

CONSTRUCTION OF THE MAPPING OF CORPORATE SOCIAL RESPONSIBILITY ISSUES THAT CAN BE MANAGED DURING THE DESIGN PROCESS - APPLICATION IN THE AUTOMOTIVE INDUSTRY

**Capomaccio, Anne-Laure (1,2);
Reyes Carrillo, Tatiana (1);
Garcia, Julien (2)**

1: Universite de Technologie de Troyes;
2: PSA group

ABSTRACT

Sustainability is a key issue for manufacturing companies, which detail in their annual corporate social responsibility (CSR) reports how they plan to operationalise the seventeen sustainable development goals set by the United Nations in 2016. Design is deemed particularly relevant to integrate sustainability issues, and many design for sustainability (DFS) approaches have developed since the 1980s. However, the lack of understanding of the relationship between CSR and design prevents DFS approaches from enabling sustainability issues to be integrated in the design process in a relevant manner with the CSR strategy of a company. Consequently, we developed a mapping methodology in order to provide a better understanding of the CSR-design relationship. This mapping methodology consists in (1) identifying the relevant CSR goals that can be managed during the design process, (2) gathering information about the links between these CSR goals and the design process through semi-structured interviews, and (3) building a map representing these links. We started to apply our mapping methodology in an application case in the automotive industry. The first results of this application are presented in this article.

Keywords: Social responsibility, Sustainability, Design for X (DfX), Mapping model, Automotive industry

Contact:

Capomaccio, Anne-Laure
Universite de Technologie de Troyes
CREIDD
France
anne_laure.capomaccio@utt.fr

Cite this article: Capomaccio, A.-L., Reyes Carrillo, T., Garcia, J. (2021) 'Construction of the Mapping of Corporate Social Responsibility Issues that can be Managed during the Design Process - Application in the Automotive Industry', in *Proceedings of the International Conference on Engineering Design (ICED21)*, Gothenburg, Sweden, 16-20 August 2021. DOI:10.1017/pds.2021.75

1 INTRODUCTION

In the 1960s, a global awareness was raised on the consequences of the development model largely adopted by humans on the environment and on society. In order to make a transition towards sustainable development (SD) the [United Nations \(2016\)](#) have set seventeen Sustainable Development Goals (SDG) that need to be reached by 2030 for a successful transition.

The manufacturing industry is by essence a major actor and driver of the transition towards SD. Indeed, it has largely “*contributed to the environmental crisis*” ([Aggeri and Godard, 2006](#)) and thus has the potential to reduce its environmental and social impacts through innovation. In addition, it contributes to “*sustainable development by [its] actions in terms of social norms’ creation, good environmental practices spreading and new technologies development*” ([Aggeri and Godard, 2006](#)). The European Non-Financial Reporting Directive (NFRD) from 2014 “*lays down the rules on disclosure of non-financial and diversity information by large companies*” ([European Commission website](#)). Manufacturing companies can publish this information in their annual corporate social responsibility (CSR) report, in which they detail how they plan to operationalise the SDG set by the United Nations.

Product design has a major role to play in the transition towards SD as every decision made during the design process - concerning costs, quality, materials and so on - has a direct influence on the social and environmental impacts of products (or services) being developed ([Koo and Cooper, 2011](#)). It is thus particularly relevant to integrate the corporate sustainability goals - i.e. the CSR goals - in the design process. A lot of design for sustainability (DFS) approaches have been developed since the 1990s in order to help integrate sustainability in the design process. However, to our knowledge, none of the existing DFS methods and tools allows the integration of sustainability in the design process in a relevant manner with the CSR strategy. In other words, DFS approaches do not enable an alignment between the CSR goals and the sustainability criteria integrated in the design process. For example, [Dekoninck et al. \(2016\)](#) explain that it is a challenge to “*integrate ecodesign into management and corporate strategy*”; [Rocha et al. \(2019\)](#) highlight the lack of alignment between CSR and DFS, especially for social aspects.

The main barrier highlighted in the literature is the lack of understanding of the relationship between CSR and design. Therefore, we developed a methodology to map the CSR issues and goals that can be managed during the design process. This methodology aims at providing a better understanding of the influence the design process has on the performance of the CSR goals. It consists in three main steps: (1) identifying the CSR goals that can be managed during the design process; (2) identifying the links between the identified CSR goals and the design process (i.e. identifying how the design process influences the CSR performance of the company regarding the identified goals); and (3) providing a map - which is the outcome of the methodology - representing these links. The obtained map should highlight both formalised and non-formalised links between the CSR goals and the design process. When applied in a case study, this mapping methodology should enable companies to identify the links between CSR and design that need to be formalised, in case they want to improve the management of CSR in the design process. We assume that this mapping methodology is especially relevant for companies dealing with complex systems, for which the relationship between CSR and design can be particularly difficult to map due to this complex aspect.

