**Chapter 065**

**EXPLORING CONSUMER AND BUSINESS PERCEPTIONS OF THE USE OF DIGITAL TECHNOLOGIES FOR TRACEABILITY**



**Abstract.** Digital transformation affects business competitiveness mainly in terms of innovation, efficiency, and cost reduction and affects global value chains in specialization, geographic scope, governance, and upgrading (Leão and da Silva 2021). In food, digital tools can improve competitive advantage by supporting businesses in ensuring food quality and safety by addressing the main issues related to this topic: food fraud, food safety and recall, regulatory compliance, social issues, and consumer information (Burke 2019). However many companies still struggle to respond adequately to digital transformation's challenges by adopting new technology concepts as a trend and not a real business imperative, misallocating internal resources and capabilities around technology, and expecting good results (Kane et al. 2015). Moreover, studies on the impact of digitization on firms' competitiveness are, for the time being, still at an early stage of development (Leão and da Silva 2021) as well as related impact assessment criteria (Lisienkova et al. 2022). The objective of this research is to analyze the entire national olive supply chain to understand the level of application of digital technologies by leading companies in the sector and, through consumer research, to understand what consumers' perceptions are regarding the use of digital technologies in the area of traceability.

**Keywords.** Agrifood, Digital transformation, Evo oil, Competitiveness, Digital tools, Traceability



# Introduction

The Mediterranean area is the leading producer of olive oil. Italy and Spain account for almost all world exports (60 percent Spain and 20 percent Italy) (Source: Oil Sector Fact Sheet - June 2021). Italian production covers on average 15 percent of world production, and even on the import side, the largest customer in Italy, followed by the US. World demand for olive oil grew slowly - averaging 1 percent annually - but steadily until 2012. From then on, world consumption also stabilized below the 3 million tons threshold until 2018, when it returned steadily above that threshold. For Italy, production for the 2020/21 marketing year stood at 255,000 tons, a 30 percent reduction from the previous year (ISMEA 2021). Due to the COVID-19 pandemic, average prices in 2020 fell sharply compared to 2019. However, there is a positive sign for exports to the US, Germany, and France. At the national level, olive oil represents a key product on the market supply-side and demand side. The consumer represents one of the main protagonists in the olive oil supply chain because the continuous growth of EVO oil consumption and consumer preferences pushes companies to make more and more quality products (ISMEA 2021) through digital technologies (Carlucci et al. 2015). Indeed, in this context, new technologies can play an important role in ensuring food quality and safety by addressing the main issues related to this topic: food fraud, food safety and recall, regulatory compliance, social issues, and consumer information (Burke 2019). However, few companies still use digital technologies for this purpose (Kane et al., 2015).

The objective of this research is to analyze the actual use of digital technologies by businesses in the food sector, with a focus on the olive oil sector, and at the same time to understand consumers' perceptions regarding the use of digital technologies in traceability.

# Review of the literature

Digital transformation affects business competitiveness mainly in terms of innovation, efficiency, and cost reduction and affects global value chains in specialization, geographic scope, governance, and upgrading (Leão and da Silva 2021). In food, digital tools can contribute to improving competitive advantage by supporting companies in ensuring food quality and safety by addressing the main issues related to this topic: food fraud, food safety and recall, regulatory compliance, social issues, and consumer information (Burke 2019). The point of safety and traceability of food products is, in fact, still the main concern of consumers (Caro et al. 2018), whose focus is not only on the quality of goods and services but also on where they come from, and this is affecting the governance of supply chains (Power 2019). Although, to date, it is still difficult to predict how and in what ways digital technologies will succeed in transforming the food sector, it is still clear that digital tools are the key to improving food traceability systems (Saveen A. Abeyratne 2016). However, many companies still struggle to adequately respond to digital transformation's challenges by adopting new technology concepts as a trend and not a real business imperative, misallocating internal resources and capabilities around technology while expecting good results (Kane et al. 2015). Moreover, studies on the impact of digitization on business competitiveness are, for the time being, still at an early stage of development (Leão and da Silva 2021) as well as related impact assessment criteria (Lisienkova et al. 2022).

# Material and methods

## Dataset analysis

The companies selected from the sample are derived from the AIDA platform (https://aida.bvdinfo.com/), considering ATECO code 10.41, "production of oils and fats." The selected companies have a turnover of more than 10 million euros as of 12/31/2021. The sample consists of 33 oil-producing companies; three do not produce extra virgin olive oil. Therefore, the final sample consists of 30 companies. Companies with the highest turnover include “Lucchese olii e vini S.p.A.” (298 mln €), “Carapelli Firenze S.p.A.” (247 mln €) and “Casa Olearia Italiana S.p.A.” (222 mln €).

## Questionnaire

The questionnaire used for the survey investigates consumer perceptions of traceability and the use of digital tools. Data collected through Google Form and social media in April and May 2021 represent the sample (Brito, Filho, and Adeodato 2021; Majeed et al. 2022; Sarfraz et al. 2021). The difficulty in clearly identifying the population of customers led to adopting a non-probabilistic sampling scheme, specifically accidental sampling, as is widely used in market research (Bracalente, B., Cossignani, M., & Mulas 2009). The questionnaire analyzed the following two sections:

* Consumer's analysis: containing information about consumers' perception concerning traceability and use of digital tools.
* Consumer profile: containing information on socio-demographic features.

The Likert scale allows for the measurement of sustainable consumer perceptions by assigning a score from respondents ranging from "strongly disagree" (score value 1) to "strongly agree" (score value 6) (Likert 1932). The data sample collected from the questionnaire administration was 464 people, analyzed using the statistical software "STATA 12 Data Analysis and Statistical Software" ([www.stata.com](http://www.stata.com)).

