



DID COVID-19 FORCE GREEK CHEMICAL INDUSTRIES TOWARD GREEN PRACTICES?

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Abstract

The quantitative part of this study revealed that there is a considerable portion of companies that neglect to replace fossil fuels, green certificates, or other measures towards reducing emissions. On the other hand, the industries increase their recycling efforts. Marketing and managerial factors, such as image and morale of employees, are more substantial incentives towards green practices than actual pro-environmental factors, such as reduction of either water and energy consumption or carbon dioxide emissions. The importance of corporate image and reputation as well as compliance with regulations tends to increase while the significance of hygiene and safety conditions was dramatically raised due to COVID-19.

Qualitative techniques offered unforeseen aspects. The experts' positive attitudes towards sustainability were highlighted. However, the interviews revealed considerable delay in adopting green practices by the Greek cosmetics and detergents industries. The alleged impact of the pandemic on green production practices is not yet apparent in the experts' testimonies. It is the national and European regulations and funding that seem to drive any pro-environmental changes in chemical industries. In addition, the executives underlined the role of marketing as the most crucial factor in any firm's response to society's constantly growing environmental concerns.

Keywords: Green Practices, COVID-19, Chemical Industry

JEL Classification : M31, Q01

Introduction

Almost any paper and study on sustainable development starts with the Brundtland's well known imperative. In that, sustainable development has been defined as *“development that meets the needs of current generations without compromising the ability of future generations to meet their own needs”* (WCED 1987). The concept of sustainable development adopted by the world community more than 20 years ago includes environmental, social and economic issues implying that economic development must be consistent with the principles of sustainability (Abutaleb and El-Bassiouny 2020; Mottaeva *et al.* 2020). Among other issues, climate change is considered to be a top priority problem forcing all shareholders to adopt pro-environmental strategies. In this direction on November 2021, more than 450 financial institutions and 45 countries with funding of 130 trillion dollars joint the Glasgow Financial Alliance for Net Zero (GFANZ), which aims to reform economies into climate neutral by 2050 (WWF 2021).

Businesses have to adapt in order to either comply to regulations imposed by governments and pressure exerted by non-governmental organizations or to respond to customers' needs and wants (Scur and Barbosa 2017; Schaltegger 2021). Recent practical evidence is provided from the United Nations Global Compact sustainability survey of leading companies. Over than 2,400 companies and 350 investors have committed to advancing the Paris Agreement through a range of actions including: carbon pricing, setting science-based targets, sourcing 100% renewable energy, and integrating climate-related financial disclosures into the heart of corporate strategy (UN Global Compact 2019). In the UN Glasgow Climate Change Conference, the “It's Possible” podcast aimed to inspire positive change, unpack the climate emergency, and connect science and action (<https://unfccc.int/its-possible-podcast>).

Since the end of 2019, the whole world has faced and continues to face an unprecedented, serious and extremely intimidating situation. The coronavirus (COVID-19) pandemic has placed every country in a condition that carries extensive health, social and economic impacts (Kumar and Abdin 2021; Hepburn *et al.* 2021). It has been argued that the uncertainty caused by the pandemic will change both consumers' behaviour and business's responds, in some cases for years to come (McKinsey 2020; Barouki *et al.* 2020). The World Economic Outlook of the

International Monetary Fund (IMF) forewarned that the lockdown economic jolt is expected to cause an ongoing economic crisis, far worse than that of the 2008-10 period, and the worst recession since the 1930s (IMF 2021). The lockdown brought about a shocking slow-down in the global economic development challenging companies to survive in this “newnormal” (Carracedo *et al.* 2021). Sustainable development is widely recommended as the most agreeable, urgent, ultimate large-scale solution (Perkins *et al.* 2021) for the global economy.

With regards to Europe, the Green Deal of 2019 aimed - before the pandemic - to climate neutrality (net-zero carbon emissions) by 2050. This deal was modified to include relevant research and policy issues that COVID-19 brought about (Barouki *et al.* 2020). The European HERA project (2021-2030) aims at setting priorities in research regarding the inter-relationships between climate change, overall environmental protection and humanity health (HERA Consortium 2021). The relevant European budgets were transformed to support green investments in the green and digital transitions areas in order to ensure recovery from the pandemic towards a sustainable direction (Hepburn *et al.* 2021). Of course, these demanding goals require extensive synergies among communities’ stakeholders and scientific fields.

In any pro-environmental agenda, the interdisciplinary collaboration is undoubtedly always required whereas it has been previously suggested that marketing science “needs and wants” to offer its own contribution to environmental synergies (Tilikidou and Delistavrou 2014). It is to be noted that marketing had been long ago (Kilbourne 1995; Peattie 1995) faced as a hostile to the environment business practice, not always unreasonably. Certain marketing activities drive affluent consumers (of the so-called developed countries) to over-consumption (Peattie 2010; Chatzidakis and Lee 2013). Over-consumption has been considered to be the most decisive factor for unsustainable business offerings and problematic swelling of the waste, both industrial and domestic. Taking responsibility, exemplary marketing scholars introduced the concept of green or eco-marketing 3 or 4 decades ago, hoping that - in the words of Peattie (1995) - marketing should become “*part of solution instead of part of the problem*”. Nowadays, there are many suggestions that sustainable marketing should be understood as a corporate philosophy (Lim 2016), as a concept embedded in the very core of sustainable development (Hunt 2017). Hence, ecological values should penetrate a company’s mission, strategy, as well as the marketing practices, known as the marketing mix (Rudawska 2019). Sustainable marketing requires a holistic corporate approach rather than simply the customary applications of conventional marketing techniques, which sometimes include greenwash. An honest ecological marketing strategy has to include goals such as reduction of emissions, energy, water and consequently waste (Abutaleb and

El-Bassiouny 2020) as well as competitive ecological offerings to meet consumers' concerns (Delistavrou *et al.* 2021). In addition, it is to be noted that sustainable orientation and practice are becoming an increasingly important part not just in B2C but in B2B marketing research and practice (Kapitan *et al.* 2019; Trollman and Colwill 2021).

