

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

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Title page**• Title**

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

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Abstract

This study analyses the digital marketing tools that companies producing Pecorino Siciliano DOP are implementing on the web through their corporate website and their brand page on Facebook. This study aims to verify the adaptation (or not) of companies to new trends in web marketing and e-commerce.

The quality of corporate websites in terms of usability and the activity carried out on Facebook brand pages by Pecorino Siciliano PDO-producing companies were assessed during the COVID-19 pandemic.

Analysed data shows that the companies producing Pecorino Siciliano PDO fell short in developing their web-marketing tools, demonstrating their poor adaptation to the new digitalization trends driven by the COVID-19.

For Peer Review

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Graphical Abstract



1 **Promoting dairy products through the Web: The case of Pecorino Siciliano PDO during the** 2 **COVID-19 pandemic**

3 **1. Introduction**

4 In the last decade, the digital transformation of companies has also enabled the development of new
5 marketing strategies that take advantage of the innovations and advances that technology has made
6 available to society (Caputo et al., 2021). This transformation has allowed companies to gain
7 visibility locally, nationally, and internationally through websites and through social media (SM)
8 platforms, such as Facebook, Instagram, Twitter, etc., which have enabled them to reach many both
9 business-to-consumer (B2C) and business-to-business (B2B) contacts in real time (Serinikli, 2020;
10 Amankwah-Amoah et al., 2021). In the last few years, the crisis caused by the COVID-19 pandemic
11 is further stimulating a strong acceleration of this digital transformation worldwide (Bradley et al.,
12 2020 Amankwah-Amoah et al., 2021; Casaleggio Associati, 2022; Pinzaru et al., 2020).

13 Indeed, the state of emergency caused by COVID-19 has placed the agri-food sector in an
14 unprecedented situation, highlighting its importance, but also its limitations and criticalities. While
15 it is true that the agri-food sector has continued to operate by ensuring the continual supply of food,
16 it is equally true that the overall scenario has changed substantially through, for example, the
17 paralysis of the Ho.Re.Ca. sector in its various forms (in Italy and abroad), the standstill of the
18 tourism sector and the drop in foreign demand; in this context, agri-food productions were all
19 affected and substantially suffered, to varying degrees, from the consequences of lockdowns,
20 including local production systems such as those of geographical indication (GI) products
21 (Barcaccia et al., 2020; Ismea - Fondazione Qualivita, 2021). In this context, there has been a
22 significant impact on the sales of the agri-food products most closely linked to the catering sector,
23 including, for example, wine, fresh meat and meat products, as well as dairy products, especially
24 fresh cheese and fresh milk, whose limited shelf-life has inevitably clashed with logistical and
25 distribution difficulties and the lack of demand from, for example, bars, restaurants and pastry
26 shops (Barcaccia et al., 2020). Moreover, the succession of events following the spread of COVID-

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19 has led consumers to change their purchasing and consumption patterns, as well as the very composition of the agri-food shopping trolley. 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).

The latter 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 (Polenzani et al., 2021; Ismea, 2021; Netcomm, 2022; 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, 2022; Istat, 2022). On the other hand, other companies were able to exploit their positioning as segments of excellence in our agri-food exports (these are mainly some GI products), or were supported by sales on channels that 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 (Borsellino et al., 2020; Ismea, 2021; Mastronardi et al., 2022). In recent years, in fact, 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 (Polenzani et al., 2021; Grosso 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

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3 53 internet connection at least once to make purchases in 2021. The corporate world recognized this
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5 54 trend and in 2020 and consequentially 34.3% of corporate spending on communication was invested
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8 55 in digital channels (The European House - Ambrosetti, 2022). The Internet is an especially
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10 56 important option for small and medium enterprises (SMEs) in the agri-food industry (Annunziata
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12 57 and Vecchio, 2013; Polenzani et al., 2021).

14 58 In this scenario, it is a prerequisite that the corporate website, and more recently its SM content on
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17 59 such platforms as Facebook, Instagram, Twitter, etc., are an integral part of a company e-business
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19 60 strategy and the main tool for communication and interaction with consumers.

21 61 This study focuses on the Sicilian dairy supply chain and in particular on Pecorino Siciliano PDO,
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23
24 62 an excellent and very promising PDO product which is currently present on the market in modest
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26 63 quantities but whose capacity to generate an increase in production and income for producers, and
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28 64 the consequent positive impact on the economic development of the production area based on the
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30 65 determination of the price of processing sheep's milk into cheese and derivatives, has recently been
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33 66 examined (Schimmenti et al., 2021).

