffusion in agriculture is provided in Xiong et al (2016). The authors examined two case studies of villages in China who were adopting new crops, *Artemisia selengensis* in one village and grape in another. In the first period of adoption information about new crop was shared and the process of adoption was rather slow, in the second phase critical number of innovators shared their experience within their social network while in the third phase late adopters introduce new crops simply due to externality effects.

Channels of information, experience and network effect (Xiong et al, 2016:6) are:

- Information effect: awareness, general costs and benefits
- Experience effect: localized costs and benefits, specific techniques, know-how and skills, opinions and resources
- Externality effect: peer externalities, local and global network externalities, and conformity.

May (2017:36-37) systematises five groups of factors which affect farmer's capacity to innovate:

- a) attitudes toward farming
- b) Participation in strategic alliances: increased negotiation power allows firm to enter in new markets and obtain new information. Spread the risk and allow high capital expenditures.
- c) farmer's goals: income increase, interpersonal relations, self-expression or intrinsic value orientation (Gasson, 1973 in May, 2017:37).
- d) participation in social and commercial networks which enable farmer to obtain useful information for innovative activities (Virkkala, 2007 in May, 2017:37)
- e) socio-economic variables

Focus of this research is on points d) and e) about networking and socio-demographic properties, respectively.

### **2.3 Advantages and barriers to innovate**

Lapple (2015) elaborated different drivers and barriers to agricultural innovation. Namely, costs and benefits of new technology influence decision-making about innovation adoption in agriculture (Meijer, 2015; Zabala, 2015:99). Costs are, for example, related to "purchase of inputs, equipment, managing pests and diseases", while benefits are related to "increase in revenues, food security and soil fertility" (Meijer, 2015:44). For example, Loutas and Charatsari (2017) find that economic goals and convenience influence green innovativeness of orchard farmers in a studied area.

However, barriers to innovation are considered more often in the literature. Although in the long run innovation might be beneficial, expected benefits from innovation may be uncertain. Furthermore, usually significant initial costs are required. Thus, uncertainty and initial investments represent significant barriers. Risk taking, lack of relevant information and subsequent uncertainty is recognized by Meijer (2015:47) as important determinants of

innovative behaviour. Also, Bold et al (2017) point out that hidden information about quality of innovative seeds hinder farmers to innovate by application of new seeds. For example, as Bolds et al (2017) mention, farmers in Uganda are suspicious about fertilizer quality since it may be sold in the market in diluted form. Furthermore, significant initial costs also represent barriers to farmers who need to experiment with a new technique before its application. However, Tomaš Simin and Janković (2014:524-525) point out that ability of farmers to experiment may vary depending on their personal, but as well as family unit characteristics.

#### **2.4 Communication channels**

In the previous sections the emphasis is on importance of general social interactions of innovators while in this section information sharing is under consideration. Information sharing may turn out to be important since it provides information about existence, application and effectiveness of an innovation. Meijer et al (2015) emphasizes importance of adoption of a new technology by learning from experiments and experience of farmers in the neighbourhood – local knowledge, instead of traditional technology transfer. Similarly, Suasih et al (2017:100) finds that “local wisdom” and social character of the community play important role in innovation adoption. Finally, Loconto et al (2016) confirm this by emphasising the importance of knowledge sharing in organic farming in order to spread useful production practices.

Information sharing in agriculture follows widely studied patterns of innovation diffusion. Tomaš Simin and Janković (2014:519) provide a short overview of theory of innovation diffusion which studies the factors which explain adoption of innovations.

In their elaboration of new innovation literature and application to agriculture, Potts and Kastle (2017) presume that innovation process in agriculture is a risk-taking activity crucially dependent on information sharing between entrepreneurs (e.g. Hunter Valley wine region). Such a pattern led to creation of private innovation commons and development of a new industry (Potts and Kastle, 2017:101). Farmer innovations can be also studied through the prospective of the theory about new technology adoption and related concepts such as social networks structures (Jackson, 2008:73; Goyal, 2007:88). Also, Conley and Udry (2010) explored effect of social learning on adoption of new technology in agriculture.

