Lockdowns and Consumers: A Dashboard to Tell Us What We Already Suspect About Toilet Paper

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Industrial Engineering and Management thesis assignment

January 27th, 2025

Management summary

The research of this thesis is performed at SymphonyAI, who provides suppliers of [supermarket X] with tools to analyze sales data and product performance among its consumers. After this research, a dashboard was presented to fit the needs of these suppliers.

Problem definition
After the pandemic, it is important to reflect and look back at data from that period. To many it is not common knowledge in which weeks the key moments in the pandemic took place and even if this information is available, within the EIA, it feels unintuitive to reselect every week when you want to check another lockdown period. This is because the EIA is commonly used to analyze the effects of weekly promotions instead of longer periods in time. To solve this problem, the following research question was formulated:

"How do we efficiently show change in shopping behavior during lockdowns?"

To answer this question, 5 subquestions were stated to present supporting context for the main research question:

1. What metrics/KPI's of shopping behavior are affected most by lockdowns?
2. What weeks were considered lockdowns and which measures were active?
3. Which covid-measures affects shopping behavior most?
4. How do we visualize KPI's on the dashboard?
5. How do we measure a dashboard's effectiveness?

Identifying lockdown weeks
To identify in which weeks covid measures were active, the RIVM (public department of health) and Rijksoverheid (government) websites were analyzed. On these websites, daily updates were posted regarding new measures. This information was then added to a table featuring a list of weeks and measures that were active.

After lockdown weeks were identified, sales data was analyzed to determine with more precision at which points product performance changed the most. This resulted in 2 transition periods per identified lockdown and curfew, focusing on the first 4 weeks of a lockdown or curfew, and the first 4 weeks after a lockdown or curfew ends (Figure 1).

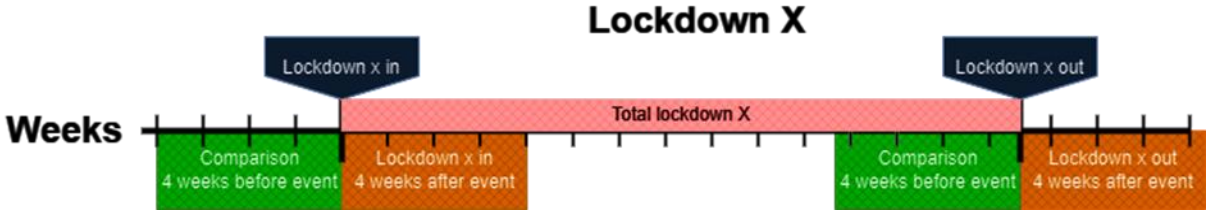

Figure 1 Lockdown transition timeline

In the figure above, an example is given for Lockdown X, for lockdown X, there are 2 events (Lockdown transitions) marked: "Lockdown X in" and " Lockdown X out" which show the start and end of a total lockdown period respectively. For each of the events, calculations are run by comparing data 4 weeks leading up to the event and 4 weeks after the event. This means in total there are 8 lockdown transitions for which the dashboard will show values (Table 1 on the next page):

Table 1 Lockdown transitions

weeks	Lockdown 1 in	Lockdown 1 out	Lockdown 2 in	Lockdown 2 out	Lockdown 3 in	Lockdown 3 out	Curfew in	Curfew out
Comparison	202007	202023	202038	202121	202140	202208	202052	202113
Comparison	202008	202024	202039	202122	202141	202209	202053	202114
Comparison	202009	202025	202040	202123	202142	202210	202101	202115
Comparison	202010	202026	202041	202124	202143	202211	202102	202116
Event	202011	202027	202042	202125	202144	202212	202103	202117
Event	202012	202028	202043	202126	202145	202213	202104	202118
Event	202013	202029	202044	202127	202146	202214	202105	202119
Event	202014	202030	202045	202128	202147	202215	202106	202120

In Table 1, all comparison and event week numbers are listed for every lockdown transition. For example, if we want to look at the start of Lockdown 2, we can see under "Lockdown 2 in" that calculations are done by comparing weeks 202042-202045 (week 42 through 45 of 2020) to weeks 202038-202041.

KPI selection

To find KPI's that are relevant to the problem, a literature review was conducted and it was found that there are five relevant immediate effects of the pandemic on consumer behavior and consumption Sheth (2020):

Hoarding: Often times, consumers are likely to stockpile on necessities like toilet paper, cleaning products, water and bread.

Improvisation: People will come up with new ways to execute their lifestyle under active measures (zoom meetings, sidewalk weddings).

Pent-up demand: The demand for luxury goods or bigger expenses are postponed with the focus laying on primary needs. This demand will sooner or later have to be satisfied.

Store comes home: When the options to go to a store a limited, people tend to spend more money online, encouraging companies to adapt with delivery services.

Discovery of talent: With more flexible time at home some consumers might discover new talents or spark new interests, resulting in a change in demand among certain product categories.

Using knowledge obtained from the literature review, KPI's from the SIS-suite relevant to consumers behavior during lockdowns were selected.

Designing a dashboard

Using literature from (Malik, 2005), general guidelines necessary and important choices relevant to a dashboard were obtained. Using these guidelines and choices 4 pages of a dashboard were designed focusing on 4 aspects of the research:

Lockdowns page: Showing products' performances during selected lockdown transition.

Customer page: To compare different customer segmentations to each other during lockdown transitions.

Product groups page: Focusing on comparing product groups among each other.

Online vs Bricks page: Showing the differences between regular stores and the online shop.

In addition to these 4 interactive pages, a 5th page featuring additional information regarding the lockdown transitions as well as a full list of measures active per week to provide users with additional context on the period selected.

Evaluation

The initial dashboard was presented to the SIS-team at SymphonyAI and evaluated using the UEQ data analysis tool to compare results to other dashboard designs. Afterwards, using feedback received

from the SIS-team, certain changes were made to the final design of the dashboard (Figure 2) to improve overall user experience.

Figure 2 Final dashboard

Conclusion

To efficiently show changes during lockdowns, it is important to automate certain standard actions to save time. Having set periods to select lockdowns will save a lot of time when the alternative is to manually research which weeks are relevant and then manually select each week individually every time a user wants to analyze another period. Having this standardized and automated will allow users to spend more time on gaining insights than preparing the actual data. Additionally, having standardized periods will result in more uniform results, preventing users from working with different parameters than co-workers.

Recommendations

After this research, the following recommendations were made to SymphonyAI:

1. Give users an option to create custom periods, these can also be used to analyze certain supply chain changes, holidays or longer promotional events.
2. Provide users with a standard list of periods. This can provide additional information to international users that are not too familiar with Dutch traditions and holidays, as well as show users how the custom periods can be used for gaining insights while saving time on manually selecting weeks.

Preface

Dear reader,

Thank you for taking the time to read this thesis I wrote to conclude my Bachelor in Industrial Engineering and Management. From early 2023, I started working on this project. It was the biggest project I ever had to do by myself which came with it's own challenges. I have learned a lot in terms of time management and bringing my academic skills into practice. Besides that, I got the opportunity to work with an amazing company with supportive employees in Amsterdam. I would like to take this opportunity to thank everyone that has supported me through the process of working on this thesis.

First, I want to thank everyone back at SymphonyAI. Their hospitality and professionalism made me feel right at home and taught me a lot about operating in a business environment. The people that guided me at SymphonyAI were always very helpful and interested when I had something to show them.

Secondly, I want to thank my supervisor at the University of Twente, Ipek Topan has been very helpful in guiding me through writing this report. Besides that she also gave me a lot of personal advice regarding personal circumstances that have slowed down my research. Her motivation and advice was indispensable to this thesis.

I also wanted to thank my student advisor Cornelis ter Napel for always checking up on me when he hadn't heard from me in a while. Not just during this thesis but throughout my academic career he has always been incredibly helpful and supportive giving me the confidence that everything would work out just fine.

Finally, I also want to thank my mom, friends and co-workers for their support and patience the last few months.

Karim Leurink

Januari 2025

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1 Introduction

In this chapter, the scope of this thesis will be elaborated on. The current situation, problems and goals of the research will be explained together with the global problem-solving approach.

1.1 Company description

In this part, SymphonyAI will be discussed. What does this company do and who are their clients? What role do they play within this research? Multiple products of the company will be summarized together with their use cases and limitations to identify the starting problem.

SymphonyAI

SymphonyAI is company that specializes in data solutions for example industries in healthcare, retail, manufacturing and financial services to provide insights in company operations and performance. In the Netherlands, SymphonyAI works with [supermarket X] marketing branch, the branch of supermarket chain [supermarket X] that provides insights and analyses in customers' shopping behavior to their suppliers from their loyalty card.

The marketing branch collect sales data from all their physical stores (bricks) and online departments (webshop) and delivers this data to SymphonyAI. SymphonyAI processes this data into an online tool, the Shopper InSide Suite (SIS-Suite). The SIS-Suite is divided in multiple parts grouped in either live tools, customer insights (reports) and add-on tools.

Live tools:
These tools are refreshed weekly and can be instantly accessed throughout the week.

- CINDE, stands for Conversational Insights and Decisioning Engine, uses advanced algorithms to analyze large amounts of data, such as customer transactions, universe penetration and market trends, to provide insights that can help retailers make better decisions. The platform can provide users with opportunities in the form of advice such as product recommendations, dynamic pricing and personalized marketing.
- RequestScoreCard Plus (RSC+), allows users to quickly navigate between category's, brands and segmentations and show their performance over the selected period.
- Item Analyzer (IA), gives the functionality to compare performance of custom product groups (down to single item level).

Customer Insights:
These reports can use custom product groups/customer groups/universes and show more detailed information. For these reports you need to set up a request using the report builder tool after which it usually takes 5-20 minutes for the server to run the report before it is available to users.

- Basket Analyzer: Shows insights in trips (baskets), e.g. "what other products/categories are bought with my products?" or "how many items are in baskets that also include my products?"
- Cross channel, shows how customers are shopping via multiple channels (webshop vs Bricks).
- Customer migration, shows customer exclusivity and -overlap amongst category's or product groups.
- Customer profiler, tells more about the customers that buy your product, are they buying premium brands? How much do they spend? What type of products do they spend more on?
- Distribution tracker, shows store information and answers questions like "Which stores are selling selected products? Where does my product perform better?"
- New product tracker (NPT), allows you to focus on a new product and benchmark its early performance it versus competitive products that were introduced.
- RequestScoreCard (RSC), does almost the same as the RSC+ but allows users to use the custom report functions mentioned above.

- **Event Impact Analyzer (EIA)**, used to show how promotions affected performance, allows users to set comparison and focus periods to compare against each other. For this research, a dashboard will be developed for the Event Impact Analyzer (EIA) (Chapter 1.1.3).
- Switching Analyzer, shows where lost/gained sales come from, did customers switch to another category/brand? Or did they just spend more/less?

Add-on Tools:

These tools are mainly used in Customer Insights reports and allow users to narrow the scope of the report in terms of buyers, products and/or stores.

- My Household Panel (MyHP): Gives the functionality to set custom buyer groups based on a set of filters (e.g. All customers that bought in category Y AND spend more than 10,- per trip on average AND do not spend any money in category X). Has a minimal limit of 1000 customers to maintain anonymity.
- Product Group (PG) : Allows users to create a custom group of products based on their UPC ID or hierarchy.
- Custom Store Group (CSG): Set a custom group of stores with a minimum of 4 stores to maintain anonymity.

Practical use

These tools are available in different packages (SIS Basic, SIS premium etc.) which are offered to suppliers of [supermarket X] like big soda brands or food producers. Suppliers use these tools to gain insights in their brands, sales and distribution to make decisions on promotions like the Bonus Box where customers receive personalized discounts based on these insights.

For example; Brand X sees that in the last 3 months they lost 10% in sales, using the Switching Analyzer they find out that of that 10%, 8% is lost to customers switching to Brand Y and Z. So using MyHP they create a custom buyer group with people that:

- bought brand X in the last year but not in the last three months.

And:

- bought brand Y and/or Z in the last three months for more than 40,- per months on average but did not spend more than 10,- a month on average in the 9 months prior on these brands.

This group of buyers will now receive a special offer in their loyalty card app to buy brand X with a discount after which the brand can use the event impact analyzer to see how the promotion affected performance among this buyer group. This is just an example of how the different solutions of Symphony AI work together to provide insights to suppliers.

SymphonyAI's role is to improve the SIS-Suite to remain of importance to its international clients and provide support to users guiding them how to work with SIS and answering questions or providing custom analytics.

Starting problem

A lot has changed over the last 3 years. At [supermarket X] alone, the AIV (Average item value) grew over 12% in the last year alone. And if there is one thing everyone can remember is the sudden rush on for example toilet paper during the first covid lockdown. It is not unlikely to assume that sooner or later we will experience another lockdown, whether pandemic related or due to some other event. But we know that lockdowns result in a specific situation in which customers' needs and (financial) resources change.

The goal for this assignment is to create a way for category managers to quickly see what changes happened in their category or brand during the different types of lockdowns (1.5m rule, max amount of visitors, no restaurants, no gyms, no school, work from home etc.) to make decisions on

promotions when a new situation arises where we find ourselves “locked” at home again. Datasets created by the Event Impact Analyzer report (EIA) are used for this.

1.2 Problem statement

Currently, the only way to gain insights in changes during lockdowns in the EIA is to first identify the exact weeks when a lockdown happened and then select these weeks in the event impact analyzer. But this only shows one product group at a time and takes a significant amount of time if you want to quickly move to another lockdown and check whether the same pattern is visible there (see Figure 3). In addition to this, the EIA only shows basic metrics which are less relevant when you want to investigate lockdown changes specifically together with the limitation of only showing a maximum of 1 year at a time in the graph. Another downside of the current presentation is the absence of SoL segmentations (Stage of Life) in the graphs making it impossible to see the distribution among age groups.

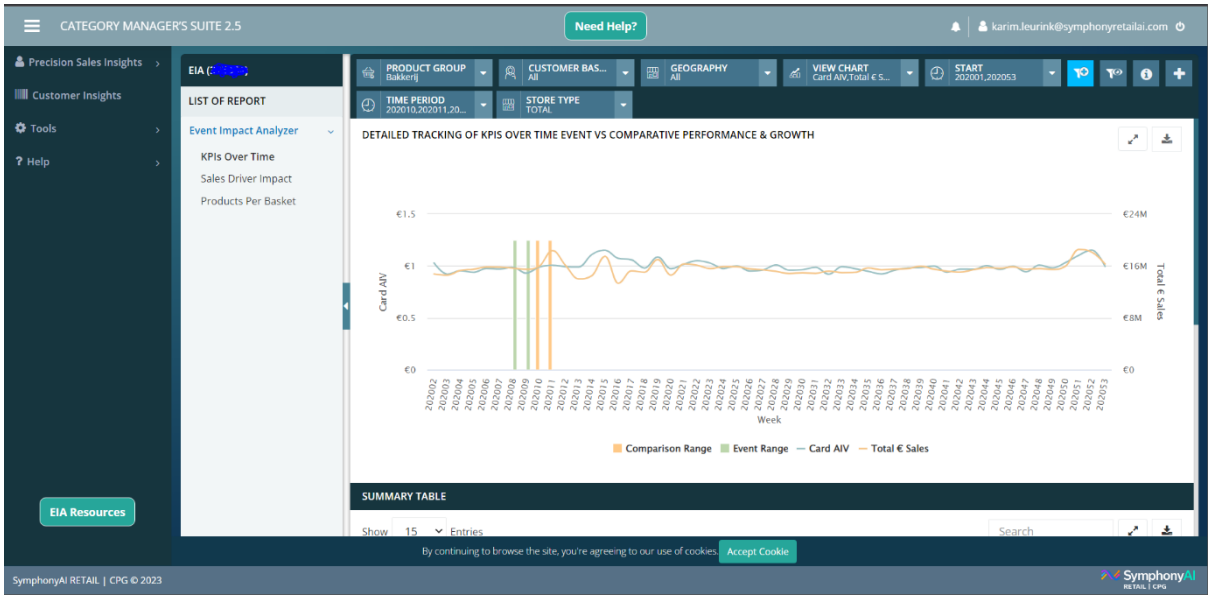


Figure 3: Event Impact Analyzer using manual selection for selecting lockdown period and control period

The best way would be to export a custom report and then run calculations in excel, after which users (suppliers’ category- and product managers, analysts, marketeers etc.) will have to do the same thing again for the next set of product groups. Therefore the core problem of this assignment is as follows:

“There is no efficient and standardized way to show changes in shopping behavior during lockdowns.”

On the next page in Figure 4, a problem cluster is created to identify the root cause of this core problem and categorize problems to find a solution to the action problems.

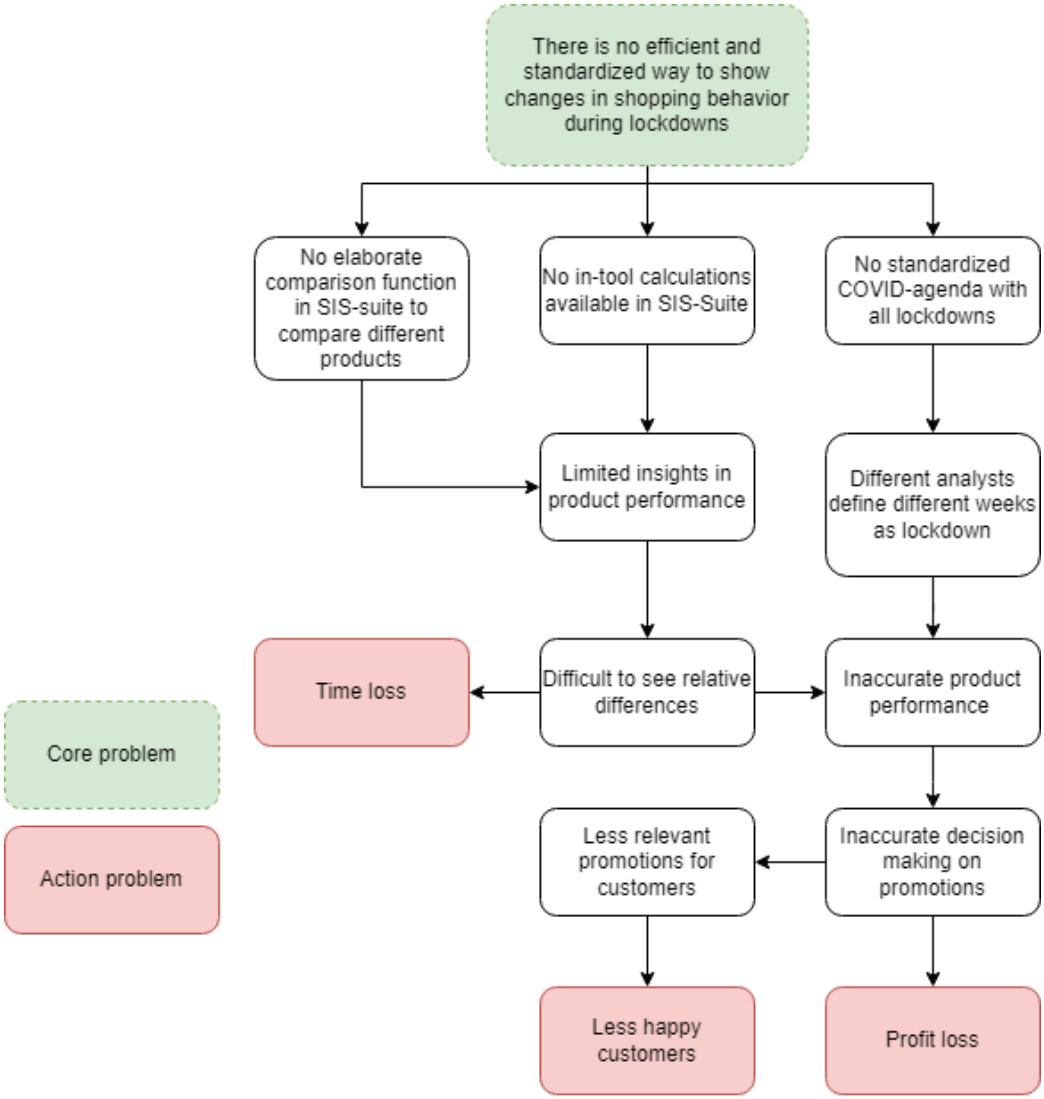


Figure 4: Problem cluster

1.3 Research goal

The action problems as shown in the problem cluster should eventually be solved. For SymphonyAI, the ideal norm would be to have a method to perfectly show the effect of every covid measure in time. In reality however, there were multiple measures in use at the same time which makes it difficult to exactly figure out the effect of every individual measure. Time loss arises when trying to do a deep dive into the performance of products in lockdown periods and having to do a lot of research regarding important KPI's to show and the exact weeks of lockdowns. Inconsistency is also an important factor I hope to minimize, different analysts might use slightly different weeks or calculations meaning relative differences are less valid. This can eventually lead to misleading results and thus less relevant promotions which affects customer satisfaction and profits.

This thesis aims to give users the ability to dive deeper into covid lockdown performance providing them with a dynamic dashboard containing preset calculations and tables that show relevant information about their product performance based on the dataset they provide.

We already know that especially during the first week of a major change in COVID measures (like the increase in home visitors or closing of restaurants/bars) a lot happens in terms of Basket size (how much customers spend per trip) and amount of baskets. However, with this dashboard I hope to identify more interesting KPI's I can show to provide opportunities for certain products. For example, maybe when the bars close, the amount of snacks sold are increased because people invite each other over. It is possible that we see an increase in customer penetration (amount of total customers that buy in the category "snacks") which means that a promotion could reach more people and thus "bind" them to your brand.

Deliverables

The following will be submitted to the problem owner:

- A list of relevant KPI's that provide insights in product's performance.
- A standardized covid calendar containing most safety measures taken in the Netherlands by week.
- A visually appealing and user-friendly dashboard that shows changes based on above mentioned KPI's.
- A manual explaining how to use the dashboard for custom reports.

Global problem-solving approach

Needed to make this dashboard is a list of important metrics and KPI's that are relevant to users that want to see information about product performance during lockdowns and a list of weeks containing information whether or not it is a lockdown week.

To obtain a list of important metrics and KPI's, data from regular weeks and lockdown weeks will be compared, important metrics will show a significantly higher or lower value compared to regular weeks. In addition to this, growth should be monitored, are sales growing faster or slower during lockdown weeks? For this to be shown, additional calculations will have to be done to show the discrepancy's. Another interesting factor to take into account is the webshop vs Bricks aspect, do people shift more towards online grocery shopping during lockdowns? And what product do they buy online? In addition to this, a literature review will be conducted to identify the most important countermeasures and the general change in customer behavior during lockdowns.

Obtaining a list of lockdown weeks including their countermeasures will be a little bit more challenging considering some of the countermeasures were not national but locally implemented. On the Dutch government website, and extensive timeline is listed on a daily basis for the last 3 years. The goal is to make a comprehensive set of lockdowns applicable on a national scale including the most important measures taken (work from home, restaurants/clubs/schools/gyms closed). Clicking

these lockdowns in the dashboard should automatically show the relevant information regarding the performance of the product groups provided by the user.

1.4 Knowledge problem

Three main research questions arise upon looking at the problem cluster, the action problems can be traced back to "limited insights in product performance" and "there is no standardized COVID-agenda with all lockdowns". Therefore, the main research question for this problem is:

"How do we efficiently show change in shopping behavior during lockdowns?"

This question is supported by five subquestions:

1. What metrics/KPI's of shopping behavior are affected most by lockdowns?

As mentioned before, it is expected that the average basket size changes a lot during lockdowns, however this is not the only relevant metric during lockdowns. Answering this explanatory research question makes the final dashboard more useful to the users. This was done by conducting a literature review (chapter 3.1) and analyzing data from previous years (chapter 2.2).

2. What weeks were considered lockdowns and which measures were active?

There were many periods where the lockdown measures changed, it is important that we find a comprehensive way to label the lockdowns by their measures. The goal of this explanatory question is to find the relation between the weeks and the lockdowns for the last three years. This will be achieved by browsing the government timeline blog on covid-updates of the last three years (chapter 2.1).

3. Which covid-measures affects shopping behavior most?

There were many different measures and levels of measures throughout the years. It would be beneficial to filter out measures that did not impact shopping behavior significantly. This question is descriptive as it describes the effect of certain measures in words and general shopping behavior. This is an additional question which relates to the first sub question and will be answered by the same literature review (chapter 2.2).

4. How do we visualize KPI's on the dashboard?

This descriptive research question aims to describe how to show KPI's in dashboards. Which type of charts are going to be used? This question will be answered by conducting a literature review as well (chapter 3.2).

