

Income Stabilization Tool in Viticulture – Risk Management Innovation: the case of the Istria County

Osiguranje dohotka u vinogradarstvu – Inovacija za upravljanje rizikom: slučaj Istarske županije

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ABSTRACT

To cope with different types of risks, farmers can implement on-farm strategies and risk-sharing strategies. Risk management tools within EU Common Agricultural Policy are subsidized crop insurance, mutual funds (MF), and income stabilization tool (IST). While subsidized crop insurance is widely applied, IST and MF are not so common. Price volatility and climate change risk significantly influence farm income. Mediterranean area is especially exposed to climate change, so Istria County as part of Mediterranean is chosen for research. IST could protect against income variability, but more research and discussions are needed prior to its commercial scale implementation. Qualitative research on the small sample was applied with the goal to explore attributes that could impact the selection of IST. Paper provides an overview of IST and previous experience of IST on the EU level, on the basis of semi structured interviews, explains the perception of climate risks and IST on wine cases in Istria. The results show that all selected cases were familiar with subsidized crop insurance; however, they were not familiar with IST. After being introduced to the IST, wine producers were ready to consider its application. Lack of experiences in business linkages could be a constraint in the development of IST and challenge for policymakers.

Keywords: climate risk, income risk, income stabilization tool, risk management innovation, vine growing

SAŽETAK

S ciljem suočavanja s različitim vrstama rizika poljoprivrednici mogu implementirati strategije za upravljanje rizikom na razini gospodarstva i strategije za prijenos rizika. Strategije za upravljanje rizikom u okviru Zajedničke poljoprivredne politike EU dijele se na potporu za osiguranje prinosa, osiguranje dohotka i uzajamno osiguranje. Mjera potpora za osiguranje prinosa je široko primijenjena, dok su ostale dvije strategije u primjeni samo u nekim zemljama članicama. Promjenjivost cijena i neizvjesnost u proizvodnji zbog klimatskih promjena značajno utječu na dohodak poljoprivrednih gospodarstava. Područje Mediterana je posebno izloženo riziku klimatskih promjena, te je Istarska županija kao dio Mediterana izabrana za istraživanje. Osiguranje dohotka štiti od varijabilnosti dohotka, ali prije komercijalne primjene je potrebno provesti više istraživanja i rasprava. Kvalitativno istraživanje na malom uzorku primijenjeno je kako bi se ispitala obilježja koja mogu utjecati na izbor osiguranja dohotka. Rad daje pregled obilježja osiguranja dohotka i dosadašnja iskustva osiguranja dohotka na razini EU, primjenom polustrukturiranih intervjuja, na izabranim vinogradarima Istre objašnjava percepciju o klimatskim rizicima i osiguranju dohotka. Rezultati pokazuju kako su svi ispitanici upoznati sa

subvencioniranim osiguravanjem prinosa, ali nisu upoznati sa osiguranjem dohotka. Nakon što su ispitanici upoznati s osiguranjem dohotka sva su četiri proizvođača spremna razmotriti primjenu spomenute strategije. Manjak iskustva uzajamnog poslovanja može biti ograničenje razvoja osiguranja dohotka i izazov za donositelje političkih odluka.

Ključne riječi: inovacija za upravljanje rizikom, klimatski rizik, osiguranje dohotka, rizik dohotka, vinogradarstvo

INTRODUCTION

Income risk represents one of the most important risks at the farm level together with price and production risks (European Commission, 2017). Income is influenced by variability of input and output prices due to climate change and business environment. Economic losses in agriculture at global and national levels are increasing. Data shows that in Croatia losses in one year equal one billion kunas (Ministarstvo financija, 2018). Farmers can apply a wide range of strategies to cope with risks. In general, risk management strategies could be divided into risk-sharing strategies and on-farm risk management strategies (Hardaker, 2004). The highly uncertain environment is a source of many risks and consequential damages, which, in parallel, causes an insufficient supply of risk management tools.

Shumetie et al. (2020) researched the effect of climate variability on crop income in Ethiopia and concluded that natural disasters had a negative and significant impact on income. Similarly, to crop production, research shows that there is an impact of climate risk on the wine business. Pomarici and Seccia (2015) established that climate change impacted the increment of production cost, income, revenue, and farm profit. Further, Jones and Webb (2010) concluded that vine growers and wine producers were vulnerable to income variability, market fluctuations as well as legal frameworks. The European Commission (2019) forecasts a decrease in EU wine demand and production by 0.5% annually by 2030 due to climate variability.