Modes of learning and obtaining necessary information about innovation may vary from different seminars, and other didactic activities of relevant public bodies, over conventional public media for communication such newspapers, radio and TV, to online social media. At the same time they serve for informing and for promotion. None the less important source of information and persuasion is personal communication or word of mouth (WOM) which relevance has not diminished by development of technology. It may be interesting to compare factors which affect consumers' favourable attitudes towards advertising and their WOM information sending (Kursan Milaković and Mihić, 2015) with the relevant results of our study.

In order to understand which factors can reverse the trends, this paper studies farmer decision-making and behaviour with respect to innovations in agriculture with a particular emphasis on communication channels that farmers use to obtain necessary information. Namely, innovations in agriculture may positively affect farmer competitiveness and in this

way contribute to regeneration of rural areas. Further knowledge on communication channels is needed in order to understand how to reduce mentioned information asymmetry.

Finally, Tomaš Šimin i Janković (2014) point out that agriculture is a specific economic activity of innovation diffusion while it is also necessary to pay attention to potential particularities of information diffusion in non-conventional farming.

### 3. Research design

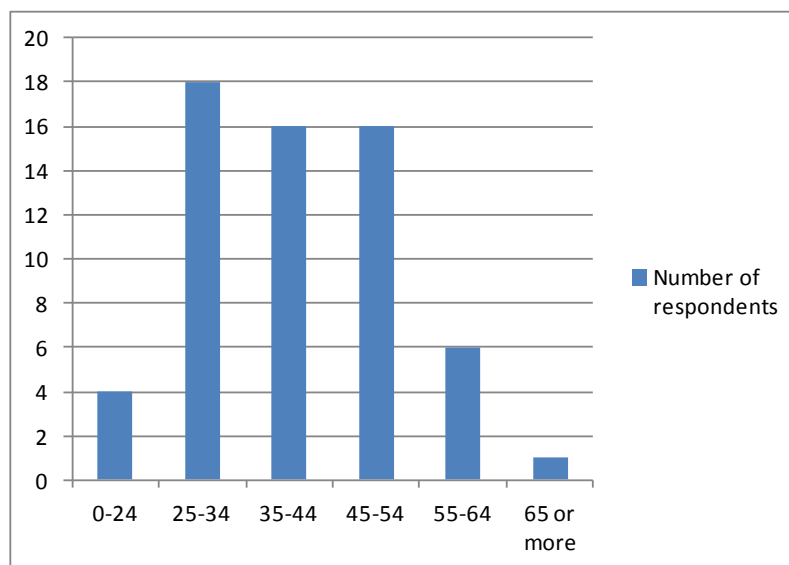
For this reason, this paper explores attributes and attitudes of local farmers with respect to their experience and decision-making about agricultural innovations, as well as communication channels which affect their behaviour.

Area under study is a part of south Croatia delineated by administrative borders of Split-Dalmatia county and Dubrovnik-Neretva county. This is coastal karstic area inhabited by many endemic species. Agriculture in this area represents a traditional economic activity, but with a limited productivity due to specific geographical and climate conditions. Drought periods and extreme temperature shocks characterize this area (Kružić and Povh Škugor, 2015). Small farm units dominate traditionally in this area with highly fragmented land and mosaic type of agriculture (Defilippis, 1997). Sustainable farming may represent suitable pathway against agricultural abandonment and agricultural intensification. Neither one nor another would represent an optimal development path in this sensitive karstic area. In order to support and promote sustainable farming practices, farmers in this area need to innovate and share their experience within their local communities.

For this reason, innovative behaviour of farmers in Coastal Croatia is elaborated. As it was pointed out in the introduction, empirical part of the research is based on primary data. Convenience sample is composed of farmers who were present at local farming markets in different occasions. Primary data collection was conducted in the period from February to March 2017. Respondents got questionnaire as a primary research instrument that contained statements in the Likert scale from 1 to 5, where 1 referred to “completely disagree”, and 5 referred to “fully agree”. Also, the questionnaire contained closed questions and some of them allowed possibility of multiple responses. There was also one open question.