5. How do we measure a dashboard's effectiveness?

This is an descriptive problem as it tries to evaluate the effectiveness, efficiency or impact of a product, in this case the dashboard. It is important to evaluate the effectiveness, but it is not simply a matter of right or wrong so we need to identify a way to measure effectiveness in the form of a survey Chapter 5.1).

On the next page in Table 2, the research design for every subquestion is shown.

Table 2 research design

How do we efficiently show change in shopping behavior during lockdowns?							
Knowledge problem	Type of research	Research population	Subjects	Research Strategy	Method of data gathering	Method of data processing	Activity plan
1. What metrics/KPI's of shopping behavior are affected most by lockdowns?	Explanatory	Literature + Loyalty card data	Customers	Deep quantitative	Literature, [supermarket X] database (longitudinal)	Descriptive text, data analyses	Research> Literature study> overview of metrics/KPI's > compare with data
2. What weeks were considered lockdowns and which measures were active?	Explanatory	The Netherlands	RIVM website, Rijksoverheid website	Deep qualitative	Data collection from RIVM and Rijksoverheid (longitudinal)	Excel table containing all weeks and covid measures active from the start of 2020	Research> check covid measures by week on website> add to excel table> identify lockdown periods
3. Which covid-measures affects shopping behavior most?	Descriptive	Literature + Loyalty card data	Customers	Broad qualitative	Literature, [supermarket X] database (longitudinal)	Descriptive text about the measures that have the most impact	Research> literature study> overview with most impactful measures
4. How do we visualize KPI's on the dashboard?	Descriptive	Literature	Database	Broad qualitative	Literature (cross-sectional)	Descriptive text about ways to visualize data	Research> Literature study> summarize visualization methods> apply to dashboard
5. How do we measure a dashboard's effectiveness?	Descriptive	Symphony AI, suppliers	Employees	Deep quantitative	Survey and observation (cross-sectional)	Table of outcomes	Creating survey > invite subjects> gather results> Evaluate> improve dashboard

1.5 Methodology

During this research, the Design Science Methodology (DSM) will be used (see Figure 5). This problem-solving approach is often used in the fields of engineering, information systems and other related fields. It uses a scientific method to develop and evaluate solutions to a problem (Peffers et al., 2007).

DSM consists of 5 stages which are:

1. Problem Identification: This stage explains the problem and explores the identification from existing literature, observations or stakeholder inputs. In this step, subquestion 1, 2 and 3 will be answered.
2. Solution design: During this stage, a designer develops a solution to the problem based on existing knowledge and theories.
3. Design and development: In this stage, the solution in the previous step is implemented. The designer may use modeling, dashboarding or simulations to test and refine the solution. In this step, the 4th subquestion will be answered.
4. Evaluation: In this stage, the effectiveness of the solution is evaluated. This can be done using multiple methods such as user testing or expert reviews. From this, designers can go back to step 3 to fix issues or add more information. In this phase, the 5th subquestion will be addressed.
5. Reflection: In this stage, the designer reflects on the design process and the results to identify possible improvements for the future.

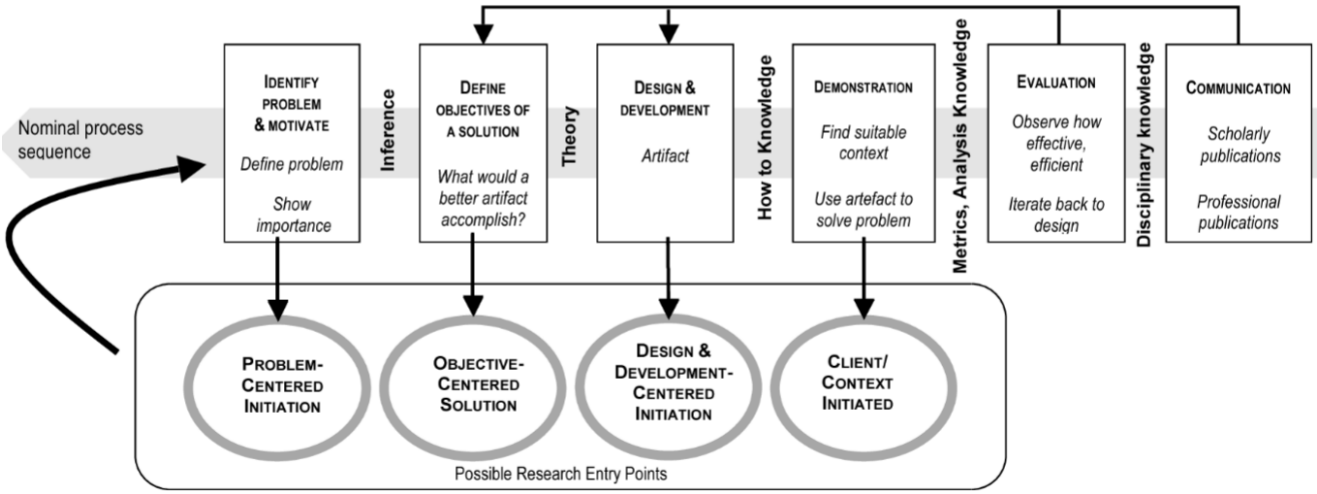


Figure 5: Design Science Methodology

Following the DSM, the sub questions can be researched in the following stage of the methodology:

1. What metrics/KPI's of shopping behavior are affected most by lockdowns? – Stage 1
2. What weeks were considered lockdowns and which measures were active? – Stage 1
3. Which covid-measures affects shopping behavior most? – Stage 1
4. How do we visualize KPI's on the dashboard? – Stage 3
5. How do we measure a dashboard's effectiveness? – Stage 5

1.6 Relevance

This chapter explores the relevance of this research, it will discuss both the scientific and practical relevance.

Scientific relevance

This research aims to provide relevant and valuable insights into how shoppers adapt their behavior in response to lockdowns being implemented. These insights contribute to a further theoretical understanding of customer behavior in response to uncertain times like covid.
The conclusions drawn from the dashboard when it is in use by suppliers from [supermarket X] can also be applicated on other parts of their businesses. Suppliers could use insights to their benefit at other retailers and apply the same decisions assuming the average shopper of [supermarket X] = the average Dutch shopper. For example, if a supplier sees a big increase in demand for one of their products at the start of a lockdown, it is likely that the same product at another retailer is also in high demand.

Internally, this solution can be used by SymphonyAI employees to gain a better understanding of the branch they work in during extraordinary times to improve consults.

For [supermarket X]'s marketing branch, this dashboard can contribute to the broader understanding of the behavior among their customers, which in turn can help marketers develop more effective strategies to reach customers, increasing the value of the service they offer.

Practical relevance

The practical relevance of this research is to solve the action problems. Time loss, profit loss and less customer happiness are possible results of having *"… no efficient and standardized way to show changes in shopping behavior during lockdowns."*. With this research I hope to provide a way for suppliers and [supermarket X]'s marketing branch to efficiently browse through different lockdowns and product groups without too many inputs increasing time spent on gaining insights. This hopefully leads to more relevant promotions for customers increasing their happiness (through discounts) and the suppliers' future profits (by customer loyalty).

1.7 Limitations

Certain limitations apply to this research, either by time constraints or technical limitations:

- Finished in 10 weeks
- Maximum of 10 product groups
- Usable without extra installation of programmes
- One customer segmentation at the same time
- Only focus on Loyalty card users

2. Context analysis

The first 2 stages of the DSM have been discussed in the previous chapters. From these stages we can focus on one of the research questions in Chapter 2.1: “What weeks were considered lockdowns and which measures were active?” after which the lockdown periods will be determined in Chapter 2.2.

2.1 Identifying lockdown weeks

The research question “What weeks were considered lockdowns and which measures were active?” will be answered by analyzing the RIVM (public department of health) and Rijksoverheid (government) websites. These sources list a timeline containing all the covid-related news and measures on a day-by-day basis. This information was then aggregated into a table (Figure 6) containing all weeks from 2020-2022 with the corresponding covid-measures that were active at that time:

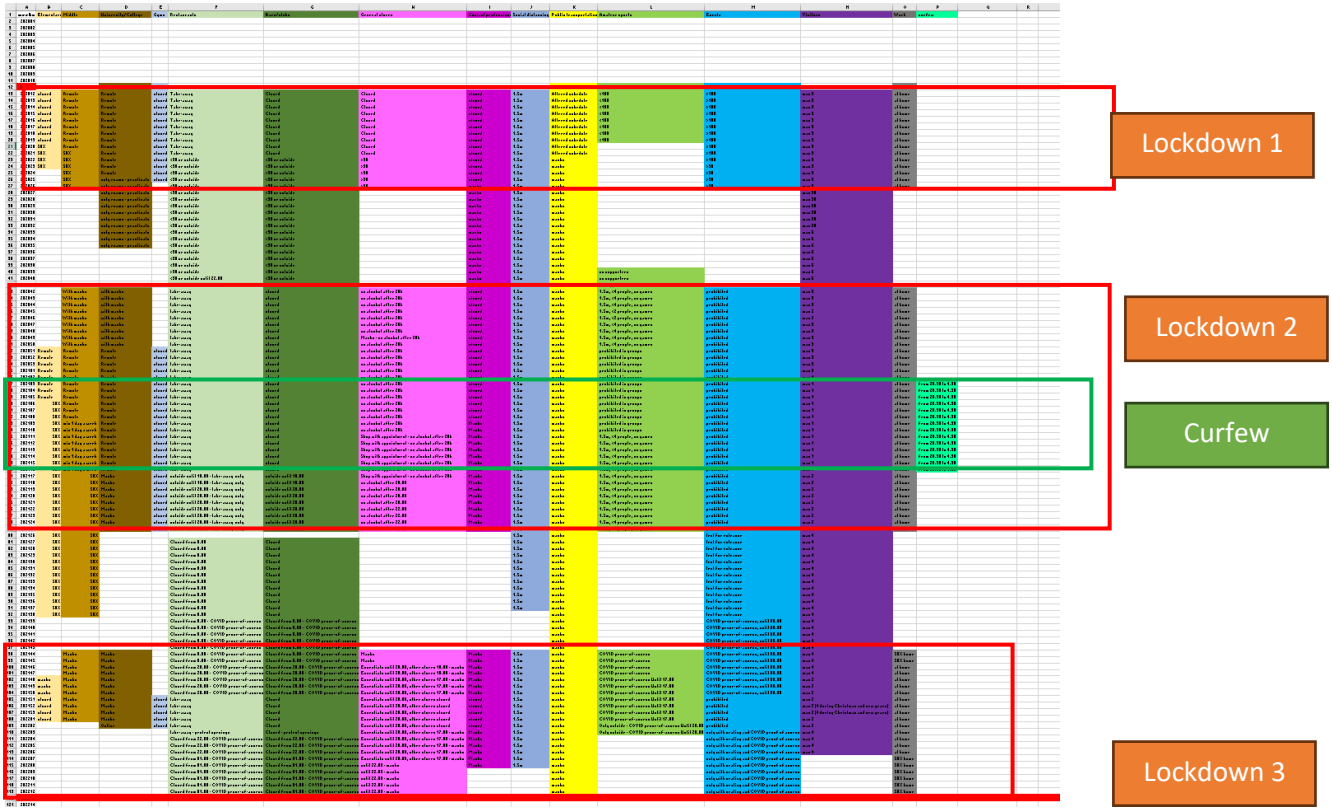


Figure 6: Covid Calendar (total overview)

From this table it is already possible to identify the 3 lockdowns and curfew we experienced over this time period. With this rough estimate of the lockdown weeks we can look at the data obtainable from the EIA and compare changes during these boundaries to narrow down the exact weeks in which we see the changes happening. This is especially important because often new measures were active from either Tuesdays (after national press conferences from the prime minister) or Fridays (as it being the last work day of the week) whilst [supermarket X] aggregates their data weekly from Monday through Sunday. Using this method of identifying lockdown periods the following boundaries have been found in Table 3:

Table 3 Lockdown periods

Name	Starting week	Ending week
Lockdown 1	202011	202026
Lockdown 2	202042	202125
Lockdown 3	202144	202212
Curfew	202103	202116

2.2 Set lockdown transitions

Now that the lockdown periods have been determined. Actual sales data will be analyzed to confirm visible changes in lockdown transitions. In Figure 7 the start and end of all lockdown periods are marked in orange. These weeks will be used to analyze sales data.

To find out what effect lockdowns have on people's buying behavior, we compare data from after a

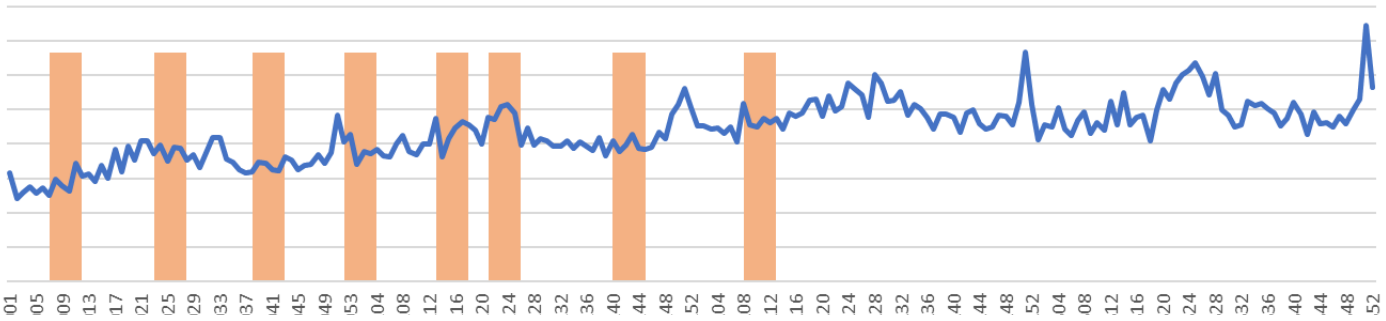


Figure 7 All sales during lockdown transitions (orange)

lockdown transition starts (event) to the period leading up to the lockdown transition (comparison period). Notable are certain peaks that fall out of lockdown weeks, these are mostly explained by holidays, year transitions or extreme weather conditions.

It is concluded that overall most changes happen in the first 4 weeks after a lockdown change (start of a lockdown, or end of a lockdown). This means that for every period selected, the event data will be from the first 4 weeks after a change (this event period is also often used among SIS-users to see the effect of promotions). As comparison, a period of 4 weeks leading up to a change is used as a comparison period:

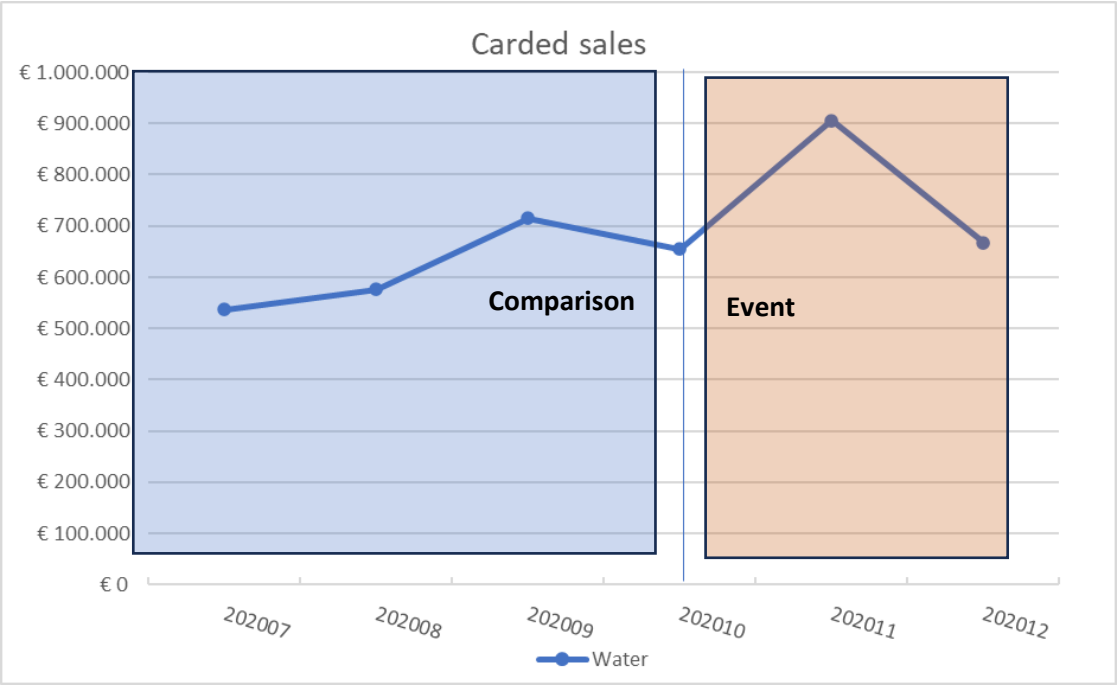


Figure 8 comparison/ event periods

Using this methodology the following lockdown transitions (Table 4 on the next page) are set in the dashboard:

Table 4 All lockdown transitions

Lockdown transitions>	Lockdown 1 in	Lockdown 1 out	Lockdown 2 in	Lockdown 2 out	Lockdown 3 in	Lockdown 3 out	Curfew in	Curfew out
Comparison	202007	202023	202038	202121	202140	202208	202052	202113
Comparison	202008	202024	202039	202122	202141	202209	202053	202114
Comparison	202009	202025	202040	202123	202142	202210	202101	202115
Comparison	202010	202026	202041	202124	202143	202211	202102	202116
Event	202011	202027	202042	202125	202144	202212	202103	202117
Event	202012	202028	202043	202126	202145	202213	202104	202118
Event	202013	202029	202044	202127	202146	202214	202105	202119
Event	202014	202030	202045	202128	202147	202215	202106	202120

In Table 4, all comparison and event week numbers are listed for every lockdown transition. For example, if we want to look at the start of Lockdown 2, we can see under “Lockdown 2 in” that calculations are done by comparing weeks 202042-202045 (week 42 through 45 of 2020) to weeks 202038-202041.

In this chapter, we found covid-measures active during each week of the covid-period, from which we identified all three lockdowns and a curfew period. We then prepared 8 lockdown transitions to analyze the start and end of all these periods based on sales data and information extracted from the RIVM (public department of health) and Rijksoverheid (government) websites.

Each of these eight transitions will tell something about how consumers reacted to either the end or start of a lockdown period by comparing the first four weeks to the four weeks leading up to the transition.

3. Systematic Literature Review

In this chapter, we will focus on three separate research questions to help solve the main research question.

The following questions will be answered in part 3.1:

- What metrics/KPI's of shopping behavior are affected most by lockdowns?
- Which covid-measures affects shopping behavior most?

These questions are answered by conducting a literature review on the different effects on consumers during a pandemic. From this, relevant KPI's will be identified from the dataset used.

In part 3.2 we will further discuss the final question:

- How do we visualize KPI's on the dashboard?

This will be done by comparing different types of visualizations available, what they are used for and how to interpret them.

3.1 Metrics & measures

The research question to be answered by the SLR is "What metrics/KPI's of shopping behavior are affected most by lockdowns?" and "Which covid-measures affects shopping behavior most?". The goal of this SLR is to gain insights into which type of metrics in sales/customer behavior are affected most during lockdowns. With this information, a comprehensible list of relevant metrics/KPI's can be used in the dashboard to show relevant information to the user.

3.1.1 Immediate effects during lockdowns

Ever since the pandemic started back in 2020 for most of us, people have been adjusting their daily lifestyle. Sheth (2020) explains eight immediate effects of the Covid-19 pandemic on the consumption and behavior of consumers of which five are relevant to this research:

Hoarding

At the start of a lockdown it is observed that essential products like toilet paper, bread, water, meat, disinfecting and cleaning products are often being stockpiled by consumers in fear of a future shortage in supply. In terms of the event impact analyzer in the SIS-suite, we can expect the average basket size to increase as people buy more products out of fear. The hoarding theory is also supported by Phang et al.(2021) who describes hoarding as panic buying (PB). Furthermore, Phang describes two additional but related effects which are compulsive buying (CB), which is described as an addiction sign that increases as uncertainty rises, and impulsive buying (IB), which is externally stimulated by products themselves.

Improvisation

Under new constraints, consumers start to improvise. The Covid-19 pandemic has shown the creativity and resilience of consumers, who have adopted alternative ways to attend events such as side-walk weddings and zoom funerals. Consumers are also more drawn towards online education and health advice. These changes in habits result in new ways to consume. This means it is likely to see people's needs change as their day-to-day routine is adjusting to the lockdown. This will lead to a shift in customer penetration, people will spend more in certain category's vs others.

Pent-up demand

During uncertain times of crisis, the general tendency is to postpone purchase and consumption of discretionary products or services. This also includes services as concerts, sports, bars and restaurants. This is also supported by Šimić and Pap (2021) and means two things:

First, we can expect to see a slight decrease in AIV (Average Item Value) as the consumer is more likely to go for a cheaper option, and because they are more likely to buy more items as mentioned above, consumers might be drawn towards cheaper options even more to manage their financials.

Secondly, this pent-up demand will sooner or later have to be satisfied, meaning that the end of a lockdown (measure) could also show a lot of change in AIV and units sold for higher-end products. In other literature, this effect is also mentioned as revenge spending, which is a new phenomenon being reported in China and Europe which refers to consumers spending more money as compensation for the deprivation they endured during lockdowns (Phang et al., 2021).

Store comes home

In some countries where complete lockdowns were active, consumers weren't able to go grocery shopping and thus the store will have to come to the consumer. This means showing the online penetration (amount % of shopper that also shop online) can be beneficial to SIS-users wanting to do an online only promotion for free shipping for example.

Discovery of talent

With more flexible time at home, new talents and interests might arise among customers. Consumers can experiment with recipes and adopt new hobby's meaning people might buy new products for the first time to try them out. Perhaps it is possible to include MyHP into the dashboard to include deep dive into customers that bought a product for the first time to target customers who are ready to try something new.

3.1.2 Online

Besides these effects, there are other interesting findings, Delasay et al. (2022) concludes that even though during lockdowns some grocery stores had an in-store limit on customers, these stores did not experience a decrease in profit, mainly due to online sales and delivery. They also suggest that curb-side pick up and the use of third-party delivery services could possibly have a positive impact on overall profits as well.

The amount of people that have the option to work from home seems to have increased almost 50% since the pandemic which also increases the amount of shoppers choosing to order groceries online (Javadinasr et al., 2022). This does confirm earlier statements about the relevance of online shopping behavior during lockdowns.

3.1.3 Sustainability

Filimonau et al. (2021) states that ever since the pandemic, people are still hesitant to eat out. Foodservice providers are expected to change their business model and focus on preventive measures like frequent cleaning and extra health checks to encourage visitation.

After the pandemic, a preference towards eating sustainable food at home is established. This is an interesting factor, as SymphonyAI offers a couple customer segmentations. One of these is called ShopStyles and focuses on the type of products consumers buy (e.g. consumers that buy a lot of easy warm-up meals, or consumers that prefer sustainable options). This segmentation can be used among others in the EIA, and thus should be incorporated into the dashboard.

3.1.4 Conclusion

From this literature, we can assume to find the following changes during a lockdown: Increase in demand (Basket size, baskets per customer), increase in online sales (online penetration %), a shift towards cheaper and primary goods, yet possibly more sustainable (Average Item Value, ShopStyles segmentation) and a possible interest in new category's (category penetration + My Household panel). These KPI's should show the effects mentioned in a quantitative manner and thus should be implemented in the dashboard.

The research questions “What metrics/KPI’s of shopping behavior are affected most by lockdowns?” and “Which covid-measures affects shopping behavior most” were answered by the literature review and the following KPI’s were found to be of special interest:

Table 5 KPI list

KPI name	Unit	Functionality
Card Basket size	€/basket	To show how much more customers spend per trip.
Card Baskets	Total baskets/week	To identify whether people do more or less grocery trips
Online penetration	% of total sales that come from the webshop	Show shift towards grocery deliveries during lockdowns
Card Average Item Value	€/unit	Show if people tend to buy more or less premium priced products
Category penetration	% of customers within the category that buy selected product group	Show shift in market share
Customers	Customers/week	Can give perspective into other mentioned KPI’s. (baskets/customer, sales/customer etc.)
Card sales	€/week	Shows a general performance of a product and gives perspective to other KPI’s
Carded units	Products sold/week	Shows if people buy more during certain periods.

In addition to the above mentioned (Table 5), we want to focus on certain [supermarket X]-defined segmentations. These segmentations are selected by the user when running a report in SIS with the choices being; PST, ShopStyles, TruPrice and Stage of Life. Clients can only select one of these segmentations and based on what their choice is the dashboard should adapt.