Wine production in Croatia is one of the most important sectors in Croatian agriculture (Bedeck and Njavro, 2016). Viticulture in Croatia is characterized by a long tradition of viticulture, wine production, and cultivation of autochthonous varieties.

According to the Official Gazette of the Republic of Croatia, Wine Act No. 32/19 (2019), Croatia is divided into four wine regions: Slavonia and Croatian Podunavlje; Istria and Kvarner; Dalmatia; and central and mountainous Croatia. In Croatia, the total grape production decreased by 22% and wine production by 26% in the period from 2012 to 2018. The average yield per hectare over the last five years is 6.02 tonnes, which is slightly lower than in 2018 (7.1 tonnes).

Table 1. Area (ha), Production (t) and Yield (t/ha) of Grapes, Republic of Croatia

| Year | Area (ha) | Production (t) | Yield (t/ha) |
|------|-----------|----------------|--------------|
| 2012 | 29,237 | 187,550 | 6.4 |
| 2013 | 26,100 | 181,096 | 6.9 |
| 2014 | 25,749 | 134,941 | 5.2 |
| 2015 | 25,587 | 154,227 | 6.0 |
| 2016 | 23,400 | 123,651 | 5.3 |
| 2017 | 21,900 | 116,307 | 5.3 |
| 2018 | 20,512 | 146,242 | 7.1 |

Source: Croatian Bureau of Statistics, 2019a

According to the Vineyard Register (2018), the largest share of vineyards in terms of the total vineyard area (19.409 ha) is in Istria County, 15%. Istria County as County of research interest accounts for the highest share of vineyard areas, specific grape varieties (e.g. Malvazija Istarska), and 7% of wine producers in Croatia (Vineyard Register, 2018). Mediterranean is more exposed to climate change (European Commission, 2016.), so Istria County as part of Mediterranean is chosen for research. In 2018, there were 38,475 wine agricultural holdings in Croatia. Among them, 99.11% were small agricultural holdings up to 5 hectares (96.89% in Istria), 0.82% farms with 5 to 50 hectares (3.04% in Istria) and only 0.07% large farms over 50 (0.07% in Istria) (Vineyard Register, 2018).

The production of grapes and wines in Croatia is low compared to the production in EU countries (Croatian share in EU wine production is 0.4%). On the other hand, wine consumption in Croatia was around 22.5 liters per capita in 2017 (Croatian Bureau of Statistics, 2019b).

The multitude of risks that impact agricultural production, such as climate change, price volatility (Hill and Bradely, 2015) and consequently income variability (Trestini et al., 2017b) emphasize the need for new risk management strategies. As the second pillar of the Common Agricultural Policy for 2014 - 2020, risk management tools were introduced to better cope with climate and other risks in business. In the new Rural Development Program for 2021 to 2027, a higher emphasis is placed on IST and mutual insurance. Income insurance is effectively applied in Canada and the USA (Meuwissen et al., 2008.) and on the other hand, the European Commission has recently proposed the income stabilization tool (IST) as a new risk management tool that can be applied in managing income risk in the climate and price risk environment. Based on El Benni et al. (2016), the attractiveness of IST, compared with other risk management tools, has three reasons. First, the subsidization of the IST agrees with World Trade Organization (WTO) green-box requirements. Second, farm income represents the economic wellbeing of a farm household much better than revenues of a single commodity, and third, the correlations between prices and yields and between different commodities are implicitly taken into account by whole-farm income insurances and must not to be measured directly.

The objective of the paper is to describe IST as a new risk management tool and with qualitative research explore attributes that affect opting for IST. The goal of this paper is to provide an overview of IST and explain, on the basis of interviews, the perception of climate risks and IST by selected wine cases from Istria County. The objective of the interviews is twofold: (1) to explain the perception of production risk that impacts wine producers in Istria, and (2) to explore attributes that will impact the selection of IST and understand the readiness of the respondents to accept IST.