# Results

## Companies

There are 30 oil farms in the sample, and among them, 15 (38.5%) make organic products, 14 (35.90%) PDO/PGI products, and 10 (25.6%) ensure product traceability (Tab. 1).

Table 1 – Dimensions of EVO

|  |  |  |
| --- | --- | --- |
| Dimensions | f | % |
| Bio | 15 | 38.50% |
| DOP/IGP | 14 | 35.90% |
| Traceability | 10 | 25.60% |
| Total | 39 | 100.00% |

Source: authors’ elaboration

Regarding traceability, 8 out of 10 enterprises use the Lot tool, 5 use the QR Code, and five use label info (Tab. 2).

Table 2 – Traceability tools

|  |  |  |
| --- | --- | --- |
| Tools | *f* | % |
| Lot | 8 | 44.4% |
| QRCode | 5 | 27.8% |
| Label information | 5 | 27.8% |
| Total | 18 | 100.0% |

Source: authors’ elaboration

For traceability, enterprises used to use the three tools in combination. The Lot, which turns out to be the main tool, is combined in QR Code and label info.

The third stage of the analysis considers the type of information on the label. Table 3 shows that most companies (23 out of 30) include the Made in Italy label; 18 have information on extraction, while 11 reports the mode of preservation.

Table 3 – Label

|  |  |  |
| --- | --- | --- |
| Type of Information | *f* | % |
| Made in Italy | 23 | 30.30% |
| Extraction | 18 | 23.70% |
| Preservation | 11 | 14.50% |
| Certifications | 9 | 11.80% |
| Unfiltered oil | 8 | 10.50% |
| Usage | 7 | 9.20% |
| Total | 76 | 100.00% |

Source: authors’ elaboration

Again, the presence of information favors combinations with others of it. For example, in the label, there is information combined with “Made in Italy”, “Extraction”, mode of “Preservation” and presence of “certifications”.

Considering the 456 responses from the questionnaire, for 299 consumers (66%), traceability of a product is very important when buying EVO oil by assigning a score (its Likert scale from 1 to 6) a value of 6. Thirty-eight percent of consumers said they would be willing to pay a higher price to purchase a traced EVO oil using new integrated digital technologies. Among the digital technologies perceived by consumers as the most reliable in this context is the QR Code (30%), while 11% assign high importance to NFC (Near Field Communication) technology (Fig.1).

Fig. 1 – Traceability technologies

Source: authors’ elaboration

Regarding label information, the country of origin/processing of the oil and the presence of certifications are the aspects that impact the consumer's purchase intention (Tab.4). The average value attributed to "Country of origin of olives" and "Country of product processing" (which can be associated with the concept of "Made in Italy") has values of 5.29 and 5.16.

Table 4 – Label information

|  |  |
| --- | --- |
| Label information | Average value |
| Country of origin of olives | 5.29 |
| Country of product processing | 5.16 |
| Certifying the body of the controls | 5.02 |
| Presence of voluntary controls | 4.77 |
| Extraction method | 4.77 |
| Polyphenol content | 4.66 |
| Olives variety | 4.63 |

Source: authors’ elaboration

# Discussion

Interesting insights emerge by combining the analysis results of companies with those of consumers. First and foremost, consumers express strong interest in oil traceability, paying particular attention to the information on the label. The presence, in fact, of information affects its purchase intention (Leão and da Silva 2021). The tools can improve companies' competitive advantages to ensure food quality and safety (Burke 2019). Consumers consider various digital tools, especially the QR Code, important and reliable.

On the business side, however, the issue of traceability is still not particularly heard. Only 10 out of 30 provide consumers with traceability information. Therefore, there is a clear need to increase awareness of this issue among businesses, considering the significant importance consumers attach to it, raising the possibility of increasing revenues.

On the digital side, there also emerges a certain lag of businesses compared to consumers, who attach particular importance to digital technologies to ensure the security of traceability systems. Among the most reliable digital tools, the QR Code stands out for consumers.

Only 5 out of 10 businesses (that do traceability) use the QR Code system. Therefore, if companies want to try to increase their competitive advantage against their most direct competitors and acquire new customers, they should invest/intervene in this aspect to meet what is an explicit customer demand according to the results obtained from the questionnaire

The analysis of label information show relationships between consumers and sample companies. "Made in Italy", information was important to 65 percent of respondents and presented in 23 labels, followed by the presence of "Certifications" (requested by 42 percent of respondents and presented in 9 out of 30 labels). Information on "Made in Italy" was found to be important by 65 percent of respondents and present in 23 labels, followed by the presence of "Certifications" (requested by 42 percent of respondents and present in 9 out of 30 labels). Among the information on the label, the extraction method is present in 18 out of 30 labels. However, the average value of this information, as shown in Table 4 above, in terms of consumer importance is 4.77. However, the average value of this information in terms of importance by consumers is 4.77. Consumers do not seem to perceive this information to be particularly important, compared to Menozzi (2014).

The final figure (Fig. 2) summarizes the significant results of this research.

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# Fig 2. Relevance of aspects for consumer and business

Source: authors’ elaboration

# Conclusion

The objective of this research was to analyze the entire national olive-oil supply chain to understand the level of application of digital technologies by major companies in the sector. In addition, a further objective was to understand consumer perceptions regarding using digital technologies in traceability through consumer research. The results show the tremendous interest by consumers in acquiring information through labels before purchase. However, the analysis highlights the need for greater alignment between consumer demands in terms of label information and traceability and capacity on the part of businesses to meet those demands.

The research has some limitations. First and foremost is the sample of businesses analyzed. A larger sample would allow a greater depth of the topic and completeness of data. We find the same limitation on the consumer side. In future research, increasing the sample of enterprises and the sample consumers is necessary.

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