Design of a material selection tool; A case study in finding a suitable material for packing vinyl records more sustainable.

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This bachelor assignment was performed for the client Mr. Roordink, who is a trader and collector of vinyl records. From the client, the question arose for finding a more sustainable material for packing vinyl records. In the latest years, the environment has become more and more important and through this assignment, it will be examined whether the use of a different material for the outer sleeves, can also contribute to this trend of helping the environment.

In order to draw a proper conclusion for the assignment a material selection tool has been created. This tool is developed in order to create a clear structure in the whole process and explain why certain steps are taken. The main aim of the tool was to design the tool in such a way that it cannot only be used for this specific assignment but that it can be used for all different kinds of products. So the tool would lead as guidance during the research for finding a suitable material to create a more sustainable version of a current product. The designed tool finally consists of 5 main steps, and some additional sub-steps (figure 1).

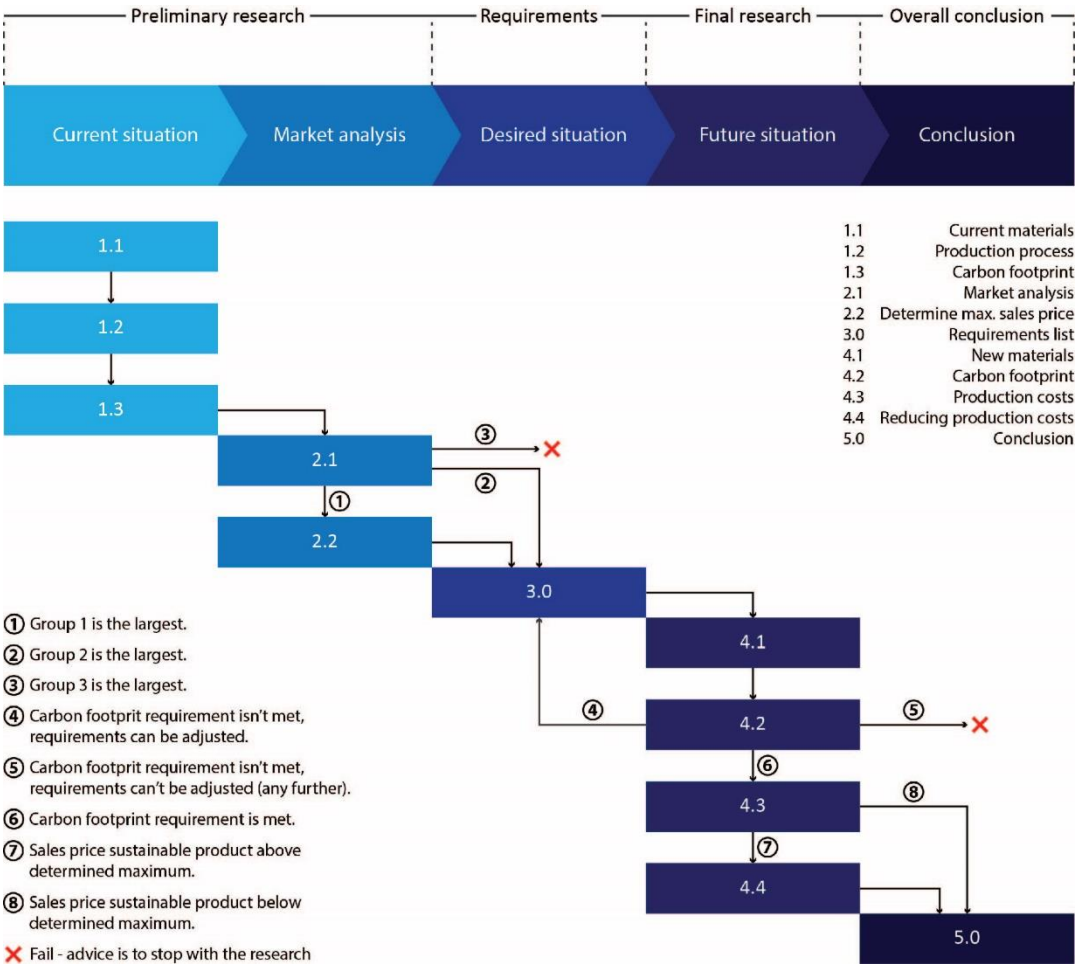

Figure 1: Scheme of the designed material selection tool

The assignment is about creating a more sustainable product, however, sustainability is a very broad term, during the assignment there is only focused on the impact of a material/product on the environment. The impact of a material/product on the environment will be determined according to their carbon footprint (CO_2 emission that occurs during the whole process).
To give an answer to the question of the client, a case study is made that follows the step by step structure of the created tool.

One of the important findings during the research is that the majority of the consumers of LPs are willing to pay more for sustainable outer sleeves. This created more opportunities in finding a more sustainable material since most sustainable possibilities require a higher price.
With the determined requirements list, to guarantee the quality of the sustainable outer sleeves, a few materials were left. From these materials, the materials HDPE and PLA were the materials with both a lower carbon footprint than the current materials (figure 2). And therefore these materials were considered to be potential materials for the sustainable outer sleeves.

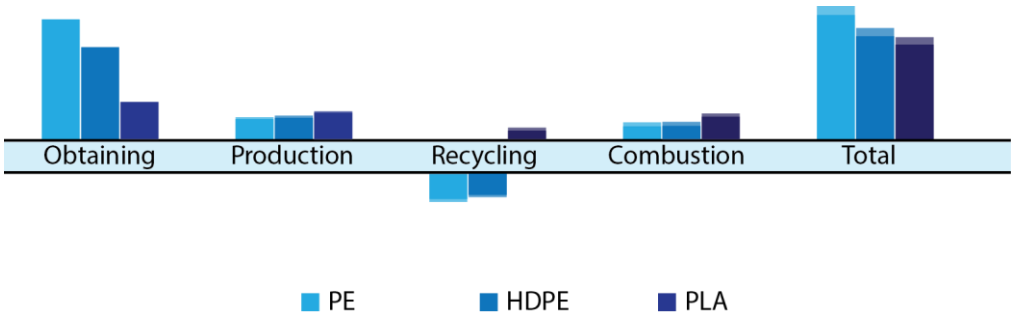

Figure 2: Overview of the comparison of the carbon footprint from 3 different materials

In order to determine the best material to go for there is also looked at the final sales price of the sustainable outer sleeves, when made of HDPE or PLA. For both HDPE and PLA their determined sales price, are stated below the earlier determined maximum sales price. The maximum sales price is determined, based on what the consumers are willing to pay.
The sales price for HDPE is lower than that from PLA, which means that the market share of sustainable outer sleeves made of HDPE is higher than the ones made of PLA. So both the materials have an advantage and disadvantage compared to each other, where PLA has the lowest carbon footprint, HDPE has a higher market share. Therefore to determine which material is the most suitable, the total carbon footprint in combination with the market share is calculated. From these results, it can be seen that also in this case PLA is the most beneficial compared to HDPE. Therefore, the final advice would be to choose PLA for producing sustainable outer sleeves.

From the reflection on the designed tool, it became clear that there are still some points for improvement, to make the tool more complete and better followable.
In the end, it must also be stated that during the research indicative data is used and that therefore without testing the results, the results will only guide as an advice.