It needs to be emphasized that the paper provides the results of semi-structured interviews from Istria, only one Croatian out of four wine regions. It can be expected that results of climate risk perception and IST would be different in other wine growing regions and other parts of Croatia. This paper presents the first study of IST on Croatian level. Represented research is a good starting point for further analysis of IST implementation in Adriatic wine region, including other risk related assessments.

MATERIALS AND METHODS

Face-to-face interviews were source of primary data for the study. Data were collected from four wine cases (respondents are both vine growers and wine producers) from Istria County. The interviews were conducted in September 2019. Three cases were from the area of Vižinada and one from the area of Labinci – both on the west coast of the Istrian peninsula. Small and large vine growers/wine producers were equally represented with two cases.

With exploratory research and qualitative approach, authors explore the new topic (income stabilization tool) in Croatia, specifically in Istria County as Mediterranean region more exposed to climate risk. Exploratory research was used to develop a picture of IST and to gain enough knowledge to build and execute future experimental study (Neuman, 1997) in different wine regions. The qualitative approach served to make comparisons between respondent's answers to help build theory about IST, especially to explore attributes that could impact the selection of IST and gain respondents' opinions about innovative risk management tool from Istria county (Neuman, 1997).

The present research represents preliminary research of IST in Croatia.

A face-to-face semi-structured interview with predefined sets of questions served as a basis. The interviews were anonymous. The role of the interview was to gain the vine growers' insight into production (climate) risks and the innovative strategy – income stabilization tool, and to explore attributes that would encourage the

wine producers to choose income stabilization tools as a strategy in their business and their readiness to accept IST. Questions were divided into two groups: the 1st group of questions was linked with the wine producers' perception of climate risks and the 2nd group of questions was about their readiness to implement IST and the attributes that would encourage the vine growers/wine producers to opt for IST. Some of the important questions were: are income threshold and compensation on the right level; is there a need for considering different threshold levels; which attributes would influence the choice of the income stabilization tool? The above said was one of the defined goals of in- depth interviews with wine producers.

A descriptive content analysis was used to systematize the interview data about climate risk, familiarity with the income stabilization tool, and the possibility to implement it in the respondents' business. Collected interview data was generated according to topics and further compared between respondents which concludingly led to main conclusions about climate change perception and IST (Flick, 2014).

According to the preliminary research and secondary data, SWOT analysis was used to summarize internal and external factors of the income stabilization tool.

Secondary sources of statistics from the Croatian Bureau of Statistics and the Vineyard Register as scientific papers were used to review the viticulture sector and for the literature review in relation to IST. The descriptive method was used for the income stabilization tool overview.

RESULTS AND DISCUSSION

The agricultural insurance sector at EU level is underdeveloped (Meuwissen et al., 2008). The same applies to Croatia. The size of the Croatian market is about 9.8 billion kunas (about 1.3 billion euros (gross premium in 2018) (Pauković, 2019). In comparison with EU, the size of the insurance industry in Croatia is very small (0.1%) (Insurance Europe, 2020).

The share of non-life insurance was 68% in gross premiums, while the share of other property insurance

groups (crop and livestock insurance and other types of insurance such as machine breakage, burglary, and robbery, glass breakage, facilities under construction, etc.) was 7% or little less than 100 million euros. Due to the insurance premium support from the Rural Development Fund, the use of agricultural insurance significantly increased in 2018 (a 54% increase in crop insurance and a 31% increase in livestock insurance premiums). The number of risks covered increased by 75%, as well as the number of insured persons and family farms (Pauković, 2019). Still, the penetration of agricultural insurance is low.

Based on the Farm Accountancy Data Network (FADN) data, rapid analysis of the farm income level in selected EU member states was done. The analysis was based on the country and type of farming (the principal type of farming). Average farm net income was calculated for the period 2014-2017, together with the standard deviation and coefficient of variation. Farm net income is defined as [remuneration to fixed factors of production on the farm (work, land, capital) and remuneration to the entrepreneur's risk (loss/profit) in the accounting year]. France and Italy were selected for analysis as countries with large wine production and long tradition, while Slovenia and Austria were selected as countries with a somewhat similar production and tradition, as well as historical connections with Croatia.

Farm net income at EU level for all farms is 18,420.75 euros, while farm net income for specialist wine farms is much higher: 31,977.75 euros (Table 2). One can notice that the farm net income of specialist wine farms is higher than for all farms in France, Slovenia, and Austria. Farm net income in Croatia is much lower in comparison with other EU countries. Unlike other selected countries, the income of specialist wine farms in Croatia is lower than the average for all farms. This may have been caused by the effect of the sample.