In the beginning of the pandemic, the lockdown shocked the overall entrepreneurship worldwide imposing a deeper understanding of the interactions between nature and human activities. Drastic turn to sustainability is now even more loudly advocated by both scientists and activists, who work on the climate change phenomenon. The impact of COVID-19 on companies and their sustainable practices has been in the spotlight (Bhattacharyya and Thake 2021; Perkins *et al.* 2021; Schaltegger 2021). Nevertheless, firms that seek or have to provide effective and efficient, sustainable solutions do need reliable research outcomes. It is to be acknowledged that, even before the outbreak of COVID-19, there was a lack of business research on which green practices are being carried out, which industries are actually adopting them, in what contexts they are being implemented (Seuring and Gold 2013; Scur and Barbosa 2017), and which factors are able to motivate them. Amid the pandemic, the relevant literature in this field has been far scarcer. It has been previously documented that circumstances do vary across business sectors, regions and countries and extensive discrepancies are to be expected with regards to both the survival from the pandemic business strategies and to the after-recovery planning that regards development goals and actions (Bhattacharyya and Thake 2021; Trollman and Colwill 2021). This means that even if there have been some scattered studies they cannot be generalized in every sector of every country. With relevance to Greece, to the best of our knowledge, there is almost complete absence of relevant investigations.

Among the other sectors of manufacturing, chemical industry is often accused of harming the physical environment heavily. Chemical industry is the third largest Green House Gas (GHG) emitter in Europe (DECHEMA 2017). Consequently, there have been national and European regulations that guide production and distribution of chemicals aiming to the reduction of carbon gas emissions (EC 2037 2000; EC 1005 2009; IME-GSEBEE 2012; IOBE 2020). Production of chemicals in Greece is an important industrial activity, ranking 5th in gross value added (GVA) in manufacturing, specializing in specific segments of the chemicals, such as cosmetics and detergents (IOBE 2020). Cosmetics and detergents were chosen as they provide the largest shares in the Greek chemical industry overall production, in terms of number of firms (45%) and employees (44%), also in terms of gross added value (38%), according to the Foundation for Economic and Industrial Research (IOBE

2020). In addition, these two sub-sectors presented the higher demand increases, immediately after the outbreak of the pandemic (IRI Hellas 2020).

Therefore, this preliminary, exploratory study aimed to investigate some aspects of the COVID-19 impact on the green practices applied by the factories in the cosmetics and detergents sub-sectors in Greece.

Literature Review

The Impact of COVID-19 on Industry

There has been a number of recent publications focusing on the necessity to examine the impact of the pandemic on environmental protection policies (Hepburn *et al.* 2021), either through theoretical perspectives (Ladas 2020) or by presenting future research guidelines (Barouki *et al.* 2021; Carracedo *et al.* 2021; Schaltegger 2021) or some fewer studies by suggesting marketing response strategies (Ding and Li 2021; Kang *et al.* 2021; Nandi *et al.* 2021).

With regards to field research projects, Udofia *et al.* (2021) argued that, although the supply disruption was not found to impact directly on industry productivity, the organizational productivity mediated negatively the relationship between COVID-19 and customer satisfaction as well as the relationship between both COVID-19, supply disruption and performance. Manuel and Herron (2020) found that businesses did engage strongly in CSR projects due to the pandemic motivated by both utilitarianism and deontological factors.

Chemical Industry in Greece

According to the latest available data for the year 2017, there are 939 companies operating in the chemical industry in Greece. The largest shares in the overall chemical production concerns consumer products (45%) and special chemical products (35%). Most of the firms are rather small as there is just the 18% of companies (170 companies) that employ more than 10 people; 5% over 50 people while only 1% over 250 people. This later 6% accounts for the 73% of the overall sales in chemical industry. The majority of the factories are located in Attica and Central Macedonia, whereas the 2/3 of the workforce is employed in Attica (IOBE 2020).

During the ten-year severe crisis in the Greek economy, the chemical industry managed to recover dynamically reducing losses from the decreasing domestic demand, mainly due to the strong growth of exports (IOBE 2020). It is without any doubt that due to the pandemic, the significance of chemical industry increased as

there are sub-sectors that produce ingredients and/or final products that are valuable in people's health. The pressing need to confine the spread of the virus demands strict sterilization. Continuous use of disinfectants and cleaners that can guarantee the effective personal and place hygiene primarily in professional premises, such as hospitals, schools, shopping malls, workplaces, etc. Besides the medical area, supplies for which are customarily provided by chemical industry, industries faced pressing increase in demand for personal care and hygiene products (cosmetics) as well as for products necessary for the cleanliness and disinfection of premises (detergents). Between 2019 and 2020 the cosmetics' exports increased by 1.3% (Cosmetics Europe 2020) while detergents' sales increased from 5.1% to 39.2%, in the several categories of the generic product, namely laundry detergents, home cleaning products etc. (IRI Hellas 2020). It has to be noted that the production of disinfectants presented the incredible increase of 525% as before the pandemic the usual production value was around 240.000 Kg. raising to 1.500.000 Kg., in just one month after the pandemic (Minister of Development and Investment 2021).

With regards to environmental rules and regulations, limits have been set, long ago, concerning the greenhouse emissions levels, installation of environmental protection systems targeting air pollution and waste management (Christostomides 2000). The emissions trading scheme - introduced by the Kyoto Summit - was extended to business in 2005, under the norm "the polluter pays" (IME-GSEVEE 2012). The legal prohibit that was imposed by the HCFC-22 directive (EC 2037 2000) was actually applied in Greece as from 2007 (Government Gazette 1827 2007). Eventually, the greenhouse emissions (mainly CO₂) were decreased by 67%, in comparison to the base year 1990 (IOBE 2020). Nonetheless, the increase in production in both detergents and cosmetics brings forward challenges to deal with the extra emissions that are naturally increasing.

