

Factors affecting the adaptation of olive oil organizations to covid-19

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ABSTRACT: The covid-19 pandemic has had catastrophic effects on the global economy. The olive oil sector, whose producers were already undergoing their own crisis, has also clearly been affected by this situation. Despite Spain's world leadership in olive oil production, the added value that this product can generate has not been maximized. Falling prices and supply saturation are the problems that have been most highlighted and to which covid-19 has added. Faced with such a situation, the digitalization of the olive mill has gone from being a recommendation to an essential factor in avoiding the paralysis of its activity. In this context, the objective of this study is to detect the organizational factors that have been associated with a better adaptation of the organizations to the current complex situation. To this end we have made use of the fuzzy sets Qualitative Comparative Analysis technique which makes it possible to contrast different variables in order to explain a result, overcoming the limitations of more traditional techniques. The results obtained reveal that the cooperative form, the degree of innovation, the training of the top managers and the flexibility and size of the organization are factors that contribute to a better adaptation of the olive mill to the situation caused by covid-19.

KEYWORDS: Olive oil sector, COVID-19, digitization, ICT, organisational adaptation.

ECONLIT DESCRIPTORS: P13, O33, P55.

How to cite this article / Cómo citar este artículo: MOZAS, A. & FERNÁNDEZ, D. (2022): "Factors affecting the adaptation of olive oil organizations to covid-19", *CIRIEC-España, Revista de Economía Pública, Social y Cooperativa*, 104, 65-82. DOI: 10.7203/CIRIEC-E.104.21767.

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RESUMEN: La pandemia de la covid-19 ha tenido unos efectos catastróficos en la economía global. El sector del aceite de oliva también se ha visto claramente afectado por esta situación, cuyos productores ya arrastraban su propia crisis. Pese al liderazgo mundial de España en producción de aceite de oliva, no se ha terminado de maximizar el valor añadido que puede generar este producto. La caída de los precios y la saturación de la oferta son los problemas más señalados, a los que se ha sumado la covid-19. Ante tal situación, la digitalización de la almazara ha pasado de ser una recomendación a un factor imprescindible para evitar la paralización de su actividad. En este contexto, el objetivo de este trabajo consiste en detectar los factores organizacionales que se han asociado a una mejor adaptación de las organizaciones a la compleja situación actual. Para ello, se ha hecho uso de la técnica fuzzy sets Qualitative Comparative Analysis, que permite contrastar distintas variables para explicar un resultado, superando las limitaciones de técnicas más tradicionales. Los resultados obtenidos revelan que la forma cooperativa, el grado de innovación, la formación del máximo responsable, la flexibilidad y el tamaño de la organización son factores que contribuyen a una mejor adaptación de la almazara a la situación provocada por la covid-19.

PALABRAS CLAVE: Sector oleícola, COVID-19, digitalización, TIC, adaptación organizacional.

Resumen amplio

Factores que afectan a la adaptación de las organizaciones de aceite de oliva al covid-19

La declaración de pandemia supuso el reconocimiento de una gran amenaza a escala mundial y generó una crisis económica que según el informe del World Bank Group es “la peor recesión desde la segunda guerra mundial y la primera vez desde 1870 en que tantas economías experimentan una disminución del producto per-cápita”.

A pesar de la delicada situación, la tecnología permitió la continuidad de la actividad en muchas empresas. Así, según el INE (2021b) el teletrabajo (con un 44,7% de respuestas), el incremento del nivel de digitalización (15,9%), el comercio electrónico (13,3%) y la innovación de los procesos (12,5%) fueron las fórmulas más utilizadas por los gestores de los establecimientos para mantener el nivel de actividad anterior a la crisis. Por tanto, en este escenario, las Tecnologías de la Información y de la Comunicación (TIC) han sido herramientas clave para mantener el funcionamiento de algunos sectores económicos (Eurostat, 2020).

En el sector del aceite de oliva, en el que el cooperativismo tiene un destacado protagonismo, no se ha paralizado la actividad de sus operadores al ser considerada una actividad esencial. Sin embargo, estas entidades se han visto obligadas a un proceso acelerado de adaptación y aprendizaje.

Considerando todo lo anterior, el objetivo de este trabajo consiste en analizar el grado de adaptación de las empresas oleícolas al escenario de la covid-19. A tal fin, se trata de evaluar en qué medida las diferentes características de la organización, entre ellas el tamaño, la formación de sus responsables o el grado de digitalización previo a la crisis ha afectado a la resiliencia de éstas ante este nuevo escenario.