While farm net income on specialist wine farms is higher than or close to the average farm income for all farms, it is at the same time much more volatile. In Croatia, Austria, and Slovenia, this volatility reached 35, 39, and

75% respectively (Figure 1). The calculated income risk may have been caused by price volatility and highly competitive global wine market, consumer preferences, and risk connected with climate change and pests.

Table 2. Farm net income in selected EU member states per type of farming (average 2014-2017), euro

| | Specialist wine | All farms |
|------------|-----------------|-----------|
| France | 62,008.25 | 32,592.25 |
| Croatia | 6,044.50 | 7,393.50 |
| Italy | 27,466.00 | 32,627.75 |
| Austria | 25,120.25 | 24,266.50 |
| Slovenia | 14,012.50 | 5,048.75 |
| EU average | 31,955.75 | 18,420.75 |

Source: FADN statistics, 2020

To cope with production risk and decrement of yields, vine growers and wine producers can implement crop insurance in their business (of risk-sharing strategies). The policy measure that can be used to cope with yield risk and income volatility is IST. IST (Article 39) is defined as a measure that will be activated when the crisis destroys more than 30% of the average annual farmer's income (Council Regulation, 2013). Average income is calculated as an average of the preceding three-year period or a three-year average based on the preceding five-year period, excluding the highest and lowest entry. The main pre-requisite for IST is the existence of a mutual fund to compensate losses for up to 70% of lost income.

Mutual funds compensate for economic losses caused by adverse climatic events, animal or plant disease, pest infestation, and environmental incident (Council Regulation, 2013). The fund function as a financial reserve in which farmers pay annual premium. As Kuliešis et al. (2017) stated mutual funds is an organized fund for the accumulation of income, which aim is to stabilize farm income. With mutual funds and IST there is a broader insurance possibility, better bargaining power of farmers, insurance of risks that insurance companies do not insure, and reduction of information asymmetry (Kuliešis et al., 2017).

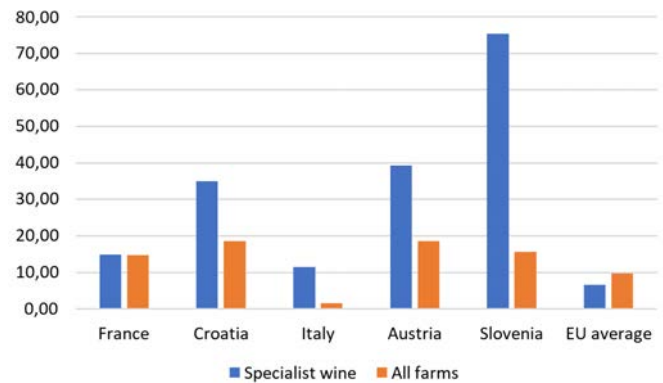


Figure 1. Coefficient of variation of farm net income in selected EU member states per type of farming (average 2014-2017), in % (Source: FADN statistics, 2020)

The peculiarity of IST is that the farmer insures the whole farm – so the tool can be considered as whole-farm insurance. The benefit of IST is the coverage of all risks in business (Pigeon et al., 2012; Finger and El Benni, 2014) and it covers losses from price volatility and production risk (Finger and El Benni, 2014).

IST efficiency has mostly been researched in Italy and Switzerland. Fabian et al. (2016) showed that IST protects farmers from income variability. The research estimated the cost of implementation of the income stabilization tool and the economic efficiency of a related mutual fund. Finger and El Benni (2014) have concluded that IST reduced income inequalities among farmers in Switzerland. Severini et al. (2019a, b) confirm that the income stabilization tool stabilizes income among Italian farmers, and also reduces income inequality in Italian agriculture.

Other research about IST has been done. Trestini and Giampietri (2018) have researched income losses in viticulture in Italy, level of indemnification (premium), and average fee. Trestini et al. (2017a) have assessed the probability of wine farm income reduction in Italy on some farms' characteristics, as factors that impacted income variability.