There are many issues that arise regarding the strength, the signs and the actual impacts of the pandemic on each firm's philosophy, mission, strategies as well as possible changes in the adoption and implementation of green practices in chemical industries. In overall, there is much to be further understood concerning the sustainable development in the sub-sectors of cosmetics and detergents, along with the importance of factors that may be found able to motivate effective measures towards reduction of hazardous industrial emissions.

Research Objectives

- To explore the impact of COVID-19 on selected aspects of the overall business activities, as well as to investigate the degree of changes due to the pandemic, in the green practices of the firms
- To examine the importance level in a number of factors that motivate and oblige the firms to adopt and implement pro-environmental practices in production, as well as the impact of COVID-19 on the importance of these factors
- To record the impact of COVID-19 regarding ecologically related requirements for collaboration with third parties and associates
- To understand in more depth the industry experts' overall views, thoughts and ideas concerning green practices in the cosmetics and detergents production

Methodology

Sampling

The population of the study was the sum of the cosmetics and detergents industries in Greece. The population frames were obtained from the Hellenic Association of Fragrances and Cosmetics Industries /PSVAK (2021) and the Hellenic Association of Detergents Industries /SEVAS (2021) members list. The interviews were decided to be gathered via digital links due to the pandemic restrictions. The response rate in the electronic data collection is usually rather low, hence the data collection method was decided to be a census. 79 production companies were approached and the procedure resulted in 17 usable questionnaires providing a response rate of 21,5%.

Valorizing a number of previous research studies in similar topics (Dangelico and Pujari 2010; Duran *et al.* 2014; Abutaleb and El Bassiouny 2020) a mixed technique was utilized. Mixed research technique involves both quantitative and qualitative tools (Leech and Onwuegbuzie 2009), a solution that has previously provided more fruitful outcomes than each separate technique alone. For the requirements of this study, a semi-structured instrument was constructed. The instrument development procedure included literature study, editing and re-editing, 3 in-depth interviews with chemical engineers (2 practitioners and 1 academic, who provided valuable consulting services) and finally pre-testing, pilot techniques.

Questionnaire

The final research instrument included 1 section for the business characteristics, 3 sections, with 5 quantitative questions, each of which contained a number of items (45 in total), as well as an open-end part, and 1 section with a totally open part. The following variables were measured:

Business Characteristics (BC), in which 7 chosen items were recorded, namely legal form and ownership, number of employees, specialty and position of the respondent and the types of the produced consumer packaged products (CPGs), either cosmetics or detergents or both.

Changes in Business Activities (CBA), in which the respondents were asked to report the level of change in the overall business activities of their companies, in a number in 10 indicators.

Green Practices (GP), in which the respondents were asked to report the level of changes due to the impact of COVID-19 on those green practices that are applied in their industry among a set of 10 green practices.

Factors/Significance (F/S), in which the respondents were asked to report the importance of each one of 9 factors that affect the adoption of pro-environmental practices in their industries.

Factors/COVID-19 Impact (FCI). In sequence to the later question, the respondents were asked to express any changes to the importance of the above 9 factors due to COVID-19.

Third Parties (TP), in which the respondents were asked to report the impact of COVID-19 on 3 issues of their relations with their external associates.

The variables **CBA**, **GP**, **FCI**, **TP** were measured on a 5-point scale *1=Heavy Decrease 2=Light Decrease, 3=No Change, 4=Light Increase, 5=Heavy Increase* while **F/S** was measured on a 5-point scale *1=Very Insignificant 2=Insignificant, 3=Neither Insignificant/Nor Significant, 4=Significant, 5=Very Significant*.

In the open parts, in each one of the above questions, the respondents were asked to express their own feelings, opinions and suggestions. Finally, in the end of the instrument in a totally open part of the instrument, the respondents were asked to express in detail their overall views, attitudes, thoughts – ideas, expectations – predictions concerning green practices in the cosmetics and detergents production.

Results and Discussion

Quantitative Findings

In Table 1 the **Business Characteristics (BC)** are presented. With regards to the *legal form*, among the 17 companies, there were 3 Sole Proprietorship Business, 5

Private Capital Company 2 General Partnership Business, 5 Societe Anonyme (SA) 1 Limited Liability Company and 1 Co-operative, social company.

There are 10 companies that have up to 10 **employees**, 4 companies up to 50 and 3 of them have more than 50 members of staff. There is 1 company with 150 and 1 company with 500 members of staff.

With regards to the **specialties** of the respondents, 6 of them were Owners/Stockholders 2 Chemicals/Production Managers, 3 CFOs, 3 HR Executives, 3 Administrative Executives.

With reference to **production** 12 companies specialize in Detergents, 5 in both Cosmetics and Detergents, while all companies produce Disinfectants.

In Table 2, the **Changes on Business Activities (CBA)** that have been occurred due to COVID-19 are indicated. With regard to the **overall business** (9 increase, 7 decrease 1 no change), as well as with regards to **supply** (8 increase, 7 decrease 2 no change) and **turnover** (9 increase, 8 decrease), it is observed that the companies are divided into 2, as about half of them declared decrease and half of them increase. With regards to **investment**, 6 of them (35%) reported increase, 7 (41%) reported no change, while 4 of them (23.5%) reported decrease. With regards to **personnel** just 4 of them (23.5%) declared that had increased their staff. In addition to that, 4 of them (23.5%), declared increase of **working hours** 12 companies, the clear majority (70.6%) stated no change, while 1 company reported decrease. It has to be commented that there are 4 companies (3 15 16 17), which stated heavy increase in overall business activities while 2 of them reported no change and 2 light increase in personnel and 3 of them reported light increase and 1 no change in working hours. This picture makes someone wonder how did these companies manage to respond to the increased demand.