35 67 In this context, this study aims to assess the quality of the websites and activities carried out on SM
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37 68 platforms by Pecorino Siciliano PDO companies according to an e-service quality assessment
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40 69 system already used in other studies and in other sectors (Cox and Dale, 2002; Begalli et al., 2009;
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42 70 Schimmenti et al., 2012; Chung et al, 2014; Vlachvei and Notta, 2015; Galati et al., 2017;
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44 71 Borsellino et al., 2018;). The study was conducted during the critical pandemic period (February
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46 72 2020-February 2021) with the aim of verifying the adaptation (or not) of companies to the above-
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48
49 73 mentioned new trends in e-commerce and use of SM platforms. This analysis provides useful
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51 74 information for optimising the web marketing strategies of the Pecorino Siciliano PDO and
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54 75 indicating new commercial strategies to support the development of the sector. The digitisation of
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56 76 the dairy industry does not only depend on economic factors, but above all on cultural factors;
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58 77 firstly, it is affected by the mistaken belief that innovation might somehow undermine tradition
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60 78 (Lanfranchi et al., 2018) and, secondly, by the lack of specific skills of the SMEs in the dairy sector,

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3 79 which until now have been run by business owners who are certainly not digital natives and have
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5 80 limited knowledge of the enormous resource offered by the Internet (Licitra, 2022).
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8 81 The article is organised as follows: after briefly describing the context regarding the Pecorino
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10 82 Siciliano PDO, the methodology used to carry out the assessment of both the quality of the websites
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12 83 and the activity carried out on the SM platforms is described. Finally, after presenting the results
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14 84 obtained, they are discussed, and some concluding remarks are drawn.
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19 86 **2. Materials and methods**

20 87 **2.1 Pecorino Siciliano PDO**

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22 88 In 2021, Sicily was ranked as the sixth Italian region by production of G.I. products with 67 PDO
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24 89 and PGI products of which 36 are in the *food* sector and 31 are in the *wine* sector, (Ismea -
25
26 90 Fondazione Qualivita, 2021). In the dairy sector, Sicily has 5 PDO cheeses: 2 made from cow's
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28 91 milk, Provola dei Nebrodi PDO and Ragusano PDO, and 3 made from sheep's milk, Piacentinu
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30 92 Ennese PDO, Vastedda della Valle del Belice PDO and Pecorino Siciliano PDO (Schimmenti et al.,
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32 93 2021). Pecorino Siciliano PDO is a semi-cooked hard cheese made from whole raw sheep's milk
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34 94 obtained from animals reared throughout the entire region of Sicily. According to scholars and fans
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36 95 of the art of cheese-making, Pecorino Siciliano DOP is the oldest cheese produced in Italy, and
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38 96 probably the oldest in Europe (Betta, 2000). Along with Fontina, Gorgonzola, Grana Padano,
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40 97 Parmigiano Reggiano, and Pecorino Romano, it was one of the first cheeses to benefit from
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42 98 Denomination of Origin recognition during the middle of the last century (Presidential Decree No.
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44 99 1269 of 30.10.1955, GURI No. 295 of 22.12.1955). In 1996, the EU approved the PDO mark
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46 100 (Commission Regulation (EC) No 1107/96 of 12 June 1996) and its transcription in the EU's GI
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48 101 register, thus guaranteeing the strong link between the cheese, its place of origin and traditional
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50 102 production methods. In 2020, the product specification was amended at the request of the 'New
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52 103 Consortium for the Protection of Pecorino Siciliano PDO' (Commission Implementing Regulation
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54 104 (EU) 2020/1338 of 21 September 2020) with the aims of consolidating Pecorino Siciliano PDO

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3 105 specifications into a single document, allowing producers to satisfy consumer demand during the
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5 106 summer season, and implementing a graphic image common to all Pecorino Siciliano PDO
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8 107 producers. At present, this product makes up a low volume of the national production of GI sheep's
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10 108 cheeses, and is less known than other more famous ones, with Pecorino Romano DOP dominating.
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12 109 Specifically, based on data provided by the certifying body, the 'Consorzio per la Ricerca nel
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14 110 Settore della Filiera Lattiero-Casearia' (CoRFilaC), the production of Pecorino Siciliano PDO went
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17 111 from 0.4 tonnes in 2002 to 87.5 tonnes in 2019, and in 2020 registered a sharp drop in the volumes
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19 112 produced to 37.9 tonnes due to the closure of the main marketing channel, the HO.RE.CA. The
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22 113 production data for 2021 indicate a recovery compared to 2020, with a production volume of 50.1
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24 114 tonnes. The New Consortium for the Protection of Pecorino Siciliano PDO has increased its
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26 115 marketing activities related to its PGI for the post-pandemic relaunch, with actions aimed mainly at
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28 116 national distribution and the food processing industry, but also with activities aimed at making
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31 117 agreements with large-scale retail trade and promoting online sales.

