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BARRIERS AND CAPABILITIES FOR EMBEDDING A STRATEGIC DESIGN FOR SUSTAINABILITY APPROACH IN ORGANISATION

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Abstract

Manufacturing companies play a key role in climate change. Through their use of resources and their activities, they release tonnes of greenhouse gases daily (McKibben, 2012). However, they also have the opportunity to be part of the solution to this problem by incentivising virtuous behaviour and changing themselves (Seelos & Mair, 2005). This can only happen through the introduction of a sustainable culture within the daily practices of all corporate figures, especially in decision-making and design processes (Faludi et al., 2020; Mosca et al., 2015). Strategic design for sustainability (SDfS) is closely linked to both and is capable of supporting practices and principles to enable the desired change (Manzini & Vezzoli, 2003; Gallego et al., 2020).

To successfully implement a SDfS approach within an organisation, it is important to understand what the barriers are that prevent its integration and what the typical capabilities of strategic design and sustainability are that need to be implemented to overcome them. Through collaboration with an Italian company in the corrugated packaging sector, it was possible to conduct observations and six semi-structured interviews with company figures involved in the design and managerial decision-making process. By triangulating the data (Denzin & Lincoln, 2005) with the literature, it was possible to identify eight barriers and ten soft skills and capabilities necessary to overcome them.

The analysis of the results shows that within the SDfS approach, capabilities such as multidisciplinary collaboration, communication, and negotiation are fundamental for company improvement and play a primary role in overcoming five out of eight barriers. Only through dialogue and collaborative learning it is possible to work together to tackle climate change and act for sustainability (Galimberti, 1994; Johnson et al., 2000). Systemic thinking and future thinking are common to both strategic design and sustainability because of the need to look holistically at different aspects and stakeholders' interests but also to envision and achieve desirable futures (Hess et al., 2015; Zurlo, 2022). Finally, skills such as data interpretation and visualisation can be seen as serving others by helping in the clarification and transmission of concepts and knowledge (Buhl et al., 2019; Papile et al., 2020).

Author Keywords
Strategic design; sustainability; design in organisation; barriers; capabilities.

Introduction
The role of the manufacturing industry in climate change is already well known. The first signs of this relationship can be traced back to the first industrial revolution and the beginning of the massive use of fossil fuels to support production (Perrow & Pulver, 2015). Through the direct release of substances into the environment or through the indirect encouragement of inappropriate behaviour, organisations are one of the main contributors to carbon pollution and greenhouse gases (McKibben, 2012). Firms are also social actors endowed with will, agency, and the capacity to influence the political, legal, social, cultural, and informal environment using the three powers defined by Levy and Egan (1998): the structural, the instrumental, and the discursive. The first – structural power – refers to the ability of firms to sustain economic growth; instrumental power refers to the ability to influence policy; and finally, discursive power is related to the ability to influence and direct public opinion (Perrow & Pulver, 2015). Signs of these powers can be seen in the development of the E.U. Emission Trading Scheme and in the food industry where companies respectively use their instrumental and discursive power (Betz & Sato, 2006; Boasson & Wettestad, 2013; Environmental Protection Agency, 2008).

However, it must be recognised that companies can be part of the solution to the problem by improving themselves and cooperating with states and society (IPCC, 2007) by making good use of the powers previously listed. Perrow and Pulver (2015) mention five possible actions that companies can take to improve emissions, namely: awareness-raising actions, disclosure of information on emissions, sustainable investments, development of new eco-friendly products, and finally, the implementation of an appropriate organisational structure. Although these actions may seem straightforward, not all companies manage to implement them. They proceed at different speeds, and even though the leading organisations have caught up in recent years, some are still lagging in the ecological transition. Furthermore, over the last 50 years, there has been a progressive understanding of how climate change can be addressed, leading companies from end-of-pipe solutions to systemic and integrated initiatives (Adams et al., 2016; Brezet, 1997). However, if we hope to succeed in the global challenge we are facing, not only do all companies need to be able to adapt and improve in the shortest time, but it is important that sustainability concepts also penetrate the daily actions of all the individuals inside an organisation. Sustainability must therefore be seen as part of the corporate culture and as a competence, implementing what is already present (Pulver, 2007) and being integrated into both managerial decision-making and design processes (Berkhout et al., 2006; Faludi et al., 2020; Lowe & Harris, 1998; Waage, 2007).