Further, the clear majority of the companies increased **observance of hygiene and safety rules** (12 increase, 5 no change). However, most of them kept the same **observance level of quality** (12 no change, 5 increase) **and environmental protection rules** (14 no change, 3 increase). More specifically with reference to the environmental rules there are just 3 of the companies that reported light increase in observing environmental protection rules due to COVID-19. Almost half of the companies (8), reported that they increased their efforts towards **digitalization and e-commerce** while the other half (9) reported no change in this activity. The tendency to increase efforts towards digitization of functions is rationally interpretable as all business had to face the challenges especially during the strict lockdown, in the first period of the pandemic. It is to be noted that there is an

unanswered issue at this point regarding the other half of the companies, which made no change. Had they been involved in the digitalization of their supply chain earlier, owning e-shops already or do they still deny e-commerce?

In Table 3, changes (due to COVID-19) in the **Green Practices (GP)** of the chemical industries are presented. Findings indicate that almost none company reported decrease, either light or heavy, in any of the green practices. Most of the companies reported no pro-environmental changes due to the pandemic. It is to be underlined that the larger firms (150 and 500 employees respectively) did not report any change towards green practices due to the pandemic. No company at all reported increase in the technology for *reducing carbon dioxide emissions*. It has to be noted that there is a considerable number of companies, in which some of the green practices are not applied at all. Irrespectively of the pandemic for example, 7 companies (41%) do not make any *replacement of fossil fuels* with renewable energy sources, 6 companies (35%) have not obtained any *green certification*, 5 companies (29%) neither have implemented any *environmental management system* or taken any measures to *avoid raw materials tested on animals*. There are 6 companies (35%) which increased *recycling technologies*. Increase was reported in *partial replacement of supplies* with green alternatives or *fossil fuels* with renewable energy sources and *eco-packaging* by just 3 companies (17%) respectively.

In Table 4 the **Significance** of those **Factors (F/S)** that are assumed to motivate pro-environmental practices in production are presented together with the **Impact** of **COVID-19 (FCI)** on them. It is observed that the majority of the companies do find importance in most of the factors that imply adoption of pro-environmental practices in production. These factors represent (in declining order) the *corporate image and reputation* (16), *motivation and morale* of employees (16), the *customers' loyalty* (15), improvement of *hygiene and safety conditions* (15), responds to *market demands* (15) and *compliance with laws and regulations* (14). More than half of the companies find importance to some other factors too, such as valorisation of *European Union funding* (10), relationships with *ecological groups and organizations* (9) and *Corporate Social Responsibility* projects (8).

After the pandemic, the majority of the companies (11) reported, of course, increase in their perceptions of importance regarding *hygiene and safety conditions* (Table 4). Nonetheless, the importance of the first in order incentive, namely the *corporate image and reputation* (10) appeared to be increasing, too, in the majority of the companies. In about half of the companies (9) the importance of *compliance with laws and regulations* increased due to the pandemic. No changes have been reported by the majority of the companies with regards to the other factors, namely *building relationships with ecological groups* and organisations (15), development of

corporate social responsibility projects (12), respond to *market demand* (11) for innovative, green products and utilization of *European Union funding* (12).

In Table 5 the relationships of each companies with Third Parties (TP) are presented. It was found that COVID-19 clearly did not make any difference to the companies' relationships with their *suppliers* with reference to their demands of either *ISO certificates* (13) or *environmental info* (11). It is to be noted that most of the companies were not found to *seek for co-operation with ecological groups* or organizations (10) due to the pandemic.

Qualitative Findings

The elaboration of the responses in the open parts of the quantitative questions as well as the final open section of the inventory indicated the following:

All experts expressed their positive attitudes towards replacement of raw materials that are made by oil sub-products with more environmentally friendly ingredients, although the quantitative procedure indicated that this green practice is not yet applied by most of the companies. Many of the experts believe that their companies would be more willing to adopt renewable energy resources (photovoltaic etc.) if they did not have to face too many bureaucratic issues and delays. One of them said:

“As from March 2020 we faced severe problems with our connection with the Public Electricity Company (DEI GR). We had to find a way to secure the uninterrupted power supply of our factory and we willingly turned to renewable energy alternatives. Unfortunately, we soon discovered that, for most of our production volume, we had to utilize private diesel generators, which we had to buy. In addition, just for systems with low energy requirements we can turn to photovoltaics. However, installations of photovoltaics and other renewable energy sources are very expensive. For this reason, we have to follow a gradual replacement procedure that will take a long time.”

The experts of the small size industries expressed their belief that Greek industries are far behind technological, green innovations in comparison with the multinational business groups. One of them said:

“The idea of adopting innovative, green practices in the production of cosmetics by the Greek factories is just an idea. At best, Greek cosmetics industry follows “borrowed” techniques of big multinational business’ innovations. Unfortunately, the majority of our practices are in the conventional direction. The level of adoption of green policies depends on the size of the firm. There are 3 or 4 big firms in Greece that could

adopt pro-environmental practices and the rest of the small medium size (SMS) companies will have to follow. There are 2 crucial factors in this direction: a. European funding or other financial incentives and b. effective marketing effort to reach or “create” profitable enough consumers’ segment.”

It is to be underlined that there are many factories that are not at all engaged in any recycling activity; they are just used to dispose raw, unrefined waste to recycling intermediaries (middlemen). Although the quantitative relevant question indicated that recycling technologies appear to be increasing in the industry, one expert explained further that:

“There is no legal obligation for our industry to apply any special waste management programme. The law requires waste to be submitted with documents to a third party, namely a recycling management company. In the industry all garbage is placed in bins and there is a management company that takes it from the factory premises. We are not aware of what the following procedures are.”