At EU level IST has been introduced in Italy, Hungary, and Spain (Castilla y Leon). So far, IST has been applied only in Italy. The reason for not applying IST in Hungary and Spain is the lack of information and guidelines from the EU (Cordier and Santeramo, 2018). Cordier and

Santeramo (2018) concluded that there was a need for more guidelines from the EU for a more efficient application of IST and mutual funds.

There is no experience in applying IST in Croatia. Even the application of traditional agricultural insurance is limited. Because of the growing presence of climate change, farm structure, the need for new management tools, IST could be an attractive and effective tool in stabilizing farm income.

Results of interviews

The results of the interviews with the cases are divided into two groups. The first one relates to the perceptions of production (climate) risk that has affected viticulture, while the second group is related to innovative risk management strategies, readiness to implement IST, and attributes that will encourage them to implement it.

Sample overview

The interviewees according to the agricultural holding size belong to small and large producers (Table 3). Two interviewees are small producers: one of them owns 1.5 hectares and the other 4 hectares (1 hectare is leased), respectively. The other two growers are large holdings. One has 19.6 hectares and the other has 20 hectares.

Perception of production risks among vine growers and wine producers

Small farm 1 has diversified production. Beside vine grape and wine production, it produces olive and beekeeping. Half of the producer's total grape production is used for contract sale and one half for wine and distillation. Grape price is an important market risk, but he sells under contract to other wine producers, so the price is predetermined. As for climate risks, the grape producer stated that grapevine yellows is the most significant risk in grape production and causes major economic losses. As for natural disasters, in the last ten years hail occurred twice on the farm just before harvest. As the results of the hail large quantities of grape yields was destroyed and botrytis appeared. The interviewee also noticed a change in climatic variables, an unevenly distributed level of precipitation, and an increment in temperatures in the summer that affects plant physiology.

Small farm 2 holds 4 hectares, of which 1 hectare is leased, mentioned that in the last production year, the biggest climate risk had been hail, which had reduced the yield by 40 to 50%. Beside the hail risk, the respondent mentioned grapevine yellows as a risk, although it had not been recorded on their farm. The biggest negative consequences of climate change that wine producers notice in their production are reduced yields and lower quality of grapes.

Table 3. Sample overview

| Size farm | Small farm 1 | Small farm 2 | Large farm 1 | Large farm 2 |
|------------------------|---------------------------------|---|--|---|
| Number of hectares | 1.5 | 4 | 19.6 | 20 |
| Capacity (l/ season) | 500 | 30,000 | 140,000 | 140,000 |
| Grape varieties | Malvazija Istarska; Borgonja | Malvazija Istarska; Teran; Merlot; Cabernet Sauvignon; Pinot crni | Malvazija Istarska; Sauvignon Blanc; Chardonnay; Sivi Pinot; Cabernet Franc; Teran; Merlot | Malvazija Istarska; Chardonnay; Muškat žuti; Pinot crni, Teran, Cabernet Sauvignon |
| Crop insurance applied | No | Yes | Yes | Yes |

Source: Authors, based on interviews

The large wine producer with a total of 19.6 hectares mentioned that the core of their business was winemaking. Large wine producer buys grapes from other grape producers. In total, he processes grape from about 30 hectares. The most significant climate risk is hail. Although the interviewee states that hail occurs every year on a smaller or larger scale, but it has serious consequences every five years. The occurrence of high humidity at flowering time destroys the flower and does not allow the pollen to spread throughout the vineyard. It causes underdevelopment of grape berries. Beside hail, the interviewee mentions diseases and pests; grapevine yellows which affects about one percent of the vineyard. It means that, for example, if a wine producer has 100,000 vines, 1,000 grapevines are destroyed, and the wine producer needs to replace the infected part of the vineyard and invest in new vines. According to the wine producer's experience, the risk of drought does not affect wine production; the main reason the respondent mentions is deep soil. The fourth interviewee was a wine producer who owns 20 hectares. Climate risk is visible in high temperatures, extreme weather events, and the occurrence of botrytis. The botrytis in September 2018 was mentioned as an extreme event that had not been recorded in previous years in Istria in that part of the year. For example, a wine farm witnessed hail storm in late April 2019 in which 70% of Cabernet sauvignon sprouts were destroyed. The interviewee concluded that the above mentioned risks had consequences on yields and income.