The data collection was conducted during the implementation of Horizon 2020 project *HNV Link - Agriculture in areas of great natural value: learning, innovation and knowledge*. Dalmatian islands are threatened by depopulation and increasingly abandoned agriculture land. Innovators have to respond to this challenge and find ways and mechanisms to oppose to such trends and keep the traditional landscape alive and economically viable.

Out of 61 participants in the survey 60,66% were male while 39,34% were female. Respondents were evenly distributed across dominant age groups what is presented in the following figure. Almost 40% of interviewed farmers possess high degree of education.



**Figure 1:** Distribution of farmers by age

Source: own research

As it was mentioned in the introduction, topics which were elaborated were farmer demography, networking, advantages and barriers to innovate and communication channels. Thus, questionnaire is composed of six questions related those topics. After collecting basic demographic data, farmer past participation to workshops was examined. Next questions were about innovation intending to check if farmers applied innovations and in order to identify obstacles to innovative behaviour. Next two questions were dedicated to the communication channels which were used for informing and decision-making about innovation. Finally, Likert scale was applied in order to measure farmer attitudes about innovations. The data were collected and analysed in order to obtain essential insights about properties of innovative farmers in Split-Dalmatia and Dubrovnik-Neretva Counties. Findings of this analysis will be used to structure further research and for informed policy design tackling rural development issues in this specific context.

#### 4. Results

Results of a pilot survey of convenient sample of farmers from Split-Dalmatia and Dubrovnik-Neretva country are discussed. Insights about obstacles and advantages of innovative behaviour provide directions for further research and improvement of competitiveness of local farmers in vulnerable rural areas.

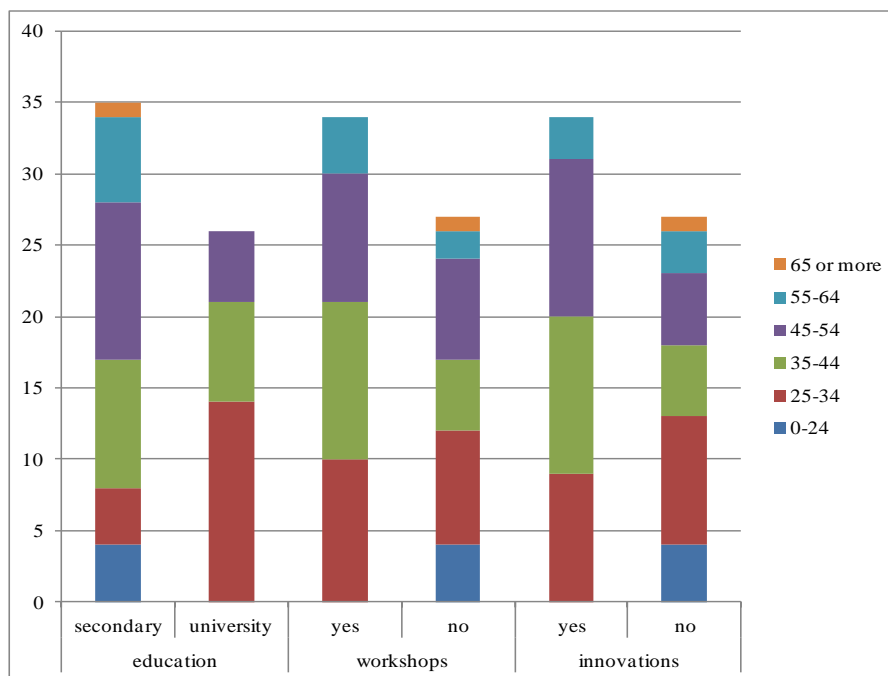
While basic demographic data about interviewed farmers are presented in the previous section, workshop participation, innovative behaviour and obstacles, communication channels are elaborate in this section. Since education and age are identified as significant factors which determine innovative behaviour, networking and innovative behaviour is examined across various categories of respondents.