Tras la revisión bibliográfica se han desarrollado las siguientes proposiciones:

- Proposición 1. La apuesta tecnológica de la empresa ha contribuido a una mejor adaptación de la organización a la situación originada por la covid-19.
- Proposición 2. La utilización de medidas flexibles alternativas al ERTE o al cierre de la organización ha contribuido a una mejor adaptación de la organización a la situación originada por la covid-19.
- Proposición 3. La forma jurídica cooperativa ha contribuido a una mejor adaptación de la organización a la situación originada por la covid-19.
- Proposición 4. El tamaño de la organización, medido a través del número de socios, se vincula positivamente a una mejor adaptación de la organización a la situación originada por la covid-19.
- Proposición 5. La formación académica del máximo responsable de la organización afecta positivamente a una mejor adaptación de la organización a la situación originada por la covid-19.

Esta investigación se centra en las organizaciones oleícolas jiennenses, provincia líder en superficie de olivar, con más de 70 millones de olivos y el 20% de la producción mundial en aceite de oliva. Los datos de la Agencia de Información y Control Alimentarios (AICA) señalaban para 2020 un total de 324 almazaras en esta región, que conforman nuestra población de estudio. Nos dirigimos a los responsables organizacionales de estas entidades, solicitando su colaboración para cumplimentar un cuestionario. Finalmente, se obtuvieron 84 respuestas válidas, lo que supone una tasa de respuesta del 25,93%. Se elaboró un cuestionario estructurado con información sobre la organización, sus características y uso de las TIC, así como del impacto tecnológico experimentado en la organización por la covid-19.

La variable dependiente consiste en la valoración de los máximos responsables sobre el grado de adaptación de su organización a la situación originada por la covid-19. Ésta es una variable Likert de cinco puntos. Como variables dependientes se consideraron factores organizacionales y medidas frente a la covid-19, elegidas tras una revisión de diferentes investigaciones previas y son las siguientes: índice de uso de las TIC; índice de flexibilidad; ser cooperativa; tamaño de la organización y formación académica del responsable de la gestión de la empresa.

Para lograr el objetivo de este estudio se ha utilizado el llamado Qualitative Comparative Analysis (QCA), que permite identificar una serie de factores (o variables independientes) asociados a la presencia de un resultado dado. Aplicando QCA es posible analizar sistemáticamente un conjunto de casos, para determinar patrones causales en forma de relaciones de necesidad y de suficiencia, entre un conjunto de condiciones y un resultado (Scheider y Wagemann, 2010).

Los resultados indican una cobertura global del modelo de 0,74 lo que sugiere que una proporción sustancial del resultado está cubierto por las cinco variables consideradas en esta investigación, formuladas a través de proposiciones. La consistencia global del modelo es de 0,83, lo que denota la fortaleza de la solución. La configuración 1 explica por sí sola un 45,28% de las organizaciones que presentan una mayor puntuación en su grado de adaptación a la situación generada por la covid-19. Esta configuración muestra la relación positiva de las variables de formación del máximo responsable, ser cooperativa y tamaño. En nuestra investigación, también salen resultados similares con otras variables de tamaño como el número de empleados o el volumen de producción. La configuración 2 muestra que un 33,03% de las organizaciones con mejor puntuación de adaptación son aquellas que han utilizado medidas flexibles de (menos drásticas) frente a la situación de confinamiento, aquellas que tenían una base tecnológica para comercializar sus productos de forma online o a través de comercio electrónico, cooperativas y bajo un responsable con una alta formación. La configuración 3, con menor alcance explicativo, considera la combinación de empresas no cooperativas, con base tecnológica y con un máximo responsable con formación, independientemente de las medidas tomadas y el tamaño de la organización.

