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ARTICLE

Promoting dairy products through the web: The case of Pecorino Siciliano PDO during the COVID-19 pandemic

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This study analyses the digital marketing tools that companies producing Pecorino Siciliano with a protected designation of origin (PDO) are implementing on the web through their corporate website and their brand page on Facebook. It aims to verify whether companies are adapting (or not) to new trends in web marketing and e-commerce. The quality of corporate websites was assessed during the COVID-19 pandemic in terms of usability and amount of activity on Facebook brand pages by Pecorino Siciliano PDO-producing companies. Analysed data show that the companies producing Pecorino Siciliano PDO fell short in developing their web-marketing tools, demonstrating their poor adaptation to the new digitalisation trends driven by the COVID-19 pandemic.

Keywords Cheese, Dairy economics, Marketing, Quality, Regulations.

INTRODUCTION

In the last decade, the digital transformation of companies has also enabled the development of new marketing strategies that take advantage of the innovations and advances that technology has made available to society (Caputo *et al.* 2021). This transformation has allowed companies to gain visibility locally, nationally and internationally through websites and through social media (SM) platforms, such as Facebook, Instagram and Twitter, which have enabled them to reach many both business-to-consumer (B2C) and business-to-business (B2B) contacts in real time (Serinikli 2020; Amankwah-Amoah *et al.* 2021). In the last few years, the crisis caused by the COVID-19 pandemic is further stimulating a strong acceleration of this digital transformation worldwide (Butu *et al.* 2020; Cavallo *et al.* 2020; Pinzaru *et al.* 2020; Amankwah-Amoah *et al.* 2021; Casaleggio Associati 2022).

Indeed, the state of emergency caused by COVID-19 has placed the agri-food sector in an unprecedented situation, highlighting not only its importance but also its limitations and criticalities. While it is true that the agri-food sector

has continued to operate by ensuring the continual supply of food, it is equally true that the overall scenario has changed substantially through, for example, the paralysis of the Hotel-Restaurant-Catering (Ho.Re.Ca.) sector in its various forms (in Italy and abroad), the standstill of the tourism sector and the drop in foreign demand; in this context, agri-food productions were all affected and substantially suffered, to varying degrees, from the consequences of lockdowns, including local production systems such as those of geographical indication (GI) products (Barcaccia *et al.* 2020; Ismea – Fondazione Qualivita 2021). In this context, there has been a significant impact on the sales of the agri-food products most closely linked to the foodservice sector such as wine, fresh meat and meat products, as well as dairy products, especially fresh cheese and fresh milk, whose limited shelf-life has inevitably clashed with logistic and distribution difficulties and the lack of demand from, for example, bars, restaurants and pastry shops (Barcaccia *et al.* 2020; Cavallo *et al.* 2020). Moreover, the succession of events following the spread of COVID-19 has led consumers to change their purchasing and consumption patterns, as well as the very composition of the

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agri-food shopping trolley (Cavallo *et al.* 2020). Various related trends include a resurgence of traditional and proximity retailing, a preference for quality products that are in any case domestic, a growth of food delivery and an explosion of online shopping (Borsellino *et al.* 2020; Ismea 2021; Nomisma 2021). In this regard, Acosta *et al.* (2021) highlighted that movement restrictions due to the pandemic triggered consumers to explore online food shopping for the first time, and that online distributions, as a strategy for adapting to the health crisis, have also become a highly relevant marketing channel for food. Similarly, Weersink *et al.* (2021) reported that in the United States and Canada, the role of online food shopping increased in response to limited consumer mobility, while Snow *et al.* (2021) found that in Australia and New Zealand, the crisis highlighted the crucial role of widespread access to fast Internet. These facts suggest that in the immediate future, the use of e-commerce channels is likely to grow at a faster rate than in the recent past.

The spread of online agri-food shopping has led to a significant increase in the demand for digital services, driving the strong acceleration of digital transformation and bringing to light years of backwardness and shortcomings including the limits of the current technological infrastructure of companies, their fragilities and the general lack of foresight of the entrepreneurial system (Ismea 2021; Netcomm 2021; Polenzani *et al.* 2021; Istat 2022). Some companies (entire supply chains in some cases), in fact, were caught unprepared and with inadequate corporate technological structures: many of them did not have their own online sales site and were not present on any third-party online sales platform (Netcomm 2021; Istat 2022). On the other hand, other companies were able to exploit their positioning as segments of excellence in agri-food exports (these are mainly some GI products), or were supported by sales on channels that are better equipped to respond to the increased demand for food during the lockdowns (such as large-scale retail trade and proximity retailers) or had the know-how and capacity to use alternative commercial methods such as direct home sales or e-commerce (Béné 2020; Borsellino *et al.* 2020; Ismea 2021; Mastronardi *et al.* 2022). For example, Perrin and Martin (2021) reported that in France, farmers were able to reorganise their logistics to deliver milk and dairy products directly to supermarkets, while Acosta *et al.* (2021) reported the implementation of the online trading platform 'Finca Agropecuaria' in Costa Rica to promote consumption and make small farms able to promote and offer their products.

Already in the years before the pandemic, some agri-food companies have integrated websites and SM platforms into their corporate communication plan, leading to a profound transformation of their organisational models and marketing dynamics (Grosso *et al.* 2021; Polenzani *et al.* 2021;

Mastronardi *et al.* 2022). In relation to new market trends, e-commerce capacity building represents an important potential investment for those operating in the agri-food sector (Hobbs *et al.* 2003; Manthou *et al.* 2005; Canavari *et al.* 2009; Schimmenti *et al.* 2012; Annunziata and Vecchio 2013; Schimmenti *et al.* 2014; Scuderi and Sturiale 2014; Zeng *et al.* 2017; Polenzani *et al.* 2021). The online channel is becoming more and more strategic for companies to reach consumers: 74% of Italians used the Internet at least once in 2021 to make purchases. The corporate world recognised this trend and in 2020 consequentially 34.3% of corporate spending on communication was invested in digital channels (The European House – Ambrosetti 2022). The Internet is an especially important option for small and medium enterprises (SMEs) in the agri-food industry (Annunziata and Vecchio 2013; Polenzani *et al.* 2021).

In this scenario, it is a prerequisite that the corporate website, and more recently its SM content on such platforms as Facebook, Instagram and Twitter are an integral part of company e-business strategy and the main tool for communication and interaction with consumers.