There were some experts (chemical engineers/production managers), who believe that there is a large tendency for greenwashing, especially in the cosmetics sector, as there is a constantly increasing consumer demand for organic toiletry. One of them said:

“Consumers should be very careful as it is mostly the marketing effort that creates an environmentally friendly positioning of a brand, not always corresponding with the actual green composition of the product.”

The experts of most companies expressed their hope that Greece will be able in the near future to obtain the European certification for green products. Should this development be combined with incentives for favourable national or European funding and relevant adjustments to laws and regulations, predictions concerning a noteworthy shift towards green practices in the chemical industry will become more optimistic.

Conclusions

In this study, the impact of COVID-19 pandemic on the green practices, which are applied by the Greek chemical industries, was examined.

The first objective was to explore the impact of COVID-19 on the overall business activities as well as to investigate the degree of changes due to the pandemic, in the

green practices of the firms. The results indicated that about half of the companies reported increase in the overall of business activities, as well as in specific functions, such as turnover and supply. The clear majority of the companies increased the level of observance on the hygiene and safety rules, a finding that is absolutely interpretable amid the pandemic. On the contrary, surprisingly, the vast majority of the companies reported no change in the environmental protection rules. Further, with regards to the changes in specific green practices due to the pandemic, most of the companies (the larger 2 included) reported no change. It is to be underlined that there are some green practices (e.g. replacement of fossil fuels with renewable energy sources) that are not applied at all by almost half of the companies. About 30% of the firms have not applied any green certification or environmental management system. It is also to be noted that there is no company, which increased adoption of any technologies to reduce carbon dioxide emissions. Recycling technologies appeared to be the practice with the larger percentage of increase among the examined factories (35%).

As for the second objective, concerning the significance of the factors that motivate green practices in the firms and the impact of COVID-19 on them, it was found that marketing factors, such as corporate image-customers' loyalty-market demands as well as managerial factors, such as morale of employees, are the stronger incentives for the adoption of green practices. At about the same level, the experts declared that green practices are also motivated by the need to improve hygiene and safety conditions and comply with laws and regulations. It is to be noted, though, that the actual pro-environmental factors, namely relationships with ecological groups and organizations and corporate social responsibility projects (in contrast to Manuel and Herron 2020) were not found to be strong incentives towards any green practices. Of course, as expected, the importance of hygiene and safety conditions provided the larger score of increase due to COVID-19. Further, it is to be mentioned that the importance of corporate image and compliance with laws and regulations increased after the pandemic, too.

As for the third objective, no noticeable tendency - due to the pandemic - was found in the firms' requirements for collaboration with third parties and associates or their relationships with ecological groups and organisations.

With regards to the qualitative part of this research, special effort was made to capture some parts of the experts' attitudes, experience, expectations and predictions regarding green practices and the contribution of chemical industry to the reduction of carbon emissions. It is to be underlined that the free, in-depth parts of the discussion offered new, unforeseen issues and aspects that had not been included in the quantitative parts of our inventory. However, the alleged impact of the pandemic

is not yet apparent in the testimonies of experts regarding green practices in the production of cosmetics and detergents. The overall picture illustrates positive attitudes within the industry executives towards practices related to the European goals for neutrality until 2050. On the other hand, a noticeable delay in the greening of the production in the Greek factories has been underlined by many respondents. Chemical industries have not yet proceeded to extended adoption of green practices, due to cost and bureaucratic reasons. The qualitative techniques revealed the crucial role of national and European policies, both legal and financial, to motivate, persuade or oblige industry to proceed to drastic pro-environmental strategies. The qualitative analysis verified the significant role of marketing in the green image of brands, both detergents and cosmetics. It can be argued that no firm would undertake the risk or the trouble to adopt an integrated strategy towards neutrality if it is not convinced by marketing that there is a profitable enough consumer segment, eager to welcome ecological toiletry and detergents.

Limitations and Further Research Suggestions

As in every study, the remote data collection did not provide a satisfactory enough response rate, at least with regards to the quantitative part of the inventory. In future research, personal interviews, in a larger sample of high-level executives, at the same or similar object of specificity, are probably going to offer a better data base. The face-to-face data collection method will be certainly more fruitful for the qualitative part of the inventory, too, as feedbacks in the discussion would be more hopefully effective. This was not feasible in this study leaving some unanswered issues. For example, we are not in a position to understand why half of the companies did not report increase in digitalization in the lockdown period or what are the actual recycling activities inside the premises of the factories. The scarcity of relevant primary data studies, too, confined the discussion of the results of this study.

Climate changes in the coronavirus era press more dramatically towards urgent, sustainability policies. National, European and global authorities as well as business associations are obliged to proceed to synergetic memorandums towards reduction of carbon emissions. It is no secret that business worldwide is not always willing to take pro-environmental measures if negative impact on profits are at stake. Future investigations regarding the views and intentions of critical stakeholders, such as the chemical industry, will help us to understand further both the motivations and the impediments to sustainability. Research might focus on more specific issues, such as perceptions and willingness to adopt green, carbon-neutral technologies in production and delivery of biodegradable, renewable, recycled and recyclable raw materials, sub-products and final products and packaging. Deeper, multilateral

understanding will hopefully set the roots for suggestions towards clear, sustainable business missions accompanied with responsible marketing strategies.

The results of this study, although preliminary and exploratory, verify proposals that address sustainability not only as an option now (Abutaleb and El-Bassiouny 2020) but as an absolute imperative worldwide. Greece had better follow this direction as soon as possible. If the lessons learned from the pandemic are not fully understood and accepted, if the necessary investments are not planned and implemented, the world will be facing terrible threats, in the near future (Hepburn *et al.* 2021). Considerable damages are at the gates including not just climate change and extended damages on natural environment but also increasing possibilities of further pandemics as interactions between and among plant, animal and human ecosystems are constantly evolved and transformed.