Design has a double link with both strategic corporate decisions and sustainability. About the latter, while at the dawn of the ecological movements this link was only present in product design, expressing itself in design philosophies such as eco-design, in recent years this relationship has strengthened (Ceschin & Gaziulusoy, 2016; Kim et al., 2020). Indeed, the focus of design has broadened by moving toward product-service systems, business models, and even corporate strategies (Baldassarre et al., 2020; Ceschin & Gaziulusoy, 2016). Strategic design encompasses a bit of all this, designing and promoting integrated systems and influencing a company's strategic decision-making process with

its principles, tools, and methods (Calabretta et al., 2016; Manzini & Vezzoli, 2003). Strategic design(er) has the ability to design and influence the company's relationships with stake-holders, producing a long-term impact and managing complex situations with diverse interests at play (Calabretta et al., 2016; Gallego et al., 2020; Zurlo, 2010).

As Manzini and Vezzoli already recognised in 2003, the skills and knowledge typical of strategic design can be put to work for sustainability and implemented within the corporate culture, leading to an improvement for companies towards emissions and sustainability in general. The integration of this approach and this mindset within a company is not an easy task, as firms try to resist change, leaning towards a state of enduring comfort with what is familiar and fearing the unknown (Gharajedaghi, 2006). To simplify and foster integration, it is necessary to know what the entry barriers are, but also to understand what the skills and knowledge of strategic design(er) for sustainability are that can be transferred through targeted actions. Therefore, this research aims to answer the following questions: Which barriers hamper the integration of a strategic design for sustainability approach into an organisation? Which unique capabilities of strategic design and sustainability need to be implemented to overcome these barriers?

Through collaboration with an Italian company in the corrugated packaging sector, it was possible to conduct observations of bad and best practices and six semi-structured interviews with company figures involved in the design and managerial decision-making process. By triangulating the data (Denzin & Lincoln, 2005) with the literature, it was possible to identify eight barriers and ten soft skills and capabilities necessary to overcome them.

The article is therefore divided into five main parts. First, a background section clarifies what strategic design means and its link to sustainability. This is followed by the methodology, indicating how the research was conducted. Then the results where the barriers and capabilities emerged are described. Finally, we present a discussion of where further elements necessary for the inclusion of SDfS and the importance of certain capabilities are indicated. The conclusions at the end briefly show the remarks, limitations, and future perspectives of this research.

Background

As mentioned earlier, design has undergone a strong evolution in recent decades, moving away from the most familiar applications such as the design of physical or graphic artefacts. This shift has led design culture to evolve and mature, pushing it towards cross-fertilisation with other disciplines. Strategic design moves its first steps from such a hybridisation, from the meeting of design culture and business culture (Zurlo, 2007). In its early days, this was seen as a cohesive approach, capable of linking the product to the brand image, creating a unique system of corporate identity. Following this school of thought, Mauri defined strategic design in 1996 as a design activity "whose object is the integrated set of products, services and communication (product system) with which a company presents itself on the market, positions itself in society and shapes its strategy." Over time, this conception has evolved, leading strategic design(er) to increasingly interface with and influence the future decisions and directions of companies to achieve specific strategic results (Meroni, 2008). Indeed, Zurlo (1999) defines it as

> that project activity that is involved in the formulation and development of corporate strategy. [...] It is an activity that generally interfaces with management (i.e. with those who decide on strategy) and is carried out in a group through the synergy of interdisciplinary skills. And it is an activity that makes sense if contextualised within a business context. Strategic design can therefore fall within the more general framework of the relationship between design and business strategy.