Como conclusión se debe indicar que esta investigación aborda un tema de gran actualidad y relevancia, ya que indaga en las características organizacionales que han permitido a las almazaras afrontar en mejores condiciones la compleja situación provocada por la covid-19. Estos factores se recomiendan como características necesarias para el sector, al objeto de

mejorar su posición en el mercado frente a futuras amenazas y retos. Sin duda, las almazaras deben afrontar un proceso de modernización, que les permita competir con garantías en el turbulento entorno actual. Como respuesta a futuras amenazas, en este trabajo destacamos cinco claros factores, recomendados en la literatura, que han sido de utilidad durante la covid-19 y que, deben ser reconocidos y adoptados, en la medida de lo posible, por los productores. En términos generales, el mayor tamaño de la organización, su flexibilidad, la formación de su máximo responsable, el nivel de innovación y su carácter cooperativo, son un conjunto de factores que, en la medida que se combinan y están presentes en las organizaciones oleícolas, garantizan un mejor posicionamiento y resiliencia de la almazara en el mercado y una mejor respuesta a situaciones de incertidumbre como ha sido la generada por la covid-19.

Este artículo no está exento de limitaciones, como es el número de respuestas obtenidas en los cuestionarios, aunque entendemos que los resultados pueden ser extrapolables al resto del sector. Del mismo modo, nos centramos en las organizaciones de la provincia de Jaén, aunque estamos haciendo referencia a la región con mayor concentración de olivar y tasa de producción de aceite de oliva en el mundo. Estos resultados son la continuación de otras investigaciones previas desarrolladas en el sector del olivar y que se pretende llevar a otros sectores agroalimentarios. En la misma línea de investigación, en Mozas et al. (2020) se señala que la innovación tecnológica en la organización, medida a través del uso de las TIC, es un factor transversal para el progreso de la organización y el cumplimiento de los Objetivos de Desarrollo Sostenible (ODS). La adaptación de la organización a los ODS y otros retos del entorno, como ha sido el escenario provocado por la covid-19, estará determinada por las características de la organización y, especialmente, por las capacidades de los recursos humanos que la integran (Pérez et al., 2021).

1. Introduction

The declaration of the coronavirus pandemic 2019 (covid-19) on 11 March 2020 by Tedros Adhanom Ghebreyesus, Director General of the World Health Organization (WHO), marked the recognition of a major global threat and generated an economic crisis that according to the World Bank Group report is “the worst recession since World War II and the first time since 1870 that so many economies have experienced a decline in per capita output”. Different governments have put in place different measures to alleviate the economic slowdown that has been generated by the pandemic.

One of the impacts of the economic downturn is the reduction of output worldwide, and we must learn that excessive globalization has had a perverse effect. According to the Governor of the Bank of Spain, Hernández de Cos (2020), a “relative fragility of the world economy” has manifested itself. The effect was not long in coming. In Spain, the labor market ended 2020 with 622,600 jobs destroyed and 527,900 more unemployed. According to the Encuesta de Población Activa (EPA), the total number of unemployed reached 3.71 million in 2020 (INE, 2021a).

In this scenario, Information and Communication Technologies (ICT) have been key tools for keeping some economic sectors functioning (Eurostat, 2020). Home confinement and mobility restrictions have left organizational management in the hands of technology as the only alternative to the paralysis of their activity. At the same time, the digitalization processes of companies have accelerated, reinforcing the potential and multiple advantages that these tools have for organizational performance.

Despite the delicate situation, technology has enabled many companies to continue their activities. Thus, according to the INE (2021b), teleworking (with 44.7% of responses), increasing the level of digitalization (15.9%), e-commerce (13.3%) and process innovation (12.5%) were the formulas most used by establishment managers to maintain the pre-crisis level of activity.

In this sense, the health crisis has forced a large number of companies to adapt overnight to remote working, a relatively minority practice in Spain before the outbreak of the pandemic (Bras and Schaefer, 2020). As a result, teleworking has taken off very quickly and is here to stay. So much so that the government regulated it during the pandemic through a Royal Decree-Law 28/2929 of 22 September on teleworking. The aim of the agreement was to develop a general framework at the European level on the working conditions of teleworkers and to reconcile the needs for flexibility and security that are common to both teleworkers and companies. However, in 2021 the Government found it necessary to pass a law (Law 10/2021 of 9 July) to fill the gaps in the Royal Decree-Law in relation to the organization of telework, the employment rights of teleworkers and the organization and control of telework by companies.

Another of the consequences of covid-19 is the great use that consumers have made of e-commerce, where once again we find technology. Consumers have not only increased their digital capabilities, but have also changed their buying patterns. According to Gaminde (2021) in 2020 ecommerce in Spain grew by more than 20%, although other sources put it at 24% (ELOGIA, 2021) and closed with a turnover of 51,600 million euros. E-commerce has ceased to

be a trend and has become a solution, not to say an obligation, for companies trying to combat falling sales during the pandemic (El País, 2021). This should make companies think about the need for further digitalization, especially in the area of marketing.