This paper presents the created mapping methodology. We start by presenting the findings from the literature, justifying the need to build this methodology. Then we focus on the methodology itself and the way it was built. Finally, we present an application case of our methodology in the automotive industry. This application is incomplete, but future perspectives are presented at the end of the paper, as well as perspectives to utilize the information given by the obtained map.

2 STATE OF THE ART AND RESEARCH PROBLEM

This section presents the findings from the literature review, leading to investigate how to map the CSR goals that can be managed during the design process.

2.1 A strong relationship between CSR and design

The main goal of a company when implementing a CSR strategy is to “*maximise its contribution to sustainable development*” ([AFNOR, 2010](#)). The ISO 26000 standard recommends that CSR shall be integrated in all the activities of the company. The design process is part of these activities, and is deemed particularly relevant to integrate sustainability issues. Indeed, the decisions made during the design process “*directly influence the impacts products and services have on our society and the*

environment” (Koo and Cooper, 2011). 70% to 80% of these impacts are determined by the design choices. Consequently, design activities have the potential to positively influence the success of the CSR strategy and the achievement of the CSR goals. The matrixes developed by Yang et al. (2016) and Koo (2015) support that statement as they highlight the links between CSR issues and design activities. For instance, the matrix developed by Yang et al. (2016) shows that the selection of components during the design process strongly influences the pollution prevention and the sustainable use of resources, which are key strategic issues for companies today. However, these matrixes do not provide a deep understanding of the relationship between CSR and design, as they only deal with macro design activities. In addition, they consider only the major CSR issues listed in the ISO 26000 standard, without taking into account the fact that CSR is specific to each company - regarding both the CSR issues and the operationalization of the CSR strategy. The important point here is that there is a strong relationship between CSR and design, and that it is necessary to understand this relationship deeply in order to integrate the CSR issues in the design process successfully.

2.2 Gaps identified in DFS approaches to address CSR issues

As it is very relevant to integrate sustainability aspects in the design process, many DFS approaches were developed after the emergence of the concept of SD. Ceschin and Gaziulusoy (2016) have mapped the existing DFS approaches, which have evolved from technology-centred and insular approaches to human-centred and systemic approaches. The first approaches focused on products and their goal was mainly to reduce the environmental impacts of products through incremental innovation. These approaches then became larger, including not only environmental but also social concerns, and considering not only the products but also the whole socio-economical systems around the products. However, to our knowledge, none of the existing DFS approaches enables the integration of sustainability in the design process in a relevant manner with the CSR strategy. For DFS approaches to enable designers to address CSR issues, several gaps need to be bridged.

A first gap to bridge is the fact that DFS approaches are not enough operational. Even if a lot of DFS approaches, methods and tools exist, *“the high degree of effort required for their selection and application”* is an obstacle to their adoption by designers (Buchert et al, 2017). In addition, the variety of methods and tools reveals a *“lack of consensus on how to operationalize sustainable development”* (Rocha et al., 2019). As a result, DFS approaches are much more developed in theory than practically adopted. Faludi et al. (2020) recommend that the field of sustainable design *“should rely less on theory and more on empirical testing of sustainable design methods”*. Empirical testing is also a way to make *“industry designers, engineers, and managers consider environmental and social implications of their products more than they otherwise would”* (Faludi et al., 2020).

Another gap regarding DFS approaches is the coverage of sustainability issues. Rocha et al. (2019) analysed ten DFS models and concluded that *“environmental criteria tend to be more emphasized than the social and the economic ones, either in the sense they are more numerous and detailed or because they are more directly related to product or service performance, whereas the other dimensions are addressed in a vaguer way”*. The social dimension in particular is still poorly addressed by DFS approaches, which constitutes one of the barriers for the adoption of DFS approaches to manage CSR goals during the design process. Rocha et al. (2019) question the potential of aligning CSR and DFS in order to address the question of social issues: *“Will a better alignment of social responsibility and DFS support overcoming this difficulty?”*. Rocha and Schmidt (2014) already analysed the potential alignment between CSR and design: *“As the current DfS frameworks and practices overlook social aspects and stakeholder engagement or deal with these aspects based on an ad hoc list of topics, the ISO 26000 standard on Social Responsibility potentially offers a new and systematic approach both as regards the social issues to be included in DfS and in managing the stakeholder engagement”*.

A last important point to keep in mind is the fact that CSR is very specific to each company, meaning that DFS approaches need to be flexible enough to take into account the specific CSR goals of a given company. Indeed, the ISO 26000 standard is only a guide for companies to question their practices: every company has a unique CSR approach, depending on its strategic context and ecosystem, as well as on its maturity in terms of integration of social issues in the different spheres of the company.

