

Profit at the expense of health. Irresponsible corporate communication in the supplements industry

Rentabilidad a costa de la salud. Comunicación corporativa irresponsable en la industria de suplementos

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ABSTRACT: The growing concern over health and nutrition have led to the proliferation in the consumption of supplements worldwide. In Europe, the market size has reached 13,300 million euros in 2022. Nevertheless, consumers remain uninformed and deceived by products that presume to be remedies for even the most serious diseases. In the context of an industry, in which legal gaps have allowed profitability to displace ethics, it seems urgent to analyze the degree of (ir)responsibility of companies in managing the transparency of the information they provide to the consumer. This work aims to evaluate the transparency of supplements enterprises' corporate communication, exploring three different dimensions of the information provided: *disclosure*, *clarity*, and *accuracy*. A quantitative approach and descriptive statistics were performed using χ^2 , based on the content analysis of 103 corporate websites. This corpus encompasses the entire universe of companies that invested in digital advertising between the years 2017 and 2021. Results show that 61.2% of enterprises do not declare themselves socially responsible on their websites, and only 13 out of 113 have issued transparency reports; product information is confusing in 45.6% of companies and lacking in 19.4%; ingredients are absent in more than half of the corpus, and empirical evidence is omitted in 83.5% of enterprises.

Keywords: transparency; corporate communication; corporate social responsibility; supplements; disclosure; clarity; accuracy; public health.

RESUMEN: La creciente preocupación por la salud y la nutrición ha propiciado la proliferación del consumo de suplementos alimenticios a nivel mundial. En Europa, el tamaño del mercado alcanzó los 13.300 millones de euros en 2022. Sin embargo, los consumidores continúan desinformados sobre la realidad de unos productos que se siguen presentando como remedios incluso para las enfermedades más graves. En el contexto de estas organizaciones, en las que los vacíos legales han permitido que la rentabilidad desplace a la ética, urge analizar el grado de (ir)responsabilidad de las empresas en la gestión de la transparencia de la información que facilitan al consumidor. Este trabajo evalúa la transparencia en la comunicación corporativa de las empresas de suplementos, explorando tres

dimensiones en la información proporcionada: *divulgación, claridad y precisión*. Se llevó a cabo un enfoque cuantitativo y estadística descriptiva utilizando χ^2 , a partir de un análisis de contenido de 103 sitios web corporativos. Este corpus abarca todo el universo de empresas que invirtieron en publicidad digital entre los años 2017 y 2021. Los resultados muestran que el 61,2% de las empresas no se declaran socialmente responsables en sus páginas web, y sólo 13 de 113 han emitido informes de transparencia; la información sobre los productos es confusa en el 45,6% de las empresas y escasa en el 19,4%; los ingredientes están ausentes en más de la mitad del corpus, y se omite la evidencia empírica en el 83,5% de las empresas.

Keywords: transparencia; comunicación corporativa; responsabilidad social corporativa; suplementos; divulgación; claridad; precisión; salud pública.

1. Introduction

The healthcare industry is booming. The pandemic has created a scenario of changes and uncertainty where the demand for health and wellness products has thrived, consolidating their place of priority in the international market. Yet, and although it is true that consumption of these products has escalated with the health crisis, previous root causes for their demand include an aging population, a holistic approach to self-care and preventative healthcare, and increased risk awareness among the population. In any case, it seems that the trend is here to stay and encounters significant ethical challenges. In Spain, the sector has a 2023 sales forecast of 2,490 million euros, with a projected increase of 30.72% in the next five years. Of all product categories included in the sector, supplements show the highest growth, with increases of 18.26% in Europe and 31.17% in Spain since 2017 (Euromonitor International, 2023). Regarding consumer's behaviour, a recent survey conducted in 14 European countries showed that of the 88% of respondents who reported using supplements, 93% had used them regularly in the last 12 months. Of particular relevance for the purposes of this research is the average of Europeans who reported trusting in the information provided by the supplements industry (69%), with Spain standing out as the third most trusting country for these products (72%) (Ipsos - European Public Affairs, 2022).

In view of the above figures and the exponential growth forecasts, it remains striking that today's much more sophisticated and empowered consumers still hold as healthy and promoting wellbeing products that may not have said properties and may even be harmful to the very health that they prioritise. In this regard, what is conceived as potentially beneficial has been proven in many cases to be "health fraud" (FDA, 2019).

These practices, which contravene the principles of social responsibility, flourish in the context of a weak regulatory framework where legal gaps promote inadequate and dangerous self-regulation, with negative repercussions on public health. One of the main issues is that the legislation on supplements does not clarify whether they are considered food or medication, and this creates an ambiguous information environment and facilitates constant breaches of the law (García-Arranz, Perelló-Oliver & Muela-Molina, 2021; Muela-Molina, Perelló-Oliver & García-Arranz, 2020). In this regard, Regulation (EC) 1924/2006 of the European Parliament and of the Council stipulates that advertising may not be a) false, ambiguous or misleading; b) give rise to doubt about the safety and/or the nutritional adequacy of other foods; c) encourage or condone excessive consumption of a food; d) state, suggest or imply that a balanced and varied diet cannot provide appropriate quantities of nutrients in general. Aware of this regulatory precariousness and of a much needed common European framework, the European Parliament passed, on the 27th March 2021, Regulation (EU) 2019/1381 on the transparency and sustainability of the EU risk assessment in the food chain. The regulation, which affects supplements, aims to promote transparency and risk communication to citizens through awareness-raising activities and the delimitation of the scientific evidence on which products are based. Similarly, Directive 2014/95/EU requires the largest European companies to be transparent in their public communications. However, no mention is made of the way in

which said information is to be presented, which has allowed for discretionary, inconsistent, and irresponsible practices.