##### 4.1 Education, workshop participation and innovation

Analysis reveals that the same percentage of respondents (55,74%) participated to the workshops and applied innovation in agriculture. Correlation coefficient between these two



activities of respondents is 0,53 and it is statistically significant at 1% probability. It indicates that there exists a significant correlation between workshop attendance and innovative practices. Bayesian probabilities show that 79,4% of respondents who participated to the workshop also applied innovations, while 74% of respondents who did not attend any workshop also did not apply any innovation in agriculture.



**Figure 2:** Education, workshop participation and innovations across age groups  
 Source: own research

The above figure demonstrates how education, workshop participation and innovation vary by age. Vertical axis represents number of respondents. Those with at most secondary education dominate, while minority of respondents holds university degree. However, majority of highly educated farmers are young, from 25 to 34 years old. This finding is in line with general trends in education. However, it also may imply that farming becomes attractive for such a population which is insightful for design of policies of agricultural development. For example, organic agriculture is highly complex and requires much more education and knowledge than conventional agriculture, but it may be feasible in knowledgeable population of farmers.

There is high similarity between structures of farmers who attended workshops and applied innovations which are evenly distributed cross different age groups. Farmers of age between 25 and 34 years dominate among those who have never attended workshop or applied innovation. Since correlation between workshop attendance and innovation application is significant, such findings imply that in order to foster innovations in agriculture, public bodies might design workshops targeted for young farmers.

Table 1: Workshop attendance and innovation adoption by age						
A	Hig	Participatio	Adoption of	Conditional probability	Correlation	coefficient

age	degree	workshop for farmers	innovation in agriculture	of innovations on workshop attendance	between participation and innovation adoption
20-24	0%	0%	0%	-	-
25-34	78%	56%	50%	60%	0,22
35-44	44%	69%	69%	91%	0,71
45-54	31%	56%	69%	100%	0,76
55-64	0%	67%	50%	50%	0,00

\*There was only one respondent of age above 64 who neither attended workshops nor adopted innovation

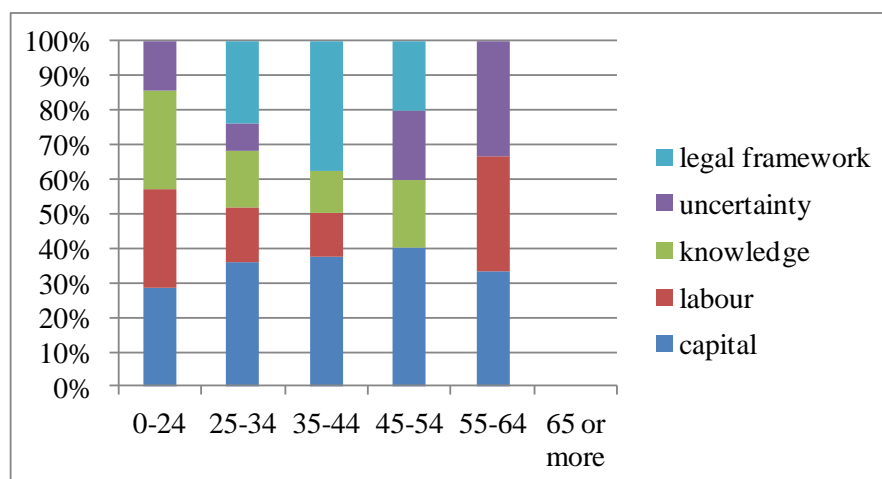
Source: own research

The above table demonstrates workshop participation and innovation adoption by ages. Among correlation coefficient previously calculated for the whole sample, level of correlation between workshop participation and innovation application was calculated for different age groups. While correlation is weak for populations of ages 25 to 34 and 55 to 64, correlation is very high for age groups 35 to 44 and 45 to 54 years old. This may indicate that young farmers who innovate did not need networking and information exchange through workshop since they inherited them from their parents. Such a pattern needs to be further elaborated since it may contribute to the optimization of targeting strategies for education and networking of young famers. Furthermore, it was also checked if importance of obstacles varies with the age of respondents. The following figure represent share of different barriers across age groups.