2.3 How to bridge the gaps of DFS approaches?

Despite the fact that there is a strong relationship between CSR and design, DFS approaches fail to address CSR issues. The different gaps highlighted before make it possible to outline an answer to

these gaps. Indeed, for DFS approaches to be operational and to cover relevant social issues there is a need to improve the alignment between CSR and design. This alignment is necessary to implement the relevant sustainability targets in the design process, and to make DFS operational and adapted to the sustainability strategy of each company. However, the first necessary step is to understand the relationship between CSR and design deeply. It is all the more important given the fact that CSR is very specific to each company. The challenge is to understand how the design process influences the performance of the CSR goals of companies, knowing that many links between CSR and design are not formalised. Some models were developed to improve the understanding of the relationship between the strategic level - CSR - and the operational level - the design process. For example, Zhang et al. (2013) developed a navigation model composed of three modules: strategic, tactical and operational. They made the hypothesis that the integration of sustainability in a company would be facilitated by a better circulation of information flows between the different hierarchical levels of the company. However, their navigation model only covered environmental aspects, and it misses some bricks to enable the identification of the non-formalised links between CSR and design. The other models developed have the same problems: they either prevent all CSR issues from being covered or miss some bricks to enable a deep understanding of the relationship between CSR and design. Consequently, it is impossible to evaluate whether the implementation of the CSR strategy in the design process is optimal or not. That is why there is a need to develop a methodology to understand and assess the relationship between CSR and design; this methodology should enable to identify the links between the CSR goals and the design process, either formalised or not. The main scientific problem we tackle is the lack of alignment between CSR and design, which can be bridged by a deep understanding of the relationship between CSR and design, and of the way design activities can influence the success of the CSR goals. Our first research question is therefore: how is it possible to map the CSR issues that can be managed during the design process? The methodology we developed to build this map is presented in the next section.

3 CONSTRUCTION OF THE MAPPING METHODOLOGY

This section presents the mapping methodology that we created. It consists in three steps: (1) identifying the relevant CSR goals that can be managed during the design process; (2) gathering information through semi-directive interviews in order to understand the influence of the design process on the performance of the identified CSR goals; (3) building the map to represent the links between the CSR goals and the design process. These three steps are detailed thereafter.

3.1 Identifying the relevant CSR goals that can be managed during the design process

The first step of our mapping methodology is presented in Figure 1. It aims at identifying the CSR goals that can be managed during the design process.

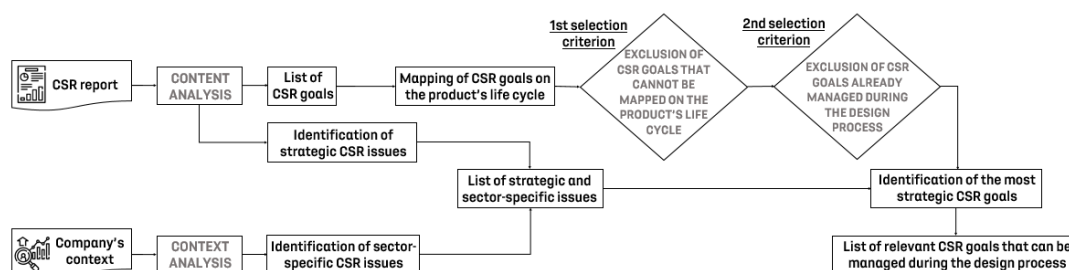


Figure 1. First part of the mapping methodology - Identification of the relevant CSR goals that can be managed during the design process

This step is necessary for two main several reasons: first, some CSR goals are not relevant to manage during the design process because design activities have no or very little influence on the performance of these goals; second, some CSR goals are already managed during the design process and should therefore not be addressed in priority. Two selection criteria were established in order to identify the CSR goals that can be managed during the design process.

A prior step to the selection process is to obtain an exhaustive list of the CSR goals targeted by the company. To do this, a content analysis of the CSR report is necessary. Indeed, manufacturing companies publish every year a CSR report in which they detail their commitments and actions in terms of social responsibility. CSR reports vary from one company to another, both in terms of content and structure, in line with the fact that CSR is very specific to each company. However, the ISO 26000 standard provides guidelines for CSR reporting, and other reporting guidelines have been largely adopted by companies - like the Global Reporting Initiative (GRI). This makes it easier to analyse the content of the CSR reports as they tend to be standardized. CSR reports are also useful to follow the evolution of the CSR issues from one year to another. This evolution strongly depends on the current trends in the sector of the company: analysing the company's context is therefore important to anticipate the CSR issues that are or will become the most strategic.