In the olive oil sector, in which the cooperative movement plays an important role¹, the activity of its operators has not been paralyzed as it is considered an essential activity. However, these entities have been obliged to undergo an accelerated process of adaptation and learning in order to continue operating, given the health limitations established in the management of the health crisis. Consequently, not all have adapted to this scenario in the same way, nor did they all start from the same situation. The use of technology was already a recommendation for the sector, but it has now become an essential tool for operating in today's market.

The aim of this study is to analyze the degree of adaptation of olive oil companies to the covid-19 scenario. To this end, the aim is to assess the extent to which the different characteristics of the organization, including size, the training of its managers and the degree of digitalization prior to the crisis, have affected their resilience in the face of this new scenario. In order to achieve this objective, the data obtained in a structured survey aimed at the heads of olive-growing organizations were used as a starting point. The results obtained show that the cooperative form, the degree of innovation, the training of the top management, the flexibility and the size of the organization are factors that contribute to a better adaptation of the olive mill to the situation caused by covid-19.

The structure of this paper is as follows: After the current introduction, the theoretical framework supporting the variables that have been proposed is presented. Next, the study population and the methodology used are detailed. Subsequently, the results obtained are shown and the corresponding conclusions are drawn.

2. Theoretical framework

Digital technologies have been taking center stage in society, especially during covid-19. Mobility restrictions forced many companies to adapt their activity to remote working, triggering an accelerated digital transformation process (Eurostat, 2020). ICTs, together with the tools integrated into the internet, have been essential to ensuring the competitiveness of the different actors in agri-food chains, in the coordination of their activities and the creation of value (Vial, 2019). In many cases they have enabled business continuity during a pandemic situation, avoiding disastrous results (Papadopoulos et al., 2020).

Similarly, a commitment to innovation significantly enhances organizational growth and chances of survival in complex situations (Pérez et al., 2021). Moreover, innovation improves the flexibility and responsiveness of the company to the environment, along with its organiza-

1. According to Cooperativas Agroalimentarias de España (2017), the cooperativization rate in this sector amounts to 70%, which means that 70% of all production is carried out by cooperative societies. In Jaén, the largest producing area in the world (20% of world production) and for the 2017-2018 season, the cooperativization rate is higher, reaching 75.3% in the 2018-19 season (CES, 2020).

tional performance (Fitzgerald et al., 2014). Along these lines, the scientific literature provides evidence that the strategic and appropriate adoption of digital technology leads to numerous advantages for the firm, in terms of competitiveness, productivity and performance (Papadopoulos et al., 2020). For example, having a quality website can be a differentiating element for the commercial success of the olive oil company (Bernal et al., 2018; Fernández et al., 2020b). Also, the combination of different digital technologies such as social networks, websites and the use of other platforms, will improve the organization's results (Andrieu et al., 2021).

Considering the above, the following proposition is evident:

Proposition 1. The technological initiative of the company has contributed to a better adaptation of the organization to the situation originated by covid-19.

The company's ability to respond to problems arising from the environment is key to its future, with the organization's human resources being an essential element in the management of organizational change (Sánchez et al., 2011). In this sense organizational flexibility, understood as the ability to adapt quickly and efficiently to an uncertain environment, is a clear determinant of organizational survival (Phillips and Wright, 2009). Flexibility is a concept closely interrelated with innovation (Lucas and Olson, 1994) and managerial decisions, with a direct impact on organizational performance (Koçyiğit and Akkaya, 2020).

According to Sánchez et al. (2011), flexibility integrates three dimensions: productive, organizational and labor flexibility, which involve different measures in the adaptation process of the company. We prioritize labor flexibility over the other dimensions, since the polyvalence of human resources is valued over other legal measures (ERE, ERTE, salary reductions, etc.) that have a more drastic impact on the functioning of the organization and society (Pérez et al., 2021). Thus, the best performance will be derived from that organization with the capacity to react with versatility, capable of taking appropriate and efficient measures (Phillips and Wright, 2009). In this line, the training of the organization's human resources is a relevant factor in its performance, such as in the field of ICT (Fernández et al., 2020a).