This study focuses on the Sicilian dairy supply chain and in particular on Pecorino Siciliano with a protected designation of origin (PDO); an excellent and very promising PDO product that is currently present on the market in modest quantities but whose capacity to generate an increase in production and income for producers, and have a consequent positive impact on the economic development of the production area based on the determination of the price of processing sheep's milk into cheese and derivatives, has recently been examined (Schimmenti *et al.* 2021).

In this context, this study aims to assess the quality of the websites and activities carried out on SM platforms by Pecorino Siciliano PDO companies according to an e-service quality assessment system already used in other studies and other sectors (Cox and Dale 2002; Begalli *et al.* 2009; Schimmenti *et al.* 2012; Chung *et al.* 2014; Vlachvei and Notta 2015; Galati *et al.* 2017; Borsellino *et al.* 2018). The study was conducted during the critical pandemic period (February 2020–February 2021) with the aim of verifying whether companies adapted (or not) to the above-mentioned new trends in e-commerce and the use of SM platforms. This analysis provides useful information for optimising the web marketing strategies of the Pecorino Siciliano PDO and indicating new commercial strategies to support the development of the sector. The digitisation of the dairy industry does not only depend on economic factors but above all on cultural factors; firstly, it is affected by the mistaken belief that innovation might somehow undermine tradition (Lanfranchi *et al.* 2018) and, secondly, by the lack of specific skills of the SMEs in the dairy sector, which until now have been run by business owners who are

certainly not digital natives and have limited knowledge of the enormous resource offered by the Internet (Licitra 2022).

To the best of our knowledge, few published studies have investigated the digital marketing tools implemented by dairy product companies on the web through corporate websites and brand pages on the main SM platforms (Strzębicki 2014; Kaushik *et al.* 2018; Garner 2022).

The article is organised as follows: after briefly describing the context regarding Pecorino Siciliano PDO, the methodology used to carry out the assessment of both the quality of the websites and the activity carried out on the SM platforms is described. Finally, after presenting the obtained results, they are discussed, and some concluding remarks are drawn.

MATERIALS AND METHODS

Pecorino Siciliano PDO

In 2021, Sicily was ranked as the sixth Italian region by the production of GI products with 67 PDO and protected geographical indication (PGI) products, of which 36 are in the *food* sector and 31 are in the *wine* sector (Ismea – Fondazione Qualivita 2021). In the dairy sector, Sicily has five PDO cheeses: two made from cow's milk, Provola dei Nebrodi PDO and Ragusano PDO, and three made from sheep's milk, Piacentinu Ennese PDO, Vastedda della Valle del Belice PDO and Pecorino Siciliano PDO (Schimmenti *et al.* 2021). Pecorino Siciliano PDO is a semi-cooked hard cheese made from whole raw sheep's milk obtained from animals reared throughout the entire region of Sicily. According to scholars and fans of the art of cheese-making, Pecorino Siciliano PDO is the oldest cheese produced in Italy, and probably the oldest in Europe (Betta 2000). Along with Fontina, Gorgonzola, Grana Padano, Parmigiano Reggiano and Pecorino Romano, it was one of the first cheeses to benefit from Denomination of Origin recognition during the middle of the last century (Presidential Decree No. 1269 of 30.10.1955, GURI No. 295 of 22.12.1955). In 1996, the EU approved the PDO mark (Commission Regulation (EC) No 1107/96 of 12 June 1996) and its transcription in the EU's GI register, thus guaranteeing the strong link among the cheese, its place of origin and traditional production methods. In 2020, the product specification was amended at the request of the 'New Consortium for the Protection of Pecorino Siciliano PDO' (Commission Implementing Regulation (EU) 2020/1338 of 21 September 2020) with the aims of consolidating Pecorino Siciliano PDO specifications into a single document, allowing producers to satisfy consumer demand during the summer season, and of implementing a graphic image common to all Pecorino Siciliano PDO producers. At present, this product makes up a low volume of the national production of GI sheep's cheeses, and is less known than other more famous ones, with Pecorino

Romano PDO dominating. Specifically, based on data provided by the certifying body, the 'Consorzio per la Ricerca nel Settore della Filiera Lattiero-Casearia' (CoRFilaC), the production of Pecorino Siciliano PDO went from 0.4 tonnes in 2002 to 87.5 tonnes in 2019, and in 2020 registered a sharp drop in the volumes produced to 37.9 tonnes due to the closure of the main marketing channel: the Ho.Re.Ca. The production data for 2021 indicate a recovery compared to 2020, with a production volume of 50.1 tonnes. The New Consortium for the Protection of Pecorino Siciliano PDO has increased its marketing activities related to its GI for the post-pandemic relaunch, with actions aimed mainly at national distribution and the food processing industry, but also with activities aimed at making agreements with large-scale retail trade and promoting online sales.

Experimental design and data analysis

This study was designed to assess the consistency and quality of the websites of the companies producing Pecorino Siciliano PDO as well as their presence on the main SM platforms and the quality of interaction between them and SM users.

Definition of the study population

To this end, an initial survey of what digital marketing tools were employed was conducted by consulting the list of members registered in the New Consortium for the Protection of Pecorino Siciliano PDO, as of 30/09/2020: this consists of 21 members who carry out different stages of the production process, from sheep breeding to cheese-making and maturing to the final marketing stage.

The search for websites was conducted by typing the company name of the 21 members into the Google browser; in doing so, it was possible to check for possible links to the websites of these companies. This search showed that of the 21 members:

- 7 do not have their own website;
- 1 has a temporarily unavailable site, which was therefore not consultable;
- 3 have outsourced the sale of their products to third-party sites (marketplaces).

As a result, 10 members have a working corporate website. Subsequently, the use of SMs by the companies producing Pecorino Siciliano PDO was investigated by checking for the presence of companies in the following SM platforms: Facebook, Instagram, YouTube, Twitter and Pinterest. This research shows that, of the 21 companies, only 15 use at least one of the above-mentioned SM platforms; more specifically, all 15 are present on Facebook, and among these 8 are also registered on Instagram, 3 on Twitter, 2 on YouTube and 2 on Pinterest.

The results of this initial survey on Pecorino Siciliano PDO companies’ digital marketing tools are summarised in Table 1.