Through the inclusion of the design elements within management and strategy, Manzini and Vezzoli (2003) highlight the possibility of strategic design to reconfigure the role of the company, customers, and stakeholders by adding a time perspective and thus linking long-term strategic objectives with trends and new market opportunities. The same authors claim for the first time the relationship between strategic design and sustainability, defining strategic design for sustainability (SDfS) as "the capability to create new stakeholder configurations and develop an integrated system of products, services and communication that is coherent with the medium-long term perspective of sustainability, being, at the same time, economically feasible and socially appreciable today" (Manzini & Vezzoli, 2003). Sustainability was the last important piece in defining the objectives and values of strategic design. Although there may be several definitions available in the literature, in all of them the elements already mentioned above emerge and constitute the cornerstones of strategic design: a strong link with corporate objectives, the ability to hybridise with other disciplines and figures, the need to look to the future, the possibility of reviewing relations with the various stakeholders, and the need to do all this by generating value that is not only economic but also socially responsible and environmentally sustainable (Calabretta et al., 2016; Freire et al., 2017; Gallego et al., 2020).

In recent years, strategic design has been recognised as a mindset capable of stimulating the industrial mentality and culture to respond to environmental and social challenges using specific design tools and methods. To succeed in this, however, it is necessary to integrate strategic design into internal dynamics and processes (Franzato, 2010). Hence, it becomes of crucial importance to understand what the barriers to the implementation of such a design mindset and approach are and what the resistances against sustainability aspects related to it are. There is currently a shortage of evidence and specific research on this in the literature. This article aims to fill this gap, creating an organic vision of the problem, and taking a holistic view between strategic design and sustainability through the results of a qualitative analysis in the field, thus adding a more practical perspective.

Methodology

Through collaboration with an Italian company producing secondary corrugated packaging, it was possible for the authors to explore and define potential barriers for SDfS. The manufacturing company focuses mainly on business-to-business and does not have a specialised figure dedicated to sustainability (e.g., sustainability manager) which is seen as a shared responsibility among everyone. Instead, strategic decisions are taken by top management and the CEO (see limitations in the "Conclusion" section).

To gain a clear perspective, a qualitative approach was applied to the research by conducting participatory action research (PAR) (Gray, 2004). PAR is based on the action research methodology, which in turn consists of three main points:

- ▪ The research subjects are involved in a democratic partnership with the researcher;
- ▪ The researcher is seen as an agent of change; and
- ▪ Data are generated from the direct experience of the researcher and participants.

The last of these represents the characteristic element of PAR, enhancing it and placing it at the heart of the methodology. In fact, participants are not simply involved, but immersed in the research and involved in the data collection and analysis (Gray, 2004). Furthermore, the focus of the research is on carrying it out with and for the people who will greatly benefit from the output (Jones, 2018). Given the close contact of the research with practice and the different business figures involved, three methodologies were the most appropriate: first, conducting participatory observations; then, semi-structured interviews; and finally, a triangulation of the data with the literature to validate the information obtained.

Participatory Observation
To verify the state of the art regarding a sustainable strategic perspective and capabilities related to it, it was necessary to undertake an in-depth analysis of the partner company. Therefore, a qualitative analysis was carried out in the form of participatory observation. The possibility of being physically inside the company and conducting on-site observations allowed the researchers to immerse themselves in the culture of the organisation under investigation, thus enabling them to highlight the internal mechanisms, practices, and attitudes of the subjects under analysis (Muratovski, 2016). The introduction of the researcher within the workplace also allowed for unstructured interviews during the observations, enabling the description of the design and managerial decision-making processes, highlighting, if necessary, the relationships with sustainability aspects. For this reason, the observations were mainly conducted within the design and marketing department.