3.2 Dashboard design

When building a dashboard, there are many choices in types of graphs/charts to use. It is important to know which type of visualization is expected in certain cases to make sure users do not get confused. Besides this, the design is crucial to provide insights in a pleasant and clear way.

3.2.1 Design

A well-designed dashboard should be visually pleasing and provide ample information within limited space. (Malik, 2005) names four key elements to a good dashboard design:

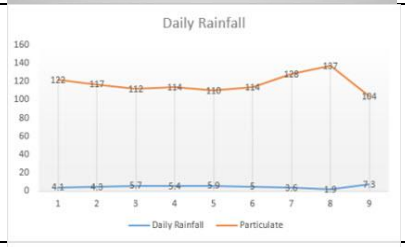
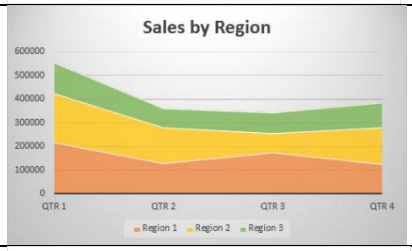
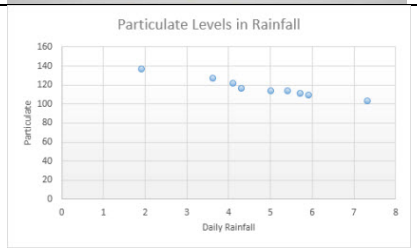
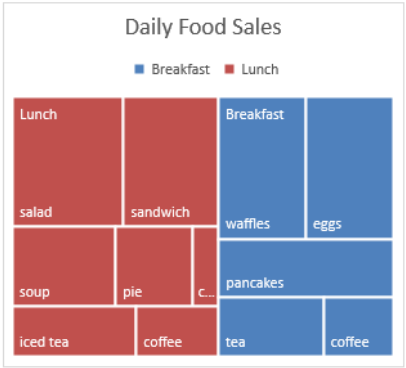
- Screen graphics and colors
- Selection of appropriate chart types
- Animation with relevance
- Optimal content placement

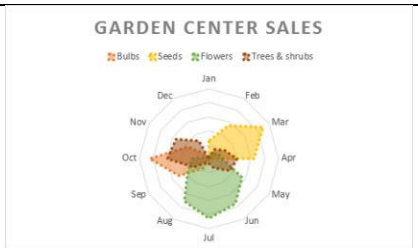
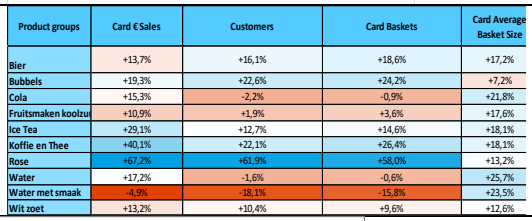
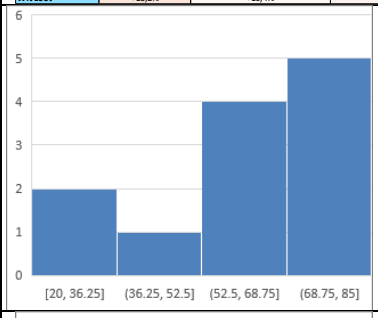
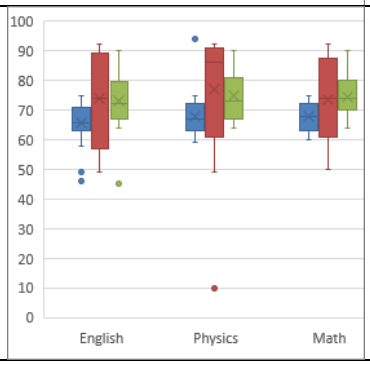
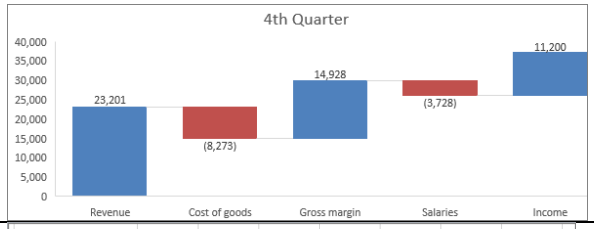
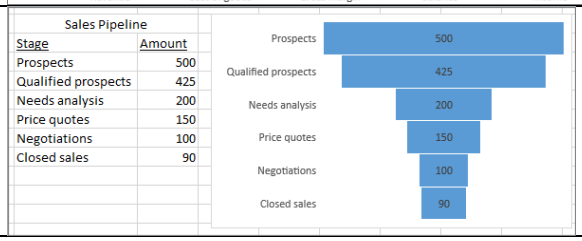
Colors should be simple and not distract from the information being conveyed. Pictures and logo’s should be kept to a minimum as screen space is already limited and these elements do not add function to the dashboard. It is also important to choose the right chart type for each part of the dashboard. Users will associate certain graphs with certain information so using a type of chart that the user is not expecting will lead to confusion. As for content placement, it is important to not clutter a page with too many elements. This will cause an information overload to the user which is not desired.

3.2.2 Visualizations

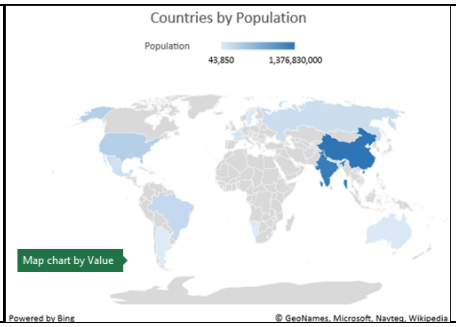
As the dashboard is build within Excel to assure all users can open and work with the dashboard, we shall take a look at the different types of visualizations that are available within excel and in which cases you make use of them (*Available Chart Types in Office - Microsoft Support*).

Table 6 Chart types (from: Available Chart Types in Office - Microsoft Support)

Name	**Example**	**Use case**
Bar chart		To show values across groups/categories.
Line chart		Show values progressing over time.
Doughnut/pie chart		Visually show share of categories among the total
Area chart		Show values of multiple categories over time and the share of each category..
Scatter chart		Can show relation between variables.
Treemap chart		Visually represents every category by size and/or color based on their value.

Radar chart		Visually shows overall performance across many metrics.
Table		Shows exact values across multiple data points.
Histogram		Shows frequency of values within a distribution in bins.
Box and Whisker chart		Shows data distribution in quartiles, highlighting the outliers.
Waterfall chart		Clearly shows subtraction and additions to a running total.
Funnel chart		Shows values from each stage in a process

Product groups	Card € Sales	Customers	Card Baskets	Card Average Basket Size
Bier	+13,7%	+16,1%	+18,6%	+17,2%
Bubbels	+19,3%	+22,6%	+24,2%	+7,2%
Cola	+15,3%	-2,2%	-0,9%	+21,8%
Fruitsmaken koolzu	+10,9%	+1,9%	+3,6%	+17,6%
Ice Tea	+29,1%	+12,7%	+14,6%	+18,1%
Koffie en Thee	+40,1%	+22,1%	+26,4%	+18,1%
Rose	+67,2%	+61,9%	+58,0%	+13,2%
Water	+17,2%	-1,6%	-0,6%	+25,7%
Water met smaak	-4,9%	-18,1%	-15,8%	+23,5%
Wit zoet	+13,2%	+10,4%	+9,6%	+12,6%

Map chart			Compare values based on geographical regions.

4. Design and Implementation

In this chapter, the dashboard's design and implementation will be discussed. We now have a dataset including all the KPI's from the report on a weekly basis. From this a dashboard can be made to show insights during lockdowns to identify promotional opportunities in the future.

4.1 Data management (design implementation)

To obtain the data used for the dashboard, a certain amount of steps need to be taken by the user depending on which products or categories they want to focus on.

First, users need to identify the scope of the report they want to view. Do they want to focus on the performance of certain categories, brands or products? And among which universe should this report fall? For example, does the user want to see premium brands performance among soda sales? Or do they want to view personal health care performance among the total sales? Another point of interest is the segmentation they might want to view, do they want to distinguish customers by their ShopStyles or age group?

After defining the scope of the report, user will go to the SIS report builder to build the dataset needed. In here they can select the product groups, universes and optional household panel. These steps are visualized in Figure 9.

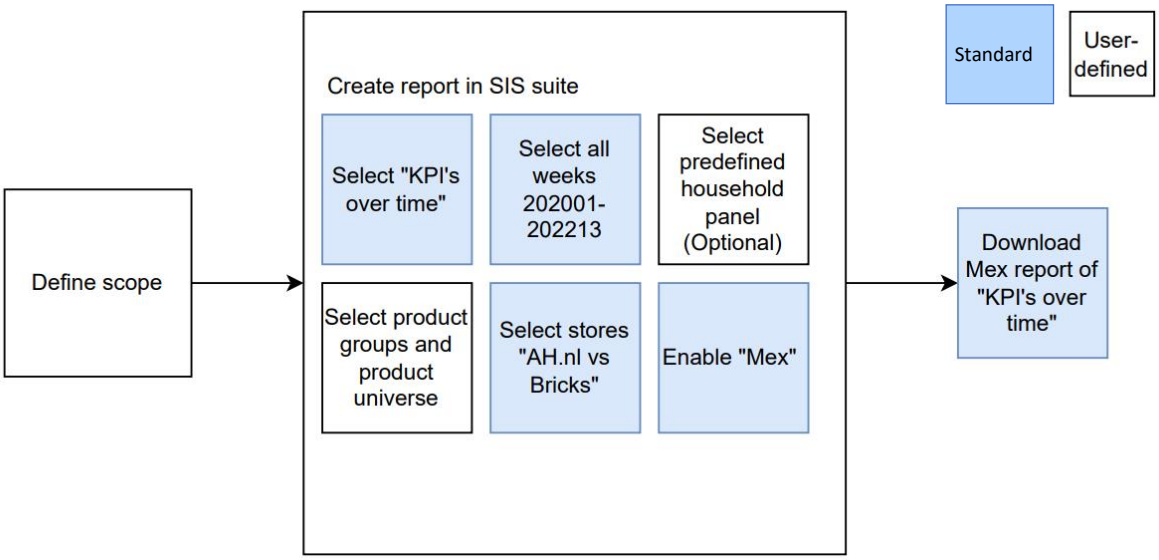


Figure 9 User actions needed

In Figure 9, a flowchart of actions necessary to obtain a dataset suitable for the dashboard are visualized. First, the user needs to define the scope of the report, what do they want to research from the report? After the scope is defined, the user will create a report in the SIS-suite as usual. The parameters needed are given as well in the figure, blue boxes show actions that should always be checked in the report builder. The white boxes show actions in which user input is necessary based on the scope that was defined earlier (what products are going to be looked at? Among which customer groups do we investigate?). After the report is created in the SIS-Suite, the Mex-report of the "KPI's over time" can be downloaded, this document features all the raw data needed to run the dashboard.

4.2 Importing dataset

The first step to showing the data in a dashboard is to actually put the raw data from the Mex report in the dashboard file. This is done by simply copying the entire table into the “raw data” tab in the dashboard file. The next step is to prepare the data for further analysis by adding a column to mark every row with a lockdown value based on the week number of that row. This can be done in multiple ways but since every dataset has a different amount of rows depending on the amount of product groups and household panels selected, a button named “update” is assigned to a macro (Figure 10)

```
Sub lockdowncheck()

Dim n As Long

n = 2
'clear column to account for earlier use of document
Columns("X").Clear
'set column name
Cells(1, 24) = "Lockdown?"

'set boundaries of dataset
Do Until Worksheets("Raw data").Cells(n, 1) = ""

' check for lockdown weeks
    If Cells(n, 3) > 202006 And Cells(n, 3) < 202013 Then
    Worksheets("Raw data").Cells(n, 24) = "Lockdown 1 in"
    End If
        If Cells(n, 3) < 202029 And Cells(n, 3) > 202022 Then
        Worksheets("Raw data").Cells(n, 24) = "Lockdown 1 out"
        End If
            If Cells(n, 3) > 202037 And Cells(n, 3) < 202044 Then
            Worksheets("Raw data").Cells(n, 24) = "Lockdown 2 in"
            End If
                If Cells(n, 3) > 202120 And Cells(n, 3) < 202127 Then
                Worksheets("Raw data").Cells(n, 24) = "Lockdown 2 out"
                End If
                    If Cells(n, 3) > 202139 And Cells(n, 3) < 202146 Then
                    Worksheets("Raw data").Cells(n, 24) = "Lockdown 3 in"
                    End If
                        If Cells(n, 3) > 202207 And Cells(n, 3) < 202214 Then
                        Worksheets("Raw data").Cells(n, 24) = "Lockdown 3 out"
                        End If
                            If Cells(n, 3) > 202051 And Cells(n, 3) < 202105 Then
                            Worksheets("Raw data").Cells(n, 24) = "Curfew in"
                            End If
                                If Cells(n, 3) > 202112 And Cells(n, 3) < 202119 Then
                                Worksheets("Raw data").Cells(n, 24) = "Curfew out"
                                    End If

    n = n + 1
Loop
'update all graphs and tables
ActiveWorkbook.RefreshAll

End Sub
```

Figure 10 Macro for labelling lockdown weeks

used to do this:

This macro first clears the entire column X (first available empty column from Mex report) to ensure that previous data is removed, and then checks for every row if the “week” column contains any of the predetermined boundaries of the lockdown periods. If this is the case, the macro assigns the name of the lockdown and whether the lockdown started or ended in that period. The macro keeps running until the bottom of the dataset. Finally, the macro refreshes the entire document to make sure results from the dashboard will never be from older data.

4.3 Covid-measures table

Now that we have defined the lockdown periods in the dataset, a dynamic Covid-measures table will be created to show users that want to look at data from certain lockdown periods which measures were active during the comparison period and the event period.

As explained in chapter 2.1.1, a table containing all measures taken in the Netherlands was made using data from government sources. Lockdown periods were defined in 2.1.2. Using this information the following table containing the lockdown periods and their active measures was prepared:

Table 7 Covid measures during defined periods

Covid measure	Lockdown 1 in	Lockdown 1 out	Lockdown 2 in	Lockdown 2 out	Lockdown 3 in	Lockdown 3 out	Curfew in	Curfew out
Elementary schoo	closed	no restrictions	no restrictions	50% capacity	no restrictions	no restrictions	Remote	50% capacity
Middle school	Remote	no restrictions	With masks	50% capacity	Masks	no restrictions	Remote	50% capacity
University/Colleg	Remote	only exams + prac	with masks	no restrictions	Masks	no restrictions	Remote	Masks
Gyms	closed	no restrictions	no restrictions	no restrictions	no restrictions	no restrictions	closed	closed
Restaurants	Take-away only	<30 or outside	take-away only	no restrictions	Closed from 0.00 +	no restrictions	take-away only	outside until 18.00
Bars/clubs	Closed	<30 or outside	closed	no restrictions	Closed from 0.00 +	no restrictions	closed	outside until 18.00
General stores	Closed	no restrictions	no alcohol after 20	no restrictions	Masks	no restrictions	no alcohol after 20	no alcohol after 20
Contact professior	closed	masks	closed	no restrictions	Masks	no restrictions	closed	Masks
Social distancing	1.5m	1.5m	1.5m	1.5m	1.5m	no restrictions	1.5m	1.5m
Public transportat	Altered schedule	masks	masks	masks	masks	no restrictions	masks	masks
Amateur sports	<100	no restrictions	<4 people, no gam	no restrictions	COVID prove-of-a	no restrictions	prohibited in grou	<4 people, no gam
Events	<100	no restrictions	prohibited	test for entrance	COVID prove-of-a	no restrictions	prohibited	prohibited
Visitors	max 3	max 30	max 3	max 4	max 4	no restrictions	max 1	max 2
Work	at home	no restrictions	at home	no restrictions	50% home	no restrictions	at home	at home
curfew	no restrictions	no restrictions	no restrictions	no restrictions	no restrictions	no restrictions	from 20.30 to 4.30	no restrictions

All restrictions in the table (Table 7) have been color-coded on severity:

Red: Closed, prohibited or very strict

Orange: Strict, but possible under restrictions

Yellow: Normal routine possible, but with extra rules

Green: No restrictions

This table (Table 7) is then used in combination with a filter of the lockdown periods (Figure 11) and IF-statements for every lockdown period to create a dynamic transition table (Table 8) showing both the measures during the comparison period (4 weeks prior to the selected period) and the event (first 4 weeks of selected period):

Table 8 Dynamic transition table

Lockdown 1 in	Comparison	Event
Elementary school	no restrictions	closed
Middle school	no restrictions	Remote
University/College	no restrictions	Remote
Gyms	no restrictions	closed
Restaurants	no restrictions	Take-away only
Bars/clubs	no restrictions	Closed
General stores	no restrictions	Closed
Contact professions	no restrictions	closed
Social distancing	no restrictions	1.5m
Public	no restrictions	Altered schedule
Amateur sports	no restrictions	<100
Events	no restrictions	<100
Visitors	no restrictions	max 3
Work	no restrictions	at home
curfew	no restrictions	no restrictions

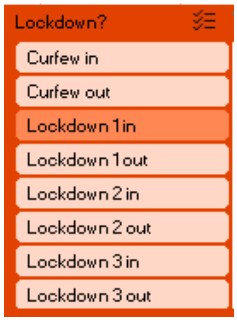


Figure 11 period filter

4.4 Define dashboard pages

A lot of information can be obtained from the dataset, it is important to give more in-depth information on certain aspects without the information becoming too niche, meaning information is only relevant for certain scopes (E.g. only relevant for reports focusing on brands, or price ranges). Information presented should be relevant, usable and understandable by anyone viewing the dashboard regardless of the type of report they ran.

To ensure a logical progression in depth of the dashboard, the following pages will be present showing information on a particular subject:

- Lockdowns (chapter 4.4.1):
  This page will focus on the KPI's during a lockdown period:
  - Card € Sales: Total sales
  - Customers: Weekly amount of customers
  - Card Baskets: Amount of transactions
  - Card Average Basket Size: Average transaction size
  - Carded Units: Total units sold
  - Card Average Item Value: Average value per unit:
  - Universe Penetration: Market share, calculated by dividing sales of a product group by the total sales in the category (or product universe).
- Customers (chapter 4.4.2):
  This page will show information regarding the types of customers during a lockdown period and what effect they have on the KPI's of product groups.
- Product comparison (chapter 4.4.3):
  This page allows users to compare two product groups versus each other to get a better understanding of a product's performance versus another.
- Online vs Bricks (chapter 4.4.4):
  This page will focus on the performance of products being sold online versus products being bought in-store.

4.4.1 Lockdowns page

The goal of the "lockdowns" page is to provide the user with an easy way to show performance of product groups during user-selected filters to scope in on certain combinations of dimensions.

Below a screenshot of the lockdowns page can be found (Figure 12). The page is divided into 6 elements:

1. Filter list
2. KPI graphs (with 6 providing previews of all KPI's)
3. % Change table
4. Quick insights
5. Covid measures table
6. Previews of KPI graphs

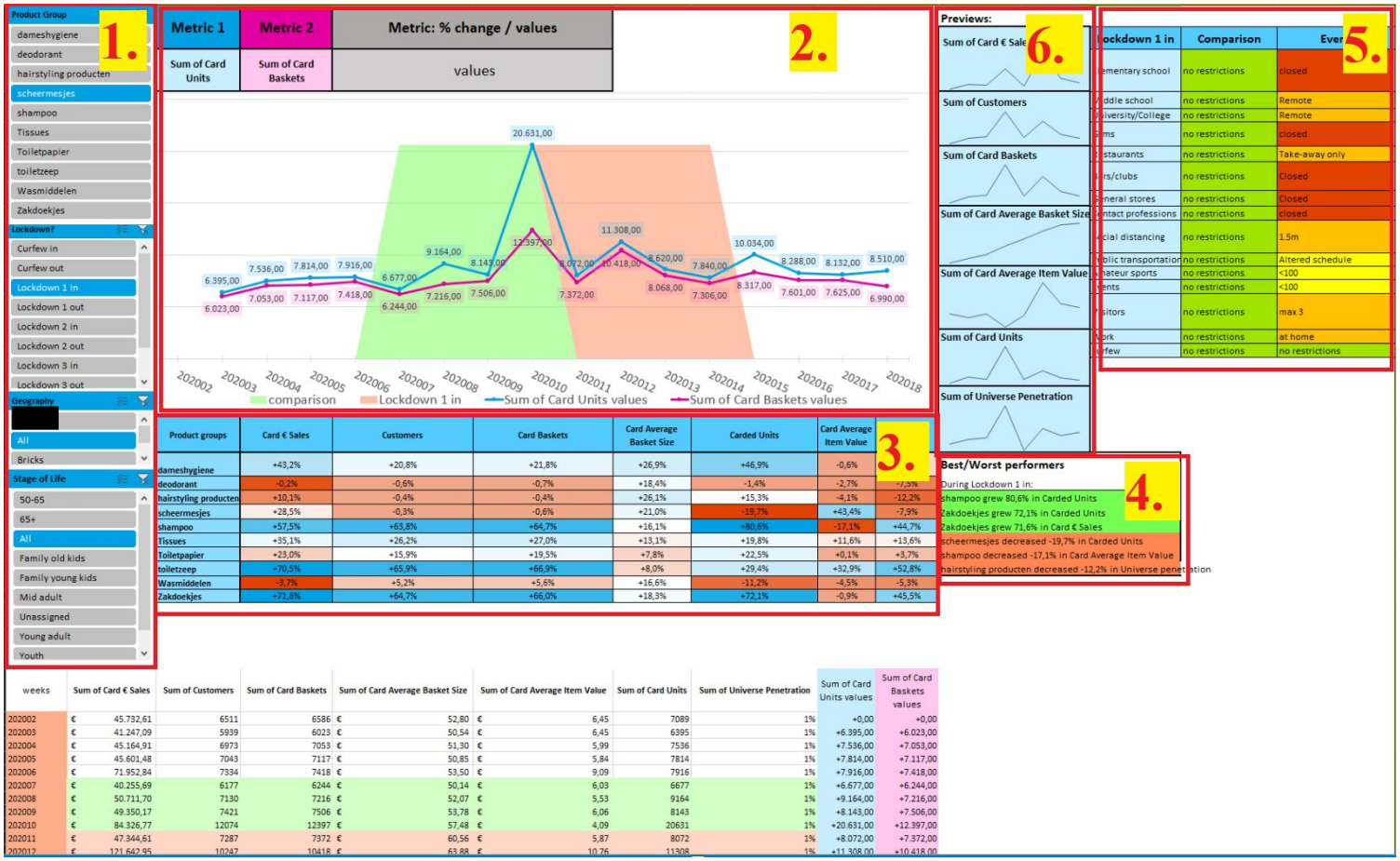


Figure 12 Lockdowns page

1. Filter list

On the right (Figure 13), the filter list present on the “lockdowns” page can be viewed. The list consists of all dimensions in the dataset. These dimensions can be specified when creating a report within SIS. In the example in figure 13, the dimensions selected are for customer base “stage-of-life” and for geography “webshop vs Bricks” and the report that was created was based on drinking products.

The filter list allows users to interact with the graphs and tables shown in the dashboard and is consistent throughout the pages meaning that selecting for example “young adults” in stage of life on the “lockdowns” page will also automatically select the same group on the other pages that use the same filter. This ensures that no matter what page you are looking at, you are always looking at data from the same set of filters.

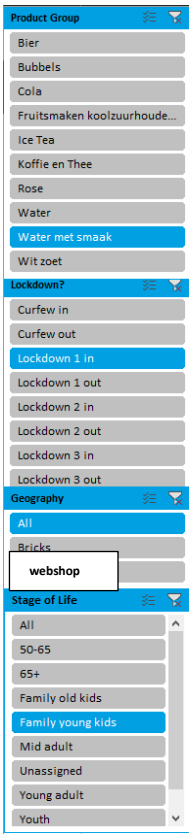


Figure 13 Filter list

2. KPI’s

The main graph of the page consists of two selected KPI’s during the selected period. In figure 14, the KPI’s “Sum of Card units” vs “Sum of card Baskets” are plotted in the same figure.

In addition to the regular filters, there are three more fields the user can alter to change what is shown in the graph. Metric 1 and 2 will change which KPI’s are shown, and the “% change / values” allows the user to show either weekly change in percentages or absolute values per week.