#### 4.2 Barriers to innovate

The data analysis proceeds by elaboration of barriers to innovation. Literature on innovation identifies numerous obstacles to innovative behaviour of famers. Lack of resources characterizes agricultural area under study due to rural abandonment. Shortage of capital and labour represents a significant threat to development of innovative farming activities. Furthermore, volatile market for agricultural products and climate variability are examples of

uncertainty which affect farming. However, innovative activities may be limited also due to lack of relevant information and trust. Finally, unstable legal framework also deters decisions of farmers to innovate. In order to understand which factors represent significant barriers to innovate respondents were asked to select reasons for avoiding innovations. Barriers which were identified by most respondents were lack physical and financial capital, followed by inappropriate legal framework, lack of human and labour capital, while trust is identified by less than 10% of respondents as a barrier to innovate.



**Figure 3:** Barriers to innovate

Source: own research

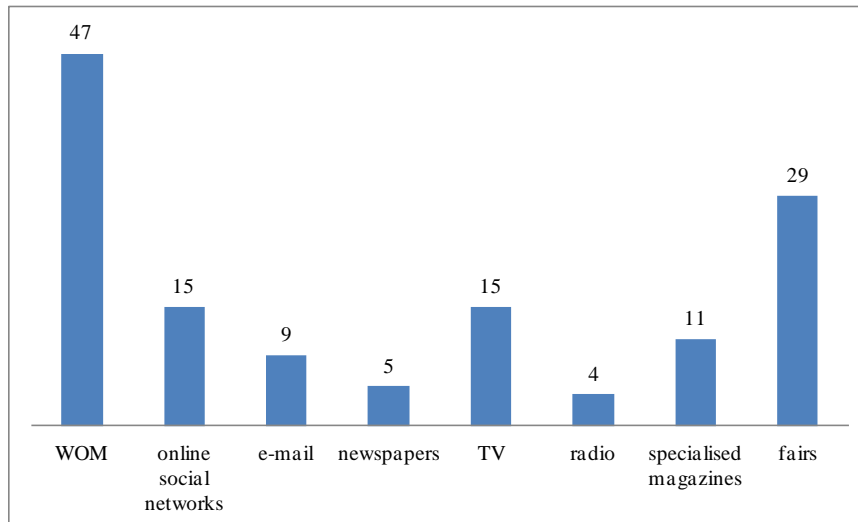
It was also checked if importance of obstacles varies with the age of respondents. The following figure represent share of different barriers across age groups. Number of obstacles mentioned by respondents decreases by age, starting with the average of 1,75 obstacles for the young respondents who are 24 years old or younger, while this indicator takes the value around 0,5 for older age groups.

The most dominant reason identified by all age groups is physical capital, while shortage of labour is in the second place. Lack of knowledge and uncertainty are recognised as significant barriers first of all by very young group of 24 years old or younger, which is not surprising. Inappropriate legal framework is recognized as equally important obstacle by respondents who are 34 to 44 years old. It can be concluded that although the literature stresses information, trust and uncertainty as important factors which explain decision of farmers to avoid innovations, this study finds that in this specific context lack of capital dominants in decision-making. Thus, policies which support innovation in farming need to address first of all capacity of farmers to finance necessary capital equipment. In the following section we address the issue of information diffusion and modes of communication which promote innovation.

### 4.3 Innovation diffusion channels

Since innovation is usually accompanied by uncertainty and lack of information due to unpredictable efficiency of new production methods, unknown costs or lack of trust for example, farmers learn about new practices which may be introduces, as well about respective costs and benefits. Information sharing might be crucial for decision-making about innovations. This study considers in particular sources of information which were significant

for decision-making about adoption of innovation in the specific case of small farmers in Split-Dalmatia and Dubrovnik-Neretva counties.