Income stabilization tool among vine growers and wine producers

A small vine grower/wine producer gave a negative answer when asked if he used insurance as a tool. The reasons for not applying insurance are small grape areas and diversification of production. The respondent stated that the introduction of IST would encourage him to consider applying it but could not confirm with certainty that he would actually apply it. Regarding the mutual fund and the producers involved in this fund, the interviewee's opinion is that other farmers with different productions can be included in the fund. Specifically, there should

be an “umbrella organization” at the national level and divisions organized depending on agricultural production. The opinion of the interviewee is that participation in the mutual fund should not be time-limited and should be voluntary. Lower-income threshold around 15% or 20%, direct yield losses around 40%, lower premium around 100 euros per hectare are the attributes that will motivate grape producers to apply income stabilization tool. The interviewee stated that producers should pay a premium, and the state should help with paying the administrative cost for maintaining the mutual fund.

The second wine producer uses hail insurance. The main reason for choosing crop insurance is the 2008 hail, in which 90% of grape yields were destroyed. Since then, crop insurance has been applied at the wine farm regularly. The annual premium per three hectares is HRK 12,000 (about 1,600 euro). The interviewee has been using crop insurance support from EU Rural Development Fund since 2017. After being introduced to the income stabilization tool and mutual fund, the interviewee decided to consider applying it at the wine farm, depending on the financial requirements of the tool and the fund. The premium which the interviewee is willing to pay for the income stabilization tool equals the amount of the applied crop insurance. If necessary, the interviewee is also prepared to pay administrative costs.

Large farm 1 manager believes that the Fund should include only wine producers. Fund membership should be limited to one year and should be voluntary. If wine producers are aware that in the case of a natural disaster they can receive compensation by the state, they are less willing to implement an income stabilization tool, however, knowledge of the possibility of EU support encourages them to consider its implementation. Specific attributes that would encourage the interviewee to choose income stabilization tool would be the following thresholds: direct loss of 40% of yields, income loss of 20% instead of the current 30%, income compensation for 100% of income losses, as well as knowing that IST is more efficient than the present crop insurance. The Large farm 1 manager confirmed that he had taken an insurance policy against hail and frost and that all 19.6 hectares were insured.

The total premium per year paid is around HRK 63,000 (about 8,400 euro), including hail and frost insurance. The main reason he chooses insurance as a risk management strategy is own safety primarily. The possibility of a crop insurance policy subsidized by the European Union is also a good reason to implement insurance. Likewise, the advantage of insurance was evident in 2008 when hail destroyed about 60% of all yields, and the compensation by the insurance company was enough to buy grapes and continue production. After the question about insurance, the respondent was asked if he was familiar with the income stabilization tool and the mutual fund as new instruments within the European Union. After an explanation of the income stabilization tool and mutual fund, the wine producer responded that he would consider applying the income stabilization tool. The wine producer said that if he knew that other producers were serious and striving for successful implementation of the Fund, he would enter it. Asked with whom he wanted to share the fund, he stated that he would be involved in the fund only with vine growers, without specifying any geographical restriction (for example, the mutual fund would not be restricted to growers from Istria County). The fund should function as a voluntary scheme, and participation would not be mandatory. If he knew that in the case of a natural disaster he could get compensation from the state, he would invest in an income stabilization tool anyway. When the wine producer was asked about the income stabilization premium, he stated that the premium needed to be at the same level as the current crop insurance premium, around 8,000 euros for 20 hectares.

When asked what would motivate him to choose an income stabilization tool, he mentioned two attributes: direct damage higher than 40%, and a 25% or 30% threshold for income drop.

The fourth interviewee has used crop insurance for the last three years and has used the EU support (subsidized crop insurance) too. He would consider the income stabilization tool and mutual fund. The mutual fund should include all agricultural producers from the whole country. Participation in the mutual fund should be

for a period of one year and voluntary for wine producers. Knowing that a producer can get state compensation in the case of a natural disaster, does not detract him from considering crop insurance or income stabilization tool. The main attributes which would influence the choice of the income stabilization tool are income threshold of around 20% instead of the current 30%, direct damage to the yields of 15 to 20%, and income premium equal to the crop insurance premium.

It can be stated that the constraints of the research are a small number of selected cases, the research is only in the area of Istria, and the conclusions of the study cannot be drawn for the whole Croatia and all Mediterranean wine regions, but, this preliminary research will serve as a basis for further research and analysis of income stabilization tool in Croatia.