Data coding and analysis to assess the quality of corporate websites

Morales-Vargas *et al.* (2020) report on the existence of various approaches and methods developed to assess the quality of a website, which can be divided into two main groups: user studies and expert analysis. Among the former, studies on the usability of websites stand out, *i.e.* those aimed at measuring the user friendliness of a website and its ability to provide information and services effectively and efficiently to ensure customer satisfaction. This present study is part of this line of research. More specifically, to assess the quality of the 10 identified websites, an evaluation form was prepared based on the model adopted by Schimmenti *et al.* (2012), with the appropriate adaptations made to customise it for dairy sector websites. The form consists of five sections.

The first section, ‘context’, identifies the type of site: informative, showcase and e-commerce. The second, ‘content and convenience’, aims to analyse both the size of the website and the languages in which it is available, as well as information about the company itself (certifications, location, company type, awards and participation in trade fairs),

purchasing procedures, payment methods and sections reserved for company news.

The third section, ‘design and comfort’, looks at features of the website, *i.e.* the graphics (length of text and layout of the menu bar), the presence of photos and useful links as well as the presence of a site map, back button and search function to facilitate user navigation within the site.

The last two sections are aimed at evaluating customer loyalty services. In particular, the fourth one, ‘customer service’, identifies the ways made available to customers to establish contact with the company such as FAQs, telephone/fax contacts and e-mail addresses to request information, services dedicated to receiving complaints and solving technical problems.

Finally, the fifth section, ‘community’, analyses the presence of forums, chats or *links* to SM platforms (Facebook, Twitter, Instagram, *etc.*) allowing for a virtual interface with potential customers, currency exchange services and incentives for repeat buyers, as well as other motivations for the customer to return to the corporate website often.

The presence or absence of quality attributes on the websites was observed directly by the authors: one author evaluated all the websites. Inter-rater reliability of the evaluation form was assessed by having a second independent evaluator code 30% (no. 3) of the 10 websites to determine the percentage agreement on the evaluation form. There was a

Table 1 Presence of the companies producing Pecorino Siciliano PDO on the web with their own corporate site and on the main SM platforms.

No.	Qualification	Website	Social Media Platform				
			Facebook	Instagram	YouTube	Twitter	Pinterest
1	Cheesemaker	Marketplace					
2	Breeder/Cheesemaker/Maturer		X	X			
3	Cheesemaker/Maturer	Temporarily unavailable	X	X	X		
4	Cheesemaker/Maturer	X	X	X			
5	Breeder						
6	Maturer	X	X	X		X	
7	Breeder/Cheesemaker/Maturer	Marketplace	X	X			
8	Cheesemaker	X	X			X	X
9	Breeder						
10	Breeder/Cheesemaker/Maturer						
11	Breeder/Cheesemaker		X				
12	Maturer	X	X	X			X
13	Breeder/Cheesemaker/Maturer	X	X	X	X		
14	Breeder/Cheesemaker/Maturer	Marketplace					
15	Breeder/Cheesemaker/Maturer	X	X				
16	Maturer	X	X	X			
17	Breeder/Cheesemaker/Maturer		X				
18	Breeder/Cheesemaker/Maturer						
19	Cheesemaker	X	X				
20	Breeder/Cheesemaker/Maturer	X	X			X	
21	Breeder/Cheesemaker/Maturer	X	X				
	Total	10	15	8	2	3	2

98% agreement between evaluators. Data were collected from December 2020 to February 2021. The evaluation scale identified whether certain quality attributes were present within the website: they were coded 'Yes' for present and 'No' for not present. To process the data derived from the content analysis forms, descriptive statistics were used. Data processing was carried out using Microsoft Excel, version 2010.

Data collection and analysis to assess the SM interaction quality

Given the different number of company pages surveyed on the various SM platforms, the analysis of the interaction quality between Pecorino Siciliano PDO-producing companies and users was limited to the most used platform, Facebook. The metrics suggested by Chung *et al.* (2014) were used to assess the efforts of the companies and to measure their engagement on SM aimed at supporting their marketing and communication strategies. Measurements included the number of fans, posts, photos, videos, links, likes and comments from the Facebook profiles of the 15 companies.

Next Analytics software (nextanalytics.com) was used to acquire these data. This software makes it possible to monitor the involvement and influence exerted by an individual page or a group of Facebook pages by examining activity in terms of number of fans, number and type of posts (*i.e.* photos, videos, links or simple status updates), number of shares, number and type of reactions (from like to love, *etc.*), comments to posts and distinguishing, in this case, those posted by companies from those posted by users. Therefore, the list of web addresses (known as URLs, Uniform Resource Locator) of the 15 pages previously tracked on Facebook was entered into the appropriate field, followed by the time frame in which to examine posts and comments, and finally, the data were downloaded in the form of Excel spreadsheets. The data were collected with reference to the observation period of a year, between 29 February 2020 and 28 February 2021, falling during the COVID-19 pandemic.

Subsequently, the data were processed and analysed to measure the three dimensions that define a company's engagement on SM in terms of intensity, richness and responsiveness (Chung *et al.* 2014) with reference to each company producing Pecorino Siciliano PDO as well as to the overall average data of the 15 Facebook pages traced online. Specifically:

- the intensity parameter was calculated as the ratio between the sum of posts and comments on the company's social page and the number of fans;
- the richness parameter was calculated by relating the number of posts containing videos, photos and links to the number of total posts;

- the responsiveness parameter was measured by the ratio of the number of comments written by the author of the post (company) to the number of total comments.

RESULTS

Content analysis of the corporate websites

The analysis aimed to assess the website quality of the companies belonging to the New Consortium for the Protection of Pecorino Siciliano PDO and took into consideration 10 active websites, equal to 47.62% of the total New Consortium members. The greater presence on the web of those members who develop all the stages of the production process, from sheep breeding to cheese-making and maturing, is noteworthy.

Characteristics of companies with a corporate website

The companies with a corporate website are predominantly located in the western part of Sicily (Figure 1). Specifically, four are in the Trapani province, three in the Palermo province and 1 in the Agrigento province; two companies are located in the eastern part of Sicily, one in the Ragusa province and one in the Messina province.