Semi-Structured Interviews
To consolidate what emerged during the observation phase, face-to-face semi-structured interviews were conducted with specific company figures. The questions were aimed at assessing the state of the art regarding the methods for creating and sharing strategies and the level of integration with sustainability, as well as the challenges encountered in these elements. In addition, to observe the level of reluctance to the introduction of innovation related to SDfS, the possibility of the inclusion of new methods and tools was exposed (Berná-Martínez & Maciá-Pérez, 2012). For this reason, interviews were conducted with key figures with managerial decision-making power and the company's designers, all of whom are directly involved in an SDfS approach (CEO, three managers, and two designers). A total of six people were interviewed with an average time per interview of 65 minutes. All interviews were recorded, transcribed, and analysed. To promote an ethical approach, all interviewees were informed about the recordings and the confidentiality of the information.

Data Triangulation
To correlate and validate the findings from the previous research steps, it was decided to proceed with a data triangulation with online scientific literature, thus ensuring academic

integrity, rigour, and reliability (Bradbury-Huang, 2010; Given, 2008). A conceptual literature review was conducted concerning barriers to the introduction of SDfS in companies and the skills required for both strategic design and sustainability (Thomas & Hodges, 2010). This made it possible to highlight traces of the results obtained in the work of different authors. The review was approached by querying Scopus and Web of Science (WoS) search databases for specific keywords within the title, abstract, or keywords in different combinations, firstly for barriers ("strategic design," barriers or challenges, sustainability or sustainable development) and then for capabilities ("strategic design," sustainability or sustainable development, capabilities or competencies or skills). The publications that were concerned with measurement methods and tools were excluded. From these results, further documents were obtained through a snowballing sampling analysis (Wohlin, 2014). From this analysis, seven texts related to barriers and twelve texts related to capabilities emerged.

Results

Through transcription, analysis, and coding of the research results, it was possible to identify eight challenges and barriers that hinder the introduction of the SDfS approach within the company. Four of the eight identified barriers emerged during the observation phase and were then highlighted again during the semi-structured interviews. Three out of eight, on the other hand, were mentioned directly by the company figures during the interviews, and one was not mentioned directly but emerged from the subsequent analysis. All the barriers found a counterpart within the literature, although in different industries from that of the company under analysis or related only to strategic design or sustainability. The barriers identified can be clustered into three groups: information sharing and collaboration, knowledge and awareness, and forward-looking (Table 1). The individual barriers will be explored below following these categories.

Information Sharing and Collaboration
B1. Awareness and Sharing of the Company's Objectives
It was clear from the interviews that not all employees were aware of the company's objectives. This gap is evident when the different figures – CEO, managers and employers – describe the goals. While the CEO can go into detail about the future direction (vision) and the necessary actions (strategies), the managers show partial knowledge more focused on their department. Employees, on the other hand, are completely unaware of the company's intentions. This makes it complicated to create a shared objective or a shared vision (Senge, 2006) and to allow different figures to share ideas and thoughts. Furthermore, some initiatives and projects risk being misunderstood and unwelcome. Since the SDfS has a natural tension to the future, it is important that everyone feels and understands the objectives.