Once the list of CSR goals is obtained, the first selection criteria can be applied. It aims at selecting only the relevant CSR goals that can be managed during the design process. We make the statement that only the CSR goals related to one or more steps of the product's lifecycle are relevant to manage during the design process, as they are more likely to be influenced by design activities. We make this statement for two reasons: first, we believe it should enable to exclude CSR goals that relate to company practices rather than to the product itself. At first glance, design activities are more likely to influence the success of CSR goals related to the product than to company practices. Second, we believe that mapping the CSR goals on the product's lifecycle should enable us to understand the relationship between these goals and the design process better, and to integrate relevant CSR issues that are still poorly addressed during the design process - especially social issues.

Then the second selection criteria can be applied. It aims at excluding the CSR goals that are already managed during the design process. All the CSR goals that are already well included and managed during the design process are excluded from our scope.

This selection process enables the identification of the relevant CSR goals that can be managed during the design process, and for which there is no obvious formalized link with the design process. The last step is to confront the identified CSR goals with the list of strategic CSR issues, derived from both the analysis of the company's context and the content analysis of the CSR report. Indeed, the key CSR issues are different from one sector to another, but also from one company to another, even in the same sector. They depend on the trends of the company's sector, on the expectations of the stakeholders, on the company's strategic vision, and so on. Having these key CSR issues in mind is very useful to prioritise the CSR goals that are the most relevant to target, when trying to understand how their performance can be influenced by the design process. In addition, emerging strategic CSR issues can be identified, and mapping their relationship with the design process enables companies to understand how they can be influenced by design, if companies aim at addressing them properly during the design process.

3.2 Gathering information about the relationship between CSR and design

The second step of our mapping methodology is presented in Figure 2. It aims at gathering information about the relationship between the identified CSR goals and the design process.

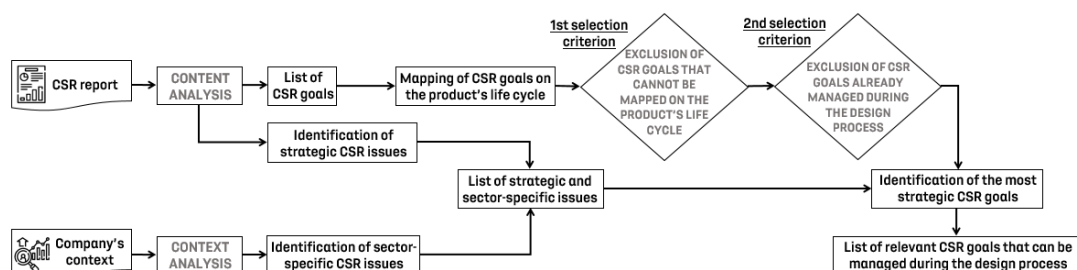


Figure 2. Second part of the mapping methodology - Gathering of information about the relationship between the CSR goals and the design process

The content analysis of the CSR report already enables to gather information about the different CSR goals and the potential link with the design process. However, to go deeper in understanding the relationship, we need to gather information from appropriate interlocutors inside the company. These interlocutors can be identified through a content analysis of the CSR report - which often details how

the CSR strategy is operationalised - combined with an internal investigation. Depending on the operational management of CSR in the company, these interlocutors will be different. In any case, the goal is to identify these key interlocutors and to characterise their role in the management and flow of CSR data. In order to gather information, semi-structured interviews seem particularly appropriate. Indeed, they “*can be flexible, with open-ended questions and the chance to explore issues that arise spontaneously (Berg 2009, Ryan et al 2009). The researcher is free to vary the order of the questions (Power et al 2010), depending on the direction of the interview, and to ask additional questions (Corbetta 2003). The researcher can explore new paths that emerge during the interview that may not have been considered initially (Gray 2004)*” (Doody and Noonan, 2013). As the relationship between CSR and design is not formally established regarding the CSR goals we target, semi-structured interviews are appropriate because they allow a very flexible discussion. They enable the interviewer and the interviewees to characterise the relationship progressively by bouncing back on the different questions and answers. In addition, the common guide of topics addressed during every interview enables gathering the same type of information from all interviewees while letting the possibility to adapt the questions to the different CSR goals and domains. One of the limits of semi-structured interviews is the risk to miss important information because of the flexibility of the interviews. This limit should not be a problem in our research, as several iterations of interviews can be organised. It is also possible that some interviews lead to the identification of other relevant interlocutors not identified before, and not necessarily directly linked with CSR. In this case, semi-structured interviews can be planned with these interlocutors too. Whoever the interviewee is, several iterations of interviews can be made until the right amount of information is gathered.