Income stabilization tool – SWOT analysis

After literature research and interviews with vine growers and wine producers, the authors formulated the main finding in the form of the SWOT analysis (Table 4). Using the SWOT analysis, authors want to emphasize the strengths and weaknesses of the proposed measures, and opportunities and threats from the external environment.

The main strengths of the income stabilization tool are the possibility of insuring a whole farm against different types of risks. The income stabilization tool functions on a mutual fund principle, which means that farmers need to cooperate with other farmers and can share risks and exchange knowledge and ideas.

However, trust in other farmers and moral hazard is important for the income stabilization tool and can represent a weakness. Being in the fund only with farmers from the wine business can encourage farmers to consider and enter a mutual fund and implement an income stabilization tool earlier than when being in a fund with farmers from other types of production. The funding of these measures by the European Commission is an advantage for farmers, as well as the possibility of payment of the administrative cost of a mutual fund by the EU.

Table 4. Income stabilization tool – SWOT analysis

| Strengths | Weaknesses |
|--|---|
| 1. insure risks caused by climate change | 1. operates on a mutual fund principle |
| 2. insure income risks | 2. cooperation with other farmers - trust |
| 3. insure whole-farm risk | 3. high-income threshold |
| 4. cooperation with other farmers and risk sharing with other farmers | 4. low level of compensation |
| 5. voluntary basis | 5. five years in a fund |
| 6. sectoral mutual fund | 6. moral hazard |
| Opportunities | Threats |
| 1. measure proposed by the European Commission | 1. old farmers are averse to accepting innovation |
| 2. measure financed by the European Union | 2. not enough knowledge about income stabilization tool and mutual fund |
| 3. farmers need to pay a low entry premium | 3. farmers do not know the efficiency of income stabilization tool |
| 4. EU pays the initial administrative cost for maintaining a mutual fund | 4. direct payments |
| | 5. disaster management state support |
| | 6. subsidized crop insurance policy by the European Union |

According to the interviews, the income threshold of 30% is too high for farmers and there is a need for considering and suggesting a lower threshold. On the other hand, interviews show that 70% of loss compensation is too low for a farmer. The main threats are farmers who are averse to accepting new measures and innovations in general. The interviewees say that the lack of knowledge about these measures prevents their wider implementation, so they point out that training about the income stabilization tool and mutual funds and their efficiency are of great importance.

Croatian farmers depend on direct support and this can impede implementing new risk management measures; knowing that they can get disaster management compensation can impact farmers' choice. Likewise, better awareness of crop insurance and its greater acceptance among farmers, together with EU subsidy, can lead to a lower use of IST.

CONCLUSION

Existing literature shows that the income stabilization tool stabilizes farm income and can help farmers to cope with risks on the farm. The IST as a new risk management strategy represents a new instrument on the insurance market. Based on research, there is high volatility of the average farm income of specialist wine farms in relation to all farms. Specifically, it is seen in Croatia, Austria, and Slovenia.

Beside income volatility analysis, preliminary (exploratory) research of selected wine producers, using a qualitative approach on the small sample assisted to explore wine producers' perception of production – climate risk and understand attributes that could impact the selection of IST. All four interviewed farmers from Istria county are aware of production risk and climate change. In viticulture, producers mention hail and grapevine yellows as the most important risk. Producers also recognize changes in climate variables, such as temperature increment and precipitation decrement. The income stabilization tool can insure income risk and is voluntary is a good reason for considering its application in business. The funding of IST by the European Union can encourage farmers to consider its implementation.

The main attributes that all respondents emphasize will encourage them to choose IST are the farmer's income threshold and compensation level. After the interview, all respondents stated that they would consider implementing IST.

Collected data from Istria county represent the first study of IST in Croatia. This paper can serve as a sample and as an opportunity for further research of IST on other wine regions in Croatia. The sample size and area should be opportunities to study rather than limitations, while the lack of experience in mutuals could be seen as a constraint in the development of IST and challenging for policymakers and agricultural producers. This preliminary research will serve as a basis for further experimental research in Croatia about producers' willingness to implement a new risk management strategy called income stabilization tool. Besides, prior to a commercial-

scale implementation among farmers, the efficiency of IST should be studied on the national level.

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