CLUSTER	BARRIERS OF THIS STUDY	BARRIERS IN PREVIOUS STUDIES	REFERENCES
Information sharing and collaboration	B1. Awareness and sharing of the company's objectives	• The corporate group has a large influence • Leitbild (there is no clear and comprehensive vision on circular economy (CE) that is shared by all participants, either internally in the company or externally between actors)	Hallstedt et al., 2013; van Keulen & Kircherr, 2021
	B2. Departments are experienced as silos	• Internal conflicts between business functions • Fear of sharing sensitive information • Conflict of interest	Ceschin, 2014
Knowledge and awareness	B3. Awareness of the systemic consequences of actions	• Simulation of sustainability consequences across the product's life cycle • Win-win-win situations for people, planet, and profit	Hallstedt et al., 2013
	B4. Knowledge of design possibilities and knowledge of sustainability aspects	• CEOs do not understand strategic design • Lack of skills to understand users and markets • Companies require new competences, skills, and experiences • Absence of an internal common language and alignment of mindsets • Lack of CE knowledge • Lack of knowledge can be a barrier	Liu & de Bont, 2017; Ceschin, 2014; Adams et al., 2017; Schult & Hallstedt, 2017
	B5. Awareness of key stakeholders	• Social span (company only thinks within own company realms and own industry)	van Keulen & Kircherr, 2021
Forward-looking	B6. Management's commitment and belief in the objectives	• Lack of management commitment • Sustainability is not included at a high level in advanced engineering • The mindset and commitment of the staff is an important aspect to ease the transition to a CE model	Hallstedt et al., 2013; Schulte & Hallstedt, 2017; Rizos et al., 2016
	B7. Learning and knowledge fertilisation	• Designers lack multidisciplinary backgrounds • Know how/knowledge (the know-how to develop CE solutions is not available and/or not applicable)	Liu & de Bont, 2017; van Keulen & Kircherr, 2021
	B8. Short-term thinking	• Incorporating backcasting together with forecasting • Costs and short-term economic thinking are perceived as the dominant barrier	Hallstedt et al., 2013; Schulte & Hallstedt, 2017

Table 1. Barriers derived from the analysis.

B2. Departments Are Experienced as Silos
The different departments and divisions of the company are seen by both management and employees as independent silos that do not contaminate each other. Although

necessary collaborations exist for the proper functioning of the company, information sharing and project collaboration is not encouraged. Following the framework proposed by Gharajedaghi (2006), this fits into a view of the divisional corporate structure where each department, like a part of the body, follows its function dictated by a unicum, the brain. Such a perspective limits the fertilisation of ideas and knowledge, two cornerstones of SDfS.

Knowledge and Awareness
B3. Awareness of the Systemic Consequences of Actions
Within departments, choices are often made mechanically, "because it has always been done that way." Blindly following the same pattern of actions without understanding their motivations and consequences limits the possibility of innovation and the emergence of new opportunities. Furthermore, this limits the prediction of unconscious and uncontrolled consequences not only to the external environment but also to different departments within the company itself.

B4. Knowledge of Design Possibilities and Knowledge of Sustainability Aspects
Regarding sustainability, the knowledge observed in the company under analysis mainly concerns environmental sustainability, leaving the social and economic behind. Regarding strategic design, it is still unknown what its possibilities are. Many still see design as related to products, graphics, or design thinking and its tools. The lack of understanding and knowledge makes it difficult for companies to explore and integrate this approach and its possibilities. This also complicates communication as there is a lack of a common vocabulary.

B5. Awareness of Key Stakeholders
Suppliers and customers are the key stakeholders. Designing and making decisions by looking only at these two main groups is reductive. Considering laws, communities, shareholders, and all the actors that are part of the value chain would increase awareness but also clarify why certain actions are taken. Furthermore, clarifying, mapping, and sharing the stakeholders that gravitate around a company would enable life cycle thinking, resulting in sustainability benefits (Vezzoli & Manzini, 2008).

Forward-Looking
B6. Management's Commitment and Belief in the Objectives
Some corporate actions are perceived as just market goals or are not shared and felt by employees. The commitment of all people in the company, with more emphasis on managers and CEOs, is recognised as valuable by several authors (Hallstedt et al., 2013; Schulte & Hallstedt, 2017; van Keulen & Kirchherr, 2021). It becomes important to best communicate the commitment and ideals that the company stands for. Furthermore, it is important that managers and CEOs show openness towards the opinions of others, fostering dialogue and the emergence of new ideas and future possibilities from collaborating and negotiating with those with different expertise.

B7. Learning and Knowledge Fertilisation
Sustainability is a constantly evolving field, as are the tools and methodologies used in strategic design. The related knowledge must be constantly updated for the company to be competitive, trying to make people understand their importance as learning moments

are often experienced as a waste of time. Furthermore, investing in the education of the company's human capital fosters a sense of commitment and allows those involved to share their knowledge by hybridising it with others.