In this example (Figure 14), the “Sum of Card units” and “Sum of card Baskets” are shown of the product group “Fruitsmaken koolzuurhoudend” during “lockdown 1 in” meaning weeks 202007-10 are comparison weeks and weeks 202011-14 are the first 4 weeks of lockdown 1. This is also visualized by a colored area showing when the comparison period ends and “lockdown 1 in” starts.

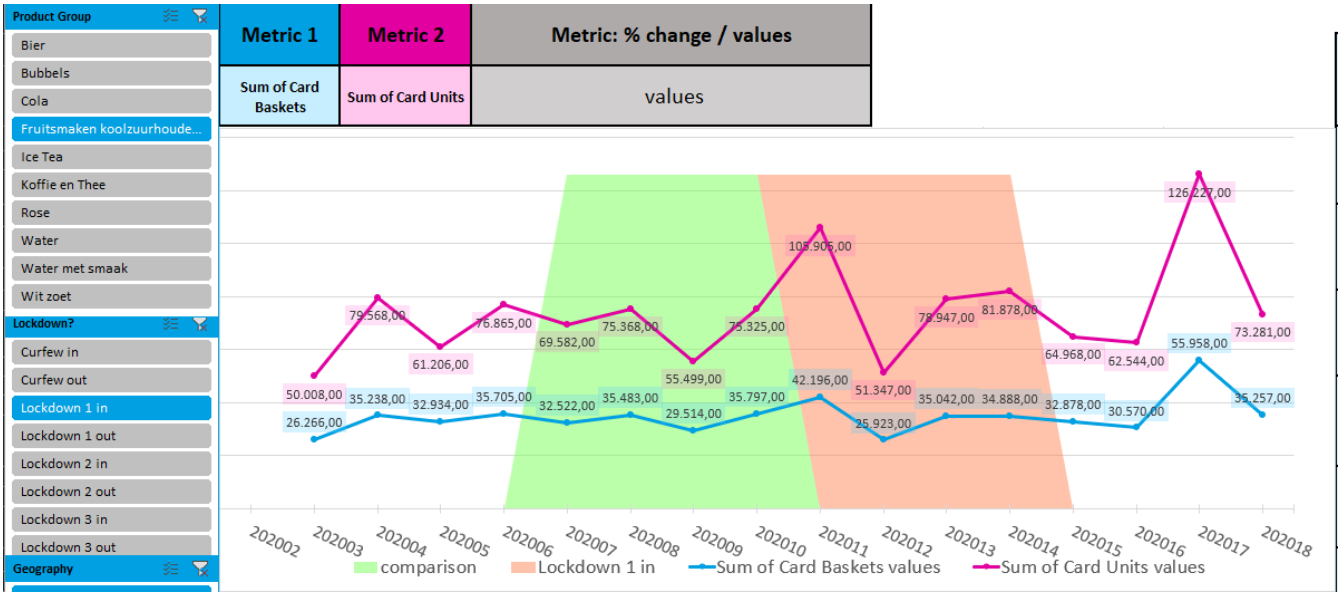


Figure 14 Metrics graph

3. **Percent change table**

The % change table shows the change of all KPI’s in percent for all product groups at the same time allowing users to quickly spot outliers in terms of growth and decline within certain KPI’s. This percentage is taken by comparing the average of the event to the comparison for every KPI. Like with the KPI graphs, this table updates in real-time when the user changes filters.

Table 9 percent change table on "lockdowns" page

Product groups	Card € Sales	Customers	Card Baskets	Card Average Basket Size	Carded Units	Card Average Item Value	Universe penetration
Bier	+13,7%	+16,1%	+18,6%	+17,2%	+17,9%	-3,5%	+11,5%
Bubbels	+19,3%	+22,6%	+24,2%	+7,2%	+21,1%	-0,6%	+17,4%
Cola	+15,3%	-2,2%	-0,9%	+21,8%	-1,1%	+15,4%	-6,8%
Fruitsmaken koolzuu	+10,9%	+1,9%	+3,6%	+17,6%	+15,3%	-3,3%	-2,9%
Ice Tea	+29,1%	+12,7%	+14,6%	+18,1%	+34,6%	-0,5%	+7,5%
Koffie en Thee	+40,1%	+22,1%	+26,4%	+18,1%	+40,7%	-0,2%	+16,9%
Rose	+67,2%	+61,9%	+58,0%	+13,2%	+64,0%	+2,6%	+55,9%
Water	+17,2%	-1,6%	-0,6%	+25,7%	+4,7%	+12,9%	-6,4%
Water met smaak	-4,9%	-18,1%	-15,8%	+23,5%	-17,5%	+10,2%	-21,8%
Wit zoet	+13,2%	+10,4%	+9,6%	+12,6%	+10,9%	+2,1%	+5,5%

In the example above, we see that “water met smaak” scores relatively low on all KPI’s except Card Average Basket Size and Card Average Item Value, where it score around average compared to the other product groups. This indicates that even though less people bought even less products, the people that actually did buy the product, spent more on both the product as well as their basket (People that bought “water met smaak” payed more per product and also spent more per trip in total).

4. Quick insights

The quick insights table shows the three best and worst performances from the % change table and puts it in a simple insights card. These insights also update as filters are being changed.

Table 100 quick insights on "lockdowns" page

Best/Worst performers
Koffie en Thee grew 36,2% in Card € Sales during Lockdown 1 in
Water grew 21,3% in Card € Sales during Lockdown 1 in
Koffie en Thee grew 20% in Carded Units during Lockdown 1 in
Cola decreased -18,9% in Carded Units during Lockdown 1 in
Cola decreased -14,5% in Universe penetration during Lockdown 1 in
Cola decreased -13,1% in Customers during Lockdown 1 in

In the example shown above for example, the biggest changes in KPI values given the selected transition period are shown for both the best and worst performances. The Carded sales of “Koffie en Thee” was the KPI that grew the most during “ lockdown 1 in” with a 36,2% increase.

5. Covid measures table

As mentioned in Chapter 4.3, the Covid measures table (Table 11) shows restrictions made by the government in the selected period including the period before to inform the user which measures were changed from the comparison to the event period, in this example from “no lockdown” to “lockdown 1 in”.

This table is also useful when screenshots are taken from the dashboard for later inspection. This ensures that no matter who is looking at the screenshot, they can still see what measures changed in that period without having to need access to the actual dashboard itself.

Table 11 Measures table

Lockdown 1 in	Comparison	Event
Elementary school	no restrictions	closed
Middle school	no restrictions	Remote
University/College	no restrictions	Remote
Gyms	no restrictions	closed
Restaurants	no restrictions	Take-away only
Bars/clubs	no restrictions	Closed
General stores	no restrictions	Closed
Contact professions	no restrictions	closed
Social distancing	no restrictions	1.5m
Public transportation	no restrictions	Altered schedule
Amateur sports	no restrictions	<100
Events	no restrictions	<100
Visitors	no restrictions	max 3
Work	no restrictions	at home
curfew	no restrictions	no restrictions

6. Previews of KPI graphs

These previews can give a quick insight into the effects on the KPI’s. For example, if one KPI graph is looking significantly different than the others, it could be worth it to further investigate.

4.4.2 Customers page

The goal of the “Customers” page is to provide insights into the different customer segments that were selected by the user as described in chapter 2.3. Whether this is based on the PST, TruPrice, ShopStyles or Stage of Life segmentation, this also includes custom customer groups that can be created in the MyHP function of the SIS-Suite.

Below a screenshot of the lockdowns page can be found (Figure 15). This page is divided into 7 elements of which some have similarities to elements from the “lockdowns” page:

1. Filter list
2. KPI chart
3. % Change table
4. Quick insights
5. Growth chart
6. Covid measures table (Chapter 4.3)
7. Previews of KPI graphs

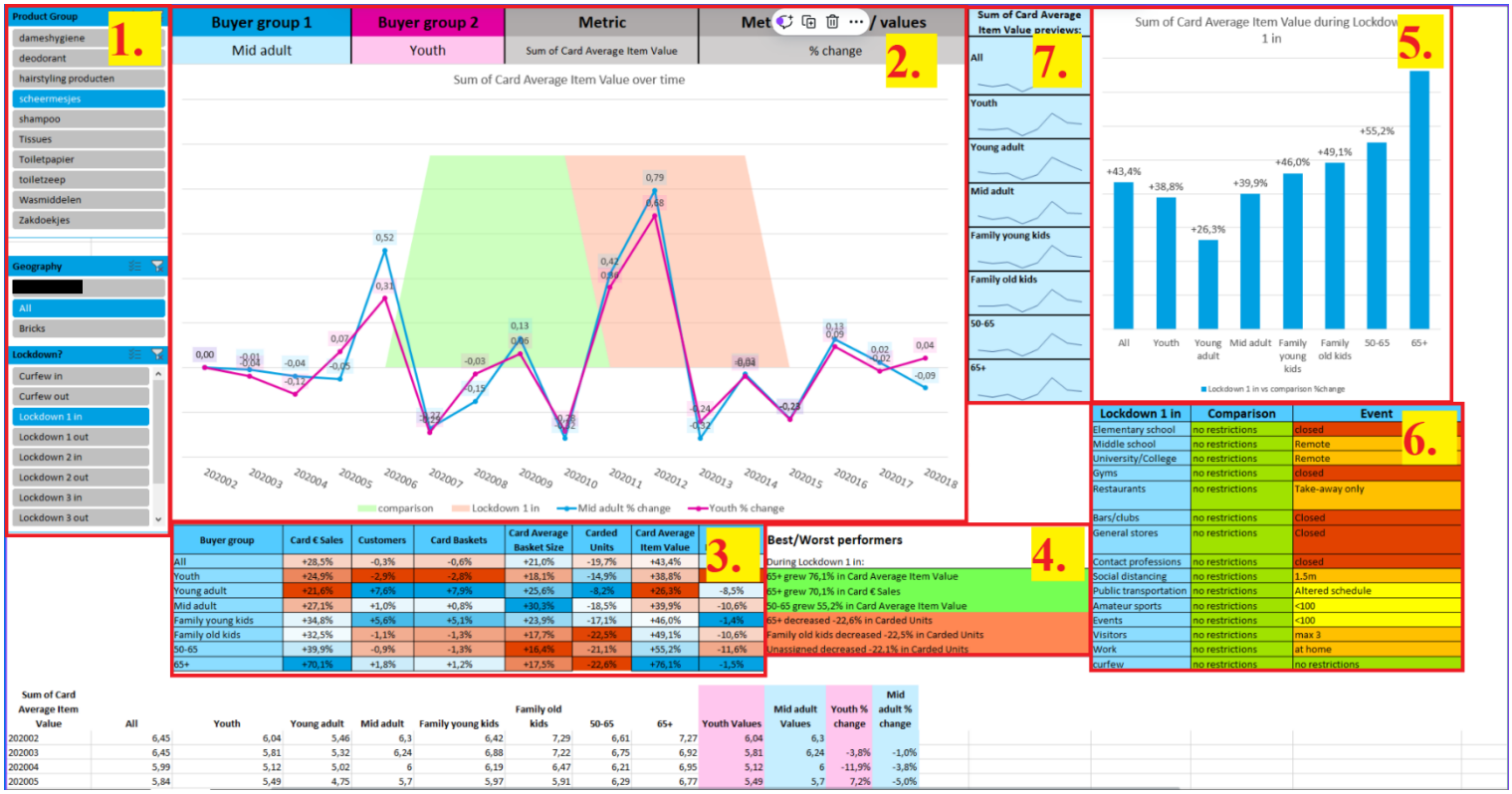


Figure 15 "Customers" page

1. Filter lists

The filter list on the “Customers” page is mostly the same as on the “lockdowns” page excluding the buyer group filter (in example “Stage of Life”). These buyer groups are all included on the page to allow for quick comparisons between them. The filter list still allows users to quickly change between product groups, lockdowns and geography. These three filters are linked to the other pages to ensure you are always looking at the same set of filters.

2. KPI chart

This chart functions in the same way the chart on the “lockdowns” page works, on this page it shows two different buyer groups instead of different KPI’s. Above the chart users can select which buyer groups to compare and which in KPI to compare them with. In addition to this, users can view actual values per week or weekly change in percent based on their selection in the fields above the chart.

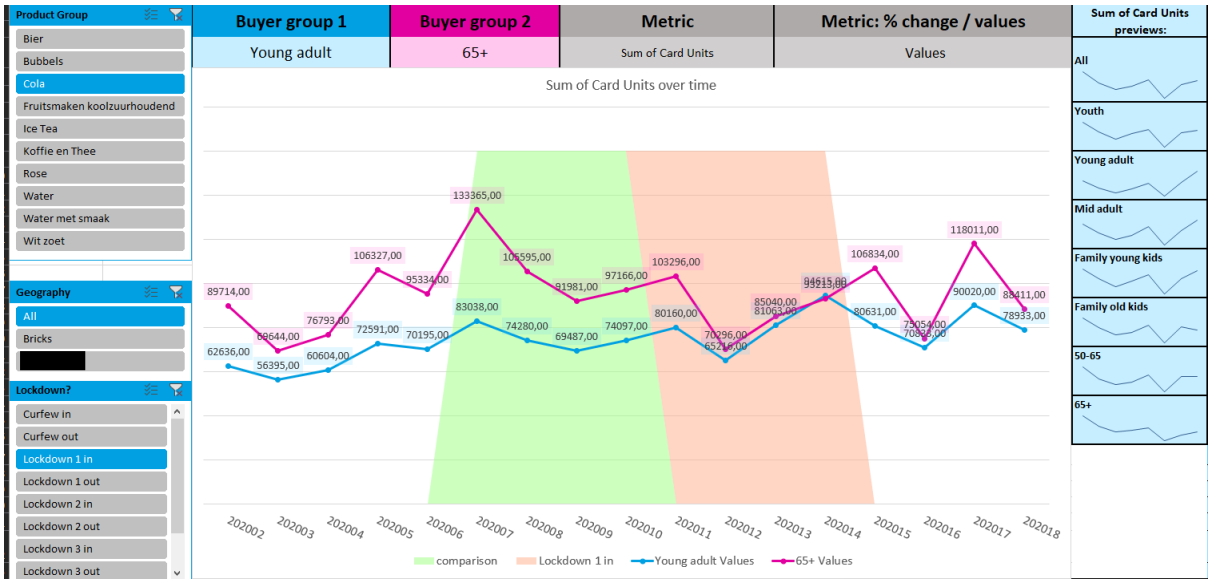


Figure 16 Buyer group graph

In the example (Figure 16) “young adults” are plotted against “65+” buyers in terms of “Carded Units” for the product group “cola”. There is a visual decrease in units sold for 65+ buyers when comparing the comparison period to the event “Lockdown 1 in”.

This can help understand why a certain age group might show less sales in the weekly sales chart. The KPI’s shown on the page can provide the user with a better understanding of their target group and how they react on lockdowns. It can answer questions like “which buyers spend relatively more during lockdowns?” and “which buyers should be targeted in an upcoming promotion?”.

Average growth is shown in the table below this chart for every buyer group.

3. % change table

The % change table on the “Customers” page (Table 12) shows all percentages as shown in the charts in one table for selected filters. This allows user to quickly spot outliers and points of interest to further inspect. This also provides users with the option to copy the values more easily.

Table 11 percent change table on "Customers" page

Buyer group	Card € Sales	Customers	Card Baskets	Card Average Basket Size	Carded Units	Card Average Item Value	Universe Penetration
All	+8,2%	-5,7%	-3,9%	+17,8%	-4,9%	+12,5%	-6,1%
Youth	+8,2%	-6,2%	-5,0%	+17,0%	-5,3%	+13,3%	-6,2%
Young adult	+15,7%	+1,7%	+3,2%	+20,2%	+6,7%	+8,5%	-7,3%
Mid adult	+18,1%	+1,1%	+1,9%	+24,6%	+3,3%	+13,8%	-5,1%
Family young kids	+15,3%	-2,2%	-0,9%	+21,8%	-1,1%	+15,4%	-6,8%
Family old kids	+11,7%	-3,8%	-1,9%	+16,0%	-6,0%	+17,3%	-7,6%
50-65	+11,6%	-3,3%	-1,4%	+16,1%	-3,1%	+13,7%	-7,1%
65+	-5,3%	-17,9%	-16,0%	+17,1%	-17,8%	+13,0%	-13,3%

In this example we are looking at the growth of Cola during “lockdown 1 in” for all buyer groups. This table can be used to spot outliers by their color. For example; Young Adults perform very well on all KPI’s except “Card Average Item Value”, compared to the other buyer groups Young Adults score the least in this KPI. This indicates that Young Adults made more use of promotions than other groups, or simply switched over to cheaper alternatives.

4. Quick insights

In Table 13, the 3 best and worst performing values are listed to give quick insights into the buyer groups given the selected filters.

Table 13 Quick insights on "Customers" page

Best/Worst performers
Young adult grew 18,3% in Carded Units during Lockdown 1 in
Mid adult grew 17,2% in Carded Units during Lockdown 1 in
Young adult grew 17,1% in Card € Sales during Lockdown 1 in
65+ decreased -9,6% in Universe Penetration during Lockdown 1 in
65+ decreased -8,1% in Customers during Lockdown 1 in
Family young kids decreased -7,4% in Universe Penetration during Lockdown 1 in

5. Growth Chart

This chart (Figure 17) shows relative growth of the selected metric in the KPI chart during the selected period, in this example “Carded units” during “Lockdown 1 in”. These values can also be seen in the % change table, but are visualized for the selected fields to provide extra perspective. In this example, during “lockdown 1 in”, young adults bought 6,7% more units than in the comparison period whereas 65+ bought 17,8% less units in the same timeframe.

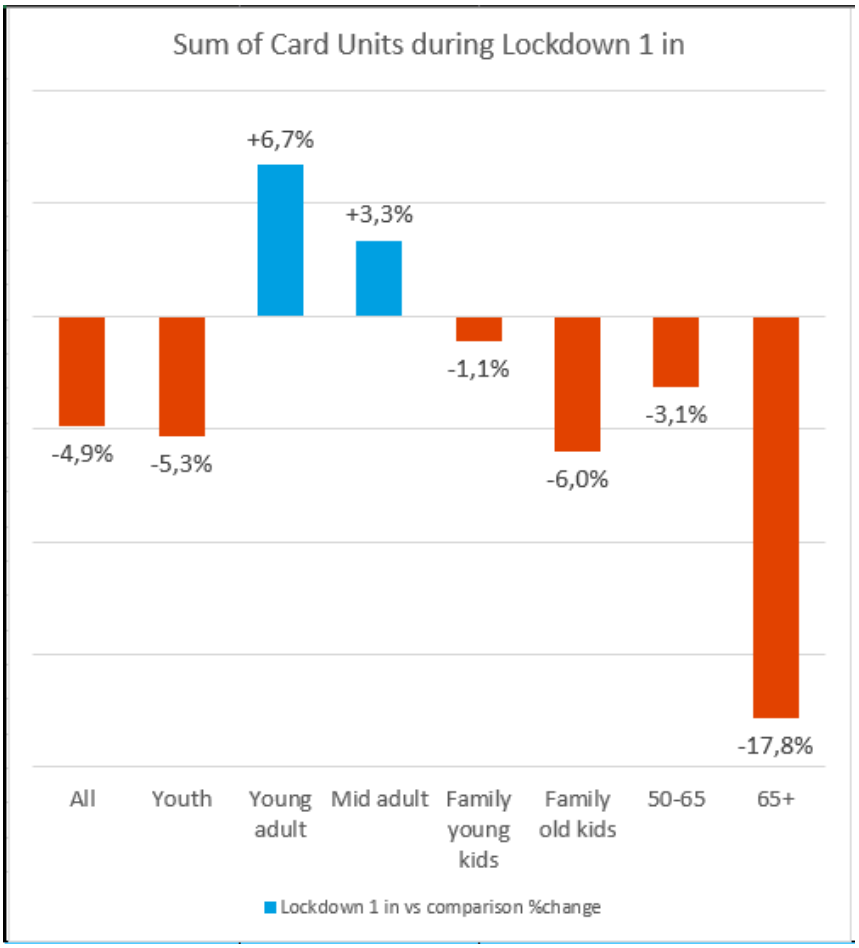


Figure 17 Growth chart

4.4.3 Product groups page

The goal of the “product groups” page is to further compare the different product groups to each other in detail.

Below a screenshot of the lockdowns page can be found (Figure 18). The page is again divided into 5 elements of which some have similarities to elements from the “lockdowns” page:

1. Filter list
2. Comparison graph
3. KPI spider chart
4. Covid measures table (Chapter 4.3)

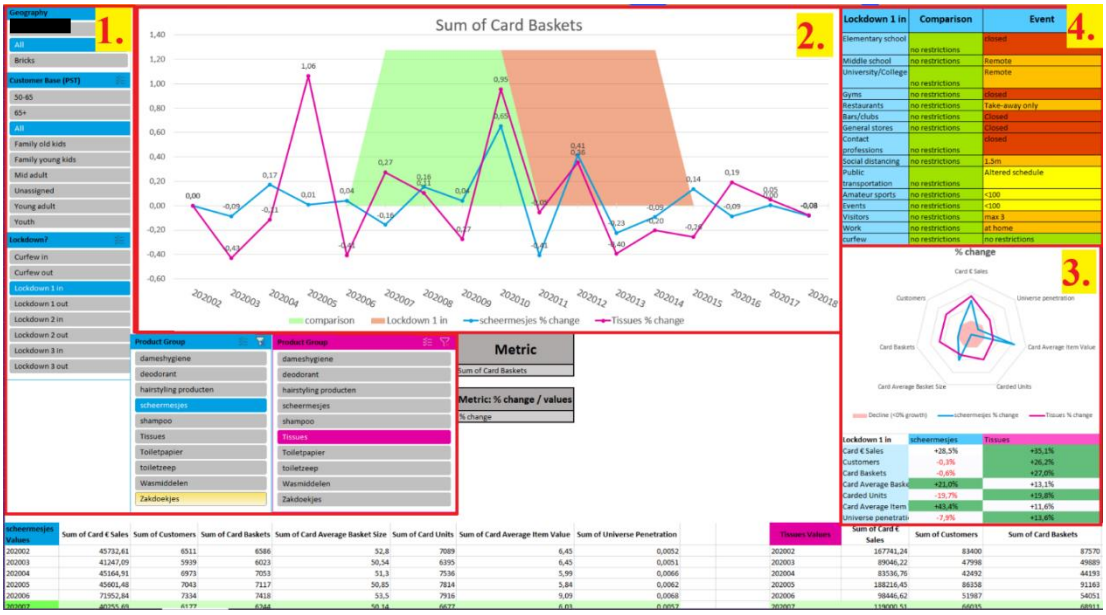


Figure 18 “Product groups” page

1. Filter list

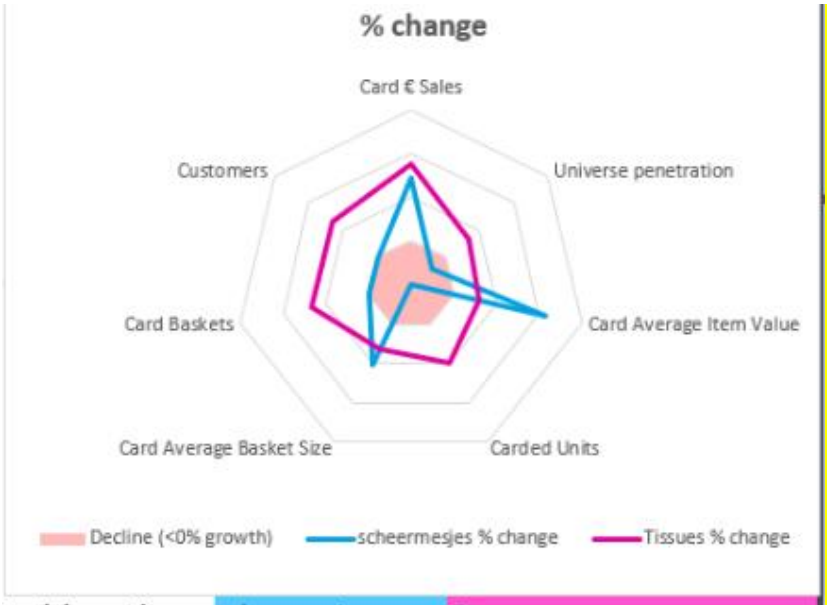
The filters on this page function in the same way as the other pages. The key difference is that there are 2 filters for product groups. Here you can select the desired product groups to be compared on the rest of the page.

2. Comparison graph

This graph shows the weekly values or growth in percentage for the selected KPI and two product groups.

3. KPI spider chart

This chart (Figure 19) draws an area with all corners representing growth in a certain KPI for the 2 selected product groups. It also features a red area to show where decline starts.