Thus, the following proposition is put forward:

Proposition 2. The use of flexible measures alternative to ERTE or the closure of the organization has contributed to a better adaptation of the organization to the situation originated by covid-19.

In the olive oil sector, the cooperative legal format is very important. According to Cooperativas Agroalimentarias de España (2017), 70% of the oil produced in Spain comes from mills that operate under the cooperative formula. In comparison with capitalist companies, a certain delay has been observed in the technological adaptation of agri-food cooperatives, although the particular usefulness of innovation and the use of ICT in these organizations has also been highlighted (Cristóbal et al., 2020). Thus, better performance is expected in cooperative organizations that have integrated these digital technologies, which are directly related to those organizations that are larger in size (Jorge Vázquez et al., 2021; Bernal et al., 2021). On the other hand, according to Vargas (2004), there are reasons to affirm that cooperative societies, under

certain premises such as in situations of uncertainty, are more efficient than capitalist entities. Thus, according to Campos and Chaves (2012), agricultural cooperatives are an appropriate formula in the face of threats, showing greater resistance and resilience in crisis situations (Castillo and García, 2013b).

Based on these premises, the following proposition is presented:

Proposition 3. The cooperative legal format has contributed to a better adaptation of the organization to the situation caused by covid-19.

Size is a key determinant of the organization's competitive position in the market, traditionally related to better business performance. This is due to greater ease of innovation and adaptation to ICT (Wamba and Carter, 2014), a better financial situation and greater ability to integrate value chain activities (Cook, 1995), as well as the ability to secure economies of scale (Lunan and Haugland, 2008). In contrast, SMEs are often faced with a lack of numerous resources, including financial resources, lack of personnel, technological support, etc., which hinders their performance (Serrasqueiro and Nunes, 2008). Therefore, the smaller the business, the greater the difficulties in adapting to changes and threats in the environment (Harries, 2021). Similarly, in cooperative societies larger size also implies better positioning in the market and a higher level of innovation, which leads to better adaptation to the environment and greater performance (Jorge Vázquez et al., 2021).

Such arguments lead us to put forward the following proposition:

Proposition 4. The size of the organization, measured through the number of partners, is positively linked to a better adaptation of the organization to the situation originated by covid-19.

Human capital plays a decisive role in decision-making in complex situations, especially in highly competitive environments such as the current olive oil market. The academic training of the manager is considered a determining factor in the future of the organization, as well as in its adaptation to the current social and technological context (De Lucas, 2015). In this way, the general manager/CEO of the organization has been identified as a variable linked to business success (Fernández et al., 2020b). Following this line, numerous studies have argued the relevance of the level of the academic education of top managers on firm performance (Levie and Autio, 2011). This is because their skills, experiences and knowledge lead to good organizational practices and the impetus to innovate and implement more efficient practices (Mozas et al., 2016).

Based on the above, the following proposition is formulated:

Proposition 5. The academic background of the organization's top manager positively affects a better adaptation of the organization to the situation originated by covid-19.

3. Population and method

3.1. Population and variables

This research focuses on olive-growing organizations in Jaén, a leading province in terms of olive grove surface area, with more than 70 million olive trees and 20% of the world's olive oil production. Data from the Agencia de Información y Control Alimentarios (AICA) indicated a total of 324 olive mills in this region by 2020, which make up our study population. We approached the organizational heads of these entities, requesting their collaboration in completing a questionnaire. In the end, 84 valid responses were obtained, which represents a response rate of 25.93%. These data were obtained between June and July 2021.

To obtain the data, a structured questionnaire was developed with information about the organization, its characteristics and use of ICTs, as well as the technological impact experienced in the organization of covid-19. This questionnaire was provided by email to the organizations. To facilitate the completion of the survey, it was also designed using the Google Form tool. For the elaboration of the questionnaire, prior information was obtained on existing studies that were linked to the objective of this study. In addition, several tests or pre-tests were carried out to corroborate its validity and eliminate possible errors.

Table 1. Description of variables used

Variable	Description	Type of variable
Adaptation (dependent variable)	Assessment of the degree to which the organization has adapted to the covid-19 situation	Categorical ¹
ICT index	Use of ICT by the organization	Categorical ²
Flexibility index	Use of alternative measures to closure	Categorical ³
Cooperative	Whether or not the organization is a cooperative	Dichotomous
Partners	Number of members of the organization	Continuous
Manager training	Academic background of the person in charge	Categorical ⁴

1. Five-point Likert variable (from very poor adaptation to very good adaptation).

2. 4-level categorical variable (includes the use of the website, online shop and social networks).