Based on data provided by the CoRFilaC, in 2020, the 10 companies with their own website allocated 174 406 L of milk for the production of Pecorino Siciliano PDO (with the quantity of milk transformed by each company ranging between 8451 and 70 565 L). During the same year, 3233 wheels of Pecorino Siciliano PDO cheese were produced (ranging from 166 to 1275 wheels per company), equal to 73.6% of the total number of wheels produced by the Consortium, with a total weight of 28.7 tonnes (ranging from 1.35 to 14.2 tonnes per company), representing 75.8% of the total production. After ageing, 2722 wheels received the PDO label and were put on the market by the 10 companies identified on the web (ranging from 133 to 1232 wheels per company), representing 69.7% of the total production; the weight of the Pecorino Siciliano PDO-labelled product amounted to 25.3 tonnes (1.1–13.7 tonnes), representing 74.4% of the total production. The total revenue of the aged cheese (including both PDO labelled and unlabelled products) amounts to about 330 000 euro, with about 5% coming from sales made on the web.

Corporate website assessment

Based on the first section of the evaluation form, referring to the context, websites can be classified according to type as follows:

- four are informative;
- three are showcase sites;
- three are e-commerce sites.

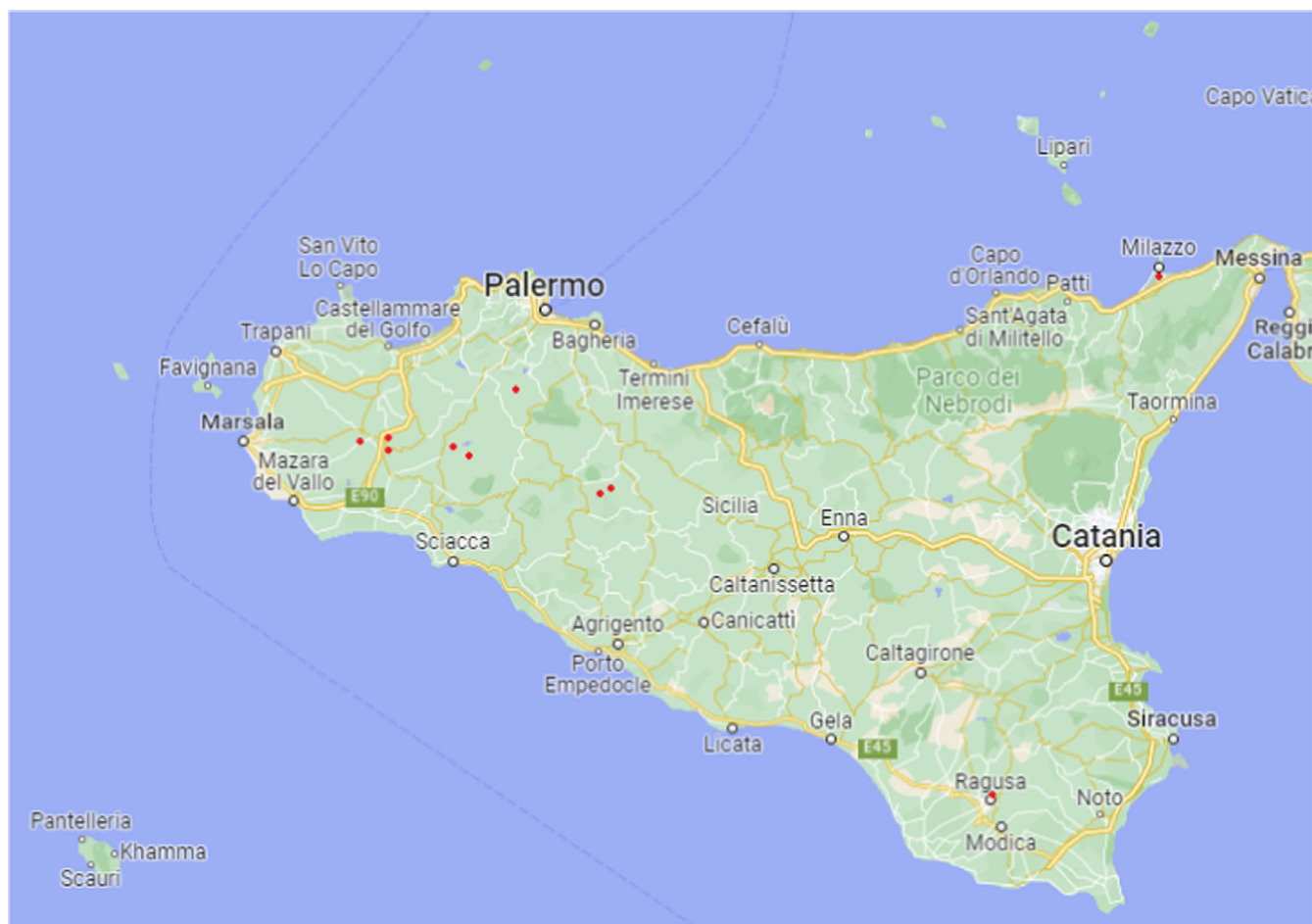


Figure 1 Location of companies with a corporate website.

More specifically, informative sites are intended to present the company and the products it offers to the consumer. Showcase sites are created not only for the presentation of the company but also for product sales; thus, orders can be placed online while transactions are carried out offline. E-commerce sites allow the consumer to order products and make payments online.

Concerning the ‘content and convenience’ characteristics of the websites, with reference to website size, it emerged that:

- two have a website size between 1 and 5;
- seven have between 6 and 10 pages;
- one is larger than 10 pages.

The website evaluation form analyses the languages used within the sites. It was found that:

- eight only use the Italian language, of which three are informative sites, three are showcase sites and two are e-commerce sites;

- two use four languages, namely Italian, French, English and German, of which 1 is an e-commerce site and 1 is an informative site.

In all the sites consulted, the company location is indicated and there is also a section telling the history of the company, the activities carried out and the services offered to users. In addition to Pecorino Siciliano PDO (100% of the sites), ricotta is the most present product offered by the analysed websites (90% of the sites), followed by Vastedda della Valle del Belice PDO (60%) (Table 2). Three of the websites also offer goat and cow cheeses while two sell goat cheeses, showing a high degree of production diversification. Finally, in one case, oil and wine are also present, completing the offer of farm food products.

The information relating to Pecorino Siciliano PDO found on the examined websites concerns, in descending order of frequency, maturation, shape, weight, production method, price, organoleptic characteristics, storage temperature, nutritional values and packaging (Table 3).

Regarding additional information, included in the ‘news and events’, ‘about us’ or ‘certifications’ sections of the website, it was possible to find references to awards, recognitions or certifications obtained by the company over the years in only five of the websites.