32 33 118 **2.2 Assessment of the quality of the Pecorino Siciliano PDO digital marketing tools**

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35 119 The analysis conducted in this study aims to assess the consistency and quality of the websites of
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38 120 the companies producing Pecorino Siciliano PDO as well as their presence on the main SM
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40 121 platforms and the quality of interaction between them and SM users. To this end, a survey was
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42 122 conducted by consulting the list of members registered in the New Consortium for the Protection of
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44 123 Pecorino Siciliano PDO, as of 30/09/2020: this consists of 21 members who carry out different
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47 124 stages of the production process, from sheep breeding to cheese-making and maturing to the final
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49 125 marketing stage.

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51 126 The search for websites was conducted by typing the company name of the 21 members into the
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54 127 Google browser; in doing so, it was possible to check for possible links to the websites of these
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56 128 companies. This initial search showed that of the 21 members:

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58 129 - 7 do not have their own website;

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60 130 - 1 has a temporarily unavailable site, which was therefore not consultable;

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3 131 - 3 have outsourced the sale of their products to third-party sites (marketplaces).

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5 132 As a result, 10 members have a corporate website (Table 1).

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7 133 Subsequently, with reference to the use of SMs by companies producing Pecorino Siciliano PDO,

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10 134 research was undertaken on the possible presence of companies in the following SM platforms:

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12 135 Facebook, Instagram, YouTube, Twitter, and Pinterest. The research shows that, of the 21

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14 136 companies, only 15 use at least one of the above-mentioned SM platforms; more specifically, all 15

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16 137 are present on Facebook, and among these 8 are also registered on Instagram, 3 on Twitter, 2 on

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18 138 YouTube and 2 on Pinterest.

19

20 139 Table 1 - Presence of the companies producing Pecorino Siciliano PDO on the web with their own

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22 140 corporate site and on the main SM platforms

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N	Qualification	Website	Social Media platform				
			Facebook	Instagram	YouTub e	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

2.2.1 Quality of 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 traced to 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 websites identified, an evaluation form was prepared based on the model adopted by Schimmenti et al. (2012), with the appropriate adaptations made to adapt it to dairy sector websites. The form consists of five sections.

The first section, “context”, identifies the type of site: informative; showcase; 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, 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

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3 160 company such as FAQs, telephone/fax contacts and e-mail addresses to request information,
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5 161 services dedicated to receiving complaints and solving technical problems.
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8 162 Finally, the fifth section, 'community', analyses the presence of forums, chats, or *links* to SM
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10 163 platforms (Facebook, Twitter, Instagram, etc.) allowing for a virtual interface with potential
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12 164 customers, currency exchange services and incentives for repeat buyers, as well as other
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15 165 motivations for customer to return to the corporate website often.

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17 166 Data was collected for the purposes of the above analysis from December 2020 to February 2021.
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19 167 **2.2.2 SM interaction quality**

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22 168 Given the different number of company pages surveyed on the various SM platforms, the analysis
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24 169 of the interaction quality between Pecorino Siciliano PDO producing companies and users was
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26 170 limited to the most used platform, Facebook. The metrics suggested by Chung et al. (2014) were
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29 171 used to assess the efforts of the companies and to measure their engagement on SM aimed at
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31 172 supporting their marketing and communication strategies. Measurements included the number of
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33 173 fans, posts, photos, videos, links, likes, and comments from the Facebook profiles of the 15
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35 174 companies.

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38 175 Next Analytics software (nextanalytics.com) was used to acquire this data. This software makes it
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40 176 possible to monitor the involvement and influence exerted by an individual page or a group of
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42 177 Facebook pages by examining activity in terms of number of fans, number and type of posts (i.e.
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45 178 photos, videos, links, or simple status updates), number of shares, number and type of reactions
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47 179 (from like to love, etc.), comments to posts, distinguishing in this case those posted by companies
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49 180 and those posted by users. Therefore, the list of web addresses (URL, Uniform Resource Locator)
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52 181 of the 15 pages previously tracked on Facebook was entered into the appropriate field, followed by
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54 182 the time frame in which to examine posts and comments, and finally the data was downloaded in
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56 183 the form of Excel spreadsheets. The data was collected with reference to the observation period of a
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58 184 year, between 29 February 2020 and 28 February 2021, falling during the COVID-19 pandemic.
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3 185 Subsequently, the data was processed and analysed in order to measure the three dimensions that
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5 186 define a company's engagement on SM in terms of intensity, richness and responsiveness (Chung et
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8 187 al., 2014) with reference to each company producing Pecorino Siciliano PDO as well as to the
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10 188 overall average data of the 15 Facebook pages traced online. Specifically:

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12 189 -the intensity parameter was calculated as the ratio between the sum of posts and comments on the
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15 190 company's social page and the number of fans;

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17 191 -the richness parameter was calculated by relating the number of posts containing videos, photos,
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19 192 and links to the number of total posts;

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21 193 -the responsiveness parameter was measured by the ratio of the number of comments written by the
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24 194 author of the post (company) to the number of total comments.