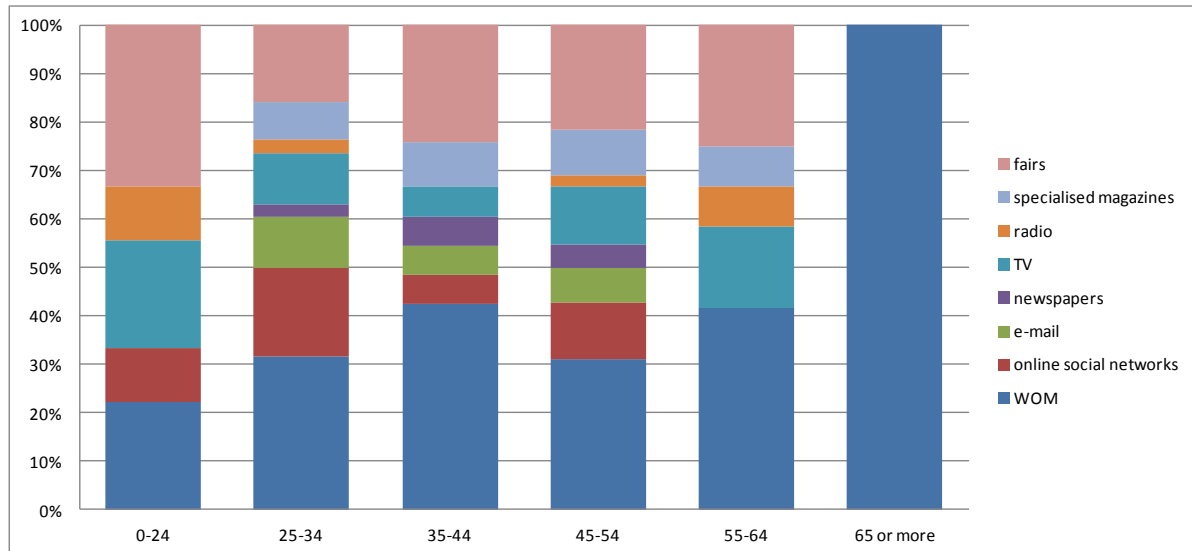


**Figure 4:** Use of communication channels by respondents

Source: own research

Most of respondents (47 persons or 77%) emphasised “word of mouth” as a significant factor which contributed to their decision about introduction of information. In literature on marketing and social networks it is recognised that despite other sources of information traditional way of gaining information by chatting with others remains very relevant source for reduction of information. The next relevant sources are also traditional methods, such as fairs, which were reported by half of respondents. Television is as relevant as online social media and networks and it is reported by one quarter of farmers included in the sample. They are followed by specialized magazine and e-mails, while the least of respondents find radio and newspapers to affect their decisions significantly.

Distribution of communication channels across ages follows general trends. Although word of mouth and fairs dominate in all age groups, television is also very relevant source for very young respondents 24 years old or younger and respondents of 55 to 64 years old. Online social networks are also relevant source for age group of 25 to 34 years old.



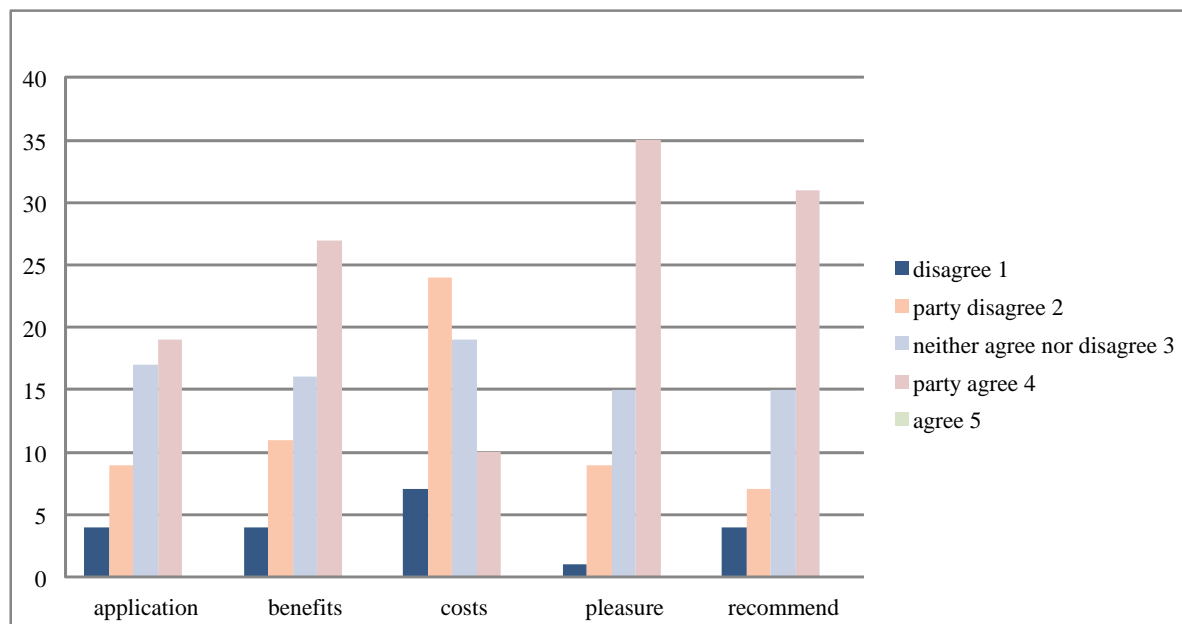
**Figure 5:** Communication channels which significantly affected innovation adoption by age  
 Source: own research