The main goal of these interviews is to characterize the relationship between the identified CSR goals and the design process. In other words, the goal is to understand how design can influence the performance and the achievement of the identified CSR goals. During these interviews, it is possible to identify already formalised links, links under creation, or non-formalised links. Further details about the different kind of links are available in the next section.

3.3 Building the map to represent the links between CSR and design

The outcome of our mapping methodology is a map representing the links between the CSR goals we identified as relevant, and the design process. The information gathered during the interviews is used to build this map. This map aims at enabling a better understanding of the relationship between the CSR goals and the design process. A general model of the map that can be built thanks to our mapping methodology is presented in Figure 3.

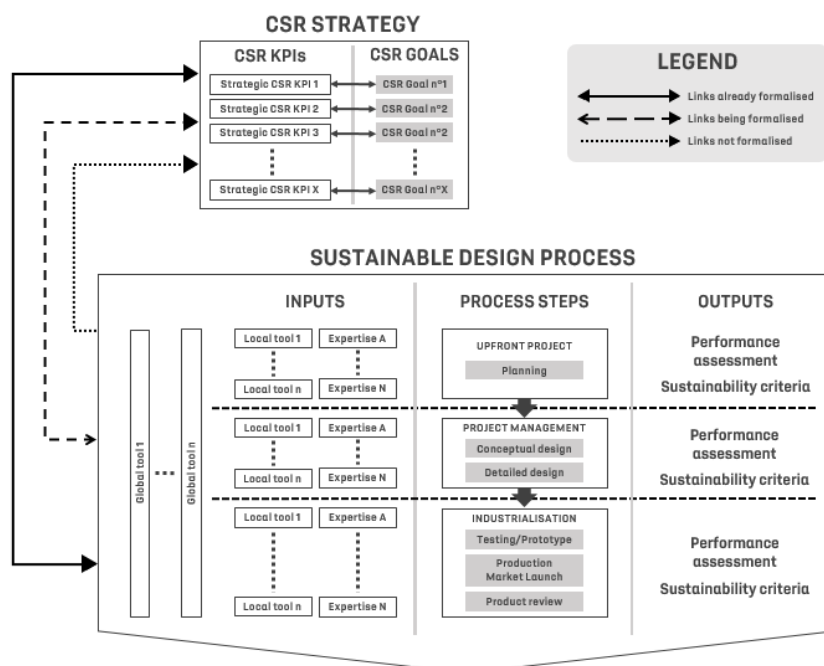


Figure 3. Model of the desired mapping model

The CSR strategy of the company is represented on top of the map. It is composed of different CSR goals, whose performance is monitored thanks to strategic Key Performance Indicators (KPIs). One CSR goal can be monitored by one or more strategic KPIs. The sustainable design process of the company is represented on the bottom of the map. It is composed of several successive steps. At each step, several expertise and tools are mobilised. Some tools are local - used only for a specific step of the design process - while some other tools are global - transversal to the design process. Expertise and tools are the inputs of the design process. The outputs at each step are both a performance assessment - quality, cost and so on - and sustainability criteria. These outputs can either guide the decisions during the design process, or inform these decisions, regarding the targets in terms of performance and sustainability. The arrows between the CSR strategy and the design process represent the different kind of links that exist between the CSR goals and the design process, identified during the interviews: (1) links already formalised, (2) links being formalised and (3) links non-formalised. Multiple links of each type exist, but the model in Figure 3 only shows the kind of links that exist: when a map is built within a case study, all the links identified during the interview need to appear on the map, each link corresponding to one of the three kind of links presented here. Links already formalised are represented by two-way arrows, meaning that the influence of design on the associated CSR issue is acknowledged, and that the CSR issue is already managed during the design process. However if this kind of link is identified throughout the interviews, it means that the CSR issue is not completely - or not optimally - managed during the design process, because CSR issues already well-managed during the design process are excluded from the scope of the mapping methodology from the beginning. Links being formalised are also represented by two-way arrows, but with dotted lines to indicate that the link is being created. In this case, the influence of design on the associated CSR issue is acknowledged, but the management of the CSR issue during the design process is under development. Finally, non-formalised links are represented by one-way arrows, meaning that the influence of design of the associated CSR issue is acknowledged but that the CSR issue is not managed at all during the design process. All three kind of links will be illustrated in our application case.

This model is voluntarily very general, so that it can be adapted to the specificities of each company - regarding both its CSR strategy and its design process. But when applied in a case study, this model will need to be more detailed in order to get a deep understanding of the relationship between the CSR goals and the design process. We have partially applied our mapping methodology in our application case in the automotive industry. The next section presents the first results we have obtained so far. The next steps to complete the application of our methodology are detailed in the discussion section.