25 26 195 **3. Results**

27 28 196 **3.1 Analysing the quality of websites**

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30 197 The analysis aimed to assess the website quality of the companies belonging to the New
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33 198 Consortium for the Protection of Pecorino Siciliano PDO and took into consideration 10 active
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35 199 websites.

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37 200 Based on the first section of the evaluation form, referring to context, websites can be classified
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40 201 according to type as follows:

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42 202 - 4 are informative;

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44 203 - 3 are showcase sites;

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46 204 - 3 are e-commerce sites.

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49 205 More specifically, informative sites are intended to present the company and the products it offers
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51 206 to the consumer. Showcase sites are created for the presentation of the company, but also for
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54 207 product sales; thus, orders can be placed online while transactions are carried out offline. E-
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56 208 commerce sites allow the consumer to order products and also make payments online.

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58 209 Concerning the “content and convenience” characteristics of the websites, with reference to website
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210 size it emerged that:

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3 211 - 2 have a website size between 1 and 5;
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6 212 - 7 have between 6 and 10 pages;
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8 213 - 1 is larger than 10 pages.
9
10 214 The website evaluation form analyses the language used within the sites. The examination showed
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12 215 that:
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15 216 - 8 use only the Italian language, of which 3 are informative sites, 3 are showcase sites and 2 are e-
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17 217 commerce sites;
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20 218 - 2 use 4 languages, namely Italian, French, English and German, of which 1 is an e-commerce site,
21
22 219 and 1 is an informative site.
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24 220 In all the sites consulted, the company location is indicated and there is also a section telling the
25
26 221 history of the company, the activities carried out and the services offered to users. In addition to
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28
29 222 Pecorino Siciliano DOP (100% of the sites), ricotta is the most present product offered by the
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31 223 analysed websites (90% of the sites), followed by Vastedda della Valle del Belice PDO (60%)
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33 224 (Table 2). 3 of the websites also offer goat and cow cheeses while 2 sell goat cheeses, showing a
34
35
36 225 high degree of production diversification. Finally, in one case oil and wine are also present,
37
38 226 completing the offer of farm food products.
39
40 227 Table 2 - Type of products offered by the analysed websites
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42

Type of products offered	Number of websites	%
Pecorino Siciliano DOP	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

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

231 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

232 Regarding additional information, included in the “news and events”, “about us” or “certifications”
 233 sections of the website, it was possible to find references to awards, recognitions or certifications
 234 obtained by the company over the years in only 5 of the websites.

235 With reference to the 6 sales sites, i.e., showcase and e-commerce sites, not all of them provide all
 236 of the necessary information: specific information concerning the conditions of purchase can only
 237 be found on 5 sites, as well as information on the right of withdrawal (i.e., order cancellation,
 238 product returns or refunds); only 4 sites provide information on the availability of the product at the
 239 time of the order (Table 4).

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

Sales information	Number of websites	%
Product availability	4	67
Conditions of purchase	5	83
Right of withdrawal	5	83

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3 241 The 3 identified e-commerce sites allow customers to view the products offered by the company by

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5 242 consulting an online catalogue; subsequently, should one intend to purchase, products can be added

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7 243 to the shopping trolley and removed, should one change one's mind. If the consumer intends to

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9 244 purchase, he or she must register some personal data before making the payment:

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11 245 - First and last name;

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13 246 - Country/region;

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15 247 - Street and house number for shipping;

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17 248 - Postal code;

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19 249 - City;

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21 250 - Province;

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23 251 - Telephone number;

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25 252 - E-mail address.

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27 253 After entering personal data in a form within the online purchase section, the user can proceed to

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29 254 pay for the products in the shopping cart. All 3 analysed e-commerce sites allow online payments

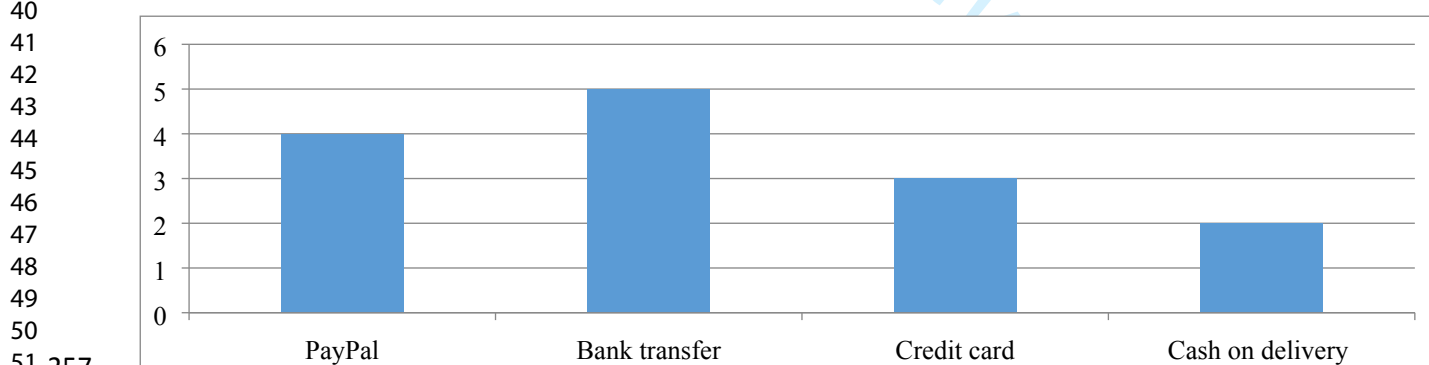
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31 255 by means of Paypal, Credit Card or Bank Transfer (Figure 1).