Lockdown 1 in	scheermesjes	Tissues
Card € Sales	+28,5%	+35,1%
Customers	-0,3%	+26,2%
Card Baskets	-0,6%	+27,0%
Card Average Baske	+21,0%	+13,1%
Carded Units	-19,7%	+19,8%
Card Average Item	+43,4%	+11,6%
Universe penetrati	-7,9%	+13,6%

Figure 19 Spider chart

At the bottom of the chart is a table that shows the actual values of the spider chart for both product groups and highlights the best performing one. In this example Scheermesjes are compared to Tissues during lockdown 1 in. From the spider chart we can see that tissues have outgrown scheermesjes on all KPI's except Basket Size and Item value. We can also see clearly that 2 KPI's of scheermesjes are in the red marked area meaning those KPI's have declined. From the table below we can see the actual growth values compared to eachother for each selected product group.

4.4.4 Online vs Bricks page

The goal of the "Online vs Bricks" page is to compare online metrics versus metrics from actual physical stores. In literature review was found that people tend to spend more time shopping online when in a lockdown, meaning this page can provide insights in to what degree this happens for [supermarket X].

Below a screenshot of the online vs bricks page can be found (figure 20). The page is divided into 5 elements of which some have similarities to elements from the other pages:

1. Filter list
2. Comparison graph
3. % change bar chart
4. Exclusive customers
5. Covid measures table (Chapter 4.3)

At the bottom of the page, the full data is displayed for the selected filters.

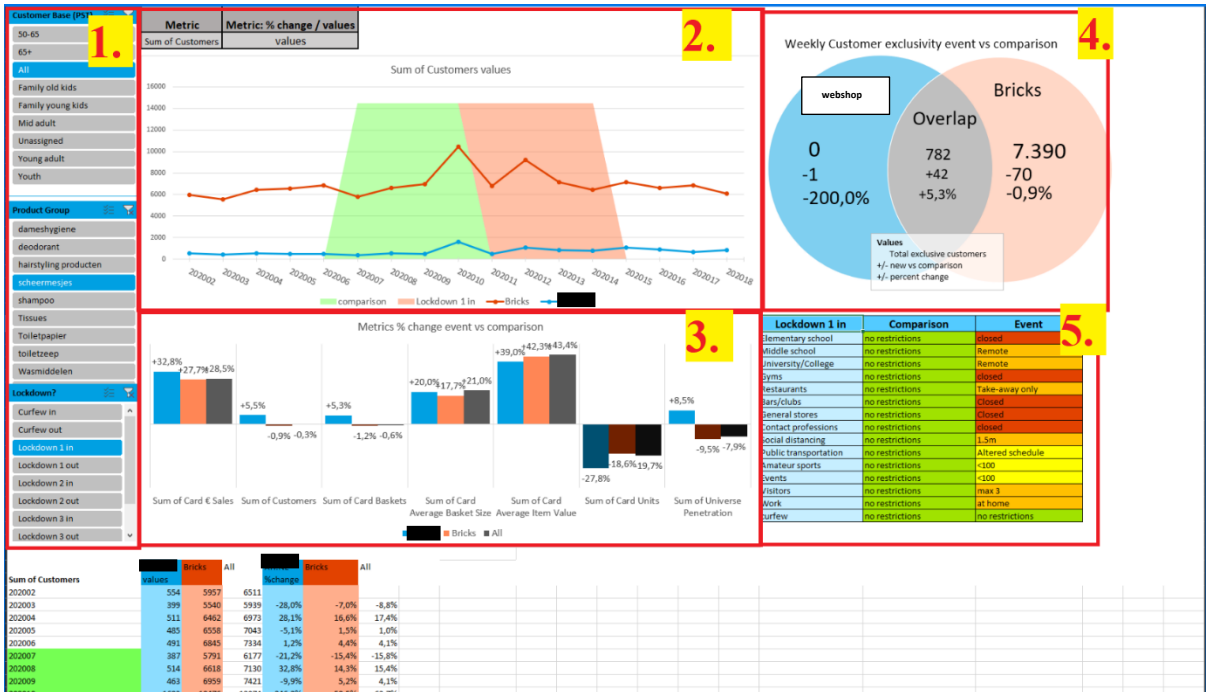


Figure 20 "Online vs Bricks" page

1. **Filter list**

These filters work in the same way as on the other pages, they influence all other elements on the page.

2. **Comparison graph**

This graph shows the selected KPI per week for both webshop and Bricks, this can be changed to the weekly growth by changing the filters at the top of the chart.

3. % change bar chart

This bar chart (figure 21) functions in the same way as the % change table on other pages. Since this chart only compares 3 geographies (as opposed to 10 product groups in the lockdowns page), there was space to visualize them next to eachother in this way.

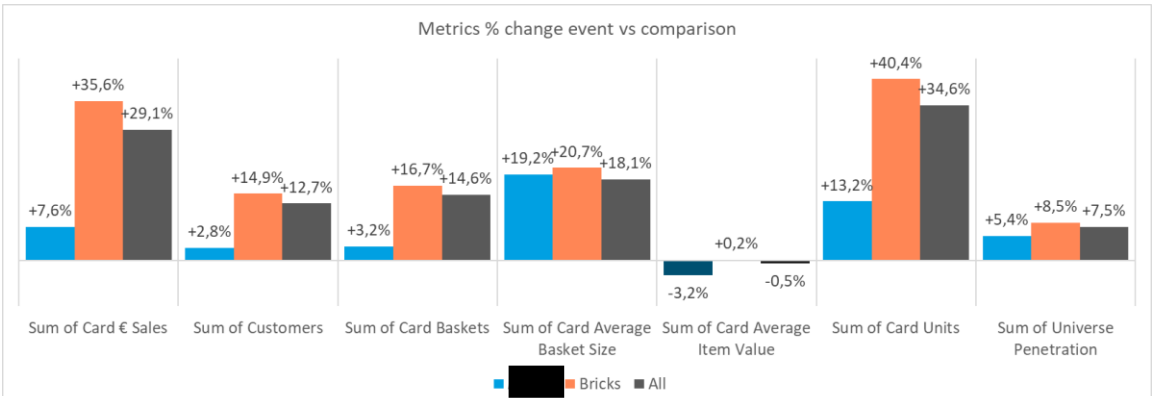


Figure 21 % change bar chart

4. Exclusive customers

This chart (figure 22) divides customers in one of 3 groups:

- People that exclusively buy products online (O)
- People that shop both online and in-store (B)
- People that only buy in-store (S)

Each area gives 3 values:

- Total exclusive customers
- New customers since comparison period
- Percent change in customer amount since comparison period

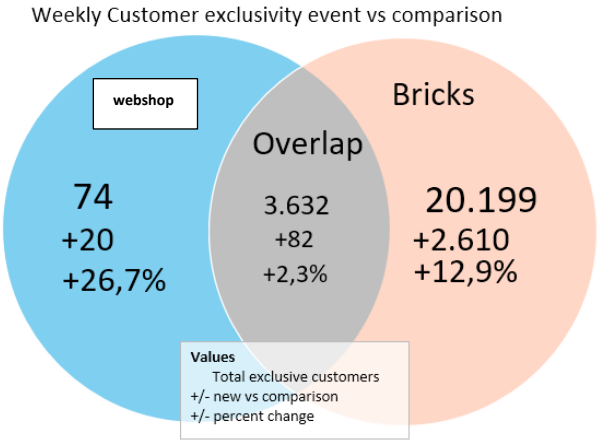


Figure 22 Customer exclusivity chart

In Figure 22, it is shown that in the selected period for selected filters, there are 74 customers that exclusively buy the product online, which is 20 more than in the comparison (26,7% increase).

Since the report used in this dashboard is only providing total customers per geography and total customers, a formula was used to calculate the customers per group:

$$Total\ AH.nl\ customers = O + B$$

$$Total\ bricks\ customers = B + S$$

$$Total\ customers = O + B + S$$

Using these formulas, we can extract the exclusive customers as follows:

$$S = Total\ customers - Total\ AH\ customers$$

$$O = Total\ customers - Total\ Bricks\ customers$$

$$B = Total\ customers - O - S$$

4.5 Conclusion

In this chapter we focused on the design of the Dashboard using what was learned from the literature study and knowledge questions. After a literature review the KPI's most useful were selected, and together with the knowledge gained from LIT we selected which types of graphs and tables to use to achieve the best user experience. After this knowledge was obtained, the first version of the dashboard was presented (also in Appendix C).

Figure 23 First draft of dashboard: A) Lockdowns B) Customers C) Product groups D) Online vs Bricks

5. Evaluation and Improvement

In this chapter we look at the feedback received from users that looked at the first dashboard. The dashboard was sent together with a one-pager that featured instructions on how the dashboard works and what it shows. In addition to the dashboard document and the manual, 4 separate datasets were provided to test whether users could change the dataset on their own. In the first section, the UEQ results are presented. In the second section, feedback comments are discussed and finally, the revised dashboard will be presented.

5.1 UEQ results

After the first version of the dashboard was finished, it was sent together with a manual to the SIS-team, who work closely together with product/category/marketing-managers of suppliers to provide insights into their products' performance. Then, the UEQ was filled in by 7 employees. The results were then added to the excel sheet provided with the UEQ service. The results of the questionnaire are shown below (figure 24 and full results in Appendix E):

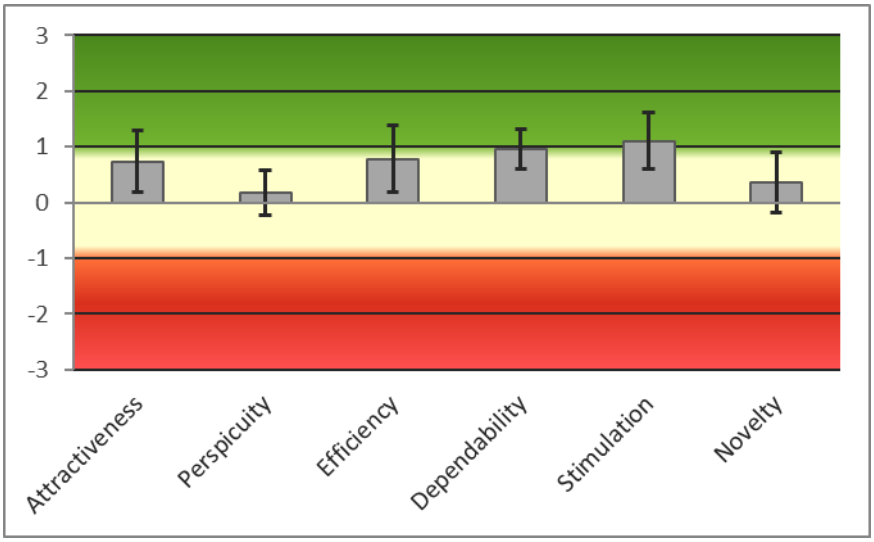


Figure 24 UEQ results

In these results, the feedback was transformed from a 1 to 7 scale to a -3 to +3 scale to give scores on different criteria. The first version of the dashboard scored highest in "stimulation" and "dependability". The lowest score "perspicuity". This means that the improved dashboard should focus more on clarifying what is shown on the dashboard so that the user can understand it better. An explanation for a somewhat lower score is the situation in which the questionnaires were presented with the dashboard. They did not receive a demonstration of the dashboard until after the results of the questionnaire. This was done to also test the manual that was provided. In an ideal situation, users would have a good enough understanding of the dashboard with just the manual. It is likely that higher scores were given if the questionnaires had received a demonstration beforehand.

This figure (figure 25) shows a benchmark of the scores. It compares the results of 20.000 users to the UEQ of this assignment to show how it performs among other designs. In this benchmark we can see that the dashboard scores slightly above or below average on most criteria. “perspicuity” is the only criteria that scores considerably lower than the rest.

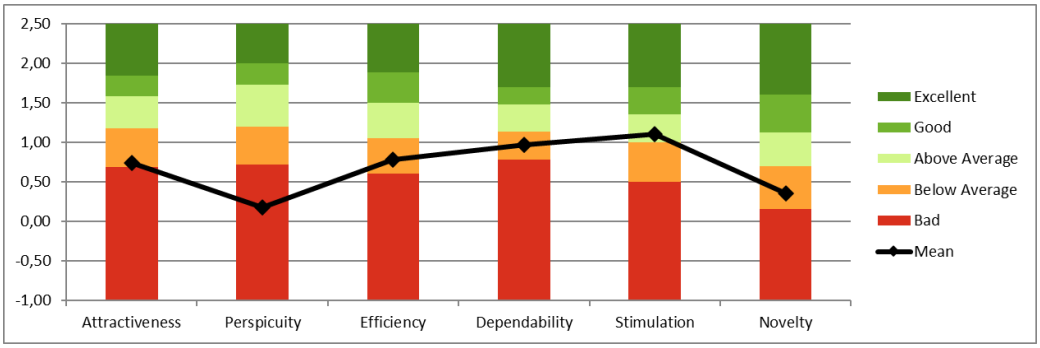


Figure 25 Benchmark scores

From both figures we can conclude that especially perspicuity is a criteria that needs to be improved. Perspicuity tells us how easy it is to understand a dashboard, and how adaptable the product is. Taking into account the results from the UEQ, we also look at extra feedback given in text by the questionees (table 14):

Table 14 Extra feedback

Feedback	Comment	Conclusion
“In tab 'Customer', you have 2 lines comparing each segment's %change. But on the graph now it shows decimal values. If it shows '0.04', does that mean 0.04% OR 4%?”	0.04= +4%, Although it is technically possible to have the labels change their format, it is very difficult and time consuming because of the dynamic capabilities in the dashboard. Instead, a format was chosen that would work the best for both absolute values and percentages. In this case 0.XX.	The manual and dashboard will explicitly mention what is meant by the value displayed when looking at the % change.
“Choice of graphs seems a bit inconsistent, a bar chart in bricks vs. webshop and tables in the other tabs”	As mentioned in chapter 4.4.4, a different chart was shown on this page because it allows users to visually see differences compared to a table with conditional formatting. On the other pages there were more groups to compare that would take up too much space if done in the same manner.	It is understandable that if you see a different type of graph on one page, you expect a difference in its function. The graph will be changed to a table so that it matches the other pages.
“the table of EIA you would also expect in the tab Product groups, to be consistent with the other tabs”	It felt unnecessary to put up two of the same functional tables in the dashboard. My thought was that people used the EIA to find product groups to further inspect,	I understand that you might want to check the product groups table more often when comparing product groups, so instead of switching between pages,

	and then go into the product groups page to compare them.	it'd be better to just have that table on the product groups pages as well.
"unclear what is ment with 'in' and 'out' with the lockdown periods"	There is an explanation in the manual. Perhaps it should be in the dashboard as well.	A separate explanation with a visual indication of the periods will be added to the covid calendar page in the dashboard.
"For the dashboard onepager, consider to add numbers in your screenshot that match with your tutorial instructions, to make it easier to understand to which part of the dashboard you're referring to."	I feel like numbers would make the onepager uglier. I was hoping I could get away by calling out the locations of the graphs in the text.	Numbers will be added in the manual.
"In selection boxes, place all on top"	I wanted to do this, but in excel, you can not change the order of slicer options. Only in alphabetical order or reversed. Changing this would mean deleting all slicers and adding and programming drop down menus (like I did at the customer tab for buyer groups) for all pages which would not be worth the effort for just an order preference.	Unfortunately, this will not be changed.
"I would tidy up the dashboards a bit, same borders or none for example"	Not sure if there is a particular section that is being mentioned here. But I do agree that the dashboard looks a bit messy in some places.	I already spent a lot of time improving the layout but I will see if I can find more areas to improve.
"if you select webshop on EIA , it doesnt automatically goes to that selection in Product Groups"	Correct, one slicers wasn't linked to the others. This was an error.	It is fixed.
"Use of color is nice, but I feel a little bit overwhelmed by all the colors that are used in the dashboard and also in the one pager - try to minimise it and maybe not all parts need to be colored?'	The use of color in the dashboard all has a function, either to indicate a period, or to show which values belong to which lines in a graph.	I don't think I can change a lot about this. I will try and see if there are some too vibrant colors I can turn a down a notch.
"Start the one pager with the purpose of the dashboard, why did you set it up and what can somebody get out of it"	Good suggestion, the onepager currently starts with an explanation on how to set up the dashboard without a reason on why to	Will add this to the manual.

	even use the dashboard in the first place.	
“Dashboard EIA - I like the block with Best/Worst performers, would be nice to add where this is based on”	Maybe not explained detailed enough in the manual.	Will add explanation to manual and dashboard

5.2 Revised Dashboard

The first version of the dashboard was improved upon using the feedback obtained from the UEQ as well as the extra feedback given by the employees. Most visual changes were done on the first page of the dashboard, the lockdowns page.

In Figure 26 on the next page we see both versions of the lockdowns page in the dashboard. Changes that were made were concerning the uncertainty over the labels used in the line graph used to show metrics changing over time. It was unclear to some user whether changing the units to % change would mean 0,04 mean 0,04% or 4%. A card to the right of this filter was added explaining the formats used in the labels when using this option.

Another card was placed to the right of the best/worst performers element. People were unsure what this card showed exactly, and on which numbers it was based on. The card gives further information on how these messages were programmed.

The cards added to this page were not placed on the other pages as they would convey the same message and users will already have read it on the first page anyway.

On the Product groups page, a malfunctioning filter was fixed so that it would be linked to the other pages as well.

Figure 26 draft (top) and improved (bottom) version of Lockdowns page

In the Online vs Bricks page (Figure 27 on the next page), the bar charts featuring the growth percentages of the geographies were replaced by a table for consistency. People found it confusing that this was the only page showing these values in a bar chart where other pages used a table to show these numbers.

Another change was regarding the webshop label. Feedback included the wish to change all "[full webshop name redacted]" to "online" for the labels. This however was only possible in a few places as some other labels simply use data from the dataset. The only way to do this in the desired way is by adding extra lines to the macro used to mark lockdown weeks. All revised dashboard pages can also be found in Appendix D.

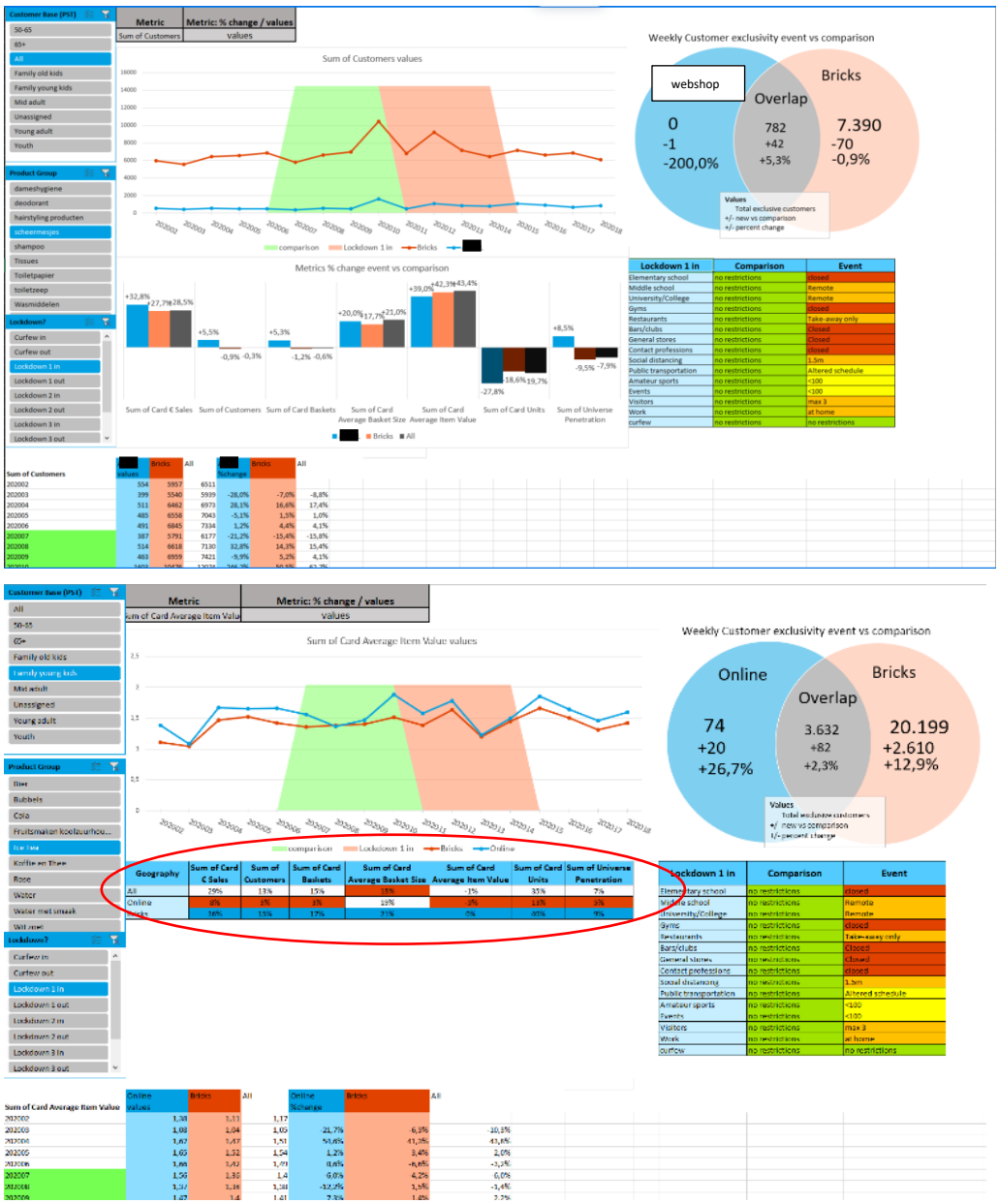


Figure 27 draft (top) and improved (bottom) version of online vs bricks page

For the manual (Figure 28 and Appendix C), feedback received mentioned reducing the colors to improve readability and to start the onepager with a text to explain what the dashboard does and what purpose it has.

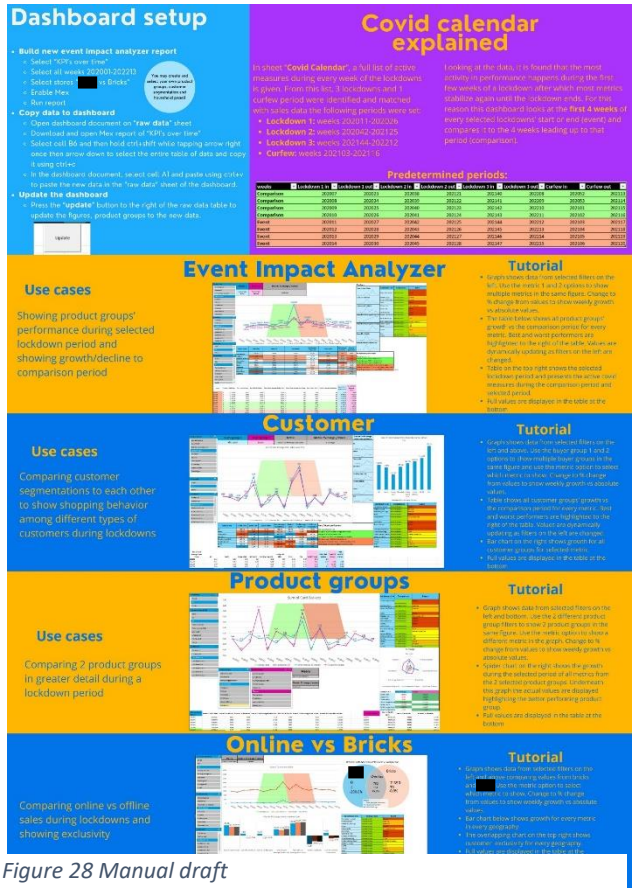


Figure 28 Manual draft

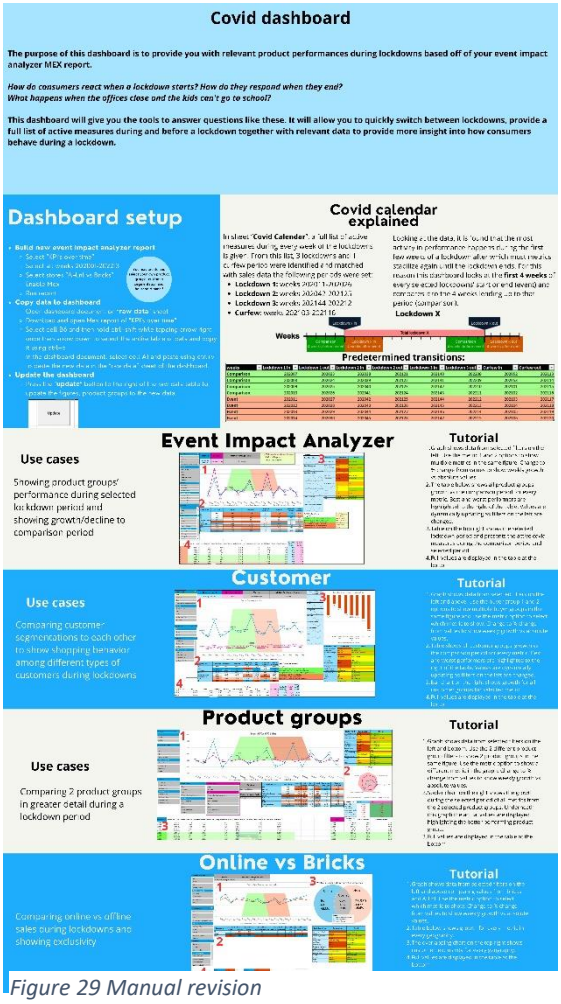


Figure 29 Manual revision

In the draft, every section had it's own vibrant color based on the SymphonyAI logo colors. This was however too cluttered according to feedback so these colors were reduced in the revision (Figure 29 and Appendix D).