With reference to the six sales sites, *i.e.* showcase and e-commerce sites, not all of them provide all the necessary information: specific information concerning the conditions of purchase can only be found on five sites, as well as information on the right of withdrawal (*i.e.* order cancellation, product returns or refunds); only four sites provide information on the availability of the product at the time of the order (Table 4).

The 3 identified e-commerce sites allow customers to view the products offered by the company by consulting an online catalogue; subsequently, should one intend to purchase, products can be added to the shopping trolley, and removed should one change one’s mind. If the consumer intends to purchase, he or she must register the following personal data before paying:

- First and last name;
- Country/region;
- Street and house number for shipping;
- Postal code;
- City;
- Province;
- Telephone number;
- E-mail address.

After entering personal data in a form within the online purchase section, the user can proceed to pay for the products in the shopping cart. All three analysed e-commerce sites allow online payments by means of PayPal, Credit Card or Bank Transfer (Figure 2).

Regarding the three showcase sites analysed, offline payments can be made by PayPal (1 site), bank transfer (2 sites) and cash on delivery (2 sites). On these sites, the user’s approach to purchasing products requires an order by e-mail or by telephone of the products and the quantity they wish to purchase. The order is subsequently processed by

Table 2 Type of products offered by the analysed websites.

Type of products offered	Number of websites	%
Pecorino Siciliano PDO	10	100
Vastedda della Valle del Belice PDO	6	60
Ricotta	9	90
Goat cheese	2	20
Goat and cow cheese	3	30
Oil and wine	1	10

Table 3 Presence of information on Pecorino Siciliano PDO on the analysed websites.

Information	Number of websites	%
Production method	5	50
Maturation	8	80
Weight	6	60
Shape	7	70
Price	4	40
Storage temperature	3	30
Organoleptic characteristics	4	40
Nutritional values	2	20
Packaging	2	20

Table 4 Information on product availability, purchase conditions and right of withdrawal.

Sales information	Number of websites	%
Product availability	4	67
Purchase conditions	5	83
Right of withdrawal	5	83

the company as soon as the user makes payment *via* the available means described above.

About ‘design and comfort’ features, all the observed websites feature images on the homepage as well as product photos on the inner pages (Table 5).

All sites denote a clear user-friendly menu layout. The text is short in four cases, while it is divided into paragraphs in six cases. The facilitated return to the previous pages of the site thanks to a back button is present in only one case. The link changes colour once consulted only in one of the sites examined, while a link appears in the text in none of the sites. The link redirecting the user to the home page is present in 8 of 10 cases. The search function is present in three sites, while only four sites have webpage animations (motion, transition, dynamic backgrounds, *etc.*). Finally, a site map is present in only 3 cases.

Regarding the quality characteristics envisaged for the evaluation of the attribute ‘customer service’, aiming to support the user in the pre/post-sales phases, none of the sites consulted provides the user with a page dedicated to FAQs, or a toll-free number for the resolution of any technical problems (Table 6).

All companies, on the other hand, provide support on their own website by giving a telephone or fax number or providing a form to be filled out. Only three e-commerce websites have a complaints section or the possibility for

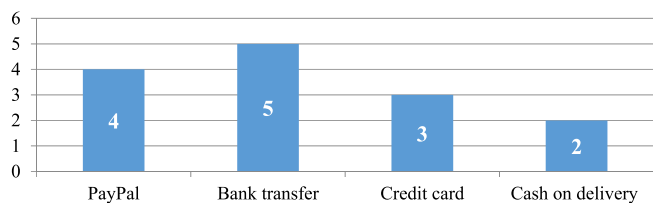


Figure 2 Payment methods in sales sites (six sites).

customers to register. Only five of the websites examined have a privacy policy that clarifies which user data may be processed by the company and in what way.

The last group of assessed quality attributes is referred to ‘community’ services. In all the evaluated sites, there is a total absence of forums, chats and personalised services for users as ‘my account’ (which would allow users to view the history of transactions carried out over time).

Only three sites, those allowing registration, allow the user to access the site by entering a username and password.

The ‘community’ services offered by companies on their websites are very modest: they consist in the presence of links to their respective pages on the main SM platforms. Specifically, no link to SM platforms is present on two sites, while a link to Facebook is present on seven of the analysed websites, a link to Instagram is present on four sites, a link to Twitter and YouTube is present on two sites, respectively, and finally, a link to Pinterest is present on one website.

Furthermore, of the eight sites with links to SM platforms, only one has a link to Facebook, just as only one site has a link to Instagram; in the remaining 6 sites, several links to different SM platforms are found in different combinations:

Table 5 Presence of ‘design and comfort’ elements on the analysed sites.

Items	Number of websites	%
Photos on the home page	10	100
Product photos	10	100
Site Map	3	30
Clear menu layout	10	100
Short text	4	40
Text in paragraphs	6	60
Back button	1	10
Link changes colour	1	10
Link appears in text	0	0
Home-page link on every page	8	80
Useful links	0	0
Search	3	30
Webpage animations	4	40

Table 6 Customer service data.

Item	Number of websites	%
FAQ	0	0
Toll-free number	0	0
Tel./Fax	10	100
Reception of complaints	3	30
Technical troubleshooting	0	0
Registration	3	30
The user can ask for info (form)	10	100
Privacy policy	5	50

four sites have two links, while two sites have links to three different SM platforms (Figure 3).

Analysis of corporate interactions on SM

Since Facebook turned out to be the SM platform with the highest presence of companies registered in the New PDO Protection Consortium, with 15 companies of 21 or 71.42% of the total members, the analysis of their activity on SM was only carried out by consulting the posts published on that SM platform. Also, as was also noted in the website analysis, those companies who carry out all stages of the production process are most present on Facebook with a business profile.

Characteristics of companies present on Facebook

The 15 companies with a business profile on Facebook are mostly located in the western part of Sicily: specifically, 5 companies in the province of Trapani, 4 companies in the province of Palermo and 2 companies in the province of Agrigento (Figure 4). Four companies are in the eastern part of Sicily: specifically, 2 in the province of Ragusa, 1 in the province of Enna and 1 in the province of Messina.