4 APPLICATION IN THE AUTOMOTIVE INDUSTRY

This section presents an application case of our mapping methodology in the automotive industry, within Groupe Stellantis. Groupe Stellantis is the second European car manufacturer and mobility provider. It is strongly engaged in favour of SD and has deployed an eco-design strategy for several years now. However, it aims at better understanding the way design activities can influence the success of its CSR strategy. We decided to apply our mapping methodology within the Groupe, in order to provide it a better understanding of the relationship between its CSR goals and its design process. So far, our application is incomplete and only the first results of our application are presented in this section.

4.1 Identification of the relevant CSR goals that can be managed during the design process

The first step consisted in identifying the relevant CSR goals that can be managed during the design process. By analysing the 2019 CSR report, we were able to identify 23 CSR goals, classified into seven macro-risks. A materiality matrix established by the company specifies how strategic the different CSR goals are, regarding the importance of the stakeholders' expectations and the importance for business performance. We started by mapping the CSR goals on the vehicle's lifecycle, as presented in Figure 4. The goals in light grey in the box on the right are those we could not easily map on the vehicle's lifecycle, either because they were related to company practices or because they did not refer to one step of the lifecycle in particular. They were thus excluded from our scope. Then we had to remove the CSR goals that were already managed during the design process. We excluded four goals from the use phase: "Vehicle impact on air quality", "Vehicle CO₂ emissions", "Vehicle safety" and "Vehicle and service quality - Customer satisfaction". These goals are all already well managed during the design

process. We also decided to exclude three more goals from our scope: “Responsible management of customer’s data and relationship”, “Responsible information and marketing” and “Local sourcing development in host territories”. Even if our exclusion criteria did not tend to exclude these goals from our scope, we realised that their relationship with the design process seemed complicated to address; therefore, we decided to remove them at least for the beginning of our application case. In the end, we identified ten CSR goals that can be managed during the design process - those in dark grey on Figure 4.

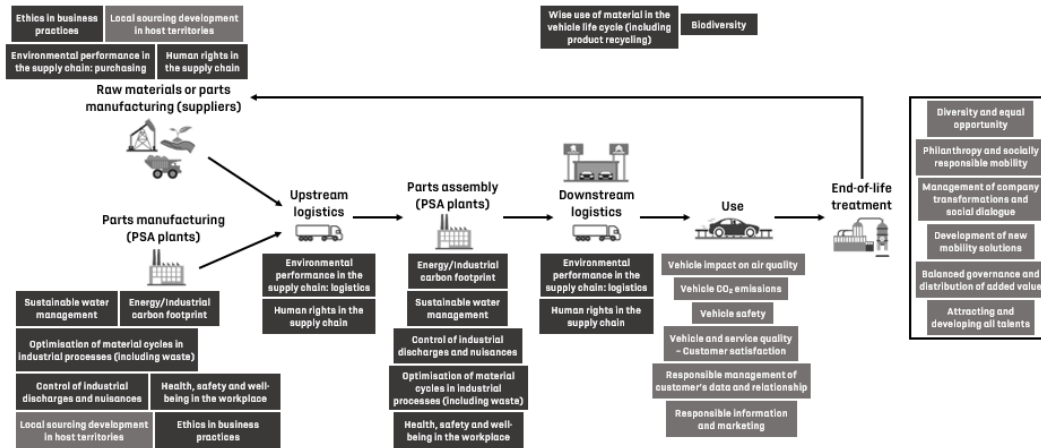


Figure 4. Mapping of the CSR goals of Groupe Stellantis on the vehicle's lifecycle

In parallel, we analysed the context of the automotive industry in order to identify strategic sector-specific CSR issues. The automotive industry is currently experimenting a shift in vehicle uses. Three main changes shape the future of the automotive industry: the electrification of vehicles, the development of new mobility offers like car sharing, and the development of smart vehicles. The electrification of vehicles is the consequence of a particular focus on the CO₂ emissions during the use phase of vehicles, which have catastrophic impacts on the environment. The added value of cars has thus moved from Europe to China, where batteries are produced. Consequently, social and geopolitical stakes have emerged, and logistics and supply problems have been raised. In addition to the electrification of vehicles, new mobility uses have developed in order to reduce road congestion - and thus the negative impact on the environment. Car sharing and car-pooling are now common practices. The development of the sharing economy raises questions on the development of new mobility offers. Finally, vehicles are becoming more and more connected. The connected objects in vehicles create new problems different from the vehicle itself that need to be addressed. Keeping these trends in mind is important to target in priority the strategic issues, and to orient the strategy of the company.