3. 3-level categorical variable (integrates alternative measures to closure and ERE/ERTE such as ICT training of workers or the use of shift work and similar).

4. Five-level categorical variable (no studies; primary studies; secondary studies; 1st degree university studies; 2nd degree university studies).

* The continuous variable was calibrated using fsQCA 3.0 software.

Categorical variables were calibrated according to Rihoux & Ragin (2009).

The dependent variable consists of the assessment of the top managers of the degree of adaptation of their organization to the situation created by covid-19. This is a five-point Likert variable. As dependent variables, organizational factors and measures regarding covid-19 were considered, chosen after a review of different previous research, announced in the previous sections. Some of the proposed variables were discarded in the previous stages of the analysis as they did not meet the prerequisites to be considered in the study. Nevertheless, a mention should be made of these variables. The use of ERTE, collective redundancy or the closure of the shop and/or office had a very strong inverse relationship on the degree of adaptation of the organization to the covid-19 scenario, which forced us to eliminate them from the study. The variables used in this research are presented in table 1.

3.2. Method

To achieve the objective of this study, Qualitative Comparative Analysis (QCA) was used to identify a series of factors (or independent variables) associated with the presence of a given outcome. By applying QCA it is possible to systematically analyze a set of cases to determine causal patterns in the form of necessity and sufficiency relationships between a set of conditions and an outcome (Scheider and Wagemann, 2010). This technique was formalized by Charles Ragin and is based on Boolean algebra. It uses a verbal, conceptual and mathematical language that configures it as a qualitative and quantitative approach, combining the main advantages of both (Ragin, 1987). QCA has three main variations: crisp set QCA (csQCA), multi-valued QCA (mvQCA) and fuzzy set QCA (fsQCA). We focus on fsQCA, as this tool can address several shortcomings of symmetric analysis and is the most popular and widely-used approach of those cited above (Pappas et al., 2021).

FsQCA has been used in recent years in different areas of social sciences, such as those related to organizational research (Fiss, 2011), being useful for inductive and deductive reasoning, theory building, elaboration and testing (Park et al., 2020). Unlike other traditional techniques, such as regression, this method allows relationships between subsets of variables to be established in order to explain more general relationships. The main benefits of fsQCA occur in comparison to typical variance-based methods and the limitations of the latter (Pappas et al., 2021). Moreover, this technique allows working with samples of all sizes, from very small to very large samples, as well as working with different types of data (Likert-scale, multimodal data, etc.), provided that the researcher can transform them into fuzzy sets (Ragin and Rihoux, 2009).

For the application of this technique, the recommendations established in the literature have been followed (Scheider and Wagemann, 2010). Firstly, the calibration of those data that require it. Secondly, a necessity analysis of the result on the different causal conditions, to verify that none of the values obtained exceeds the threshold of 0.9 recommended in the literature (Ragin, 2008). The third operation is to obtain the so-called truth table, which summarizes the combinations of the values of the independent variables as the associated values in the dependent variable. Finally, the multiple solutions are simplified and the results are interpreted.

At all of these stages researchers must make decisions based on their knowledge of qualitative analysis. This action is both a limitation and a strength of fsQCA, because of the possible subjective biases of the researchers' knowledge of the study conducted (Pappas et al., 2021).

4. Results

Following the truth table analysis, the results of the fuzzy set analysis for the organizations with the highest score on their adaptation to the situation originated by covid-19 are presented in table 2. To improve the presentation of the output solutions of fsQCA, the following terminology recommended in the literature (Fiss, 2011) has been used. Black circles (●) denote the presence of a condition, while crossed-out circles (⊗) indicate its absence. The distinction between a core and peripheral condition is denoted by the use of large and small circles, respectively. The solution table includes set-theoretic consistency values for each configuration as well as the overall solution, with a value above the recommended minimum threshold of 0.75 (Rihoux & Ragin, 2009). The causal configurations have been ordered from highest to lowest raw coverage.