Such results imply that crucial decisions of farmers are based on information which arrives through their personal social network and profession fairs. It can be questioned why other sources such as online social media or radio are not so influential. Knowledge about information sharing and influence of social networks can be applied in design of strategies for dissemination of innovations. It is also suggested to pay attention to the identification and the role of influencers. It needs to be checked if specific structure of a network may play important role in innovation decision-making of farmers in the specific context.

Empirical research is concluded by study of attitudes about innovation by applying Likert scale from 1 to 5 with meaning 1 – completely disagree, 2 – partly agree, 3 – neither agree nor disagree, 4 – partly agree, and 5 – completely agree. The statements which were evaluated are the following:

- I apply innovation in agriculture
- By applying innovation I obtain long-term benefits
- Innovation in agriculture result in higher costs compared to application of traditional methods
- Application of innovations in agriculture makes me happy
- I recommend innovations which I apply to others

Analysis of distribution of grades across various attributes shows that the most of respondents partly agree with the statements. The only exception is the statement about costs. The most of respondents partly disagree with the statement. Such a finding shows that, opposite to insights of other authors, most respondents in the sample of this study do not recognise that costs of innovation may be crucially different to costs of traditional methods. This partly contradicts with finding that physical capital is a major obstacle to innovative behaviour. However, it applies only to farmers who did not innovate. Therefore, it is recommended to further investigate perception of costs of innovation by different groups of farmers.



**Figure 6:** Advantages of innovations in agriculture  
 Source: own research

## 5. Conclusion

Innovations in farming are crucial for sustainable development of rural areas in south Croatia. Finds in the literature on innovation is compared with results of primary data analysis in the specific context which can be useful for design of further research on innovation in agriculture in south Croatia, but also for design of relevant policies. Topics which were elaborated were farmer demography, networking, advantages and barriers to innovate and communication channels.

The study reveals that there exist a significant correlation between workshop attendance, which is a proxy for networking, and innovative practices. Furthermore, it was found out that majority of highly educated farmers are young, from 25 to 34 years old. This may be relevant for development of organic agriculture which is highly complex and requires significant education and knowledge compared to conventional agriculture, but it may be feasible in a knowledgeable population of farmers. Furthermore, in order to foster innovations in agriculture public bodies might design workshops targeted for young farmers.

Barriers which were identified by most respondents were in the first place lack of physical and financial capital, followed by inappropriate legal framework, lack of human and labor capital, while trust is identified by less than 10% of respondents as a barrier to innovate. Most of respondents emphasized “word of mouth” as a significant factor which contributed to their decision about introduction of information while online social networks were relevant source of information for age group of 25 to 34 years old. Surprisingly, most of respondents in the sample of this study do not recognise that costs of innovation may be crucially different from costs of traditional methods.

Aknowledgements: This research was fostered and conducted contemporaneously with implementation of Horizon 2020 EU project *HNV-link: High Nature Value Farming: Learning, Innovation and Knowledge*, contract No. 696391.