In addition to this, a separate square was placed at the top featuring an explanation about what the dashboard's purpose is and which questions it can answer.

Finally, extra information was added to the dashboard in the “Covid Calendar” page. This page gives out all the information necessary to understand how the covid calendar and its lockdown transitions work if people want to know more after reading the manual. This page (Figure 30) features:

- A full table of all measures active per lockdown
- A transition table as featured on the dashboard pages
- All lockdown transitions listed with their corresponding week numbers in a table
- An extra visual timeline showing what the comparison and event periods are per lockdown.
- A full list of measures active per week from 2020 until 2023.

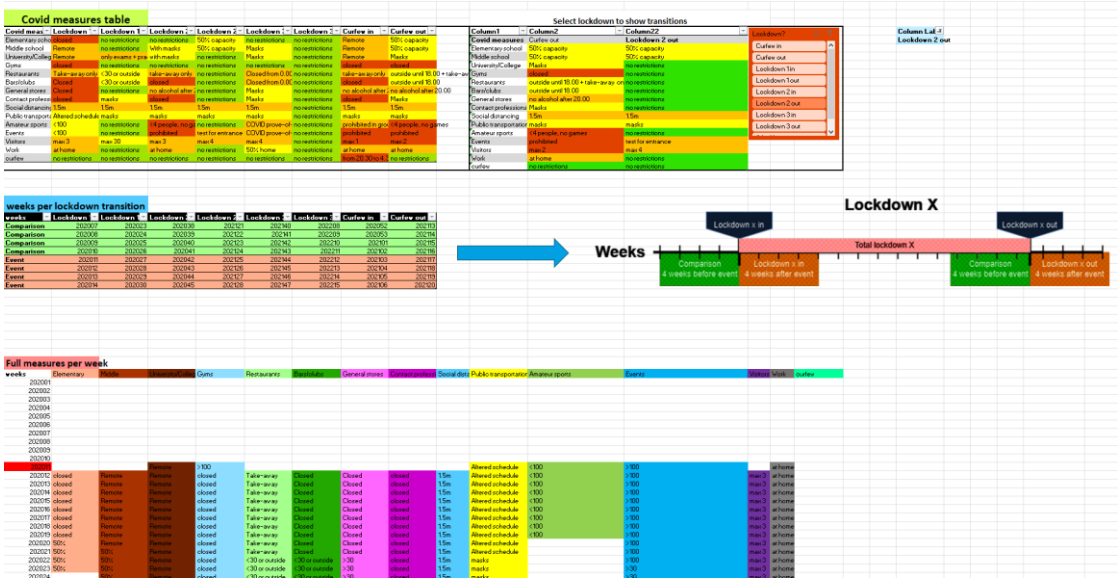


Figure 30 Covid calendar page

6 Conclusions, Recommendations and Limitations

In this chapter, the conclusion to the main research question *"How do we efficiently show change in shopping behavior during lockdowns?"* will be discussed (chapter 6.1). Recommendations for SymphonyAI will be discussed in chapter 6.2. After this, in chapter 6.3, the limitations of this research will be described. Finally, further research and scientific relevance will be discussed at the end of this chapter.

6.1 Conclusion

The main goal of this research was to provide SymphonyAI and its clients with a standardized tool to analyze and compare sales data from [supermarket X] during the pandemic and giving them the information necessary to react to a future lockdown to optimize performance of their products. To achieve this the following main research question was stated in chapter 1.4:

"How do we efficiently show change in shopping behavior during lockdowns?"

To answer this question, five subquestions were stated with the goal of providing context to answer the main research question. Below, these five questions are discussed:

1. *What metrics/KPI's of shopping behavior are affected most by lockdowns?*

A literature review covering spending habits of consumers was conducted to establish a list of KPI's that are most affected during a lockdown. These KPI's can be found in table 5 in chapter 3.1.

2. *What weeks were considered lockdowns and which measures were active?*

To find out which weeks during the pandemic were considered lockdowns, and which measures were active, data was extracted from official government websites and labelled by week and measures active. The results of this are presented in chapter 2.1.

3. *Which covid-measures affects shopping behavior most?*

The literature review in chapter 3.1 covers the answer to this question, some covid-measures affect the day-to-day of consumers more than others resulting in different spending habits.

4. *How do we visualize KPI's on the dashboard?*

In chapter 3.2, a literature review was conducted to explore the different types of data visualization together with the practical uses of them.

5. *How do we measure a dashboard's effectiveness?*

In chapter 5, the dashboard was scored based on the UEQ scale that was used to determine its effectiveness.

"How do we efficiently show change in shopping behavior during lockdowns?"

In chapter 3, measures and which metrics were affected most by them were determined. These measures (chapter 4.3) and metrics (chapter 4.4) were implemented in a dashboard. Together with predetermined lockdown transition periods (chapter 2.2), users of the dashboard have all the tools necessary to obtain valuable insights from their products' performance during the pandemic.

At the end of this research, a dashboard was presented with four interactive pages focusing on different aspects of the data, giving users the option to show sales data based on selected standardized lockdown transitions.

6.2 Recommendations

The results of this research proves the usefulness of having set periods when analyzing data. Having a similar option within the SIS-suite as the My Household Panel (chapter 1.1) to set custom periods for employees to select when creating a new report can improve standardization within a department. This option does not only apply to lockdowns, but could also be useful when a supplier has a certain promotional campaign they want to compare data to a year later, or when a supplier has issues in their supply chain they want to monitor. Without a function like this, employees will have to check for themselves whenever they want to investigate past events with the risk of having reports on slightly different weeks than others.

Secondly, it is likely that during certain national events, most clients already run reports (for example after kings day, the holiday season or the world cup). Giving clients an option to choose from a list of popular or interesting weeks could save considerable time especially when a lot of SIS users are internationals that are not entirely up to date on Dutch traditions or holidays.

6.3 Limitations

There are several limitations to this research, this chapter describes the limitations to this research.

The first limitation of this report is time. This thesis was supposed to be conducted in 10 weeks of work, limiting the time available to further develop the dashboard and the functionalities. If more time would have been available, the research could have been more thorough providing more KPI's. Besides that, the function to show markdown could have been implemented to provide users with more context into why a product suddenly performed better/worse than the week before. I would also have liked to add a functionality to manually add/edit extra transitions in the dashboard besides the 8 presets. Finally, the dashboard design could have been worked on more to improve user experience.

The second limitation was the data availability, [supermarket X] is only allowed to store sales data for a set amount of years meaning data of the pandemic was only available for a certain amount of time. This meant that before finishing the dashboard, reports had to be run in advance to make sure data from the correct periods was still available when developing the dashboard. This also means that this dashboard is only usable for clients that have their reports from that time period already stored.

The final limitation was the fact that certain data is only available for Loyalty card users (carded customers). Non-carded customers cannot be identified within customer segmentations like the Stage of Life-segmentation and thus this dashboard only takes into account carded data.

6.4 Scientific relevance

This research selected certain KPI's to be most affected and relevant for showing changes in shopping behavior among [supermarket X] customers. These KPI's can however be used in similar research for other retail stores. In addition to this, the extensive list of measures active per week during the pandemic in the Netherlands can be crucial when information online becomes less available.

6.5 Further research

When finding literature covering consumer habits during lockdowns and pandemics, most articles only covered global findings and conclusions based on experiences rather than statistical analyses. This represents a knowledge gap in which measures affect consumers most. It would useful to have a list of measures and exactly how much they affect consumer behavior. In addition to this, the severity of each lockdown and its effect on consumer behavior was not uniform. Some lockdowns barely changed the behavior of consumers and it is unclear whether this is because of habituation or because the measures were less aggressive.

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Appendix A - Definitions & variables

Table 15 shows the definitions and variables used by SymphonyAI and [supermarket X] in both their datasets and communication.

Table 15 Definitions and variables of Symphony AI and [supermarket X]

Name	Abbreviation/Synonyms	Description	Measure
Loyalty card	Loyalty card, customer card	Name of [supermarket X]'s loyalty/customer card.	
Product	-	Single item	
Product group	-	Group of product of which data is aggregated (max 10 per report)	
Product universe	-	Overarching group of predetermined products of which all product groups must be part of: Example: Product groups "White Chocolate bars" and "Dark Chocolate bars" containing all products containing white and dark chocolate compared to the Product Universe named "All chocolate bars" containing both product groups in addition to all other types of chocolate bars. (max 1 per report to which all product groups compare to)	
Total € Sales	Total Sales	Total sales amount of selected product group	€/week
Card € Sales	Carded Sales, Card Sales	Total sales amount in € of selected product group of people that used the loyalty card	€/week
Customers	-	Amount of unique households (loyalty cards) that bought selected product group, only from carded sales	Customers/week
Customer Penetration	CP	Percentage of the total customers from the retailer that bought selected product group	%/week
Universe Penetration	UP	percentage of the total customers from selected universe that bought selected product group	%/week
Total Units	-	Amount of products sold in total	Units/week
Card Units	-	Amount of products sold among loyalty card users	Units/week
Total Average Item Value	Total AIV	Average price the products from selected product group sold for	€/unit
Card Average Item Value	Card AIV	Average price the products from selected product group sold for, only from loyalty card sales	€/unit
Total markdown	-	Total cost of lost sales due to promotion	Sum of total discounts in €
Card markdown	-	Cost of lost sales due to promotion among loyalty card users	Sum of total discounts in €
Total Baskets	-	Amount of "trips" or "payments" containing at least one product from selected product groups	Number of baskets
Card Baskets	-	Amount of "trips" or "payments" among loyalty card users containing at least one product from selected product groups	Number of baskets

Total Basket Penetration	-	% amount of the total baskets that contained products from selected product groups	%/week
Total Average Basket Size	-	Average total price of basket (or trip/receipt) containing at least one product from selected product groups	€/basket
Card Average Basket Size	-	Average total price of basket (or trip/receipt) containing at least one product from selected product groups among loyalty card users	€/basket
Card share of universe	Card share	% of carded sales from universe that came from selected product groups	% per week
Primary-Seconday-Tertiary segmentation	PST segmentation	Shows data for selected customer group: • Primary: Shoppers that do most/all their groceries at [supermarket X] • Secondary: Shoppers that occasionally shop at [supermarket X] • Tertiary: Shoppers that rarely shop at [supermarket X]	
ShopStyles segmentation	ShopStyles	Filters on type of customer based on their product preferences: • Genieten (“Enjoy”) • Bewust Gezond (“Consciously Healthy”) • Gemak (“Easy”) • Budget • Categorie gedreven (“Category driven”) • Traditioneel (“Traditional”)	
Stage of Life segmentation	SoL	Filters users based on agegroup (in future SIS-updates).	
TruPrice segmentation	TruPrice	Shows data for selected customer group in terms of price: • Quality driven customers • Neutral customers • Price driven customers	
Geography	Channel, medium	• Online (webshop) sales • Offline (Bricks) sales	
Custom buyer group	My Household Panel, MyHP, Buyer Group	Group of buyers selected from elaborate filter function in My Household Panel (optional in SIS)	

Appendix B - SLR

This appendix will include step 2 to step 6 from the 7-step SLR approach.

Step 2 - defining the inclusion and exclusion criteria

Inclusion criteria	**reason**
Research on customers during lockdowns	If we can find out what happens to the regular customer during lockdowns, we can start looking at what different types of measures do
Research on different types of covid measures and the effect on people	All people are customers, and finding out which measures affected us most will be useful when selecting measures on which the preset lockdowns will be defined
Exclusion criteria	**Reason**
Research with no citations	A cited source is an indication of quality, and although not all cited research is necessarily valid, all valid research is usually cited.
Research in languages other than English or Dutch	As I can only confidently read English and Dutch, papers in other languages will be excluded as I do not necessarily trust current translation tools to be flawless.
Research in physical health	A lot of research about COVID exists in terms of health effects and the effectiveness of measures. For this research this is irrelevant, we only want to know about the behaviour of people.
research without peer reviews	Another indication of quality, if the resdearch is not peer reviewed, I will not use it
research from before 2019	research from before 2019 can not tell anything about the effect of covid measures

Step 3 – Defining databases

Source	**Motivation or justification to use this source**
Scopus	one of the largest databases, a lot of search options, only includes peer-reviewed literature
Web of Science	Only includes peer-reviewed literature, lot of search options

Step 4 – Description search terms

key concepts	**Related terms**	**narrower terms**	**Broader terms**
Shopping behavior	Consumer behavior, brand loyalty, purchase decision-making	shopping during covid/ lockdown/ quarantine	behavior, consumers, psychology
Covid measures	face masks, quarantine, isolation, lockdowns	Work from home, closed bars, closed restaurants, closed gyms	event
Retail	e-commerce, consumer goods,	Groceries, supermarket	business
Promotion	advertising, marketing, discounts	Personalized marketing, special offers	communication

Step 5- Results

Date	**Source**	**Search string or search method**	**Total hits**
13-4-2023	scopus	TITLE-ABS- KEY (covid AND measures AND shopping AND be havior)	154
13-4-2023	scopus	TITLE-ABS- KEY (effect AND covid AND measures AND retail)	112
13-4-2023	web of science	((ALL=(shopping behavior)) AND ALL=(covid measures)) AND ALL=(different covid measures)	30
	Total		**296**
	apply inclusion and exclusion	-284	**12**
	Extra sources through snowball effect	+1	**13**
	Removed after reading		

Step 6 – Conceptual matrix

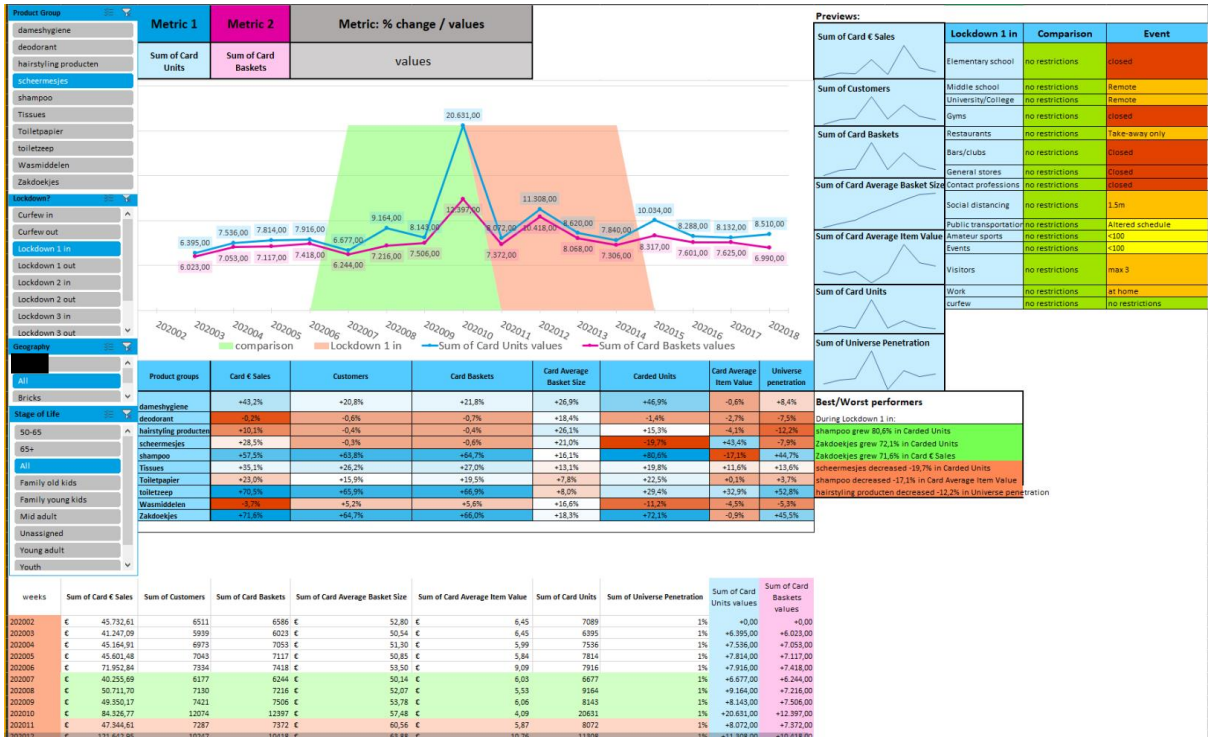
Below the conceptual matric, this also contains removed sources and an explanation on why this source was not relevant.

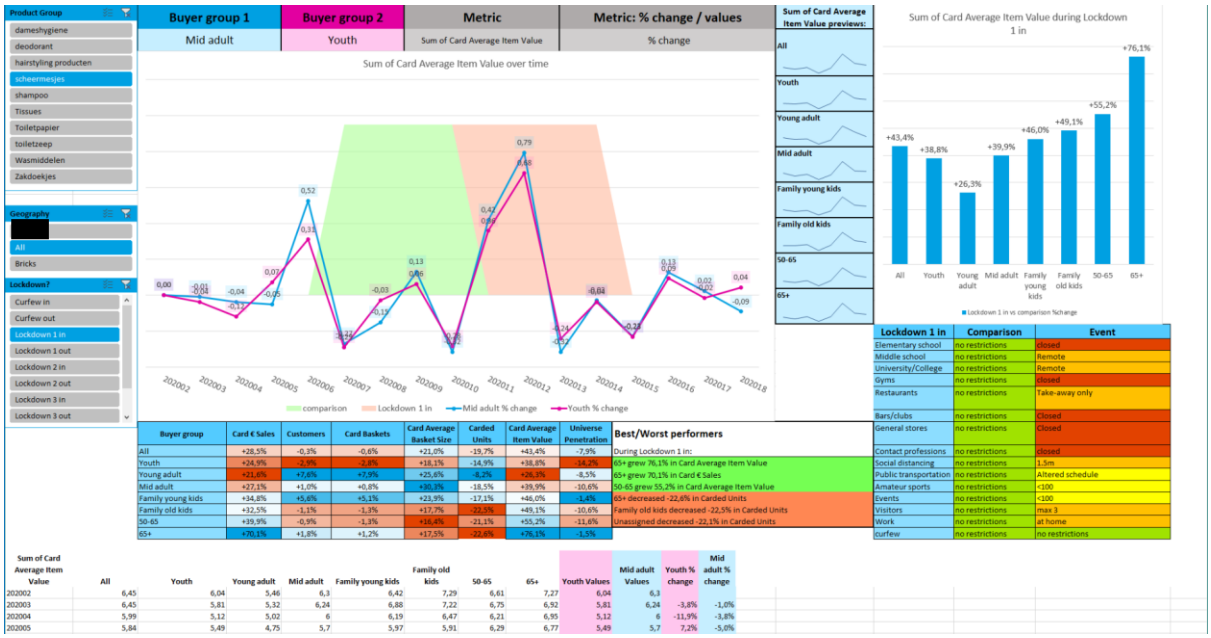
Journal	**Title**	**Author**	**Research topic**	**Application to own research**
Transportation Letters	~~The tale of two countries: modeling the effects of COVID-19 on shopping behavior in Bangladesh and India~~	Zannat, K.E., Bhaduri, E., Goswami, A.K., Choudhury, C.F.		Removed - Focuses on other countries, with a different culture and lockdown experiences
Journal of Social Marketing	Does sustainable consumption matter? Consumer grocery shopping behaviour andthe pandemic	Phang, I.G., K.P.D. Balakrishnan, B., Ting, H.	Consumer behavior	Explains consumer behavior during lockdowns
Vision	~~Shopping Safety Practices Mutate Consumer Buying Behaviour during COVID-19 Pandemic~~	Sehgal, R., Khanna, P., Malviya, M., Dubey, A.M.		Removed – Focuses on India
Socio-Economic Planning Sciences	The Covid-19 pandemic and food consumption at home and away: An exploratory study of English households	Filimonau, V., Vi, L.H., Beer, S., Ermolaev, V.A.	Consumption during lockdown	Raises the idea that segmentation spread is likely to change.
Socio-Economic Planning Sciences	Generation and prevention of food waste in the German food service sector in the COVID-19 pandemic – Digital approaches to encounter the pandemic related crisis	Strotmann, C., Baur, V., Börnert, N., Gerwin, P.		Removed – Focuses solely on food waste
Production and Operations Management	Impacts of the COVID-19 pandemic on grocery retail operations: An analytical model	Delasay, M., Jain, A., Kumar, S.	Grocery impacts during lockdowns	Mentions the relevance of online shopping behavior.
ekonomski vjesnik	GENERATION Z BUYING BEHAVIOR CHANGE IN THE COVID-19 PANDEMIC CONTEXT	Simic, ML; Pap, A	Consumer behavior	Mentions shift from luxury items to basic goods and the growth in online shopping
transportation research part f-traffic psychology and behaviour	The Long-Term effects of COVID-19 on travel behavior in the United States: A panel study on work from home, mode choice, online shopping, and air travel	Javadinasr, M; Maggasy, T; Mohammadi, M; Mohammadain, K; Rahimi, E; Salon, D; Conway, MW; Pendyala, R; Derrible, S	Covid measure effects	Supports the idea that working from home increases online grocery sales.