Based on data provided by the CoRFilaC for the year 2020, the 15 companies present on Facebook allocated 228 991 litres of milk to the production of Pecorino Siciliano PDO (ranging from 8451 to 70 565 litres per company). That same year, 3712 cheese wheels were produced to become Pecorino Siciliano PDO (ranging from 166 to 1275 wheels per company), or 84.5% of the total wheels produced by the Consortium; the wheels produced by the 15 companies weighed 32.4 tonnes (ranging 1.30–14.2 tonnes per company), representing 85.6% of the total. After ageing, 3297 wheels (ranging from 133 to 1232 wheels per company) received the PDO label and were put on the market by the 15 companies active on Facebook, representing 84.4% of the total; the relative weight of the PDO cheese was 29.4 tonnes (ranging from 1.0 to 13.7 tonnes per company), equal to 86.2% of the total. The total revenue for

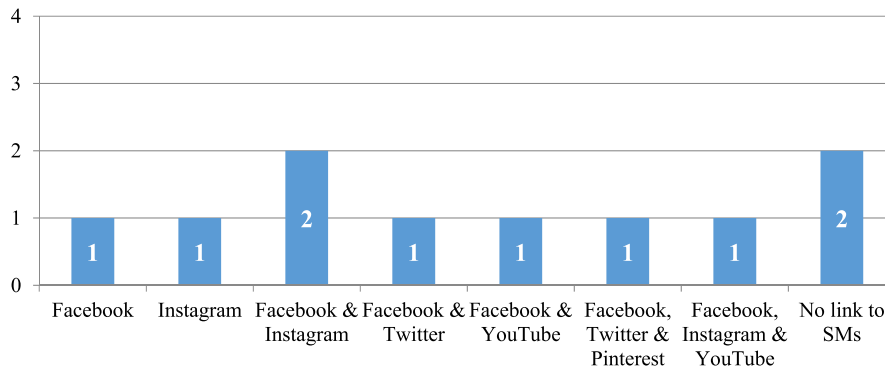


Figure 3 Presence of links to multiple SM in the 10 sites.

aged Pecorino Siciliano (including both with and without the PDO label) was about 372 000 euro.

The quality of interactions on Facebook

As for the number of fans on the brand pages of the companies producing Pecorino Siciliano PDO, these totalled 20 676, with a minimum of 363, a maximum of 4874 and an average of about 1378 fans per page (Table 7).

During the period considered, only 12 companies published posts on their pages: the last post of the remaining 3 companies dates to 20/09/2019, 12/12/2019 (followed by a single post published on 17/09/2021) and 16/01/2020 respectively.

An examination of the posts published on Facebook shows that a total of 81 posts were published in a year on the 12 pages that turned out to be active, averaging around

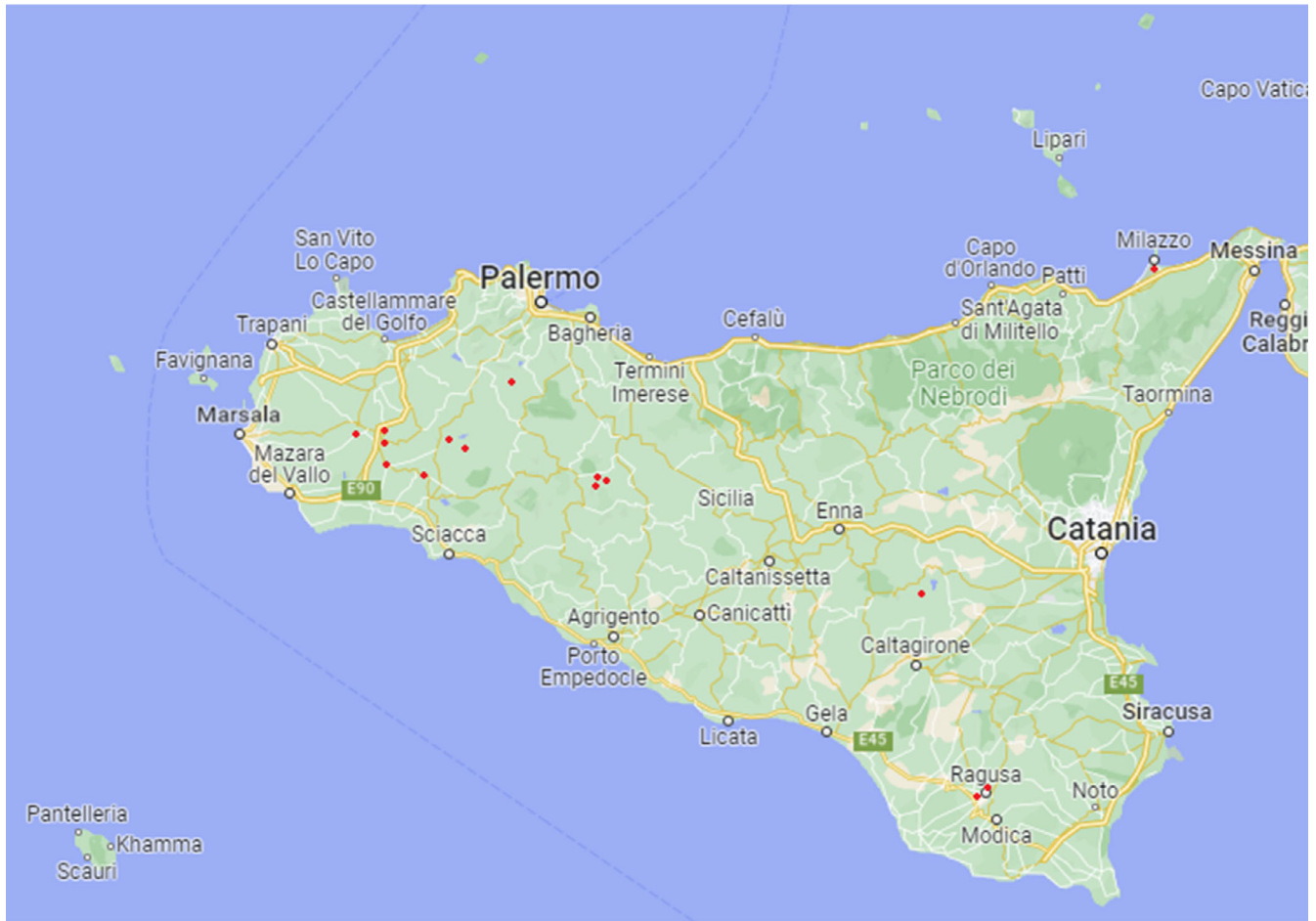


Figure 4 Location of companies with a business profile on Facebook.

Table 7 Main data collected on Facebook brand pages of Pecorino Siciliano PDO producers.