B8. Short-Term Thinking
An interviewee said, "The risk is that the person, when in a regime of everyday life, tends to spend more time doing than thinking. And so that strategic part becomes more and more narrow, and there is a risk of going very much on doing and very little on strategic thinking." Costs and short-term economic goals drive the activities of companies, moreover, and daily tasks immerse individuals in the present. This precludes a vision with medium- to long-term horizons from a strategic and sustainable perspective, which is necessary for an SDfS approach.

Since SDfS in this article is treated as an approach and a mindset, the more technical and commercial aspects, although they emerged, were not considered in the subsequent stages. Among these, it is worth emphasising how the economic aspects were mentioned by several company figures as a barrier to new possibilities. As emerged from Barrier 8, the price represents a strongly attractive element that overrides other values and characteristics. Furthermore, as the company under analysis is a manufacturer of secondary packaging, the material and new technologies also emerged as limits to future possibilities.

Based on the results of the analysis, these barriers can easily be converted into recommen-dations and enablers, beginning to glimpse indications and possibilities for overcoming them (Table 2).

CLUSTER	BARRIER	ENABLER
Information sharing and collaboration	B1. Awareness and sharing of the company's objectives	E1. Communicate the company vision and plan of action, their benefits, and expected results
	B2. Departments are experienced as silos	E2. Facilitate and improve collaborations between different company departments
Knowledge and awareness	B3. Awareness of the systemic consequences of actions	E3. Create awareness of the (systemic) consequences of everyday actions
	B4. Knowledge of design possibilities and knowledge of sustainability aspects	E4. Create a shared understanding and visualisation of topic and words
	B5. Awareness of key stakeholders	E5. Create a shared understanding of firm stakeholder connection and value chain
Forward-looking	B6. Management's commitment and belief in the objectives	E6. Show management commitment and openness to discussion
	B7. Learning and knowledge fertilisation	E7. Promote and facilitate a systematic competence and knowledge-building in a collaborative way
	B8. Short-term thinking	E8. Facilitating participation in medium- to long-term corporate objectives and understanding how daily actions contribute to these

Table 2. Translation of barriers into enablers.

Through the triangulation of data and the literature review, a strong link between barriers and capabilities also emerged. This made it possible to associate each challenge with capabilities and skills to be implemented within the company to overcome the barriers and introduce SDfS (Table 3). The skills and capabilities that arose from the analysis emerged both in texts focused strictly on strategic design or on sustainability, creating a panel of skills perfect for SDfS. These will be explored below.

C1. Multidisciplinary Collaboration
As already mentioned, the designer is a figure who gets his strength from knowledge connection, having the ability to translate and move ideas and concepts from one field to another (Zurlo, 1999). This ability is also taken up in sustainability as the complexity of the challenges related to it requires figures capable of crossing boundaries and collaborating with those with different backgrounds and knowledge (Cörvers et al., 2016).

C2. Future Thinking
Also referred to as anticipatory competence, temporal thinking, or future orientation, future thinking is the ability to analyse, evaluate, and create images of the future (Wiek et al., 2011a). This relates to both strategic design and sustainability since, in both cases, it is necessary to think about the consequences that decisions made today will have and to foresee problems or further steps needed to achieve goals (Meroni, 2008; Zurlo, 2022).

C3. Systems Thinking
Systemic, system, or rather holistic thinking indicates an individual's ability to analyse a system, relating it to another and looking at it from different perspectives. This allows – from both a design and sustainable perspective – consideration of different actors and possible negative effects that a project or an action might cause (Engle et al., 2017; Wiek et al., 2011a; Zurlo, 1999).