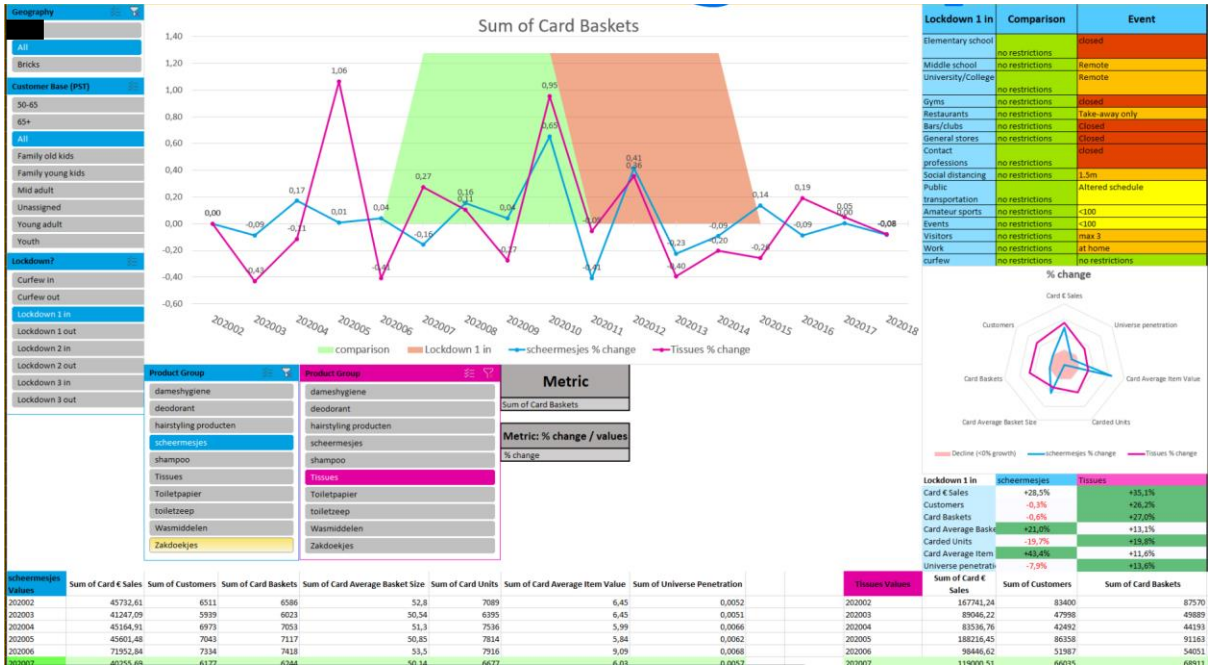
work employment and society	~~'It's Like a War Zone': Jay's Liminal Experience of Normal and Extreme Work in a UK Supermarket during the COVID-19 Pandemic~~	Cai, MJ; Velu, J; Tindal, S; Bennett, ST		Removed - More focused on floor operations
Journal of business research	Impact of Covid-19 on consumer behavior: Will the old habits return or die?	Jagdish Sheth	Consumer behavior	Explains different stages consumers go through during lockdowns
research in transportation economics	~~Grocery or @grocery: A stated preference investigation in Rome and Milan~~	Maltese, I; Le Pira, M; Marcucci, E; Gatta, V; Evangelinos, C		Removed – Focuses solely on profit growth from deliveries in Rome and Milan, which are very specific situations
psychiatry research	~~Why did all the toilet paper disappear? Distinguishing between panic buying and hoarding during COVID-19~~	David, J; Visvalingam, S; Norberg, MM		Removed – focuses on panic prevention
computers in human behavior	Adoption of shopper-facing technologies under social distancing: A conceptualisation and an interplay between task-technology fit and technology trust	Wang, XQ; Wong, YD; Chen, TY; Yuen, KF		Removed – discusses technology adoption and trust among shoppers

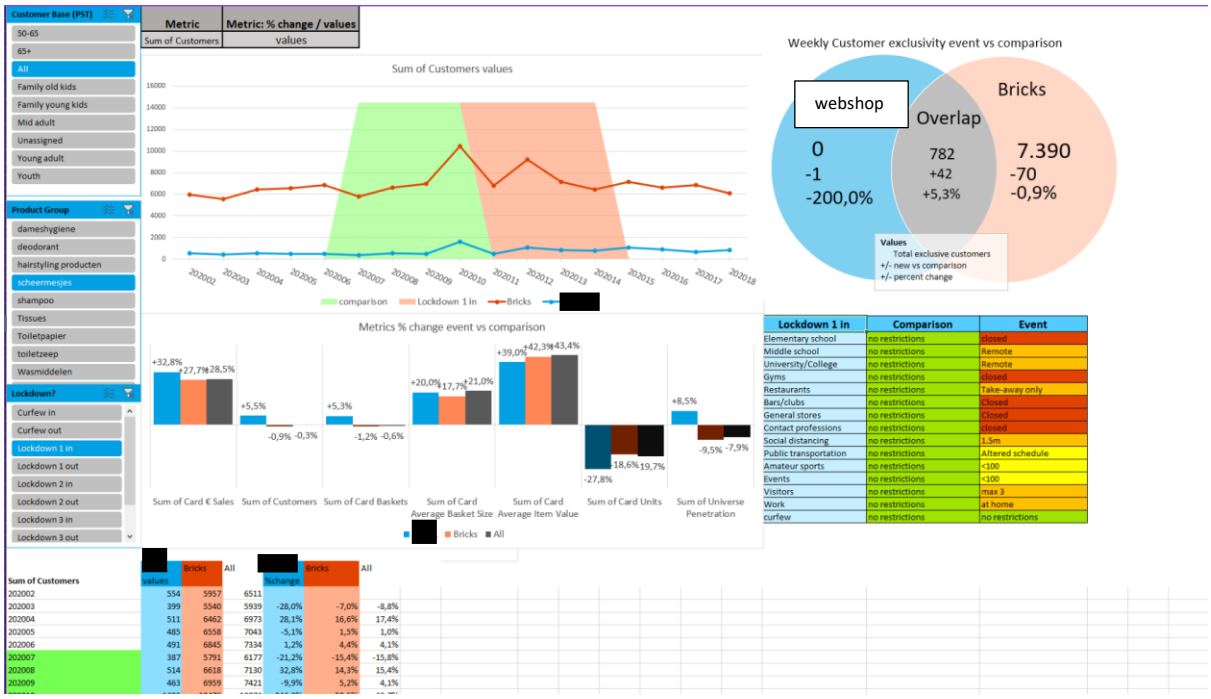
Appendix C – Dashboard Drafts

Dashboard






Sum of Card Baskets
comparison
Lockdown 1 in
scheermesjes % change
Tissues % change
Metric
Sum of Card Baskets
Metric: % change / values
% change
% change


Metric
Sum of Customers
Metric: % change / values
values
Sum of Customers values
comparison
Lockdown 1 in
Bricks
Weekly Customer exclusivity event vs comparison
webshop
Overlap
Bricks
0
-1
-200,0%
782
+42
+5,3%
7.390
-70
-0,9%
Values
Total exclusive customers
+/- new vs comparison
+/- percent change
Metrics % change event vs comparison
Sum of Card € Sales
Sum of Customers
Sum of Card Baskets
Sum of Card Average Basket Size
Sum of Card Average Item Value
Sum of Card Units
Sum of Universe Penetration
Bricks
All

Product Group	Geography	Week	Customer Base (PST)	Total € Sales	Card € Sales	Total Units	Card Units	Customers	Customer Penetration	€ per Customer	Unit per Customer	Total Average Item Value	Card Average Item Value	Total Baskets	Card Baskets	Total Basket Penetration	Total Average Basket Size	Card Average Basket Size	Total Markdown	Card Markdown	Universe Penetration	Share of Universe	Lockdown
Bier	Al	202001	All	€ 5.693.944,15	€ 5.693.944,15	1.613.826	1.613.826	490.370	16,88%	€ 11,61	3,29	€ 3,53	€ 3,53	617.281	617.281,00	4,09%	€ 41,80	€ 41,80	€ 2.652.670,32	€ 2.652.670,32	25,46%	23,48%	
Bier	Al	202002	All	€ 3.393.503,43	€ 3.393.503,43	1.189.210	1.189.210	345.957	11,34%	€ 9,81	3,44	€ 2,85	€ 2,85	459.953	459.953,00	2,83%	€ 39,45	€ 39,45	€ 912.323,72	€ 912.323,72	19,28%	17,65%	
Bier	Al	202003	All	€ 3.645.289,94	€ 3.645.289,94	1.280.458	1.280.458	375.055	12,32%	€ 9,72	3,41	€ 2,85	€ 2,85	494.720	494.720,00	3,07%	€ 39,48	€ 39,48	€ 1.180.688,04	€ 1.180.688,04	19,84%	18,34%	
Bier	Al	202004	All	€ 3.952.773,41	€ 3.952.773,41	1.425.860	1.425.860	393.154	12,94%	€ 10,05	3,63	€ 2,77	€ 2,77	524.458	524.458,00	3,27%	€ 39,87	€ 39,87	€ 1.336.948,97	€ 1.336.948,97	21,37%	18,33%	
Bier	Al	202005	All	€ 3.852.238,73	€ 3.852.238,73	1.288.058	1.288.058	383.446	12,66%	€ 10,05	3,36	€ 2,99	€ 2,99	507.249	507.249,00	3,19%	€ 39,55	€ 39,55	€ 1.062.167,08	€ 1.062.167,08	21,05%	18,97%	
Bier	Al	202006	All	€ 4.660.325,12	€ 4.660.325,12	1.347.354	1.347.354	425.919	14,00%	€ 10,94	3,16	€ 3,46	€ 3,46	559.236	559.236,00	3,50%	€ 40,43	€ 40,43	€ 1.777.428,37	€ 1.777.428,37	22,38%	22,44%	
Bier	Al	202007	All	€ 3.960.325,99	€ 3.960.325,99	1.350.114	1.350.114	373.619	12,36%	€ 10,60	3,61	€ 2,93	€ 2,93	495.611	495.611,00	3,16%	€ 39,44	€ 39,44	€ 1.332.215,62	€ 1.332.215,62	20,64%	19,75%	Lockdown 1 in
Bier	Al	202008	All	€ 4.813.053,18	€ 4.813.053,18	1.466.522	1.466.522	444.500	14,69%	€ 10,83	3,30	€ 3,28	€ 3,28	583.174	583.174,00	3,71%	€ 39,05	€ 39,05	€ 2.103.734,99	€ 2.103.734,99	23,69%	21,59%	Lockdown 1 in
Bier	Al	202009	All	€ 4.705.458,42	€ 4.705.458,42	1.548.988	1.548.988	443.237	14,58%	€ 10,62	3,49	€ 3,04	€ 3,04	584.853	584.853,00	3,67%	€ 40,98	€ 40,98	€ 2.151.723,68	€ 2.151.723,68	23,68%	21,81%	Lockdown 1 in
Bier	Al	202010	All	€ 4.202.601,33	€ 4.202.601,33	1.313.322	1.313.322	413.043	13,36%	€ 10,17	3,18	€ 3,20	€ 3,20	543.775	543.775,00	3,33%	€ 40,88	€ 40,88	€ 1.366.708,26	€ 1.366.708,26	21,58%	20,12%	Lockdown 1 in
Bier	Al	202011	All	€ 4.443.760,58	€ 4.443.760,58	1.415.559	1.415.559	423.308	13,43%	€ 10,50	3,34	€ 3,14	€ 3,14	568.226	568.226,00	3,21%	€ 45,93	€ 45,93	€ 1.016.456,80	€ 1.016.456,80	20,96%	17,44%	Lockdown 1 in
Bier	Al	202012	All	€ 4.424.315,38	€ 4.424.315,38	1.585.877	1.585.877	425.458	14,86%	€ 10,40	3,73	€ 2,79	€ 2,79	584.246	584.246,00	3,74%	€ 43,28	€ 43,28	€ 1.258.292,17	€ 1.258.292,17	22,12%	18,21%	Lockdown 1 in
Bier	Al	202013	All	€ 4.463.269,38	€ 4.463.269,38	1.425.963	1.425.963	429.769	16,78%	€ 10,39	3,32	€ 3,13	€ 3,13	572.877	572.877,00	4,53%	€ 47,81	€ 47,81	€ 1.346.535,71	€ 1.346.535,71	23,77%	19,16%	Lockdown 1 in
Bier	Al	202014	All	€ 4.882.310,04	€ 4.882.310,04	1.536.254	1.536.254	473.289	18,94%	€ 10,32	3,25	€ 3,18	€ 3,18	620.688	620.688,00	5,13%	€ 48,62	€ 48,62	€ 1.130.386,60	€ 1.130.386,60	27,10%	21,44%	Lockdown 1 in
Bier	Al	202015	All	€ 6.091.559,05	€ 6.091.559,05	2.030.744	2.030.744	603.040	23,08%	€ 10,10	3,37	€ 3,00	€ 3,00	793.180	793.180,00	6,15%	€ 51,48	€ 51,48	€ 1.904.781,28	€ 1.904.781,28	32,64%	22,93%	
Bier	Al	202016	All	€ 5.587.232,71	€ 5.587.232,71	1.853.651	1.853.651	552.089	21,49%	€ 10,12	3,36	€ 3,01	€ 3,01	721.328	721.328,00	5,89%	€ 46,59	€ 46,59	€ 1.692.174,60	€ 1.692.174,60	30,57%	24,12%	
Bier	Al	202017	All	€ 7.327.399,62	€ 7.327.399,62	2.236.681	2.236.681	659.808	24,22%	€ 11,11	3,39	€ 3,28	€ 3,28	872.300	872.300,00	6,37%	€ 47,53	€ 47,53	€ 2.922.124,54	€ 2.922.124,54	33,64%	26,05%	
Bier	Al	202018	All	€ 5.805.354,54	€ 5.805.354,54	1.772.565	1.772.565	543.580	19,99%	€ 10,68	3,26	€ 3,28	€ 3,28	706.703	706.703,00	5,29%	€ 48,47	€ 48,47	€ 1.713.338,21	€ 1.713.338,21	28,77%	23,17%	
Bier	Al	202019	All	€ 7.439.444,52	€ 7.439.444,52	2.384.038	2.384.038	666.183	23,68%	€ 11,17	3,58	€ 3,12	€ 3,12	875.683	875.683,00	6,23%	€ 48,22	€ 48,22	€ 2.668.123,44	€ 2.668.123,44	33,55%	25,59%	
Bier	Al	202020	All	€ 5.971.498,08	€ 5.971.498,08	1.962.352	1.962.352	576.243	20,30%	€ 10,36	3,41	€ 3,04	€ 3,04	743.607	743.607,00	5,32%	€ 48,94	€ 48,94	€ 1.808.862,91	€ 1.808.862,91	29,09%	22,51%	
Bier	Al	202021	All	€ 8.250.062,50	€ 8.250.062,50	2.376.058	2.376.058	682.465	23,79%	€ 12,09	3,48	€ 3,47	€ 3,47	894.827	894.827,00	6,25%	€ 47,96	€ 47,96	€ 2.948.917,08	€ 2.948.917,08	33,40%	26,46%	
Bier	Al	202022	All	€ 7.694.620,18	€ 7.694.620,18	2.328.992	2.328.992	686.161	23,33%	€ 11,21	3,39	€ 3,30	€ 3,30	898.245	898.245,00	6,03%	€ 49,06	€ 49,06	€ 2.041.012,07	€ 2.041.012,07	32,91%	24,86%	
Bier	Al	202023	All	€ 6.367.149,28	€ 6.367.149,28	1.993.886	1.993.886	612.858	21,08%	€ 10,39	3,25	€ 3,19	€ 3,19	789.545	789.545,00	5,53%	€ 47,64	€ 47,64	€ 2.078.887,27	€ 2.078.887,27	30,58%	23,27%	Lockdown 1 out
Bier	Al	202024	All	€ 7.467.005,60	€ 7.467.005,60	2.261.178	2.261.178	645.519	21,57%	€ 11,57	3,50	€ 3,30	€ 3,30	827.793	827.793,00	5,56%	€ 47,65	€ 47,65	€ 3.308.901,48	€ 3.308.901,48	31,32%	25,51%	Lockdown 1 out
Bier	Al	202025	All	€ 6.500.184,13	€ 6.500.184,13	2.107.296	2.107.296	613.164	20,53%	€ 10,60	3,44	€ 3,08	€ 3,08	786.817	786.817,00	5,26%	€ 46,27	€ 46,27	€ 1.912.109,45	€ 1.912.109,45	30,41%	24,55%	Lockdown 1 out
Bier	Al	202026	All	€ 7.029.795,94	€ 7.029.795,94	2.207.252	2.207.252	663.428	22,05%	€ 10,60	3,33	€ 3,18	€ 3,18	874.267	874.267,00	5,74%	€ 45,44	€ 45,44	€ 1.239.735,91	€ 1.239.735,91	31,68%	24,35%	Lockdown 1 out
Bier	Al	202027	All	€ 6.236.754,50	€ 6.236.754,50	1.918.338	1.918.338	554.816	18,30%	€ 11,24	3,46	€ 3,25	€ 3,25	714.154	714.154,00	4,80%	€ 47,13	€ 47,13	€ 2.032.055,12	€ 2.032.055,12	27,02%	21,79%	Lockdown 1 out
Bier	Al	202028	All	€ 5.983.897,44	€ 5.983.897,44	1.721.943	1.721.943	508.287	16,97%	€ 11,77	3,39	€ 3,48	€ 3,48	660.083	660.083,00	4,48%	€ 45,85	€ 45,85	€ 2.084.211,75	€ 2.084.211,75	25,73%	22,10%	Lockdown 1 out
Bier	Al	202029	All	€ 6.699.644,45	€ 6.699.644,45	1.972.322	1.972.322	584.495	19,75%	€ 11,46	3,37	€ 3,40	€ 3,40	757.192	757.192,00	5,23%	€ 45,30	€ 45,30	€ 2.241.160,92	€ 2.241.160,92	29,28%	24,71%	Lockdown 1 out
Bier	Al	202030	All	€ 6.354.729,80	€ 6.354.729,80	1.975.154	1.975.154	567.092	19,55%	€ 11,21	3,48	€ 3,22	€ 3,22	736.658	736.658,00	5,17%	€ 45,72	€ 45,72	€ 2.650.755,26	€ 2.650.755,26	29,27%	24,48%	Lockdown 1 out
Bier	Al	202031	All	€ 6.763.226,50	€ 6.763.226,50	2.186.867	2.186.867	609.409	21,13%	€ 11,10	3,59	€ 3,09	€ 3,09	798.802	798.802,00	5,64%	€ 44,05	€ 44,05	€ 2.260.623,44	€ 2.260.623,44	31,36%	25,20%	
Bier	Al	202032	All	€ 8.523.754,40	€ 8.523.754,40	2.511.495	2.511.495	731.858	25,00%	€ 11,65	3,43	€ 3,39	€ 3,39	966.305	966.305,00	6,57%	€ 44,94	€ 44,94	€ 2.609.904,43	€ 2.609.904,43	35,11%	27,94%	
Bier	Al	202033	All	€ 8.587.049,56	€ 8.587.049,56	2.591.374	2.591.374	735.662	24,77%	€ 11,67	3,52	€ 3,31	€ 3,31	981.615	981.615,00	6,56%	€ 43,97	€ 43,97	€ 2.439.161,34	€ 2.439.161,34	34,27%	27,84%	
Bier	Al	202034	All	€ 6.566.942,23	€ 6.566.942,23	2.219.559	2.219.559	640.407	21,07%	€ 10,25	3,47	€ 2,96	€ 2,96	842.894	842.894,00	5,55%	€ 42,54	€ 42,54	€ 2.087.578,91	€ 2.087.578,91	31,16%	24,76%	
Bier	Al	202035	All	€ 5.850.149,12	€ 5.850.149,12	2.012.798	2.012.798	545.852	17,25%	€ 10,72	3,69	€ 2,91	€ 2,91	712.043	712.043,00	4,53%	€ 43,62	€ 43,62	€ 2.352.568,07	€ 2.352.568,07	26,15%	21,98%	
Bier	Al	202036	All	€ 5.504.869,47	€ 5.504.869,47	1.668.886	1.668.886	502.042	15,79%	€ 10,96	3,32	€ 3,30	€ 3,30	657.197	657.197,00	4,17%	€ 43,48	€ 43,48	€ 1.525.378,67	€ 1.525.378,67	24,14%	21,41%	
Bier	Al	202037	All	€ 5.720.374,97	€ 5.720.374,97	1.701.623	1.701.623	525.809	16,82%	€ 10,88	3,24	€ 3,36	€ 3,36	690.225	690.225,00	4,46%	€ 42,58	€ 42,58	€ 1.770.841,57	€ 1.770.841,57	26,21%	23,04%	
Bier	Al	202038	All	€ 5.730.114,19	€ 5.730.114,19	1.991.748	1.991.748	560.804	17,92%	€ 10,22	3,55	€ 2,88	€ 2,88	750.290	750.290,00	4,82%	€ 40,47	€ 40,47	€ 1.767.808,21	€ 1.767.808,21	27,39%	22,59%	Lockdown 2 in
Bier	Al	202039	All	€ 5.476.705,83	€ 5.476.705,83	1.662.094	1.662.094	517.695	16,27%	€ 10,58	3,21	€ 3,30	€ 3,30	679.227	679.227,00	4,30%	€ 43,38	€ 43,38	€ 1.521.969,25	€ 1.521.969,25	25,01%	20,69%	Lockdown 2 in
Bier	Al	202040	All	€ 5.378.178,01	€ 5.378.178,01	1.757.912	1.757.912	506.145	15,83%	€ 10,63	3,47	€ 3,06	€ 3,06	669.608	669.608,00	4,29%	€ 42,99	€ 42,99	€ 1.812.880,07	€ 1.812.880,07	23,28%	20,37%	Lockdown 2 in
Bier	Al	202041	All	€ 5.256.590,18	€ 5.256.590,18	1.626.638	1.626.638	491.661	15,54%	€ 10,69	3,31	€ 3,23	€ 3,23	647.705	647.705,00	4,29%	€ 42,63	€ 42,63	€ 1.778.509,01	€ 1.778.509,01	23,83%	20,47%	Lockdown 2 in
Bier	Al	202042	All	€ 5.933.462,97	€ 5.933.462,97	1.715.341	1.715.341	517.652	16,61%	€ 11,46	3,31	€ 3,46	€ 3,46	678.986	678.986,00	4,57%	€ 44,39	€ 44,39	€ 1.914.167,06	€ 1.914.167,06	24,87%	22,26%	Lockdown 2 in
Bier	Al	202043	All	€ 5.591.511,89	€ 5.591.511,89	1.744.977	1.744.977	518.900	16,41%	€ 10,94	3,42	€ 3,20	€ 3,20	676.314	676.314,00	4,57%	€ 44,03	€ 44,03	€ 1.632.585,21	€ 1.632.585,21	24,09%	19,57%	Lockdown 2 in
Bier	Al	202044	All	€ 5.294.841,48	€ 5.294.841,48	1.693.892	1.693.892	501.260	15,26%	€ 10,56	3,38	€ 3,13	€ 3,13	663.144	663.144,00	4,22%	€ 44,21	€ 44,21	€ 1.267.831,37	€ 1.267.831,37	22,82%	19,07%	Lockdown 2 in
Bier	Al	202045	All	€ 5.886.434,05	€ 5.886.434,05	1.796.033	1.796.033	533.384	16,27%	€ 11,04	3,37	€ 3,28	€ 3,28	698.105	698.105,00	4,51%	€ 44,15	€ 44,15	€ 1.500.646,45	€ 1.500.646,45	24,92%	22,13%	Lockdown 2 in
Bier	Al	202046	All	€ 6.113.099,32	€ 6.113.099,32	1.914.056	1.914.056	542.055	16,16%	€ 11,28	3,53	€ 3,19	€ 3,19	713.465	713.465,00	4,51%	€ 43,85	€ 43,85	€ 1.826.409,12	€ 1.826.409,12	25,36%	23,34%	
Bier	Al	202047	All	€ 5.776.600,81	€ 5.776.600,81	1.887.853	1.887.853	533.107	16,38%	€ 10,84	3,54	€ 3,06	€ 3,06	708.740	708.740,00	4,57%	€ 42,29	€ 42,29	€ 1.836.317,47	€ 1.836.317,47	23,56%	21,05%	
Bier	Al	202048	All	€ 6.503.074,40	€ 6.503.074,40	1.845.890	1.845.890	560.397	17,16%	€ 11,60	3,29	€ 3,52	€ 3,52	731.923	731.923,00	4,68%	€ 45,54	€ 45,54	€ 1.686.496,79	€ 1.686.496,79	26,07%	23,07%	
Bier	Al	202049	All	€ 5.759.006,19	€ 5.759.006,19	1.831.003	1.831.003	523.175	15,94%	€ 11,01	3,50	€ 3,15	€ 3,15	686.870	686.870,00	4,49%	€ 45,78	€ 45,78	€ 1.436.787,93	€ 1.436.787,93	24,55%	20,67%	
Bier	Al	202050	All	€ 6.072.282,54	€ 6.072.282,54	1.763.113	1.763.113	523.587	15,78%	€ 11,60	3,37	€ 3,44	€ 3,44	685.404	685.404,00	4,36%	€ 46,35	€ 46,35	€ 1.733.527,14	€ 1.733.527,14	23,25%	20,59%	
Bier	Al	202051	All	€ 8.528.634,43	€ 8.528.634,43	2.563.979	2.563.979	664.301	19,83%	€ 12,84	3,86	€ 3,33	€ 3,33	866.474	866.474,00	5,40%	€ 53,28	€ 53,28	€ 3.941.335,12	€ 3.941.335,12	27,95%	21,85%	

Update

Dashboard setup

- **Build new event impact analyzer report**
  - Select "KPI's over time"
  - Select all weeks 202001-202213
  - Select stores [redacted] vs Bricks"
  - Enable Mex
  - Run report
- **Copy data to dashboard**
  - Open dashboard document on "**raw data**" sheet
  - Download and open Mex report of "KPI's over time"
  - Select cell B6 and then hold ctrl+shift while tapping arrow right once then arrow down to select the entire table of data and copy it using ctrl+c
  - In the dashboard document, select cell A1 and paste using ctrl+v to paste the new data in the "raw data" sheet of the dashboard.
- **Update the dashboard**
  - Press the "**update**" button to the right of the raw data table to update the figures, product groups to the new data.

You may create and select your own product groups, customer segmentation and household panel!

Covid calendar explained

In sheet "**Covid Calendar**", a full list of active measures during every week of the lockdowns is given. From this list, 3 lockdowns and 1 curfew period were identified and matched with sales data the following periods were set:

- **Lockdown 1:** weeks 202011-202026
- **Lockdown 2:** weeks 202042-202125
- **Lockdown 3:** weeks 202144-202212
- **Curfew:** weeks 202103-202116

Looking at the data, it is found that the most activity in performance happens during the first few weeks of a lockdown after which most metrics stabilize again until the lockdown ends. For this reason this dashboard looks at the **first 4 weeks** of every selected lockdowns' start or end (event) and compares it to the 4 weeks leading up to that period (comparison).