Item	Average	Minimum	Maximum
Fans	1378.40	363.00	4874.00
Post/day	0.02	0.00	0.03
Like/post	38.79	6.00	112.30
Comment/post	2.54	0.00	10.23
Shares/post	7.21	0.00	118.00

0.02 a day, with a minimum of 0.003 and a maximum of 0.03. These poor results can be attributed to the fact that, in addition to the three companies that stopped publishing posts prior to the assessment, there are companies present on Facebook with pages that have one or two posts in the observed year. Overall, the 81 posts received 3142 likes and another 115 reactions (86 loves, 20 wows, 4 hahas, 4 sads and 1 angry). The number of user interactions *via* the like button per post averages 38.79, with a minimum of 6.00 and a maximum of 112.30. Comments written by companies and users under the posts total 206: on average, they are 2.54, with a minimum of 0.00 and a maximum of 10.23. Shares of authors' posts by users total 584, averaging 7.21, with a minimum of 0.00 and a maximum of 118.00.

The content of posts plays a key role in company–user relations (Hong *et al.* 2016). Table 8 collects data on the nature of posts by classifying them into: Photo/post; Video/post and Link/post. Of a total of 81 posts, 60 included a photo. Specifically, the Pecorino Siciliano PDO producers present on Facebook use an average of 0.74 photos per post, with a minimum of 0.00 and a maximum of 1.00. There are only eight posts that include a video; an average of 0.10 videos per post, with a minimum of 0.00 and a maximum of 0.50; there are a total of three links attached to posts published by companies (on two different brand pages), with a minimum of 0.00, a maximum of 0.20 and an average of 0.04 per post.

Finally, thanks to the processing of the data in the previous tables, it was possible to calculate the extent of the three dimensions for determining the engagement of companies in SM, as identified by Chung *et al.* (2014), *i.e.* intensity, richness and responsiveness of the posts published on Facebook pages (Table 9).

Specifically, the average intensity of the examined sample, calculated per individual company through the ratio of the sum of posts and comments to the number of fans, takes a value of 0.01, the minimum is close to 0.00 (0.001) and the maximum is 0.05.

The values pertaining to the richness of the posts are decidedly higher, calculated per individual company by the ratio between the sum of videos, photos and links and the

Table 8 Indicators expressing the quality of post content.

Items	Average	Minimum	Maximum
Photo/post	0.74	0.00	1.00
Video/post	0.10	0.00	0.50
Link/post	0.04	0.00	0.20

Table 9 Intensity, richness and reactivity of the posts.

Dimensions	Average	Minimum	Maximum
Intensity	0.01	0.00	0.05
Richness	0.88	0.00	1.00
Reactivity	0.22	0.00	0.45

number of total posts, with an average of 0.88 content (videos, photos and links) per post, with a minimum of 0.00 and a maximum of 1.00 per company.

Regarding the last dimension, that of responsiveness, calculated as the ratio between the number of comments of post authors (companies) and the number of total comments (companies and users), the average indicator values are low and intermediate as seen above: in fact, there is an average of 0.22 replies from companies to users' comments, a minimum of 0.00 and a maximum of 0.45. In fact, of a total of 265 comments, only 59 are those of companies; going into more detail, we observe that only 2 companies interact with their fans by replying to their comments.

DISCUSSION

The quality of the corporate websites

This study shows that the companies registered in the New Consortium for the Protection of Pecorino Siciliano PDO are still closely linked to traditional sales and product promotion channels. In fact, less than half of the above-mentioned dairy farms have a website that can be consulted online, and of these, only 60% allow the purchase of products offline (30%) or entirely online (30%). It can thus be deduced that e-commerce is still an underused sales and marketing strategy, even though several studies have shown how useful it can be both in terms of lowering transaction costs (Bughin *et al.* 2011) and the consequent creation of short supply chains in B2C sales (Cao *et al.* 2005), and in terms of improving relationships with stakeholders (López-Becerra *et al.* 2016). These results also demonstrate the poor adaptation of the companies in the studied supply chain during the height of the COVID-19 pandemic. Indeed, on the one hand, the COVID-19 pandemic unintentionally

supported the transition to digital commerce by forcing firms to enhance their digital sales channels, catering to both old and new customers who have turned to online offerings by necessity or by choice and who intend to maintain their new purchasing practices beyond the end of the crisis (Pinzaru *et al.* 2020; Amankwah-Amoah *et al.* 2021; Kumar and Ayedee 2021; Casaleggio Associati 2022); on the other hand, the results from the present study demonstrate a lack of attention by the companies producing Pecorino Siciliano PDO to web-marketing tools and their potential.

The data show that 40% of the analysed websites are informative. This type of corporate website certainly allows companies to increase their online visibility and strengthen their brand, but it has obvious limitations that demonstrate the shortcomings of entrepreneurs in identifying and developing alternative sales channels to the traditional ones. These findings are in line with several studies on the analysis of the quality of websites in agri-businesses (specifically in floriculture and agri-food sectors) in the Italian 'Mezzogiorno' regions (Schimmenti *et al.* 2014; Galati *et al.* 2017; Borsellino *et al.* 2018), which show the inability of organisations to exploit the communicative and promotional dimensions that the Internet was already able to offer.

Another weak point of almost all the examined websites is their exclusive use of the Italian language only. This is a self-limiting barrier for companies that, during the age of globalisation and digitalisation, do not adequately consider the use of a website with at least two languages (Italian and English), which would allow foreign users to consult it with ease.

Regarding the information contained on the websites, it is often lacking. In fact, information is provided on the production method, maturation, weight and shape of Pecorino Siciliano PDO within the range 5–8 sites. Information on price, packaging and nutritional values is only provided in the range 2–4 sites, which is much sought after by users.

A positive note is the presence of product images offered within the websites, although the back button and search functionalities are almost completely absent, despite their importance, as argued by Cox and Dale (2002), in improving ease of use and navigability within the site.

The data analysed also show that the most frequently used tools within customer service websites are telephone/fax numbers and online forms to be completed requesting information from the company. Unfortunately, this customer service structure does not allow for profiling by collecting specific data on consumers' needs and requests, which on the contrary would facilitate meeting their needs (Schimmenti *et al.* 2012).

The data on community services such as SM platforms are more encouraging, which enable the creation of a relationship of trust capable of generating value over time (Wallace *et al.* 2014). In fact, almost all the sites have at least one link to social brand pages, with a clear preference for

Facebook as the SM reference. It should be noted, however, that two companies, despite having SM brand pages, do not advertise them on their own sites, showing little attention to their e-marketing tools and their potential.