32

33 256 Figure 1 - Payment methods in sales sites (6 sites)

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36 257 Regarding the three showcase sites analysed, offline payments can be made by PayPal (1 site), bank

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38 258 transfer (2 sites) and cash on delivery (2 sites). In these sites, the user's approach to purchasing

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40 259 products requires an order by e-mail or by telephone of the products and the quantity they wish to

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261 purchase. The order is subsequently processed by the company as soon as the user makes payment
 262 via the available means described above.

263 About “design and comfort” features, all of the observed websites feature images on the homepage
 264 as well as product photos on the inner pages (Table 5).

265 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

266 All sites denote a clear user-friendly menu layout. The text is short in 4 cases, while it is divided
 267 into paragraphs in 6 cases. The facilitated return to the previous pages of the site thanks to a back
 268 button is present in only one case. The link changes colour once consulted only in one of the sites
 269 examined, while a link appears in the text in none of the sites. The link redirecting the user to the
 270 home page is present in 8 out of 10 cases. The search function is present in 3 sites, while only 4
 271 sites have webpage animations (motion, transition, dynamic backgrounds, etc.). Finally, a site map
 272 is present in only 3 cases.

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3 273 Regarding the quality characteristics envisaged for the evaluation of the attribute “customer
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5 274 service”, aiming to support the user in the pre/post-sales phases, none of the sites consulted
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8 275 provides the user with a page dedicated to FAQs, or a toll-free number for the resolution of any
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10 276 technical problems (Table 6).

11
12 277 Table 6 - Customer service data

Items	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

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32 278 All companies, on the other hand, provide support on their own website by giving a telephone or
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35 279 fax number or offering a form to be filled out. Only 3 e-commerce websites have a complaints
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37 280 section or the possibility for customers to register. Only 5 of the websites examined have a privacy
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39 281 policy that clarifies which user data may be processed by the company and in what way.

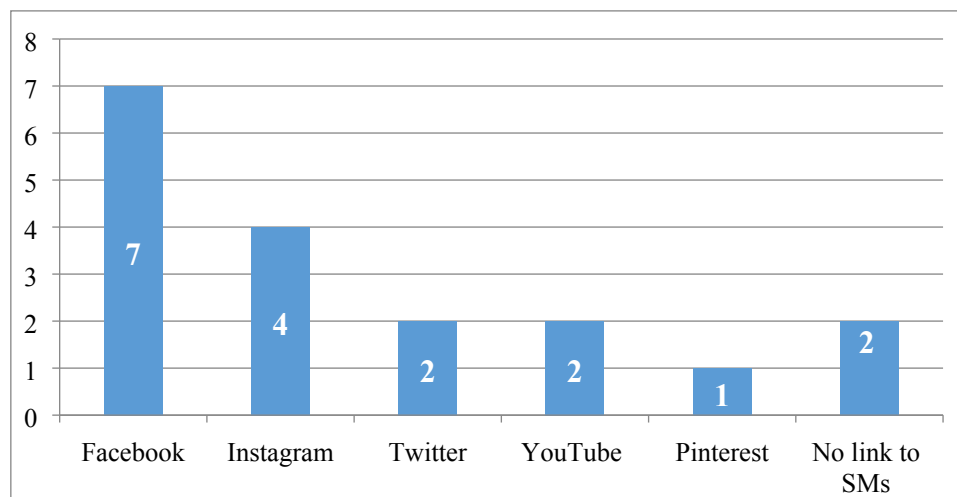
40
41 282 The last group of assessed quality attributes is that referred to “community” services. In all the
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44 283 evaluated sites, there is a total absence of forums, chats and personalised services for users as “my
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46 284 account” (which would allow users to view the history of transactions carried out over time).

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48 285 Only three sites, those allowing registration, allow the user to access the site by entering a username
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51 286 and password.