Scientific evidence has highlighted how corporate malpractices have thrived in recent years. In the United States, from 1983 to 2004, there were 1.3 million reports of adverse reactions to vitamins, minerals, and dietary supplements (Royne, Myers, Deitz & Fox, 2016). Geller et al. (2015) estimated that supplements were implicated in an average of 23,000 emergency department visits and 2,000 hospitalizations annually. Regarding the substances involved, a government-wide investigation of supplements found traces of arsenic, mercury and other heavy metals in the 40 supplements tested and pesticide residues in 16 of them (Harris et al., 2011). Later, from 2007 to 2016, 776 adulterated supplements were identified by the FDA and 146 different supplement companies were implicated (Tucker, Fisher, Uphohn, Mazzera & Kumar, 2018). In Spain warnings on unauthorised and potentially harmful active substances in supplements double every year (Spanish Agency for Food Safety and Nutrition, 2021).

Although there is abundant scientific literature on partial aspects of our investigation, we have found a few relevant studies: Wallace, Oberlies, Cech & Kellogg (2018) concluded that regulation and transparency in the industry remains a pending issue and argued that economic incentives continue to encourage the adulteration of products. Martínez-Sanz et al. (2021) have recently shown the lack of transparency regarding the real composition of product ingredients. In addition, Kulkarni, Huerto, Roberto & Austin (2017) emphasised the lack of responsibility in the sector's corporate self-regulation.

Set within the broad boundaries of CSR, our work concentrates on the transparency of corporate communications, and even if the concept of transparency has been increasingly addressed for evaluation (Coombs & Holladay, 2013; Hopp & Fisher, 2020; Lee, 2021; Lee & Boynton, 2017; Schnackenberg, Tomlinson & Coen, 2020; Schnackenberg & Tomlinson, 2014), as far as we are aware, no one has analysed transparency in the supplements industry from this perspective.

Considering the market volume of these products and the implications of their consumption, a practical work on the transparency of corporate communications to the public in this industry seems a striking omission in the academic field. Especially bearing in mind that today, more than ever, transparency is invoked as a roadmap of conduct in organizational and regulatory settings.

Therefore, the main objective of this investigation is to explore the transparency of corporate communication on the websites of supplements companies in Spain. More specifically, in the context of CSR, we aim to analyse the quality of the information provided based on three dimensions: disclosure, clarity, and accuracy, utilising the method outlined by Schnackenberg and Tomlinson (2014).

This work operationally examines the concept of transparency to address the need to narrow its "strategic ambiguity" (Eisenberg, 1984) and puts the ideal of transparency into practice (Albu & Flyverbom, 2019; Flyverbom, 2019; Lee, 2021; Lee & Boynton, 2017). It thus provides novel and statistically significant empirical evidence on the degree of irresponsibility of the supplement industry in managing the transparency of the information they provide to the consumer.

2. Theoretical framework

2.1. CSR, transparency, and digital communication

The debate on the relationship between business and society, initiated in the 1950s in the USA, continues to this day. Despite having made immense strides with models, strategic proposals, and innovative management theories and concepts adapted to today's conditions, the question

of the nature, scope, and compulsory responsibility of business in the social sphere remains unresolved. Since Bowen (1953) laid the groundwork for an understanding of the social role of businesses by highlighting businesspeople's duty to take decisions based on society's goals and values, contributions from the scientific community have been split on its nature and scope. On the one hand are the authors who hold that businesses' responsibilities must go beyond their legal and financial obligations (e.g., Elbing & Elbing, 1967); and on the other hand, are the academics who focus on the classic economic imperative that the goal of a company is to make as much money as possible, exempting them from any responsibility towards social problems. Thus, some viewed efforts to increase corporate social responsibility (CSR) as equivalent to destroying the capitalist system and inconsistent with proper goals (Friedman, 1970; Levitt, 1952). With regard to compulsory duty, in response to the main discourse on the voluntary or supplementary nature of said activities (Van Marrewijk, 2003), numerous authors (e.g., Mitnick, Windsor & Wood, 2022; Sharma & Singh, 2021) increasingly point to the (moral) obligation of businesses to address and respond to the impact of their actions across all of society.

From communication research, CSR has been addressed through different evaluation standards including transparency, which has developed from an instrumental to an intrinsic value in recent years (Lee & Boynton, 2017; Lee & Comello, 2018). Based on this analytical perspective, transparency is an increasingly significant area of research which provide valuable insights for communication studies.

By conceptualising transparency as a communication phenomenon, and not only the provision of information, as Flyverbom puts it (2019), “we move beyond the focus on information simply being transmitted, and start to consider the complex communicative, organizational and social processes involved in attempts to make something transparent” (p. 48).

Transparency is key to establishing the coherence or dissonance of business responsibility (Hopp & Fisher, 2020); a matter of refracting and managing visibilities (Flyverbom, 2019). This eventually entails analysing the consistency of what companies claim to be and what they are, what they claim to sell and what they really sell.

In many different ways, since the dawn of digital communication we have been given the hope that technology would bring transparency and clarity to our lives. In such way, there has been, and continues to be, a discourse which claims that “the internet creates corporate transparency” (Coombs & Holladay, 2013, p. 212). However, the perspective of time has revealed the enormous complexity of its interpretation and subsequent controversial implementation, full of light and shadows. Within this framework, the critical approach to CSR considers transparency to be a simple strategy that allows organisations to appear more legitimate than they are. The low credibility of their goals and the inconsistency of their statements with the reality of their practices (e.g., Diers-Lawson, Coope & Tench, 2020; Ginder, Kwon & Byun, 2021) leads to the belief that, in many cases, the strategy is no more than a declaration of intent, implemented “in order to be portrayed in a good light” (Nwobu, 2021).

Despite the benefits of dialogic communication offered by the internet, digitalisation is not devoid of risks. Enterprises are becoming more aware of their lack of control in a medium where the plurality of channels, mass interactions, and the multiplicity of simultaneous actions are an impossible-to-manage reality. The digital environment has changed communication dramatically and triggered an explosion of (mis)information on health-related issues, with varying levels of reliability. In the context of the current subject, the II Report on Health Misinformation (Association of eHealth Investigators, 2020) — a report specialising in health misinformation on the internet and social media — indicates that 77% of Spanish physicians surveyed have detected an increase in the quantity of fake news, mainly attributed to new and instant channels of communication which allow the rapid spread of unverified information. In this macrosystem contaminated by inaccurate and misleading information, our work focuses on corporate websites, which continue to take centre stage in the suite of corporate digital instruments used as tools for external communication.