Table 2. Results of the fsQCA analysis

Solutions	1	2	3	4	5	6	7
ICT index		•	•	⊗	⊗	⊗	⊗
Flexibility index		•	⊗	⊗	⊗	•	
Cooperative	•	●	⊗	●	●	⊗	⊗
Partners	•		⊗		•		⊗
Manager training	•	•	•	•		•	⊗
Raw coverage	0.45285	0.33013	0.12543	0.09755	0.09285	0.07855	0.06497
Unique coverage	0.09194	0.03167	0.11493	0.01266	0.00904	0.05592	0.03638
Consistency	0.85920	0.84094	0.81721	0.88360	0.92766	0.92144	0.93489
Solution coverage	0.74316						
Solution consistency	0.83218						

Source: Own elaboration.

The results indicate an overall model coverage of 0.74, suggesting that a substantial proportion of the outcome is covered by the five variables considered in this research, formulated through propositions. The overall consistency of the model is 0.83, denoting the strength of the solution. Configuration 1 alone explains 45.28% of the organizations with a higher score

in their degree of adaptation to the situation generated by covid-19. This configuration shows the positive relationship between the variables of training of the top manager, being a cooperative and size measured by the number of members. In our research similar results were also obtained with other size variables such as the number of employees or the volume of production.

Configuration 2 shows that 33.03% of the organizations with the best adaptation score are those that used flexible (less drastic) measures to cope with the confinement situation, those that had a technological base to market their products online or through e-commerce, cooperatives and those with a highly trained manager. Configuration 3, with less explanatory scope, considers the combination of non-cooperative enterprises, with a technological base and a highly trained manager, regardless of the measures taken and the size of the organization. The remaining configurations show very low coverage and are therefore not considered relevant to detail. In general terms, it can be observed that the training of the top manager, as a peripheral condition, has a positive effect in most cases. Similarly, the co-operative variable, but in this case it is a basic condition.

These results are a continuation of previous research carried out in the olive oil sector. In the same line of research, Mozas et al. (2020) point out that technological innovation in the organization, measured through the use of ICT, is a transversal factor for the progress of the organization and the fulfilment of the Sustainable Development Goals (SDGs). The organization's adaptation to the SDGs and other environmental challenges, such as the scenario brought about by covid-19, will be determined by the characteristics of the organization and especially by the capabilities of the human resources that make it up (Fernández et al., 2020a; Pérez et al., 2021). These conclusions extend to similar research in other agri-food sectors (Mozas et al., 2021).

5. Conclusions

This research addresses a highly topical and relevant issue, as it investigates the organizational characteristics that have enabled olive oil mills to cope better with the complex situation caused by covid-19. These factors are recommended as necessary characteristics for the sector to improve its market position in the face of future threats and challenges. Undoubtedly, olive mills must face a modernization process which will allow them to compete with guarantees in the current turbulent environment. There are many factors to consider: the growing competition in the Spanish olive oil sector from economies that do not have that olive oil tradition and are investing in this product; the technological development of society, which has modified sales channels and consumer decision-making processes; an increasingly demanding consumer who demands a product with greater guarantees, a higher level of information and environmental commitment; legislation and regulatory bases, which demand continuous changes and press for this modernization process, etc.

In response to all this and to future threats, in this paper we highlight five clear factors, recommended in the literature, which have been useful during covid-19 and which should be recognized and adopted, as far as possible, by producers. In general terms, the larger size of the organization, its flexibility, the training of its top management, the level of innovation and its cooperative nature are a set of factors which, to the extent that they are combined and are present in olive-growing organizations, guarantee a better positioning and resilience of the mill in the market and a better response to situations of uncertainty such as that generated by covid-19.

This article is not free of limitations, such as the number of responses obtained in the questionnaires, although we understand that the results can be extrapolated to the rest of the sector. Furthermore, we focus on organizations in the province of Jaén, although we are referring to the region with the highest concentration of olive groves and the highest olive oil production rate in the world. On the other hand, this study is a continuation of the lines of research developed in response to the problems of the sector, of which covid-19 has been the most recent. This environmental factor has been a clear challenge for all organizations, causing an accelerated digitalization process in business activity. This has forced a large number of olive-growing organizations to commit to ICT, which was already a reiterated recommendation for the sector.

Contribución de cada autor/a: Adoración Mozas Moral y Domingo Fernández Uclés han colaborado en la conceptualización, desarrollo, análisis y redacción.

Financiación: Esta publicación no ha recibido financiación.

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