APPENDIX

Table 1: Company Characteristics

Companies	Legal form	No of employees	Specialty	Products
<i>Co. 1</i>	PC	5	Chemist/Prod. Mgr.	Detergents
<i>Co. 2</i>	GP	10	CFO	Detergents
<i>Co. 3</i>	SP	7	Owner	Detergents
<i>Co. 4</i>	SP	2	Owner	Detergents
<i>Co. 5</i>	SP	1	Owner	Detergents
<i>Co. 6</i>	Co-op.	10	Chemist/ Prod. Mgr.	Detergents, Cosmetics
<i>Co. 7</i>	GP	10	Admin Exec	Detergents
<i>Co. 8</i>	PC	12	CFO	Detergents
<i>Co. 9</i>	SA	150	HR Exec	Detergents
<i>Co. 10</i>	SA	22	Stockholder	Detergents
<i>Co. 11</i>	PC	5	Stockholder	Detergents
<i>Co. 12</i>	PC	1	Owner	Detergents, Cosmetics
<i>Co. 13</i>	PC	10	Admin Exec	Detergents
<i>Co. 14</i>	Ltd.	55	Admin Exec	Cosmetics, Detergents
<i>Co. 15</i>	SA	500	CFO	Cosmetics, Detergents
<i>Co. 16</i>	SA	45	HR Exec	Cosmetics, Detergents
<i>Co. 17</i>	SA	40	HR Exec	Detergents

PC: Private Capital, GP: General Partnership, SP: Sole Proprietorship, Co-op.: Co-operative-social, Ltd.: Limited Liability, SA: Societe Anonyme

Table 2: Changes in Business Activities

	Bus. Act.	Invest.	Supply	Personnel	Turn-over	Rules			Work hrs	Dig/tion
						Hygiene & safety	Quality	Env. protection		
Co. 1	LI	NC	NC	NC	LD	LI	NC	NC	NC	NC
Co. 2	LI	NC	NC	LD	LI	HI	LI	LI	NC	NC
Co. 3	HI	HI	HI	LI	HI	HI	NC	NC	NC	NC
Co. 4	NC	NC	LI	NC	LI	HI	HI	NC	NC	LI
Co. 5	LD	NC	HD	NC	LD	NC	NC	NC	NC	NC
Co. 6	LI	LI	LI	LI	LI	LI	NC	NC	LI	LI
Co. 7	HD	HD	HD	LD	HD	HI	NC	NC	NC	NC
Co. 8	LD	NC	LD	NC	LD	HI	LI	LI	NC	NC
Co. 9	LI	NC	LI	NC	LI	NC	NC	NC	NC	LI
Co. 10	LD	LD	HD	NC	LD	NC	NC	NC	NC	LI
Co. 11	LI	LI	LI	LI	LI	LI	NC	NC	NC	NC
Co. 12	LD	HD	LD	NC	LD	LI	NC	NC	LD	HI
Co. 13	LD	NC	LD	NC	LD	LI	NC	NC	NC	NC
Co. 14	LD	LD	LD	NC	LD	HI	NC	NC	NC	NC
Co. 15	HI	LI	HI	NC	HI	NC	NC	NC	LI	LI
Co. 16	HI	LI	HI	LI	HI	NC	LI	LI	LI	HI
Co. 17	HI	LI	HI	NC	HI	LI	LI	NC	LI	HI

HD: Heavy Decrease, LD: Light Decrease, NC: No Change, LI: Light Increase, HI: Heavy Increase

Table 3: Changes in Green Practices

	Replace supplies with green alters	Replace fossil fuels with renewable energy	Avoid materials tested on animals	Green certs.	Environ. mgmt. systems	Eco-pack	Tec. to reduce water & energy	Tec. to reduce CO ₂ emissions	Toxic waste mgmt. tec.	Re-cycling tec.
Co. 1	LI	LI	HI	NC	HI	HI	NC	NC	NC	HI
Co. 2	NA	NA	NA	NA	NA	NC	NC	NC	LI	LI
Co. 3	NC	NA	NC	NC	NC	NC	NC	NC	NC	NC
Co. 4	NA	NA	NA	NA	LI	NC	NC	NC	NC	HI
Co. 5	NC	NA	NA	NA	NA	NA	NA	NC	NA	NA
Co. 6	NC	LI	NC	NA	NA	LI	LI	LD	NC	LI
Co. 7	NC	NA	NC	NA	NA	NC	NC	NC	NC	NC
Co. 8	NC	NC	NC	LI	LI	NC	NC	NC	NC	LI
Co. 9	NC	NA	NC	NC	NC	NC	NC	NC	NC	NC
Co. 10	LD	LD	NC	LD	NC	LD	NC	NA	NC	NC
Co. 11	NC	LI	NC	NC	NC	NC	LI	NC	NC	NC
Co. 12	LI	NC	NA	NC	NC	LI	NC	NC	NA	NC
Co. 13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Co. 14	NC	NC	NC	NC	NC	NC	NA	NA	NC	NC
Co. 15	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Co. 16	NC	NC	NC	NC	NC	NC	NC	NC	NC	LI
Co. 17	LI	NC	LI	NC	NC	NC	NC	NC	NC	NC

HD: Heavy Decrease, LD: Light Decrease, NC: No Change, LI: Light Increase, HI: Heavy Increase