2.2. A transparency measurement

Although the label transparency is relatively new in management scholarship, it is an increasingly prominent area of research that offers valuable insights for organizational studies. However, despite the growing interest in its operationalisation and documentation, there are still few empirical studies that examine such a multidimensional concept with more than an appeal for corporate transparency. Therefore, initially, in the absence of consensus on its conceptualisation, measurement and results were inconsistent and their relevance remains unclear. These techniques made use of scales that generally concerned the amount of information provided. Mindful of this gap, Schnackenberg and Tomlinson (2014) created a new concept (“the perceived quality of intentionally shared information from a sender” (p. 1788), which they operationalised in three analytical dimensions (clarity, disclosure, and accuracy) to assess the level of transparency in corporate communications. The authors have since validated the model (Schnackenberg et al., 2020) by remedying some of its weaknesses stemming from a lack of application, measurement, or tailoring to different scenarios. At present, it is being adopted by multiple authors in different fields of knowledge (e.g., Higgins, Tang & Stubbs, 2020; Holland, Seltzer & Kochiguina, 2021) who use it as a benchmark and solid measurement in the assessment of organisational reporting and messaging.

The *Disclosure* dimension has been categorised as a critical element of transparency and is defined as recipients’ perception of receiving relevant information (Jordan, Peek & Rosengren, 2000). Thus, to the extent that disclosure indicates the firm’s intent “to adhere to moral and ethical principles related to openness and information sharing, it stands as a signal of the organization’s integrity” (Schnackenberg & Tomlinson, 2014, p. 13). For the purpose of this study, this dimension includes the following variables: (1) Corporate social responsibility statements; (2) Disclosure of CSR and/or transparency reports; (3) Reference to the production process; (4) Reference to registered technology; (5) Existence of quality certifications; and (6) Information on health promotion and prevention. Consequently, and in this context, the first research question proposed is:

- RQ₁: What is the presence of relevant information in each of the selected variables in the supplements industry?

On the other hand, *Clarity* refers to the level of comprehensibility of the information provided (Hoffjann, 2021). This is vital in a sector where corporate and advertising messages are known for being difficult to understand by the public, and where enterprises are often accused of “disguising unsound business practices” (Koinig, Diehl & Mueller, 2017, p. 480). In this regard, organisations can implement strategies that (a) enhance coherence and facilitate the understanding of interested parties or (b) are confusing and employ ambiguity tactics (Schnackenberg & Tomlinson, 2014).

Clarity, defined as “the ability of the reader to decipher the intended message”, (Loughran & McDonald, 2016, p. 1193) is closely connected to the readability of corporate disclosures. After decades of being unfit for purpose, recent scientific evidence highlights that the level of readability is still poor and is not improving (Raimo, Vitolla, Marrone & Rubino, 2020). The causes of this widespread ‘opacity’ that hinders readability by using confusing and excessively technical language have mainly been categorised as the intended manipulation of reader perceptions (Gosselin, Le Maux & Smaili, 2021). The operationalisation of this dimension is formulated through variable (7) Comprehension, which allows for the identification of cases where the information is clear and easy to understand; cases where it is misleading and full of technical terms; and cases which lack information on the marketed products. The second research question is proposed as follows:

- RQ₂: To what degree is the information provided on supplements corporate websites clear and understandable?

Finally, *Accuracy* determines whether the information is correct and accurate (Higgins et al., 2020) and whether it is intentionally biased or unfounded. Previous research indicates that transparency perceptions (an assessment of the quality of the information provided by an organisation) are used to determine the perceived reliability of a company. The variables that enable the analysis of this dimension are: (8) Listing of all active ingredients and of the exact amounts contained in the product composition; (9) Explicit reference to compliance with current regulation on healthcare products; (10) Existence of verified empirical evidence; (11) Detailed explanation of how to take the product; (12) Warnings associated with product consumption; and (13) Stating of the potential adverse effects of consumption. In line with the above, the third research question is:

- RQ₃: To what extent is the information on the marketed supplements accurate and backed by scientific evidence?

3. Methodology

The aim to carry out a practical investigation into the transparency of corporate communications on the websites of supplement enterprises requires quantitative content analysis, applied after the necessary coding of the structural variables and the variables included in each of the dimensions set out in the theoretical framework: *Disclosure*, *Clarity*, and *Accuracy*. The websites of enterprises that invested in supplements digital advertising during the period of January 2017 to September 2021 have been characterised objectively and systematically. It is important to consider that in this period national investment in supplements internet advertising included 59,814 insertions and totalled 5.95m euros¹ (Table 1).

Table 1. Insertions and Value

Year	Products ^a	Advertisements ^b	Insertions ^c	Value (000€)
2017	41	1078	7033	11626.96
2018	42	358	6113	4245.42
2019	35	1154	8143	4398.23
2020	46	970	7625	27913.49
2021	73	518	30900	229157.94
Total	237	4078	59814	277342.04

^a Entries in the database with the same name linked to the same company.
^b Number of times a product is broadcast.
^c Number of times an advertisement for the same product is broadcast in a given medium and a given year.

Source: own elaboration.

This represents increases of 339.36% in the number of insertions and 185.04% in advertising expenditure over the reference period. The inference can be made that existing healthcare trends have been intensified by the pandemic, which has caused an exponential rise in the consumption of these products.

3.1. Data collection

The data analysed were extracted from the leading advertising database in Spain, Dragon (Arce Media), whose information is embedded in Nielsen. The companies were selected according to the variable of 'Product type' and three modalities of interest for our work, which are all included in the database's Health Section: Vitamin Complexes (VC), Food Supplements (FS)

¹ If we disaggregate by subcategory, 5.9% of investment is allocated to WMS; 17.80% to VC, and 76.31% to FS.

and Weight Management Supplements (WMS). The data were then categorized by 'Enterprise type' following the *size* criterion established in Regulation (EU) 651/2014 of 17 June 2014. Thus, the "category of micro, small and medium-sized enterprises (SMEs) is made up of enterprises which employ fewer than 250 persons" (Article 2.1). Large enterprises, the final category, were divided into multinational enterprises (MNEs) and national enterprises (NECs) following a *geographical* criterion.