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53 287 The “community” services offered by companies on their websites are very modest: they consist in
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55 288 the presence of links to their respective pages on the main SM platforms. In more detail, no link to
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58 289 SM platforms is present on 2 sites, while a link to Facebook is present on 7 of the analysed
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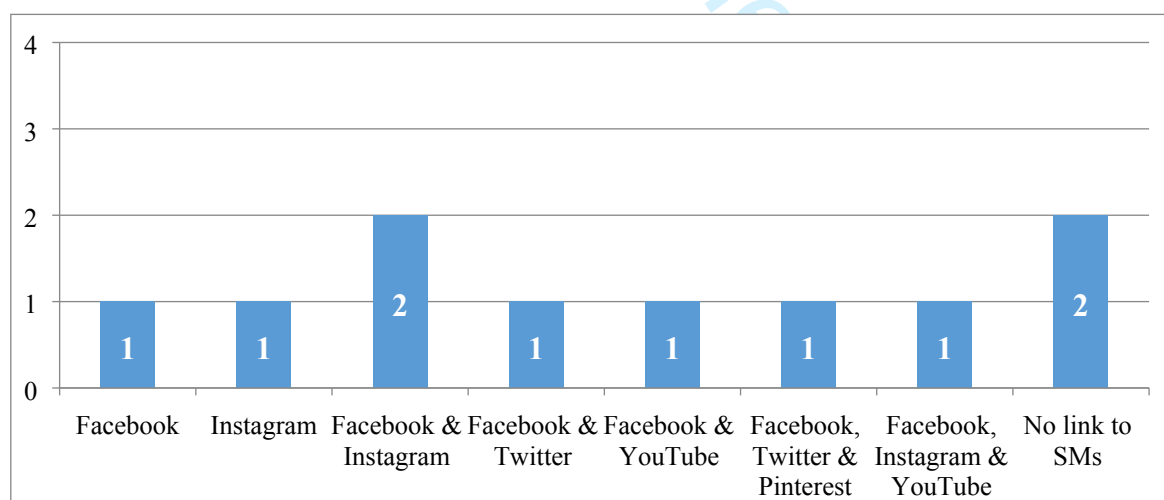
290 websites, a link to Instagram is present on 4 sites, a link to Twitter and YouTube is present on 2
 291 sites respectively and, finally, a link to Pinterest is present on 1 website (Figure 2).

292 Figure 2 - Frequency of SM links in the 10 sites



294 Furthermore, of the 8 sites with links to SM platforms, 1 only has a link to Facebook, just as one
 295 site has a link only to Instagram; in the remaining 6 sites, several links to different SM platforms are
 296 found in different combinations: 4 sites have 2 links, while 2 sites have links to 3 different SM
 297 platforms (Fig. 3).

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



300 3.2 Analysis of corporate interactions on SM

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3 301 The analysis of the activity of the companies registered in the New PDO Protection Consortium on
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5 302 SM was only carried out by analysing activity on Facebook, by consulting the posts published
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8 303 during the period between 29 February 2020 and 28 February 2021.

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10 304 As for the number of fans of the brand pages of the companies producing Pecorino Siciliano PDO,
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12 305 these totalled 20,676, with a minimum of 363, a maximum of 4,874 and an average of about 1,378
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15 306 fans per page (Table 7).

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17 307 Table 7 - Main data collected on brand pages of Pecorino Siciliano PDO producers on Facebook

Items	Average	Minimum	Maximum
Fan	1,378.40	363.00	4,874.00
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

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31 308 During the period considered, only 12 companies published posts on their pages: the last post of the
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33 309 remaining 3 companies dates back to 20/09/2019, 12/12/2019 (followed by a single post published
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35 310 on 17/09/2021) and 16/01/2020, respectively.

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38 311 An examination of the posts published on Facebook show that a total of 81 posts were published in
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40 312 a year on the 12 pages that turned out to be active, averaging around 0.02 in a day, with a minimum
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42 313 of 0.003 and a maximum of 0.03. These poor results can be attributed to the fact that, in addition to
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44 314 the 3 companies that stopped publishing posts prior to the assessment, there are companies present
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46 315 on Facebook with pages that have 1 or 2 posts in the observed year. Overall, the 81 posts recorded
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48 316 3,142 likes and another 115 reactions (86 loves, 20 wows, 4 hahas, 4 sads and 1 angry). The number
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50 317 of user interactions via the like button per post averages 38.79, with a minimum of 6.00 and a
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52 318 maximum of 112.30. Comments written by companies and users under the posts total 206: on
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54 319 average, they are 2.54, with a minimum of 0.00 and a maximum of 10.23. Shares of authors' posts
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56 320 by users total 584, averaging 7.21, with a minimum of 0.00 and a maximum of 118.00.
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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; Link/post. Out 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 8 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 3 links attached to posts published by companies (on 2 different brand pages), with a minimum of 0.00, a maximum of 0.20 and an average of 0.04 per post.

Table 8 - Indicators expressing the quality of post content

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

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).