References

- Abutaleb, S., and El-Bassiouny, N., 2020, Assessing sustainability marketing from macromarketing perspective: a multistakeholder approach, *World Journal of Entrepreneurship, Management and Sustainable Development* 16(4): 287-305. <https://doi.org/10.1108/WJEMSD-02-2019-0017>;
- Barouki, R., Kogevinas, M. Audouze, K., Belesova, K., Bergman, A., Birnbaum, L., Boekhold, S., Denys, S., Desseille, C., Drakvik, E., Frumkin, H., Garric, J., Destoumieux-Garzon, D., Haines, A., Huss, A., Jensen, G., Karakitsios, S., Klanova, J., Koskela, I-M., Laden, F., Marano, F., Franziska Matthies-Wiesler, E., Morris, G., Nowacki, J., Paloniemi, R., Pearce, N., Peters, A., Rekola, A., Sarigiannis, D., Šebková, K., Slama, R., Staatsen, B., Tonne, C., Vermeulen, R., and Vineis, P., 2021, The COVID-19 pandemic and global environmental change: Emerging research needs, *Environment International* 146: 106272, <https://doi.org/10.1016/j.envint.2020.106272>.
- Bhattacharyya, S.S., and Thakre, S., 2021, Coronavirus pandemic and economic lockdown; study of strategic initiatives and tactical responses of firms, *International Journal of Organizational Analysis* 29(5): 1240-1268, <https://doi.org/10.1108/IJOA-05-2020-2198>
- Carracedo, P., Puertas, R., and Marti, L., 2021, Research lines on the impact of the COVID-19 pandemic on business. A text mining analysis, *Journal of Business Research* 132: 586-593, <https://doi.org/10.1016/j.jbusres.2020.11.043>
- Chatzidakis, A., and Lee, M. S. W., 2013, Anti-consumption as the study of reasons against, *Journal of Macromarketing* 33(3): 190-203, <https://doi.org/10.1177/0276146712462892>
- Christostomides, T., 2000, National and European Legislation for the Environment. In: EAINYAE, 2000, Protection of the Environment from the Industrial Activities– Prevention of Industrial Accidents, Athens, GR: Hellenic Institute of Hygiene and Safety of Work (El.In.Y.A.E), pp.19-30.
- Cosmetics Europe, 2020, *Market performance 2020: European cosmetic, toiletry & perfumery data*, Cosmetics Europe.
- Dangelico, R.M., Pujari, D., 2010, Mainstreaming Green Product Innovation: Why and How Companies Integrate Environmental Sustainability, *Journal of Business Ethics* 95: 471–486, <https://doi.org/10.1007/s10551-010-0434-0>
- DECHEMA, 2017, Low carbon energy and feedstock for the European chemical industry, Frankfurt, DE: DECHEMA.
- Delistavrou, A., Tilikidou, I., and Krystallis, A., 2021, Nested relationships in pro-environmental purchasing: A moderated mediation model, *Journal of Consumer Behaviour* 20:1648-1663, <https://doi.org/10.1002/cb.1958>

- Ding, A. W., and Li, S., 2021, National response strategies and marketing innovations during the COVID-19 pandemic, *Business Horizons* 64(2): 295-306, <https://doi.org/10.1016/j.bushor.2020.12.005>.
- Duran, I., and Bikfalvi, A., and Llach, J., 2014, New Facets of Quality. A Multiple Case Study of Green Cosmetic Manufacturers, *European Accounting and Management Review* 1(1): available at: <https://ssrn.com/abstract=2532481>, accessed on November 2021.
- EC 1005, 2009, Regulation (Ec) No 1005/2009 of the European Parliament and of the Council of 16 September 2009 on substances that deplete the ozone layer, *Official Journal of the European Union*, L 286, 31.10.2009: 1-29, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009R1005&from=EN>, accessed on November 2021.
- EC 2037, 2000, Regulation (EC) No. 2037/2000 of the European Parliament and of the Council on substances that deplete the ozone layer. *Official Journal of the European Communities*, L 244, 29.9.200: 1-24, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32000R2037&from=EN>, accessed on November 2021.
- Foundation for Economic and Industrial Research [IOBE], 2020, Chemical Industry in Greece: Facts and data 2020, Athens, GR: IOBE.
- Government Gazette 1827, 2007, Common Ministers' Decision 37411/1829/E103, Athens, GR: Government Gazette 1827/11.9.2007
- Hepburn, C., Qi, Y., Stern, N., Ward, B., Xie C., and Zenghelis, D., 2021, Towards carbon neutrality and China's 14th Five-Year Plan: Green COVID-19 recovery, sustainable urban development and clean energy transition. London: Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science
- HERA Consortium, 2021, *EU Research Agenda for the Environment, Climate & Health 2021-2030*, Final Draft. HERA Consortium, 15 September 2021, available at: <https://www.heraresearcheu.eu/hera-2030-agenda>, accessed on November 2021.
- Hunt, S.D., 2017, Strategic marketing, sustainability, the triple bottom line, and resource-advantage (R-A) theory: securing the foundations of strategic marketing theory and research, *Academy of Marketing Science Review* 7: 52-66.
- IME-GSEBEE, 2012, *Environmental Protection and Energy Conservation in Small Companies*. Athens: IME-GSEBEE, available at: https://imegseevee.gr/wp-content/uploads/2018/02/perivallon_eksoikon_energeias.pdf, accessed on November 2021.
- International Monetary Fund [IMF], 2021, *World Economic Outlook Update*. January 2021, IMF, available at: <file:///C:/Users/PC/Downloads/text.pdf>, accessed on November 2021.