The process of manually coding each of the corporate websites was then initiated using the two structural variables (type of enterprise and type of supplement) mentioned above and the three dimensions included in the model (disclosure, clarity, and accuracy). Likewise, said dimensions are separated into the thirteen variables which are displayed in the contingency table and broken down in the results. Each of these dimensions, through their respective variables, will provide answers to the research questions: RQ₁: What is the presence of relevant information in each of the selected variables in the supplements industry? (*Disclosure* dimension); RQ₂: To what degree is the information provided on supplements corporate websites clear and understandable? (*Clarity* dimension) and RQ₃: To what extent is the information on the marketed supplements accurate and backed by scientific evidence? (*Accuracy* dimension). Considering the breadth of the sample and heavy workload involved, three coders from our research project were tasked with the coding. In cases where disagreement arose, the authors evaluated each case to properly adjust them to the initial formulation of each variable.

3.2. Data analysis

The corpus analysed includes 103 enterprises and encompasses the totality of companies that invested in digital advertising in the period of study. Each and every one of these enterprises has been subject to a double coding process following prescriptive standards of statistical reliability which employed Cohen's kappa coefficient (1960) with results between 0.815 and 1 (SPSS-25). Discordant cases were detected in the 'Product type' structural variable (0.846); in the 'Quality certification' variable (0.987) of the *Disclosure* dimension; in the 'Comprehension' variable of the *Clarity* dimension; and in the 'Warnings' variable (0.912) of the *Accuracy* dimension. The discrepancies detected were discussed in a work session where the final coding of these cases was agreed. The results included in the 'Findings' section present a value $k=1$ for all variables. In addition, crossed variables have been submitted to statistical significance tests using the χ^2 test.

4. Results

4.1. Disclosure dimension

a) By Enterprise type

Results for the *Disclosure* dimension (Table 2), which answer RQ₁, provide significant findings. 61.2% of the enterprises analysed do not declare themselves socially responsible on their corporate websites and of these 68.3% are SMEs. In a similar line, CSR and/or transparency reports are only available to the public in 13.6% of cases, mainly concentrated in MNEs (78.6%). Although SMEs have the highest presence in the corpus (51.5%), it should be noted that none of them makes these types of reports available to the public.

With regard to providing information about the Production process and its compliance with the quality and safety standards of the marketed products, this occurs only in 21.4% of cases and of these 50.0% are MNEs and 27.3% are NECs. Moreover, a reference to Registered technology is absent in three quarters of the enterprises, 77.7%, of which 21.3% are MNEs and 60.0% are SMEs. This last figure implies that only 5 of the 53 SMEs included in the corpus provide this information.

Turning now to Quality certification, this is stated in 35.0% of the material analysed, distributed between MNEs (52.8%) and NECs and SMEs (47.2%). It is striking that 84.9% of SMEs do not include this certification. Finally, in relation to the dissemination of news on Health promotion and prevention, the values obtained are evenly distributed between the presence (51.5%) and absence (48.5%) of this type of information, which is relevant in the context of the sector we are dealing with. Furthermore, SMEs provide this information with the highest frequency (43.4%) while NECs do so on few occasions (18.0%).

Table 2. Disclosure and type of enterprise

			MNEs	NECs	SMEs	Total
CSR statement	Absence	N	10	10	43	63
		% horz.	15.9	15.9	68.3	100.0
		% vert.	32.3	52.6	81.1	61.2
	Presence	N	21	9	10	40
		% horz.	52.5	22.5	25.0	100.0
		% vert.	67.7	47.4	18.9	38.8
	Total	N	31	19	53	103
		% horz.	30.1	18.4	51.5	100.0
		% vert.	100.0	100.0	100.0	100.0
CSR and/or transparency reports	Absence	N	20	16	53	89
		% horz.	22.5	18.0	59.6	100.0
		% vert.	64.5	84.2	100.0	86.4
	Presence	N	11	3	0	14
		% horz.	78.6	21.4	0.0	100.0
		% vert.	35.5	15.8	0.0	13.6
	Total	N	31	19	53	103
		% horz.	30.1	18.4	51.5	100.0
		% vert.	100.0	100.0	100.0	100.0
Production process	Absence	N	20	13	48	81
		% horz.	24.7	16.0	59.3	100.0
		% vert.	64.5	68.4	90.6	78.6
	Presence	N	11	6	5	22
		% horz.	50.0	27.3	22.7	100.0
		% vert.	35.5	31.6	9.4	21.4
	Total	N	31	19	53	103
		% horz.	30.1	18.4	51.5	100.0
		% vert.	100.0	100.0	100.0	100.0
Registered technology	Absence	N	17	15	48	80
		% horz.	21.3	18.8	60.0	100.0
		% vert.	54.8	78.9	90.6	77.7
	Presence	N	14	4	5	23
		% horz.	60.9	17.4	21.7	100.0
		% vert.	45.2	21.1	9.4	22.3
	Total	N	31	19	53	103
		% horz.	30.1	18.4	51.5	100.0
		% vert.	100.0	100.0	100.0	100.0

Quality certifications	Absence	N	12	10	45	67
		% horz.	17.9	14.9	67.2	100.0
		% vert.	38.7	52.6	84.9	65.0
	Presence	N	19	9	8	36
		% horz.	52.8	25.0	22.2	100.0
		% vert.	61.3	47.4	15.1	35.0
	Total	N	31	19	53	103
		% horz.	30.1	18.4	51.5	100.0
		% vert.	100.0	100.0	100.0	100.0
Health promotion and prevention	Absence	N	11	9	30	50
		% horz.	22.0	18.0	60.0	100.0
		% vert.	35.5	47.4	56.6	48.5
	Presence	N	20	10	23	53
		% horz.	37.7	18.9	43.4	100.0
		% vert.	64.5	52.6	43.4	51.5
	Total	N	31	19	53	103
		% horz.	30.1	18.4	51.5	100.0
		% vert.	100.0	100.0	100.0	100.0
CSR statement & type of enterprise: χ^2 : 20.383; Significance: $p < .001$. CSR and/or transparency reports & type of enterprise: χ^2 : 21.065; Significance: $p < .001$. Production process & type of enterprise: χ^2 : 9.351; Significance: $p < .009$. Registered technology & type of enterprise: χ^2 : 14.417; Significance: $p < .001$. Quality certifications & type of enterprise: χ^2 : 19.940; Significance: $p < .001$. Health promotion and prevention & type of enterprise: χ^2 : 3.506; Significance: $p < .173$.						