	B1. Awareness and sharing of the company's objectives	B2. Departments are experienced as silos	B3. Awareness of the systemic consequences of actions	B4. Knowledge of design possibilities and knowledge of sustainability aspects	B5. Awareness of key stakeholders	B6. Management's commitment and belief in the objectives	B7. Learning and knowledge fertilisation	B8. Short-term thinking
Complexity and uncertainty management			X		X			X
Visualisation	X			X	X			
Organisation and coordination		X					X	
Negotiation		X				X		
Knowledge connection and translation		X	X		X		X	
Communication	X			X		X	X	
Data interpretation			X					X
Systems thinking			X		X			X
Future thinking	X							X
Multidisciplinary collaboration		X				X	X	
	Information sharing and collaboration		Knowledge and awareness			Forward-looking		

Table 3. Association of barriers with the capabilities needed to overcome them (Calabretta et al., 2016; Cörvers et al., 2016; Dzhengiz & Niesten, 2020; Engle et al., 2017; Hess et al., 2015; Meroni, 2008; Remington-Doucette & Musgrove, 2015; Venn et al., 2022; Wiek et al., 2011b; Zurlo, 1999, 2022).

C4. Data Interpretation
Data interpretation is often referred to as critical thinking and data management, or is taken for granted as basic competence. However, in the professional world, the ability to analyse and understand data plays a fundamental role, especially in interfacing with other stakeholders and the development of new projects (Venn et al., 2022). Furthermore, from a strategic design point of view, correctly interpreting data can help provide new insights and signals of the progress of a started project (Calabretta et al., 2016).

C5. Communication
Communication is often part of a larger competence set: interpersonal skills. Indeed, it plays a fundamental role in the relationship with the other, being closely connected with other skills such as multidisciplinary collaboration or negotiation. The ability to communicate is of fundamental importance both because the strategic designer is inherently a figure who acts as an interface, as a communicative medium between different elements, and because it is necessary to be able to communicate correctly with all the stakeholders of a project (Wiek et al., 2011b; Zurlo, 1999).

C6. Knowledge Connection and Translation
Dealing with very different fields and figures, it is necessary to be able to create connections between these fields to carry out the technology transfer mentioned above. To facilitate the understanding of often-technical knowledge, but also complex problems, it is necessary to be able to translate this information into simpler messages (Venn et al., 2022; Zurlo, 1999).

C7. Negotiation
Also known as mediation, this capacity is present not only in any collaborative work but also in any creative effort (Zurlo, 1999). In multidisciplinary teams with different stakeholders, it becomes important to be able to facilitate the understanding of different points of view and build consensus towards a common direction (Venn et al., 2022).

C8. Organisation and Coordination
Often referred to as project management or strategic planning, this capability has a broader sense, namely that of creating the logistical conditions for activating resources (understood as both material and human resources) within and outside the organisation (Calabretta et al., 2016). Indeed, through coordination and organisation, it is possible to facilitate the implementation of new solutions (Venn et al., 2022).

C9. Visualisation
The ability to visualise enables the individual to accelerate communication and the development of new projects. Indeed, through visual artefacts such as images, diagrams, and infographics, but also prototypes and sketches, it is possible to enable a narrative and to make others understand and see. An interviewee from Venn et al. (2022) says, "You can try to gain attention for a river ecosystem with science and numbers, but a playful campaign with an artistic drawing of a fish or a kingfisher may prompt people to action more quickly."

C10. Complexity and Uncertainty Management
Sustainability is often identified as a wicked problem, a complex issue with no perfect

solution. It becomes necessary to be able to manage the complexity arising from these problems but also articulated systems with different stakeholders. This ability is usually linked to systems thinking and future thinking (Hess et al., 2015).

Lastly, it must be specified how the technical skills and capabilities required to carry out the actions of each specific sector are indispensable. What has been indicated above is to be considered complementary, overlapping with what is technically necessary, and which is usually already present within organisations.