- IRI Hellas, 2020, Clothing detergents and home cleaning products: The pandemic boosts sales, *Self Service*, 11/11/2020, available at: <https://selfservice.gr/aporrypantika-rouchon-proionta-oikiakou-katharismou-i-pandimia-edose-othisi-stis-poliseis/>, accessed on November 2021.
- Kang, J., Diao, Z., and Zanini, M.T., 2021, Business-to-business marketing responses to COVID-19 crisis: a business process perspective, *Marketing Intelligence & Planning* 39(3): 454-468, <https://doi.org/10.1108/MIP-05-2020-0217>
- Kapitan, S. Kennedy, A-M., and Berth, N., 2019, Sustainably superior versus greenwasher: A scale measure of B2B sustainability positioning, *Industrial Marketing Management* 76: 84-97. <https://doi.org/10.1016/j.indmarman.2018.08.003>.
- Kilbourne, W. E., 1995, Green Advertising: Salvation or Oxymoron? *Journal of Advertising* 24(2): 7-19.
- Kumar, R., and Abdin, M.S., 2021, impact of epidemics and pandemics on consumption pattern: evidence from Covid-19 pandemic in rural-urban India, *Asian Journal of Economics and Banking* 5(1): 2-14, <https://doi.org/10.1108/AJEB-12-2020-0109>
- Leech, N.L., and Onwuegbuzie, A.J., 2009, A typology of mixed methods research design, *Quality and Quantity* 43: 265-275, <https://doi.org/10.1007/s11135-007-9105-3>
- Lim, W.M., 2016, A blueprint for sustainability marketing: defining its conceptual boundaries for progress, *Marketing Theory* 16(2): 232-249.
- Manuel, T., and Herron, T.L., 2020, An ethical perspective of business CSR and the COVID-19 pandemic, *Society and Business Review* 15(3): 235-253, <https://doi.org/10.1108/SBR-06-2020-0086>
- McKinsey, 2020, How COVID-19 is changing consumer behavior –now and forever, available at: <https://www.mckinsey.com/industries/retail/our-insights/how-COVID-19-is-changing-consumer-behavior-now-and-forever#>, accessed on March 2021.
- Minister of Development and Investment, 2021, Speech at the online IOBE symposium on Industrial Policy and the New Economy, 24th June 2021, Athens, GR: Ministry of Development and Investment, available at: <https://www.mindev.gov.gr/%CE%BF%CE%BC%CE%B9%CE%BB%CE%AF%CE%B1-%CF%84%CE%BF%CF%85%CF%85%CF%80%CE%BF%CF%85%CF%81%CE%B3%CE%BF%CF%8D%CE%B1%CE%BD%CE%AC%CF%80%CF%84%CF%85%CE%BE%CE%B7%CF%82-%CE%B5%CF%80%CE%B5%CE%BD%CE%B4-8/>, accessed on November 2021.

- Mottaeva, A., Ivashchenko, A., and Ryattel, A., 2020, Assessment of implementation and functioning of the ecological management system, *E3S Web Conference* 164: paper 10038, <https://doi.org/10.1051/e3sconf/202016410038>.
- Nandi, S., Sarkis, J., Hervani, A., and Helms, M., 2021, Do blockchain and circular economy practices improve post COVID-19 supply chains? A resource-based and resource dependence perspective, *Industrial Management & Data Systems* 121(2): 333-363, <https://doi.org/10.1108/IMDS-09-2020-0560>
- Peattie, K., 1995, *Environmental Marketing Management*, London: Pitman Publishing.
- Peattie, K., 2010, Green consumption: Behavior and norms, *Annual Review of Environment and Resources* 35(1): 195–228, <https://doi.org/10.1146/annurev-environ-032609-094328>
- Perkins, K.M., Munguia, N., Ellenbecker, M., Moure-Eraso, R., and Velazquez, L., 2021, COVID-19 pandemic lessons to facilitate future engagement in the global climate crisis, *Journal of Cleaner Production* 290: paper 125178, <https://doi.org/10.1016/j.jclepro.2020.125178>.
- PSVAK, 2021, Hellenic Association of Fragrances and Cosmetics Industries /PSVAK. Members' list.
- Rudawska, E., 2019, Sustainable marketing strategy in food and drink industry: a comparative analysis of B2B and B2C SMEs operating in Europe, *Journal of Business and Industrial Marketing* 34(4): 875-890.
- Schaltegger, S., 2021, Sustainability learnings from the COVID-19 crisis: Opportunities for resilient industry and business development, *Sustainability Accounting, Management and Policy Journal* 12(5): 889-897, <https://doi.org/10.1108/SAMPJ-08-2020-0296>
- Scur, G., and Barbosa, M. E., 2017, Green supply chain management practices: Multiple case studies in the Brazilian home appliance industry, *Journal of Cleaner Production* 141: 1293-1302, <https://doi.org/10.1016/j.jclepro.2016.09.158>.
- Seuring, S., and Gold, S., 2013, Sustainability management beyond corporate boundaries: from stakeholders to performance, *Journal of Cleaner Production* 56: 1-6, <https://doi.org/10.1016/j.jclepro.2012.11.033>.
- SEVAS, 2021, Hellenic Association of Detergents and Soaps Industries/SEVAS. Members' list.
- Tilikidou, I., and Delistavrou, A., 2014, Pro-environmental purchasing behaviour during the years of economic crisis, *Marketing Intelligence and Planning* 32(2): 160–173, <https://doi.org/10.1108/MIP-10-2012-0103>
- Trollman, H., and Colwill, J., 2021, The imperative of embedding sustainability in business: A model for transformational sustainable development, *Sustainable Development* 29: 974– 986, <https://doi.org/10.1002/sd.2188>

- Udofia, E.E., Adejare, B.O., Olaore, G.O., and Udofia, E.E., 2021, Supply disruption in the wake of COVID-19 crisis and organisational performance: mediated by organisational productivity and customer satisfaction, *Journal of Humanities and Applied Social Sciences* ahead-of-print No. ahead-of-print, <https://doi.org/10.1108/JHASS-08-2020-0138>.
- UN Global Compact, 2019, *Business leadership for 1.5^o C*. New York: UN Global Compact.
- World Commission to Environment and Development/WCED, 1987, *Brundland Report, Our Common Future*, Oxford: Oxford University Press.
- WWF, 2021, COP26: The most interesting evolutions of the first week, available at: https://www.wwf.gr/?uNewsID=5065866&utm_source=newsletter&utm_medium=email&utm_campaign=COP26_NSL2_subscribers, accessed on November 2021.