Source: own elaboration.

b) By Supplement type

It is worth noting that Responsibility statements are absent in 81.0% of FS companies (Table 3). At the same time, of the 38.8% of enterprises who do include this on their websites, 35.0% market VC products. Furthermore, 86.4% of organisations do not provide CSR and/or transparency reports and, of these, 78.7% are again FS companies. At this point, it is important to bear in mind that there are only 6 WMS enterprises in the corpus, and half of them present these types of documents.

On the other hand, of the 78.6% of organisations that do not include information on the Production process on their corporate websites, 14.8% market VC products while 80.2% belong to the FS group. In contrast, and in relation to their total weight in the corpus, FS websites stand out for referring to Registered technology in 39.1% of cases while FS enterprises omit this information frequently (84.0%).

Focusing on Quality certification, it is missing in 65.5% of enterprises and, of these 13.4% are MNEs; although this figure seems low, it is in fact 40.9% of the overall number of this type of company in the corpus. The absence of certification is concentrated, yet again, in FS companies (83.6%). Finally, news articles, blogs, and other types of information on Health promotion and prevention appear in 28.3% of VC websites and in 67.9% of FS companies.

4.2. Clarity dimension

Table 4 presents the results on the only variable included in the *Clarity* dimension: Comprehension. We should clarify that the coding for it was based on the product information retrieved from the corporate websites. The results obtained answer RQ₂ and show a prevalence of Confusing

information in nearly half of the enterprises analysed, in 45.6% of cases. Some examples are: “The product X is obtained from the lysis of biomass”; “Product Y’s system pulverises the cell wall of chlorella.” What is more, the information is often not given in Spanish. The other half of cases is divided between those that provide Comprehensible information (35.0%) and a remarkable 19.4% of instances where no information is provided.

a) By Enterprise type

Disaggregating by type of enterprise, the information given by MNEs is clearer and more accurate in 44.4% of instances, while this value drops to 19.4% in the case of NECs. Inversely, SMEs account for the highest proportion of confusing information (51.1%), and in a staggering 80.0% of cases provide no information at all. It is also worth noting that NECs have no cases in which they provide no information.

Table 3. Disclosure and type of main supplement

			VC	FS	WMS	Total
CSR statement	Absence	N	8	51	4	63
		% horz.	12.7	81.0	6.3	100.0
		% vert.	36.4	68.0	66.7	61.2
	Presence	N	14	24	2	40
		% horz.	35.0	60.0	5.0	100.0
		% vert.	63.6	32.0	33.3	38.8
	Total	N	22	75	6	103
		% horz.	21.4	72.8	5.8	100.0
		% vert.	100.0	100.0	100.0	100.0
CSR and/or transparency reports	Absence	N	16	70	3	89
		% horz.	18.0	78.7	3.4	100.0
		% vert.	72.7	93.3	50.0	86.4
	Presence	N	6	5	3	14
		% horz.	42.9	35.7	21.4	100.0
		% vert.	27.3	6.7	50.0	13.6
	Total	N	22	75	6	103
		% horz.	21.4	72.8	5.8	100.0
		% vert.	100.0	100.0	100.0	100.0
Production process	Absence	N	12	65	4	81
		% horz.	14.8	80.2	4.9	100.0
		% vert.	54.5	86.7	66.7	78.6
	Presence	N	10	10	2	22
		% horz.	45.5	45.5	9.1	100.0
		% vert.	45.5	13.3	33.3	21.4
	Total	N	22	75	6	103
		% horz.	21.4	72.8	5.8	100.0
		% vert.	100.0	100.0	100.0	100.0

Registered technology	Absence	N	13	63	4	80
		% horz.	16.3	78.8	5.0	100.0
		% vert.	59.1	84.0	66.7	77.7
	Presence	N	9	12	2	23
		% horz.	39.1	52.2	8.7	100.0
		% vert.	40.9	16.0	33.3	22.3
	Total	N	22	75	6	103
		% horz.	21.4	72.8	5.8	100.0
		% vert.	100.0	100.0	100.0	100.0
Quality certifications	Absence	N	9	56	2	67
		% horz.	13.4	83.6	3.0	100.0
		% vert.	40.9	74.7	33.3	65.0
	Presence	N	13	19	4	36
		% horz.	36.1	52.8	11.1	100.0
		% vert.	59.1	25.3	66.7	35.0
	Total	N	22	75	6	103
		% horz.	21.4	72.8	5.8	100.0
		% vert.	100.0	100.0	100.0	100.0
Health promotion and prevention	Absence	N	7	39	4	50
		% horz.	14.0	78.0	8.0	100.0
		% vert.	31.8	52.0	66.7	48.5
	Presence	N	15	36	2	53
		% horz.	28.3	67.9	3.8	100.0
		% vert.	68.2	48.0	33.3	51.5
	Total	N	22	75	6	103
		% horz.	21.4	72.8	5.8	100.0
		% vert.	100.0	100.0	100.0	100.0

CSR Statement & type of main supplement: χ^2 : 7.249; Significance: $p < .027$.
 CSR and/or transparency reports & type of main supplement: χ^2 : 13.340; Significance: $p < .001$
 Production process & type of main supplement: χ^2 : 10.993; Significance: $p < .004$.
 Registered technology & type of main supplement: χ^2 : 6.530; Significance: $p < .038$.
 Quality certifications & type of main supplement: χ^2 : 11.345; Significance: $p < .003$.
 Health promotion and prevention & type of main supplement: χ^2 : 3.611; Significance: $p < .164$.

Source: own elaboration.

b) By Supplement type

Turning now to the different types of marketed supplements, the highest proportion of websites providing comprehensible information is found in VC companies (36.1%), while websites that present Confusing information or a total absence of information strongly feature in FS enterprises (78.7% and 85.0% respectively).