Discussion

The research results confirm the link that has already emerged in the past between strategic design and sustainability. Like any new element, the introduction of researchers and the SDfS approach was viewed with scepticism and fear by corporate figures, high-lighting some barriers. Although the body of literature on the latter is very rich in the field of sustainability and design, very little can be found concerning SDfS. The same can be said about the capabilities needed by a figure who wants to adopt such an approach. Concerning the latter, the analysis showed how the vast majority of the skills reported in the literature for one field can be detected also in the other. It should be emphasised that the strategic element is even considered a skill of its own among the capabilities required for sustainability, and that among these, typical elements of design are often referred to as basic – e.g., problem-solving, critical thinking, and even creativity (Dzhengiz & Niesten, 2020; Engle et al., 2017; Venn et al., 2022). Among other skills in the literature, we can also name normative or ethical thinking (Remington-Doucette & Musgrove, 2015; Venn et al., 2022; Wiek et al., 2011b). As this is linked to the identification of sustainability values and goals, it can be considered (as we have said in the background section) as a *conditio sine qua non* within the SDfS.

Although the results confirm and consolidate this relationship, it should be noted that the barriers in particular take different shades as they relate to the discipline and mindset of SDfS, especially in their resolution and overcoming. Many of them are only addressed through the relationship with the other, in cooperation, and through dialogue between different actors and figures. It thus becomes clear why Wiek et al. (2011a) highlight interpersonal skills as particularly important and necessary for the functioning of other competencies. Hence, management commitment becomes not only dedication, but also openness to dialogue and dissemination; learning is no longer vertical or specific, but collaborative and interdisciplinary. If SDfS is therefore an open, collaborative, and interdisciplinary approach, individuals will only be able to grow, learn, improve, and find solutions to complex problems together by talking to each other and addressing challenges collectively. Such a perspective is grounded in the words of Johnson et al. (2000) and Galimberti (1994). The former advocates cooperative learning as a new model of collective growth where the individual only learns if the group learns (Johnson et al., 2000). The second sees conversation, the exchange of information and messages between individuals as a privileged medium for human evolution (Galimberti, 1994). And, it is through a learning process of this kind – shared and communicative – that, according to Gharajedaghi (2006), it is possible for an industrial system or a society to evolve and change. In fact, he emphasises that for such changes, the sum of the learning of individuals is not sufficient, but rather a new culture is required, the achievement of a new shared positive vision. In this dimension of collective improvement and evolution, by dialoguing and learning

together, individuals somehow take care of each other and their surroundings. Therefore, through the introduction of skills and knowledge related to SDfS and through actions that enhance these aspects, it seems possible to initiate a new widespread corporate culture aimed at growth and improvement of itself and the environment. It is precisely through an approach and a mindset of this kind that we can review the three aforementioned corporate powers initially harnessed in a positive way, to promote new ideas and solutions to complex and systemic problems such as climate change, which sees different actors, each with their objectives involved.

Conclusion

The article proposes the adoption of SDfS as a new mindset to be implemented within companies to improve their contribution to climate change. To be able to incorporate it properly, it is necessary to know the barriers and the capabilities to be introduced to overcome these challenges. Therefore, the article proposes eight barriers and ten capabilities enriching the literature in the field of SDfS through a more pragmatic perspective. The research was carried out within an Italian company in the secondary corrugated packaging sector. Although this was interpreted as a positive element providing a new, more practical perspective on the subject, it could also be seen as a limitation. In fact, this limits the sampling to a single company with a specific corporate structure without a sustainability specialist figure and a well-defined market that is affected by a perception of sustainability that is strongly material-based. Future research could test and validate the results obtained with different sampling and compare them with different geographical areas. Furthermore, although the research was carried out with a practical approach, the barriers and capacities highlighted could be used and tested in the future as a framework not only within a professional context but also in an academic and teaching environment by defining training activities and objectives. By expanding the sample, it might also be possible to define and highlight potential hierarchies for barriers and capabilities.

The research is set within a broader framework of doctoral research. Future research already planned will propose activities and practices in collaboration with the company under analysis to incorporate the identified skills and capabilities. This will provide further practical input for both the community of science and practice.

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