4.2 Gathering of information to build the map

In order to characterise the relationship between the identified CSR goals and the design process, we identified the qualified persons in the company that would be able to help us establish our map. The 2019 CSR report of Groupe Stellantis details the operational management of CSR: there are different CSR correspondents who are in charge of one or more CSR goals, and who are surrounded by a network of contributors. We made an internal investigation in order to identify the CSR correspondents who were in charge of the CSR goals we identified. This helped us understand the internal organisation of CSR management in the company. So far, we have conducted interviews with interlocutors related to seven out of the ten CSR goals we identified. We have made several rounds of interviews with these interlocutors, and have gathered a lot of information regarding the links between the CSR goals we have addressed so far and the design process. To illustrate the different kind of links we have identified - formalised, under creation and not formalised - here are three examples:

- When the suppliers are chosen during the design process, their selection directly influences the CSR goal of “Environmental performance in the supply chain”. Indeed, choosing suppliers with a better performance regarding environmental aspects improves the company’s performance regarding the previously mentioned CSR issue. Consequently, a minimum level of environmental performance is required for the suppliers to be selectable: the link between the previously mentioned CSR goal and the design process is thus formalised thanks to a criterion of minimum environmental score of the suppliers.

- Regarding remanufacturing, a team in the circular business unit of the company is currently working on implementing requirements for remanufacturing during the design process: the link between the CSR performance in terms of remanufacturing (which is part of the CSR issue “Wise use of material in the vehicle life cycle”) and the design process is under creation.
- The design of components influences the painting process, which requires more or less baking time depending on the shape, volume and material of the components. This link is acknowledged, but it is not monitored during the design process: the link is not formalised.

This information will be used to build the map representing the links between the CSR goals and the design process, based on the model presented in Figure 3. The next steps of our application case are detailed in the next section.

5 DISCUSSION AND FUTURE WORK

This section presents the next steps of the application case of our mapping methodology, as well as a discussion regarding the methodology we developed, and the perspectives of use of the map obtained at the end of the mapping methodology.

5.1 Next steps of the application case

So far, in our application case, we have completed the first step of our mapping methodology, and started the second step. We now need to complete the second step, and to build our map. To complete the second step, we need to address the three CSR goals that we have not addressed yet. We need to plan interviews with the relevant interlocutors related to these goals, in order to gather the information we need. The last step will consist in building the map on the basis of the model presented in Figure 3. This map is currently under construction, based on the information already gathered during the first interviews.

5.2 Discussion regarding the mapping methodology

The aim of our mapping methodology is to provide a better understanding of the relationship between the CSR goals and the design process. Even if the application case is incomplete, we have already identified many links between the CSR goals and the design process, most of them being non-formalised. This suggests that our mapping methodology is operational, and succeeds to provide information about the relationship between CSR and design. In addition, identifying non-formalised links means that the mapping methodology highlights gaps in the operationalisation of the CSR strategy: companies can use this information to target the links that need to be built or consolidated.

However, we need to be aware of the potential limits of our mapping methodology. For the identification of the relevant CSR goals that can be managed during the design process, we make the assumption that only the CSR goals that can be mapped on the product’s lifecycle can be considered relevant. This assumption could lead to the exclusion and/or to the selection of the wrong CSR goals. In our application case, the excluded goals were all very disconnected from the design process as most of them were related to company practices. However, some of the CSR goals that could be mapped on the vehicle’s lifecycle were deemed irrelevant, as we could not easily see the link between these CSR goals and the design process. These results suggest that our first selection criterion might be only partially adequate. Another potential limit of our mapping methodology deals with the relevance of semi-structured interviews; this limit has already been addressed before, and semi-structured interviews with several possible iterations seem particularly appropriate to gather information. Finally, regarding the proposed model of the map, we cannot conclude on its relevance, as other case studies would be necessary to see if this model - and our mapping methodology in general - can be adapted to other companies with different contexts.

5.3 Perspectives of use of the obtained map

Our mapping methodology is only the first step of a more global research project, which aims at developing a methodology to manage CSR goals during the design process. The outcome of our mapping methodology - the map - will serve as a reference for the next steps of our global research project. Indeed, in order to manage CSR goals during the design process it is necessary to start by identifying the missing links between CSR and design. The map obtained at the end of our mapping methodology is therefore essential to identify which links can be formalised. Only then will it be possible to develop a methodology to manage the CSR goals during the design process.