The quality of companies' engagement in SM

The analysis of the companies' activity on SM shows a greater use of these media for sponsoring farm products and services compared to websites (15 vs 10). The greater presence on SM by companies could be justified by the lower cost (almost zero depending on the page promotion options that are activated) compared to building, maintaining and updating a quality website, especially for micro- or small enterprises (Nah and Saxton 2013; Capitello *et al.* 2014). Moreover, consumers prefer to share their thoughts and experiences through SM platforms rather than through websites (Yan *et al.* 2016).

According to the dimensions used by Chung *et al.* (2014) to assess companies' engagement on Facebook, this study shows that Pecorino Siciliano PDO companies show low engagement values despite their affirmed presence on the SM platform.

In fact, aside from the three companies that did not post any messages during the observed period, only a few companies publish enough posts during the year and share links to take advantage of e-commerce through SM platforms; most, however, make sporadic use of them. As pointed out by Chung *et al.* (2014) and Vlachvei and Notta (2015), increasing posts and comments on one's Facebook page is an opportunity to increase user awareness and engagement, and to influence the company's own market.

Literature suggests that entertaining and informative content significantly increases engagement levels (Cvijikj and Michahelles 2013) and post popularity (Lee *et al.* 2018). Visual posts are also very likely to achieve higher levels of engagement (likes, shares and comments) (Chua and Banerjee 2015); in particular, photos easily and quickly grab people's attention with less effort and in a short time (Luarn *et al.* 2015), while the inclusion of videos and images significantly increases the number of likes of a post compared to statuses or web links (Sabate *et al.* 2014) and are more likely to be noticed and shared by consumers because they are more engaging and informative (Dolan *et al.* 2019). In this sense, the examination of the data collected shows that the content published on Facebook by companies producing Pecorino Siciliano PDO is mainly rich in photos, while few posts contain videos and links.

Finally, with reference to the responsiveness of businesses on Facebook, a poor company–user interaction is observed: in fact, the responses of the post authors (*i.e.* the cheeses producers) to the users' questions are limited. Low reactivity values indicate a poor exchange of information between companies and consumers, which, instead, if it were more developed would foster greater consumer loyalty and brand

awareness and, consequently, better product performance on the market (Bianchi and Andrews 2015; Mozas-Moral *et al.* 2016).

Contributions and implications of the study

This study makes several contributions to research. On the one hand, it offers a contribution to the current literature on the assessment of the quality of web-marketing models adopted in the agri-food sector, with reference to a GI product such as Pecorino Siciliano PDO, which in recent years has recorded a notable increase in production with positive effects on the economic development of the production area (Schimmenti *et al.* 2021). While other studies have separately examined the quality of the electronic services offered through company websites (Annunziata and Vecchio 2013; Notta and Vlachvei 2013; Schimmenti *et al.* 2014; Galati *et al.* 2017; Borsellino *et al.* 2018; Fernández-Uclés *et al.* 2019; Camilleri 2021) or interactions on corporate SM pages (Capitello *et al.* 2014; Chung *et al.* 2014; Vlachvei and Notta 2015; Stevens *et al.* 2016; Galati *et al.* 2017; Vlachvei *et al.* 2017), this study simultaneously examines the quality of these two communication and marketing channels (websites and Facebook pages) aimed at broadening the sale horizons of agri-businesses, in a historical period in which the health emergency dictated by the COVID-19 pandemic has driven an acceleration of business reorganisation, especially in terms of the digitalisation of communication and marketing. Considering the changes that took place during the COVID-19 pandemic and what emerged from the study carried out, it is possible to state that the analysed companies are not making the most of the digital and technological tools available, given the shortcomings that emerged from the assessment of the quality of the websites and the activities carried out on the social brand pages for the promotion of Pecorino Siciliano PDO.

This study also has practical implications. In particular, the findings suggest that to improve and make more effective the digital communication of products of excellence such as Pecorino Siciliano PDO, it is necessary to follow a few general steps: to create, where absent, a corporate website (perhaps in conjunction with a page on SM for direct contact with users) that is clean, simple and easy to use, with a user-friendly and light layout so that it loads quickly; that can also be used in more than one language so as to expand the pool of users and avoid limiting its reach to an audience of fellow countrymen; that provides a space dedicated to e-commerce to finalise purchases by users interested in the product and that has a clear reference to an associated SM brand page. This SM page must present a constantly updated profile through *ad hoc*, engaging and interactive content such as videos, images and maps to indicate production location to entice users to consult and read it often, thereby increasing engagement and incentivising

the production and sharing of content, perhaps through links to articles or pages within the website to increase its traffic.

CONCLUSIONS

Considering that the demand for local GI foods is on the rise as they are increasingly perceived as more sustainable, containing strong identity culture and of superior quality (Di Vita *et al.* 2021; Ismea-Fondazione Qualivita 2021), and that the Internet allows small and medium enterprises (SMEs) in the agri-food industry to sell 'typical' local foods on a global scale (Annunziata and Vecchio 2013; Polenzani *et al.* 2021), it is fundamental that the company website, and more recently, its SM content on such platforms as Facebook, Instagram, Twitter, *etc.* are an integral part of its business strategy.

In particular, the findings suggest that companies should carefully formulate their e-marketing strategies to provide information and promptly respond to consumer messages and increase sales volumes through the web.

This study contains some research limitations that could be considered as starting points for future lines of research. A direct survey among companies would make it possible to quantify the financial returns of the engagement of Pecorino Siciliano PDO producers on websites and SMs, as well as to identify the socio-structural and managerial characteristics behind the adopted web-marketing models. Furthermore, the analysis should be extended to other GI dairy products, not only regional ones but also examining the communication strategies implemented by more well-known GI products such as Pecorino Romano DOP, to identify best practices to follow.

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AUTHOR CONTRIBUTIONS

Valeria Borsellino: Conceptualization; data curation; formal analysis; funding acquisition; methodology; project administration; software; validation; writing – original draft; writing – review and editing. **Nicola Pecoraro:** Data curation; formal analysis; investigation; writing – original draft. **Emanuele Schimmenti:** Conceptualization; funding acquisition; methodology; supervision; writing – original draft; writing – review and editing.

CONFLICT OF INTEREST

None.

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DATA AVAILABILITY STATEMENT

Research data are not shared.

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