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

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 number of total posts,

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3 340 with an average of 0.88 content (videos, photos, and links) per post, with a minimum of 0.00 and a
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5 341 maximum of 1.00 per company.
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8 342 Regarding the last dimension, that of responsiveness, calculated as the ratio between the number of
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10 343 comments of post authors (companies) and the number of total comments (companies and users),
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12 344 the average indicator values are low and intermediate as seen above: in fact, there is an average of
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14 345 0.22 replies from companies to users' comments, a minimum of 0.00 and a maximum of 0.45. In
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17 346 fact, out of a total of 265 comments, only 59 are those of companies; going into more detail, we
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19 347 observe that only 2 companies interact with their fans by replying to their comments.
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22 348 **4. Discussions**

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24 349 The study shows that the companies registered in the New Consortium for the Protection of
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26 350 Pecorino Siciliano PDO are still closely linked to traditional sales and product promotion channels.
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29 351 In fact, less than half of the above-mentioned dairy farms have a website that can be consulted
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31 352 online, and of these only 60% allow the purchase of products offline (30%) or entirely online
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33 353 (30%). It can thus be deduced that e-commerce is still an underused sales and marketing strategy,
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36 354 even though several studies have shown how useful it can be both in terms of lowering transaction
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38 355 costs (Bughin et al., 2011) and the consequent creation of short supply chains in B2C sales (Cao et
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40 356 al., 2005), and in terms of improving relationships with stakeholders (López-Becerra et al., 2016).
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43 357 These results also demonstrate the poor adaptation of the companies in the studied supply chain
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45 358 during the height of the COVID-19 pandemic. Indeed, while on the one hand the COVID-19
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47 359 pandemic unintentionally supported the transition to digital commerce by forcing firms to enhance
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50 360 their digital sales channels, catering to both old and new customers who have turned to online
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52 361 offerings by necessity or by choice and who intend to maintain their new purchasing practices
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54 362 beyond the end of the crisis (Kumar, & Ayedee, 2021; Casaleggio Associati, 2022; Amankwah-
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56 363 Amoah et al., 2021; Pinzaru et al., 2020; Bradley et al., 2020), on the other hand, the results from
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3 364 the present study demonstrate a lack of attention by the companies producing Pecorino Siciliano
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5 365 DOP to web-marketing tools and their potential.

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8 366 The data shows that 40% of the analysed websites are informative. This type of corporate website
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10 367 certainly allows companies to increase their online visibility and strengthen their brand, but it has
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12 368 obvious limitations that demonstrate the shortcomings of entrepreneurs in identifying and
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14 369 developing alternative sales channels to the traditional ones. These findings are in line with several
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17 370 studies on the analysis of the quality of websites in agribusinesses (specifically in floriculture and
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19 371 agri-food sectors) in the Italian 'Mezzogiorno' regions (Schimmenti et al., 2014; Galati et al., 2016;
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21 372 Borsellino et al., 2018), which show the inability of organizations to exploit the communicative and
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24 373 promotional dimensions that the Internet was already been able to offer.

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26 374 Another weak point of almost all the examined websites is their exclusive use of the Italian
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28 375 language only. This is a self-limiting barrier for companies that, during the age of globalisation and
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30 376 digitalisation, do not adequately consider the use of a website with at least two languages (Italian
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33 377 and English), which would allow foreign users to consult it with ease.

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35 378 Regarding the information contained in the websites, it is often lacking. In fact, information is
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37 379 provided on the production method, maturation, weight, and shape of Pecorino Siciliano PDO
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40 380 within the range of 5-8 sites. Information on price, packaging and nutritional values is only
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42 381 provided in the range of 2-4 sites, which is much sought after by users.

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44 382 A positive note is the presence of product images offered within the websites, although the back
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46 383 button and search functionalities are almost completely absent, despite their importance, as argued
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49 384 by Cox and Dale (2002), in improving ease of use and navigability within the site.

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51 385 The data analysed also shows that the most frequently used tools within customer service websites
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53 386 are telephone/fax numbers and online forms to be completed requesting information from the
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56 387 company. Unfortunately, this customer service structure does not allow for profiling by collecting
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58 388 specific data on consumers' needs and requests, which on the contrary would facilitate meeting their
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60 389 needs (Schimmenti et al., 2012).

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3 390 The data on community services such as SM platforms is more encouraging, which enable the
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5 391 creation of a relationship of trust capable of generating value over time (Wallace et al., 2014). In
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7 392 fact, almost all the sites have at least 1 link to social brand pages, with a clear preference for
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10 393 Facebook as the SM reference. It should be noted, however, that 2 companies, despite having SM
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12 394 brand pages, do not advertise them on their own sites, showing little attention to their e-marketing
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14 395 tools and their potential.