6 CONCLUSION

Despite the fact that design has the potential to influence the success of the CSR strategy, there is no method or tool that enables the integration of sustainability in the design process in a relevant manner with the CSR strategy of companies. Even if many DFS approaches exist in order to integrate sustainability in the design process, they fail in addressing CSR issues, mainly because of the lack of alignment between CSR and design, which results from a poor understanding of the relationship between CSR and design. The mapping methodology we developed aims at answering this scientific problem by providing a deep understanding of the influence of the design process on the performance of the CSR goals of companies. The methodology consists in identifying the relevant CSR goals that can be managed during the design process, gathering information about the relationship between these goals and the design process, and building a map representing these links. This map is the outcome of the methodology. The developed mapping methodology is the first step of a more global research project, which aims at developing a methodology to manage CSR issues during the design process. We started to apply our mapping methodology in an application case in the automotive industry. Even if the application is incomplete, our mapping methodology proves to be applicable and successful in providing a better understanding of the relationship between the CSR goals and the design process of a company.

REFERENCES

- AFNOR (2010), “*ISO 26000:2010 : Lignes directrices relatives à la responsabilité sociétale*”.
- Aggeri, F. and Godard, O. (2006), “*Les entreprises et le développement durable*”, *Entreprises et histoire*, Vol. 4 No. 45, pp. 6-19. <https://doi.org/10.3917/eh.045.0006>
- Baldassarre, B.R., Calabretta, G., Bocken, N.M.P, Diehl, J.C. and Duygu, K. (2019), “*The evolution of the strategic role of designers for sustainable development*”, In: *Academy for Design Innovation Management Conference 2019: Research Perspectives in the era of Transformations*, pp. 1-15.
- Blessing, L. and Chakrabarti, A. (2009), “*DRM, a Design Research Methodology*”, Springer, London. <https://doi.org/10.1007/978-1-84882-587-1>
- Buchert, T., A. Halstenberg, F. Bonvoisin, J., Lindow, K. and Stark, R. (2017), “*Target-driven selection and scheduling of methods for sustainable product development*”, *Journal of Cleaner Production*, Vol. 161, pp. 403-421. <https://doi.org/10.1016/j.jclepro.2017.05.067>
- Ceschin, F. and Gaziulusoy, I. (2016), “*Evolution of design for sustainability: From product design to design for system innovations and transitions*”, *Design Studies*, Vol. 47, pp. 118-163. <https://doi.org/10.1016/j.destud.2016.09.002>
- Dekoninck, E., Domingo, L., O’Hare, J., Pigosso, D., Reyes, T. and Troussier, N. (2016), “*Defining the challenges for ecodesign implementation in companies: Development and consolidation of a framework*”, *Journal of Cleaner Production*, Vol. 135, pp. 410-425. <https://doi.org/10.1016/j.jclepro.2016.06.045>
- Doody, O. and Noonan, M. (2013), “*Preparing and conducting interviews to collect data*”, *Nurse Researcher*, Vol. 20 No. 5. <https://doi.org/10.7748/nr2013.05.20.5.28.e327>
- Faludi, J, Yiu, F. and Agogino, A. (2020), “*Where do professionals find sustainability and innovation value? Empirical tests of three sustainable design methods*”, *Design Science*, Vol. 6. <https://doi.org/10.1017/dsj.2020.17>
- Koo, Y. (2016), “*Developing a framework for supporting the delivery of corporate social responsibility (CSR) through design in product- and service-oriented industries*”, *Archives of Design Research*, Vol. 29, No. 1, pp. 31-45. <http://dx.doi.org/10.15187/adr.2016.02.29.1.31>
- Koo, Y and Cooper, R. (2011), “*Managing corporate social responsibility through design*”, *Design Management Review*, Vol. 22 No. 1, pp. 68-79. <https://doi.org/10.1111/j.1948-7169.2011.00112.x>
- Rocha, C., Antunes, P. and Partidario, P. (2019), “*Design for sustainability models: A multiperspective review*”, *Journal of Cleaner Production*, Vol. 234, pp. 1428-1445. <https://doi.org/10.1016/j.jclepro.2019.06.108>
- Rocha, C. and Schmidt, K. (2014), “*The ISO 26000 standard as a driver for a systemic design for sustainability*”, In: *17th European Roundtable on Sustainable Consumption and Production, Book of Proceedings*, pp. 108-129.
- United Nations (2016), “*Sustainable Development Goals Report*”, United Nations Publication, New York.
- Yang, C., Huang, K, Huang, C. and Huang, R. (2016), “*Integration of corporate social responsibility into new product development*”, *International Journal of Management, Economics and Social Sciences*, Vol. 5 No. 1, pp. 14-34. <https://dx.doi.org/10.2139/ssrn.2764236>
- Zhang, F., Rio, M., Allais, R., Zwolinski, P., Reyes Carrillo, T, Roucoules, L., Mercier-Laurent, E. and Buclet, N. (2013), “*Toward an systemic navigation framework to integrate sustainable development into the company*”, *Journal of Cleaner Production*, Vol. 54, pp. 199-214. <https://doi.org/10.1016/j.jclepro.2013.03.054>