Table 4. Clarity by type of enterprise and type of main supplement

			Type of enterprise				Type of main supplement			
			MNEs	NCEs	SMEs	Total	VC	FS	WMS	Total
Informative comprehension	Comprehensible	N	16	7	13	36	13	21	2	36
		% horz.	44.4	19.4	36.1	100.0	36.1	58.3	5.6	100.0
		% vert.	51.6	36.8	24.5	35.0	59.1	28.0	33.3	35.0
	Confusing	N	11	12	24	47	8	37	2	47
		% horz.	23.4	25.5	51.1	100.0	17.0	78.7	4.3	100.0
		% vert.	35.5	63.2	45.3	45.6	36.4	49.3	33.3	45.6
	Without information	N	4	0	16	20	1	17	2	20
		% horz.	20.0	0.0	80.0	100.0	5.0	85.0	10.0	100.0
		% vert.	12.9	0.0	30.2	19.4	4.5	22.7	33.3	19.4
	Total	N	31	19	53	103	22	75	6	103
		% horz.	30.1	18.4	51.5	100.0	21.4	72.8	5.8	100.0
		% vert.	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Informative comprehension & type of enterprise: χ^2 : 13.643; Significance: $p < .009$.
 Informative comprehension & type of main supplement χ^2 : 9.060; Significance: $p < .060$

Source: own elaboration.

4.3. Accuracy dimension

a) By Enterprise type

The results of the third dimension, *Accuracy*, answer RQ₃. As previously mentioned, one of the many reasons that explain the controversy surrounding the sector is the ambiguity regarding the nature of its products: whether they are food or medication. Supplements are therefore covered by their own specific regulation as well as by the totality of food legislation. In this respect, Regulation (EU) 1169/2011, on the provision of food information to consumers, establishes the mandatory inclusion of all ingredients used in the production of products. As may be observed in Table 5, this is mentioned in less than half of the corpus (44.7%), and it is usual to find the following statement: “The *main* ingredients of this product are (...)” Of the enterprises that do give this information, 43.5% are SMEs, 32.6% are MNEs, and 23.9% are NECs, although, in absolute terms, the presence of this information is higher in the final type of company (57.9%).

The results in the variable concerning compliance with current regulations provide one of the most significant findings in our work, i.e., that 94.2% of enterprises omit this reference. More than half of this significant percentage is accounted for by SMEs (52.6%). A further relevant finding stems from the Empirical evidence variable, present in 16.5% of enterprises. Of these 17 companies, 8 are MNEs (47.1%). On the other hand, the omission of scientific support is evident in SMEs (55.8%). Furthermore, statements are frequently found that claim the existence of this evidence, but do not offer the relevant substantiation.

An explanation of How to take the product, also mandatory according to the above-mentioned regulation, is present in 71.8% of websites. It is most absent in SMEs (62.1%), whilst it is least absent in NECs (13.8%).

It is noteworthy that a reference to Warnings (always paraphrases of the fixed expressions: “Do not exceed the recommended dose” or “Supplements should not be used as a substitute for a varied diet and a healthy lifestyle”) is absent in more than half of the corpus (59.2%). Of the websites that do include a warning, MNEs present the highest prevalence (40.5%). Moving on, Adverse effects are only present in 7 cases (6.8%) and are always remarkably vague: “Excessive intake may cause abdominal pain” or “Some ingredients may have an effect on activity and attention in children.” NECs and MNEs have both stated these effects on 2 occasions (28.6% respectively) and SMEs on 3 (42.9%).

b) By Supplement type

Table 6 shows how, of the 55.3% of websites lacking a complete list of active ingredients and relevant quantities, the highest concentration is found in FS (80.7%). This means that although FS enterprises make up 72.8% of the corpus, more than half (61.3%) do not adequately inform consumers of the contents of their products. The relative presence of ingredients in VC companies is also worth noting, recorded at 32.6%. On the other hand, of the 6 instances in which reference is made to compliance with legal standards, 4 pertain to FS enterprises (66.7%).

The lack of Empirical evidence, omitted in 83.5% of cases, is moderate in VC (22.1%) and low in WMS (5.8%) enterprises, but considerable (72.1%) in the case of FS companies. On the other hand, indications on How to take the product, absent in 28.2% of websites, also record the highest proportion (82.8%) in FS companies. It is also worth mentioning that although WMS products account for only 5.8% of the corpus, half of their websites omit this information (50.0%).

Warnings are included in 40.8% of corporate websites, of which 28.6% market VC products and 69.0% sell FS products. Finally, Adverse effects, omitted in 93.2% of websites, are mentioned by one VC enterprise and by 6 FS companies.

Table 5. Accuracy and type of enterprise

			MNEs	NCEs	SMEs	Total
Active ingredients	Absence	N	16	8	33	57
		% horz.	28.1	14.0	57.9	100.0
		% vert.	51.6	42.1	62.3	55.3
	Presence	N	15	11	20	46
		% horz.	32.6	23.9	43.5	100.0
		% vert.	48.4	57.9	37.7	44.7
	Total	N	31	19	53	103
		% horz.	30.1	18.4	51.5	100.0
		% vert.	100.0	100.0	100.0	100.0
Regulation	Absence	N	29	17	51	97
		% horz.	29.9	17.5	52.6	100.0
		% vert.	93.5	89.5	96.2	94.2
	Presence	N	2	2	2	6
		% horz.	33.3	33.3	33.3	100.0
		% vert.	6.5	10.5	3.8	5.8%
	Total	N	31	19	53	103
		% horz.	30.1	18.4	51.5	100.0
		% vert.	100.0	100.0	100.0	100.0