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17 396 The analysis of the companies' activity on SM shows a greater use of these media for sponsoring
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19 397 farm products and services compared to websites (15 vs. 10). The greater presence on SM by
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21 398 companies could be justified by the lower cost (almost zero depending on the page promotion
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23 399 options that are activated) compared to building, maintaining, and updating a quality website,
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25 400 especially for micro or small enterprises (Nah & Saxton, 2013; Capitello et al., 2014). Moreover,
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27 401 consumers prefer to share their thoughts and experiences through SM platforms rather than through
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29 402 websites (Yan et al., 2016).

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31 403 From the study conducted, according to the dimensions used by Chung et al. (2014) to assess
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33 404 companies' engagement on Facebook, Pecorino Siciliano PDO companies, show low values despite
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35 405 their affirmed presence on the SM platform.

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37 406 In fact, aside from the 3 companies that did not post any messages during the observed period, only
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39 407 a few companies publish enough posts during the year and share links to take advantage of e-
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41 408 commerce through SM platforms; most, however, make sporadic use of them. As pointed out by
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43 409 Vlachvei and Notta (2015) and Chung et al. (2014), increasing posts and comments on one's
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45 410 Facebook page is an opportunity to increase user awareness and engagement, and to influence the
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47 411 company's own market.

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49 412 Literature suggests that entertaining and informative content significantly increases engagement
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51 413 levels (Cvijikj & Michahelles, 2013) and post popularity (Lee et al., 2018). Visual posts are also
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53 414 very likely to achieve higher levels of engagement (likes, shares and comments) (Chua & Banerjee,
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55 415 2015); in particular, photos easily and quickly grab people's attention with less effort and in a short

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3 416 time (Luarn et al., 2015), while the inclusion of videos and images significantly increases the
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6 417 number of likes of a post compared to statuses or web links (Sabate et al., 2014) and are more likely
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8 418 to be noticed and shared by consumers because they are more engaging and informative (Dolan et
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10 419 al., 2019). In this sense, the examination of the data collected shows that the content published in
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12 420 Facebook by companies producing Pecorino Siciliano DOP is mainly rich in photos, while few
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15 421 posts contain videos and links.

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17 422 Finally, with reference to the responsiveness of businesses on Facebook, a poor company-user
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19 423 interaction is observed: in fact, the responses of the post authors (i.e., the cheeses producers) to the
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22 424 users' questions are limited. Low reactivity values indicate a poor exchange of information between
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24 425 companies and consumers, which, instead, if it were more developed would foster greater consumer
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26 426 loyalty and brand awareness and, consequently, better product performance on the market (Bianchi
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29 427 and Andrew, 2015; Mozas-Moral et al., 2016).

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31 428 This study makes several contributions to research. On the one hand, it offers a contribution to the
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33 429 current literature on the assessment of the quality of web-marketing models adopted in the agri-food
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35 430 sector, with reference to a GI product such as Pecorino Siciliano PDO, which in recent years has
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38 431 recorded a notable increase in production with positive effects on the economic development of the
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40 432 production area (Schimmenti et al., 2021). While other studies have separately examined the quality
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42 433 of the electronic services offered through company websites (Notta & Vlachvei, 2013; Fernández-
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44 434 Annunziata & Vecchio, 2013; Schimmenti et al., 2014; Galati et al., 2016; Borsellino et al., 2018;
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47 435 Uclés et al., 2019; Camilleri, 2021) or interactions on corporate SM pages (Capitello et al., 2014;
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49 436 Chung et al., 2014; Vlachvei & Notta, 2015; Stevens et al., 2016; Vlachvei et al., 2017; Galati et al.,
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51 437 2017), this study simultaneously examines the quality of these two communication and marketing
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54 438 channels (websites and Facebook pages) aimed at broadening the sale horizons of agribusinesses, in
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56 439 a historical period in which the health emergency dictated by the COVID-19 pandemic has driven
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58 440 an acceleration of business reorganisation, especially in terms of the digitalisation of
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60 441 communication and marketing. Considering the changes that took place during the COVID-19

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442 pandemic and of what emerged from the study carried out, it is possible to state that the analysed
443 companies are not making the most of the digital and technological tools available, given the
444 shortcomings that emerged from the assessment of the quality of the websites and the activities
445 carried out on the social brand pages for the promotion of Pecorino Siciliano PDO.

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

5. Conclusions

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

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3 466 In particular, the findings suggest that companies should carefully formulate their e-marketing
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5 467 strategies to provide information and promptly respond to consumer messages and increase sales
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8 468 volumes through the web.

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10 469 This study contains some research limitations that could be considered as starting points for future
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12 470 lines of research. A direct survey among enterprises would make it possible to quantify the financial
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15 471 returns of the engagement of Pecorino Siciliano PDO producers on websites and SMS, as well as to
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17 472 identify the socio-structural and managerial characteristics behind the adopted web-marketing
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19 473 models. Furthermore, the analysis should be extended to other GI dairy products, not only regional
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22 474 ones, but also examining the communication strategies implemented by more well-known GI
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24 475 products such as Pecorino Romano DOP, to identify best practices to follow.

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