## References

- Bold T *et al.* 2017. Lemon Technologies and Adoption: Measurement, Theory, and Evidence from Agricultural Markets in Uganda. *The Quarterly Journal of Economics*, 132(3):1055-1100.
- Cisi M, Devicienti F, Manello A. 2016. The impact of formal networking on the performance of SMEs. University of Torino, Department of Economics and Statistics Working Paper Series, No. 39, November 2016.
- Conley TG, Udry CR. 2010. Learning about a New Technology: Pineapple in Ghana. *American Economic Review*, 10(1):35-69.
- Defilippis J. 1997. *Dalmatinsko selo u promjenama*. Avium: Split.
- FAO 2011. *Save and Grow: a Policymaker's Guide to the Sustainable Intensification of Smallholder Crop Production*. FAO: Rome.
- Goyal S. 2007. *Connections: An Introduction in the Economics of Networks*, Princeton University Press: Princeton and Oxford.
- Jackson MO. 2008. *Social and Economic Networks*. Princeton University Press: Princeton and Oxford.
- Kružić N, Povh Škugor D. (Eds). 2015. *Gospodarsko-socijalna analiza korištenja i troškova propadanja morskog okoliša i obalnog područja*, Institute of Economics Zagreb and University of Split, Faculty of Economics: Split and Zagreb.
- Kursan Milaković I, Mihić M. 2015. Predictors and Outcomes of Attitudes Towards Advertising: Demographics, Personal Factors and WOM, *Ekonomika misao i praksa*, 24(2):409-432.
- Lapple D, Renwick A, Thorne F. 2015. Measuring and understanding the drivers of agricultural innovation: Evidence from Ireland. *Food Policy*, 51:1-8.
- Lioutas ED, Charatsari C. 2017. Green Innovativeness in Farm Enterprises: What Makes Farmers Think Green? *Sustainable Development*, doi: 10.1002/sd.1709.
- Loconto A, Poisot AS, Santacoloma P. (Eds). 2016. *Innovative Markets for Sustainable Agriculture*. FAO and INRA: Rome.

- May DE. 2017. Understanding Farmers' Incentives to Innovate in Different Business Environments. *International Journal of Food and Agricultural Economics*, 5(3):35-46.
- May DE, Tate GJ, Worrall L. 2011. Understanding innovation in a dynamic agricultural business environment: a multivariate approach. *International Journal of Agricultural Management*, 1(1):7-15.
- Meijer SS *et al.* 2015. The role of knowledge, attitudes and perceptions in the uptake of agricultural and agroforestry innovations among smallholder farmers in sub-Saharan Africa. *International Journal of Agricultural Sustainability*, 13(1):40-54.
- Pavlinović S. 2017. Market failures of organic agriculture and information asymmetry. In (Eds.) S. Brown, S. Larsen, K. Marrongelle, and M. Oehrtman, Proceedings of The 5th Virtual Multidisciplinary Conference QUAESTI (QUAESTI-2017), 5:38-42. Zilina, Slovakia.
- Potts J, Kastle T. 2017. Economics of innovation in Australian agricultural economics and policy. *Economic Analysis and Policy*, 54:96-104.
- Suasih NNR, Saskara IAN, Yasa INM, Budha MKS. 2017. Which One is Stronger to Affect Innovation Adoption by Balinese Farmers: Government Role or Local Wisdom. *Journal of Sustainable Development*, 10(3):93-104.
- Tomaš Šimin M, Janković D. 2014. Application of Diffusion of Innovation Theory in Organic Agriculture. *Economics of Agriculture*, 61(2):517-529.
- Webster's new world dictionary*, 1986, Prentice hall press, New York, page 726.
- Xiong H, Payne D, Kinsella S. 2016. Peer effects in the diffusion of innovations: Theory and simulation. *Journal of Behavioral and Experimental Economics*, 63:1-13.
- Zabala A. 2014. *Motivations and incentives for pro-environmental behavior: the case of silvopasture adoption in the tropical forest frontier*, doctoral thesis, Department of Land Economy, University of Cambridge: Cambridge.