Empirical evidence	Absence	N	23	15	48	86
		% horz.	26.7	17.4	55.8	100.0
		% vert.	74.2	78.9	90.6	83.5%
	Presence	N	8	4	5	17
		% horz.	47.1	23.5	29.4	100.0
		% vert.	25.8	21.1	9.4	16.5
	Total	N	31	19	53	103
		% horz.	30.1	18.4	51.5	100.0
		% vert.	100.0	100.0	100.0	100.0
How to use	Absence	N	7	4	18	29
		% horz.	24.1	13.8	62.1	100.0
		% vert.	22.6	21.1	34.0	28.2
	Presence	N	24	15	35	74
		% horz.	32.4	20.3	47.3	100.0
		% vert.	77.4	78.9	66.0	71.8
	Total	N	31	19	53	103
		% horz.	30.1	18.4	51.5	100.0
		% vert.	100.0	100.0	100.0	100.0
Warnings	Absence	N	14	10	37	61
		% horz.	23.0	16.4	60.7	100.0
		% vert.	45.2	52.6	69.8	59.2
	Presence	N	17	9	16	42
		% horz.	40.5	21.4	38.1	100.0
		% vert.	54.8	47.4	30.2	40.8
	Total	N	31	19	53	103
		% horz.	30.1	18.4	51.5	100.0
		% vert.	100.0	100.0	100.0	100.0
Adverse effects	Absence	N	29	17	50	96
		% horz.	30.2	17.7	52.1	100.0
		% vert.	93.5	89.5	94.3	93.2
	Presence	N	2	2	3	7
		% horz.	28.6	28.6	42.9	100.0
		% vert.	6.5	10.5	5.7	6.8
	Total	N	31	19	53	103
		% horz.	30.1	18.4	51.5	100.0
		% vert.	100.0	100.0	100.0	100.0
Active ingredients & type of enterprise: χ^2 : 2.549; Significance: p <.280 Regulation & type of enterprise: χ^2 : 1.194; Significance: p <.550 Empirical evidence & type of enterprise: χ^2 : 4.154; Significance: p <.125 How to use & type of enterprise: χ^2 : 1.834; Significance: p <.400 Warnings & type of enterprise: χ^2 : 5.341; Significance: p <.069 Adverse effects & type of enterprise: χ^2 : .531; Significance: p <.767						

Source: own elaboration.

Table 6. Accuracy and type of main supplement

			VC	FS	WMS	Total
Active ingredients	Absence	N	7	46	4	57
		% horz.	12.3	80.7	7.0	100.0%
		% vert.	31.8	61.3	66.7	55.3%
	Presence	N	15	29	2	46
		% horz.	32.6	63.0	4.3	100.0
		% vert.	68.2	38.7	33.3	44.7
	Total	N	22	75	6	103
		% horz.	21.4	72.8	5.8	100.0
		% vert.	100.0	100.0	100.0	100.0
Regulation	Absence	N	21	71	5	97
		% horz.	21.6	73.2	5.2	100.0%
		% vert.	95.5	94.7	83.3	94.2%
	Presence	N	1	4	1	6
		% horz.	16.7	66.7	16.7	100.0
		% vert.	4.5	5.3	16.7	5.8
	Total	N	22	75	6	103
		% horz.	21.4	72.8	5.8	100.0
		% vert.	100.0	100.0	100.0	100.0
Empirical evidence	Absence	N	19	62	5	86
		% horz.	22.1	72.1	5.8	100.0
		% vert.	86.4	82.7	83.3	83.5
	Presence	N	3	13	1	17
		% horz.	17.6	76.5	5.9	100.0
		% vert.	13.6	17.3	16.7	16.5
	Total	N	22	75	6	103
		% horz.	21.4	72.8	5.8	100.0
		% vert.	100.0	100.0	100.0	100.0
How to use	Absence	N	2	24	3	29
		% horz.	6.9	82.8	10.3	100.0
		% vert.	9.1	32.0	50.0	28.2
	Presence	N	20	51	3	74
		% horz.	27.0	68.9	4.1	100.0
		% vert.	90.9	68.0	50.0	71.8
	Total	N	22	75	6	103
		% horz.	21.4	72.8	5.8	100.0
		% vert.	100.0	100.0	100.0	100.0

Warnings	Absence	N	10	46	5	61
		% horz.	16.4	75.4	8.2	100.0
		% vert.	45.5	61.3	83.3	59.2
	Presence	N	12	29	1	42
		% horz.	28.6	69.0	2.4	100.0
		% vert.	54.5	38.7	16.7	40.8
	Total	N	22	75	6	103
		% horz.	21.4	72.8	5.8	100.0
		% vert.	100.0	100.0	100.0	100.0
Adverse effects	Absence	N	21	69	6	96
		% horz.	21.9	71.9	6.3	100.0
		% vert.	95.5	92.0	100.0	93.2
	Presence	N	1	6	0	7
		% horz.	14.3	85.7	0.0	100.0
		% vert.	4.5	8.0	0.0	6.8
	Total	N	22	75	6	103
		% horz.	21.4	72.8	5.8	100.0
		% vert.	100.0	100.0	100.0	100.0
Active ingredients & type of main supplement: χ^2 : 6.326; Significance: $p < .042$ Regulation & type of main supplement: χ^2 : 1.384; Significance: $p < .501$ Empirical evidence & type of main supplement: χ^2 : .169; Significance: $p < .919$ How to use & type of main supplement: χ^2 : 5.916; Significance: $p < .052$ Warnings & type of main supplement: χ^2 : 3.310; Significance: $p < .191$ Adverse effects & type of main supplement: χ^2 : .785; Significance: $p < .675$						

Source: own elaboration.

5. Discussion

An analysis of the different dimensions that come together to provide quality and transparency to the information on corporate websites clearly suggests that their performance in practical terms is insufficient. The *Disclosure* dimension, which includes the relevant aspects that need to be communicated to consumers in the context of the sector, shows that more than half of the enterprises analysed do not even declare themselves to be socially responsible, although compliance with CSR standards would entail sustainable leadership. Those that do, however, rarely present reports guaranteeing this commitment, and merely including a CSR statement seems more a declaration of intent or rhetorical device (*responsibly promoted*) than a real commitment (*responsibly used*). The rest of the variables (production process, registered technology, and quality certification) present an omission of information in an average of 74% of the corpus, perhaps because enterprises know that consumers are more concerned about product efficiency than safety (Global Self-Care Federation, 2020). Therefore, pharmaceutical companies have a powerful incentive to resort to *selective disclosure* (e.g., Demir & Min, 2019), stressing their achievements in areas where they feel more secure and omitting others which, as inexcusable outcomes in this industry, may have negative consequences: in terms of reputation and market share.

On the other hand, in line with previous studies (e.g., Tan & Higgins, 2022), it is not enough for an organisation to intend to be transparent, rather it must make sure that its communications contain characteristics that clearly convey transparency in its messages. We agree with Ghosh et al. (2020) that “it has become important not just what is being communicated, but how it is being communicated as well” (p. 46).

Thus, the *Clarity* dimension, where confusing information or an absence of information totals 65%, confirms the continuity of one of the characteristic traits of the industry's communication. This is consistent with the results of previous research that has used this method which stresses that there is "extensive data, but provided very little context to aid understandability" (Higgins et al., 2020, p. 401). Scientific literature has repeatedly noted an informational dysfunction which prevents consumers' adequate self-management. Thus, rather than aiding the public, information turns into a source of confusion (Kesselheim, Connolly, Rogers & Avorn, 2015). The immediate availability of content in the digital era does not entail well informed consumers. According to Mason and Scammon (2011) "[i]nformed decision making requires not only the availability of information but also an understanding of that information" (p. 220). In this regard, the *Accuracy* dimension further complicates the matter. In Spain, Royal Decree 1/2007 establishes in Article 8 that "consumers have the right to receive *accurate* information about the different products and services". However, there are abundant cases of undeclared substances and health-related claims lacking scientific evidence or based on anecdotal evidence. Similarly, only 5.8% of enterprises state their compliance with current legislation and most silence the existence of adverse effects, confirming, once again, the inadequacy of the law. Paradoxically, despite these deficiencies, consumers continue to feel protected by safety standards. This feeling leads to self-prescription based on unproved perceptions of efficiency and benefits in products lacking scientific evidence.

With regard to the types of enterprises, the results presented are in line with previous studies and demonstrate the low performance of SMEs in CSR management and transparency (e.g., Tiep Le, Ngo & Aureliano-Silva, 2021). In this respect, abundant literature in recent years points to SMEs' inability to respond to social commitments, mainly due to low resources and chances of survival (e.g., Weaven, Quach, Thaichon, Frazer, Billot & Grace, 2021). Other published research claims this to be not so much a matter of resources but of mismanagement (e.g., Bacinello, Tontini & Alberton, 2020) and defective communication. For their part, large companies have many pending issues linked to the transparency of their corporate communications: the inclusion of reports, compliance with the law, provision of empirical evidence, and effective information on potential adverse effects, to name but a few. Finally, concentrating on the different types of supplements, FS record the most negative results, in line with extensive scientific literature manifesting its concern over the mismanagement of the communication, advertising, and marketing (e.g., Homer & Mukherjee, 2019) of products which may jeopardise public health.

6. Conclusions

In more advanced societies, consumers are faced with constant decisions on their health in a saturated product marketplace where enterprises attribute barely or unscientifically-proven qualities to these products in their communications to external audiences. However, whilst the numbers of these types of products on the market has risen by thousands year-on-year and they are freely available, regulation has not been significantly updated in areas as important as greater oversight of advertising, the information provided to the public, or the application of strict sanctions for infringement. The foregoing is compounded by lax self-regulation by business, which makes the application of corporate social responsibility principles, through transparency in communications, a possibly imperfect but viable solution in the protection of consumer rights and health in the absence of more solid and purposeful regulation.

Transparency allows for consumers to actively consider the decisions they make on their health whilst also testing the free flow of information. However, this study has laid bare the dissonance in this area and the confirmed absence of transparency and essential information in the corporate communication of supplements enterprises in Spain has worrying implications. Consumers, deprived of clear, relevant, and accurate information about products they consume regularly and without supervision, find themselves in an increasingly vulnerable

position. Products designed to potentially improve our health have, in many cases, turned into known risks. Given the dangers and legal loopholes, it appears just as crucial to encourage corporations to effectively integrate CSR principles into their business strategies as it is to develop their awareness regarding the need to implement positive manufacturing, marketing, and communication practices, in a setting where insufficient regulation must be overcome by ethical management. The need to enhance the transparency and veracity of the industry's corporate communication is essential if we are to protect the health and wellbeing of the next generations of consumers.

Implications on policies, enterprises, and the public

The results of this research entail significant implications for enterprises, public policy, and consumers. Firstly, upholding consumer rights requires the development of clearer policies on the transparency of information provided to the public to fully prevent ambiguous, subjective, and skewed information. Transparency must no longer be an interpretable construct subject to multiple interests. Its use must take into consideration the nature of the products that are being supplied to consumers. Therefore, on the topic of supplements, it is essential that possible side effects or scientific backing is mentioned, amongst other aspects. Otherwise, “[i]f the regulation currently in place were to remain for the next decade, then not only would there be tens of thousands of more products on the market, but the claims which those products would be making would continue to take advantage of the consumer” (Kennett, 2019, p. 78). On the other hand, enterprises in the sector must be vigorously called upon to comply with current regulations on supplements. If not, constant corporate failure to comply owing to the strategies and approaches used by the private sector to promote products and choices that are detrimental to health (Kickbush, Allen & Franz, 2016), in conjunction with deficient and dubious corporate communication, will entail serious consequences in the health of a population that has heavily increased its consumption of these products without solid knowledge or awareness of their possible effects (American Cancer Society, 2015; Mitra, Hastak, Ringold & Levy, 2019).

Limitations and future research

This study has addressed the websites of enterprises with the aim of researching a space where companies directly manage their organisational discourse. These platforms hold a decisive role in the construction of corporate images which are disseminated to the public in an overall context where health misinformation is profuse. Further research may extend analysis to other types of strategic communication with their audiences. Similarly, it would be pertinent to apply the model to European countries that have a common regulatory framework in order to shed light on the impact of sociological and cultural factors on said framework.

Likewise, this study has analysed separately the structural variables, types of supplement and enterprise with regard to each of the dimensions in the model. The conclusions set out a baseline for future research to expand upon using new approaches, measurement of the interaction between the structural variables (supplements and types of enterprise) and the dimensions in the model.

Finally, prospective research may seek to consider individual analysis of the three dimensions to gain more detailed knowledge on each of them and develop their conceptual and empirical refinement.

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