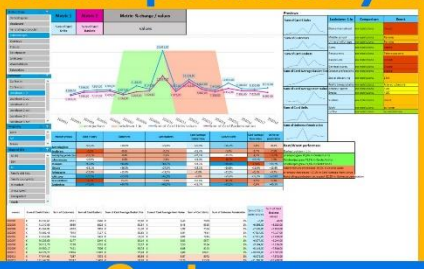
Predetermined periods:

weeks	Lockdown 1 in	Lockdown 1 out	Lockdown 2 in	Lockdown 2 out	Lockdown 3 in	Lockdown 3 out	Curfew in	Curfew out
Comparison	202007	202023	202038	202121	202140	202208	202052	202113
Comparison	202008	202024	202039	202122	202141	202209	202053	202114
Comparison	202009	202025	202040	202123	202142	202210	202101	202115
Comparison	202010	202026	202041	202124	202143	202211	202102	202116
Event	202011	202027	202042	202125	202144	202212	202103	202117
Event	202012	202028	202043	202126	202145	202213	202104	202118
Event	202013	202029	202044	202127	202146	202214	202105	202119
Event	202014	202030	202045	202128	202147	202215	202106	202120

Event Impact Analyzer

Use cases

Showing product groups' performance during selected lockdown period and showing growth/decline to comparison period



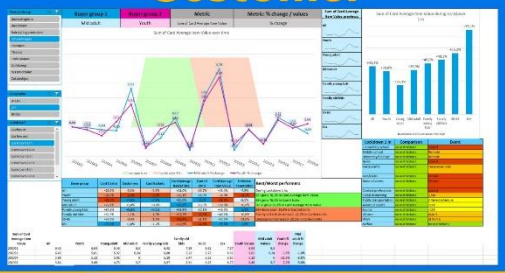
Tutorial

- Graph shows data from selected filters on the left. Use the metric 1 and 2 options to show multiple metrics in the same figure. Change to % change from values to show weekly growth vs absolute values.
- The table below shows all product groups' growth vs the comparison period for every metric. Best and worst performers are highlighted to the right of the table. Values are dynamically updating as filters on the left are changed.
- Table on the top right shows the selected lockdown period and presents the active covid measures during the comparison period and selected period.
- Full values are displayed in the table at the bottom

Customer

Use cases

Comparing customer segmentations to each other to show shopping behavior among different types of customers during lockdowns



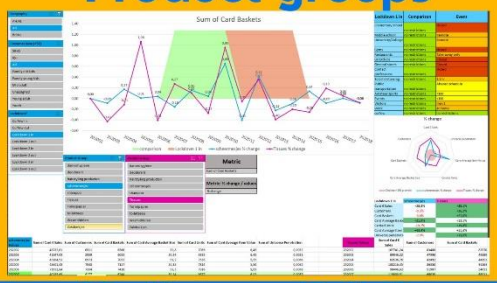
Tutorial

- Graph shows data from selected filters on the left and above. Use the buyer group 1 and 2 options to show multiple buyer groups in the same figure and use the metric option to select which metric to show. Change to % change from values to show weekly growth vs absolute values.
- Table shows all customer groups' growth vs the comparison period for every metric. Best and worst performers are highlighted to the right of the table. Values are dynamically updating as filters on the left are changed.
- Bar chart on the right shows growth for all customer groups for selected metric.
- Full values are displayed in the table at the bottom

Product groups

Use cases

Comparing 2 product groups in greater detail during a lockdown period



Tutorial

- Graph shows data from selected filters on the left and bottom. Use the 2 different product group filters to show 2 product groups in the same figure. Use the metric option to show a different metric in the graph. Change to % change from values to show weekly growth vs absolute values.
- Spider chart on the right shows the growth during the selected period of all metrics from the 2 selected product groups. Underneath this graph the actual values are displayed highlighting the better performing product group.
- Full values are displayed in the table at the bottom

Online vs Bricks

Use cases

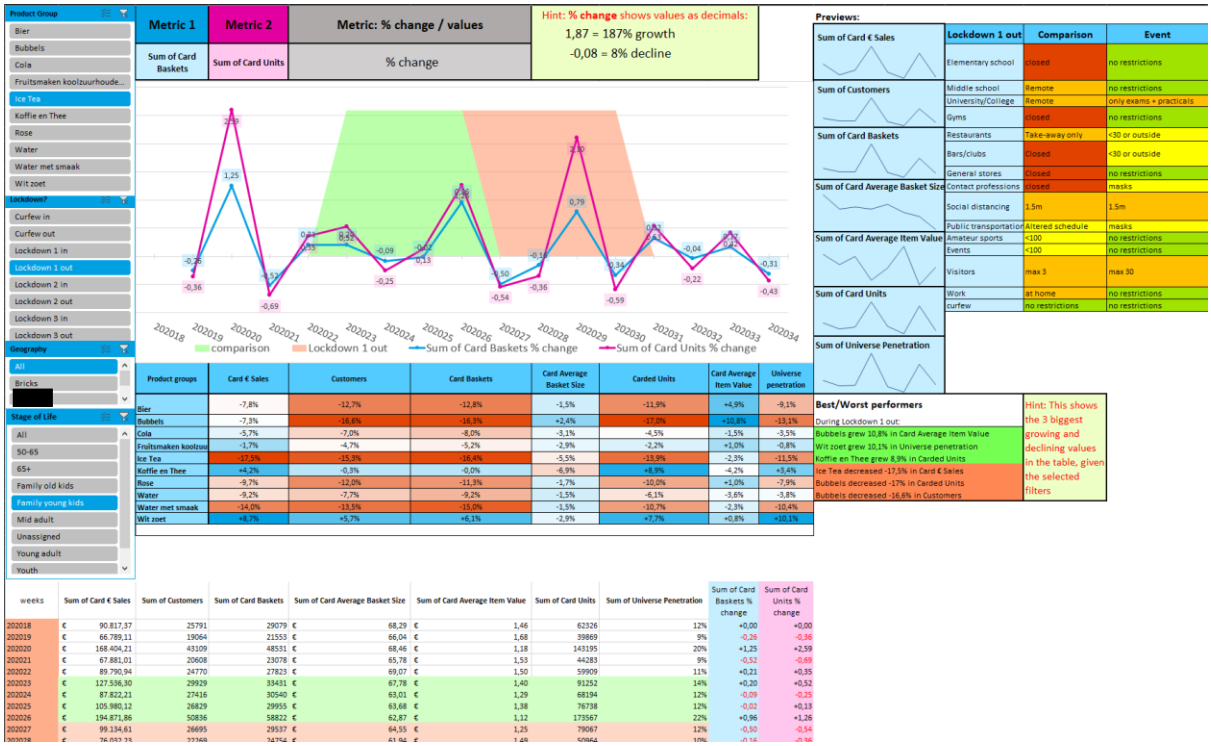
Comparing online vs offline sales during lockdowns and showing exclusivity

Tutorial

- Graph shows data from selected filters on the left and above comparing values from bricks and [redacted] Use the metric option to select which metric to show. Change to % change from values to show weekly growth vs absolute values.
- Bar chart below shows growth for every metric in every geography.
- The overlapping chart on the top right shows customer exclusivity for every geography.
- Full values are displayed in the table at the bottom

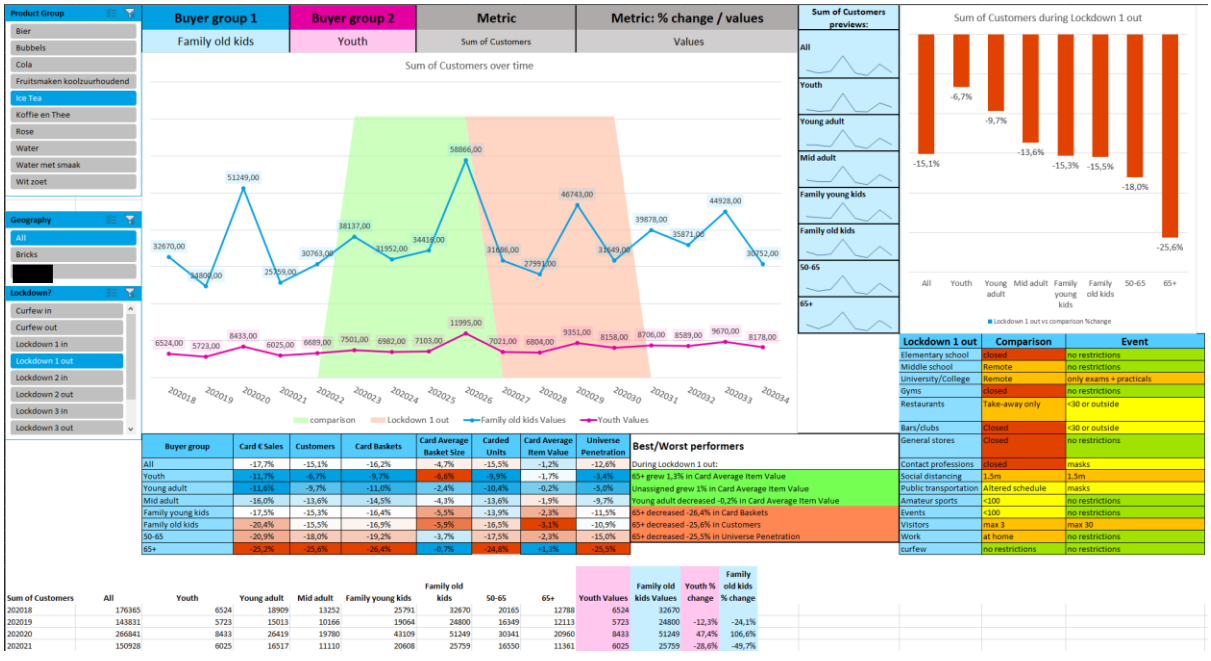
Appendix D – Dashboard revisions

Dashboard



Product groups	Card € Sales	Customers	Card Baskets	Card Average Basket Size	Carded Units	Card Average Item Value	Universe penetration
Bier	-7,8%	-12,7%	-12,8%	-1,5%	-11,9%	+4,9%	-9,1%
Bubbels	-7,3%	-16,6%	-16,3%	+2,4%	-17,0%	+10,8%	-13,1%
Cola	-5,7%	-7,0%	-8,0%	-3,1%	-4,5%	-1,5%	-3,5%
Fruitsmaken koolzuu	-1,7%	-4,7%	-5,2%	-2,9%	-2,2%	+1,0%	-0,8%
Ice Tea	-17,5%	-15,3%	-16,4%	-5,5%	-13,9%	-2,3%	-11,5%
Koffie en Thee	+4,2%	-0,3%	-0,0%	-6,9%	+8,9%	-4,2%	+3,4%
Rose	-9,7%	-12,0%	-11,3%	-1,7%	-10,0%	+1,0%	-7,9%
Water	-9,2%	-7,7%	-9,2%	-1,5%	-6,1%	-3,6%	-3,8%
Water met smaak	-14,0%	-13,5%	-15,0%	-1,5%	-10,7%	-2,3%	-10,4%
Wit zoet	+8,7%	+5,7%	+6,1%	-2,9%	+7,7%	+0,8%	+10,1%

weeks	Sum of Card € Sales	Sum of Customers	Sum of Card Baskets	Sum of Card Average Basket Size	Sum of Card Average Item Value	Sum of Card Units	Sum of Universe Penetration	Sum of Card Baskets % change	Sum of Card Units % change
202018	€ 90.817,37	25791	29079	€ 68,29	€ 1,46	62326	12%	+0,00	+0,00
202019	€ 66.789,11	19064	21553	€ 66,04	€ 1,68	39869	9%	-0,26	-0,36
202020	€ 168.404,21	43109	48531	€ 68,46	€ 1,18	143195	20%	+1,25	+2,59
202021	€ 67.881,01	20608	23078	€ 65,78	€ 1,53	44283	9%	-0,52	-0,69
202022	€ 89.790,94	24770	27823	€ 69,07	€ 1,50	59909	11%	+0,21	+0,35
202023	€ 127.536,30	29929	33431	€ 67,78	€ 1,40	91252	14%	+0,20	+0,52
202024	€ 87.822,21	27416	30540	€ 63,01	€ 1,29	68194	12%	-0,09	-0,25
202025	€ 105.980,12	26829	29955	€ 63,68	€ 1,38	76738	12%	-0,02	+0,13
202026	€ 194.871,86	50836	58822	€ 62,87	€ 1,12	173567	22%	+0,96	+1,26
202027	€ 99.134,61	26695	29537	€ 64,55	€ 1,25	79067	12%	-0,50	-0,54

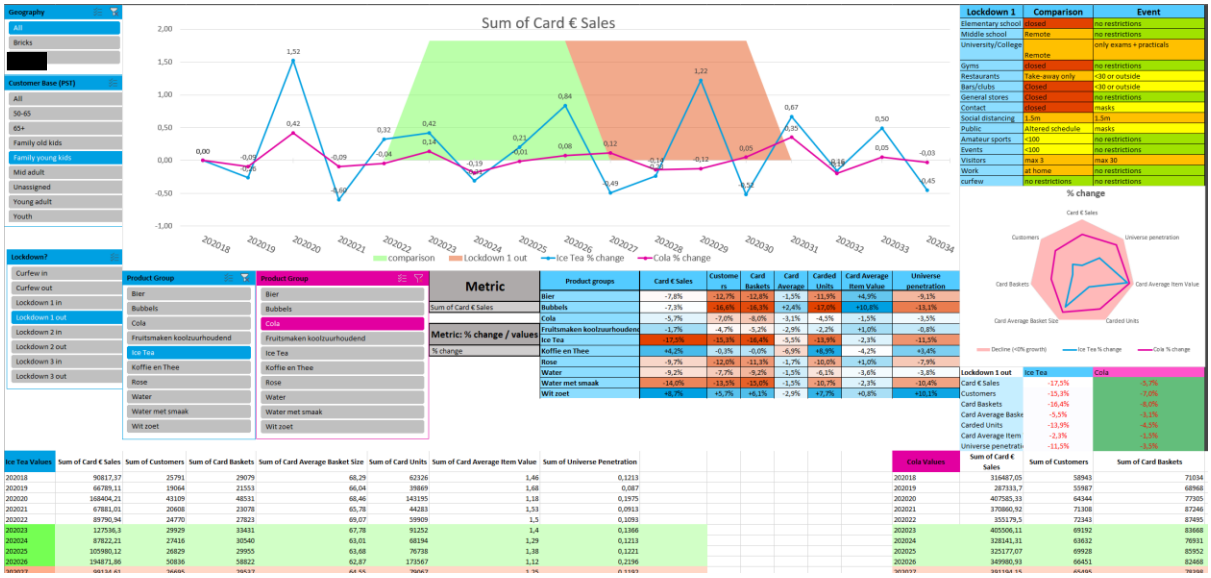


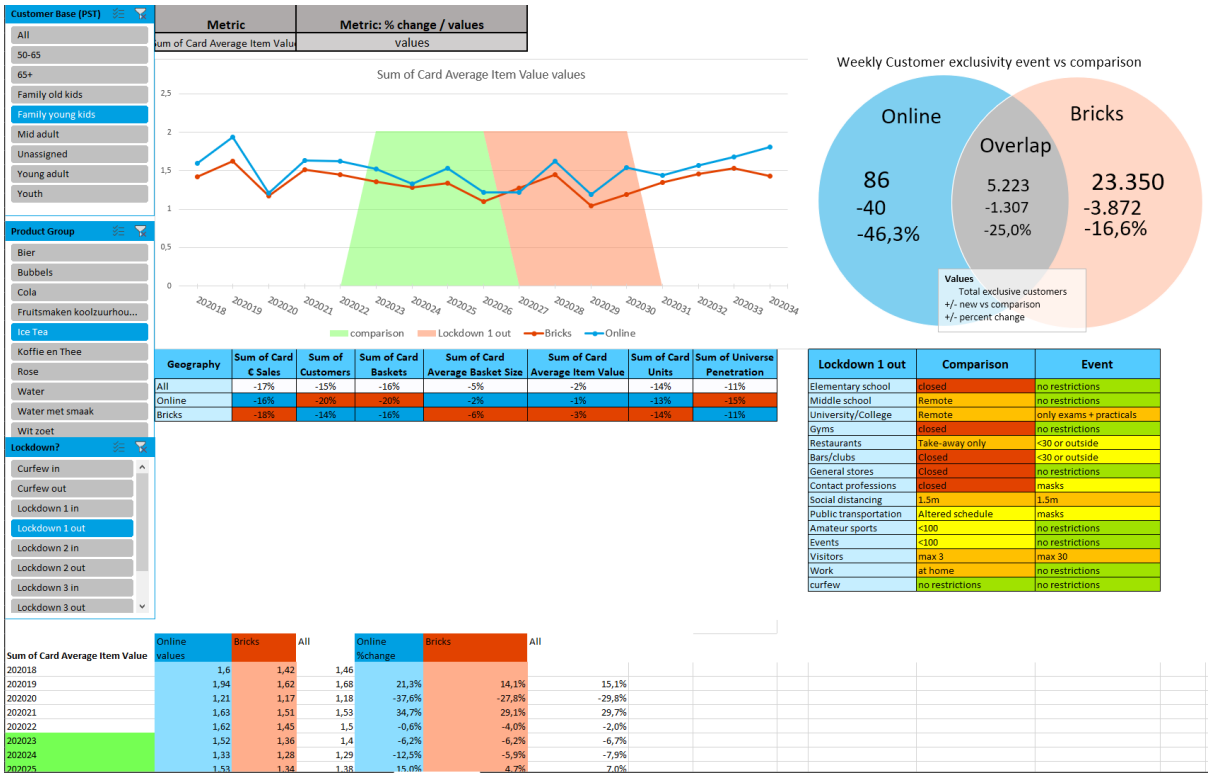
Buyer group	Card € Sales	Customers	Card Baskets	Card Average Basket Size	Carded Units	Card Average Item Value	Universe Penetration
All	-17,7%	-15,1%	-16,2%	-4,7%	-15,5%	-1,2%	-12,6%
Youth	-11,7%	-6,7%	-9,7%	-6,6%	-9,9%	-1,7%	-3,4%
Young adult	-11,6%	-9,7%	-11,0%	-2,4%	-10,4%	-0,2%	-5,6%
Mid adult	-16,0%	-13,6%	-14,5%	-4,3%	-13,6%	-1,9%	-9,7%
Family young kids	-17,5%	-15,3%	-16,4%	-5,5%	-13,9%	-2,3%	-11,5%
Family old kids	-20,4%	-15,5%	-16,9%	-5,9%	-16,5%	-3,1%	-10,9%
50-65	-20,9%	-18,0%	-19,2%	-3,7%	-17,5%	-2,3%	-15,0%
65+	-25,2%	-25,6%	-26,4%	-0,7%	-24,8%	+1,3%	-25,5%

Best/Worst performers
During Lockdown 1 out:
65+ grew 1,3% in Card Average Item Value
Unassigned grew 1% in Card Average Item Value
Young adult decreased -0,2% in Card Average Item Value
65+ decreased -26,4% in Card Baskets
65+ decreased -25,6% in Customers
65+ decreased -25,5% in Universe Penetration

Lockdown 1 out	Comparison	Event
Elementary school	closed	no restrictions
Middle school	Remote	no restrictions
University/College	Remote	only exams + practicals
Gyms	closed	no restrictions
Restaurants	Take-away only	<30 or outside
Bars/clubs	Closed	<30 or outside
General stores	Closed	no restrictions
Contact professions	closed	masks
Social distancing	1.5m	1.5m
Public transportation	Altered schedule	masks
Amateur sports	<100	no restrictions
Events	<100	no restrictions
Visitors	max 3	max 30
Work	at home	no restrictions
curfew	no restrictions	no restrictions

Sum of Customers	All	Youth	Young adult	Mid adult	Family young kids	Family old kids	50-65	65+	Youth Values	Family old kids Values	Youth % change	Family old kids % change
202018	176365	6524	18909	13252	25791	32670	20165	12788	6524	32670		
202019	143831	5723	15013	10166	19064	24800	16349	12113	5723	24800	-12,3%	-24,1%
202020	266841	8433	26419	19780	43109	51249	30341	20960	8433	51249	47,4%	106,6%
202021	150928	6025	16517	11110	20608	25759	16550	11361	6025	25759	-28,6%	-49,7%

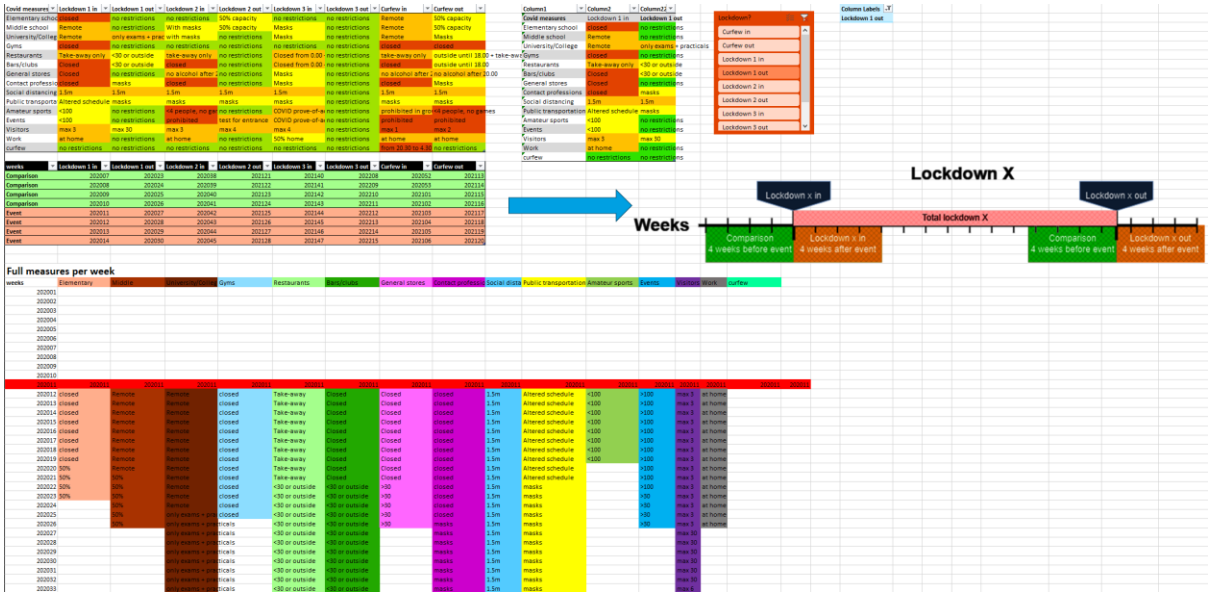




Geography	Sum of Card € Sales	Sum of Customers	Sum of Card Baskets	Sum of Card Average Basket Size	Sum of Card Average Item Value	Sum of Card Units	Sum of Universe Penetration
All	-17%	-15%	-16%	-5%	-2%	-14%	-11%
Online	-16%	-20%	-20%	-2%	-1%	-13%	-15%
Bricks	-18%	-14%	-16%	-6%	-3%	-14%	-11%

Lockdown 1 out	Comparison	Event
Elementary school	closed	no restrictions
Middle school	Remote	no restrictions
University/College	Remote	only exams + practicals
Gyms	closed	no restrictions
Restaurants	Take-away only	<30 or outside
Bars/clubs	Closed	<30 or outside
General stores	Closed	no restrictions
Contact professions	closed	masks
Social distancing	1.5m	1.5m
Public transportation	Altered schedule	masks
Amateur sports	<100	no restrictions
Events	<100	no restrictions
Visitors	max 3	max 30
Work	at home	no restrictions
curfew	no restrictions	no restrictions

Sum of Card Average Item Value	Online values	Bricks	All	Online %change	Bricks	All
202018	1,6	1,42	1,46			
202019	1,94	1,62	1,68	21,3%	14,1%	15,1%
202020	1,21	1,17	1,18	-37,6%	-27,8%	-29,8%
202021	1,63	1,51	1,53	34,7%	29,1%	29,7%
202022	1,62	1,45	1,5	-0,6%	-4,0%	-2,0%
202023	1,52	1,36	1,4	-6,2%	-6,2%	-6,7%
202024	1,33	1,28	1,29	-12,5%	-5,9%	-7,9%
202025	1,53	1,34	1,38	15,0%	4,7%	7,0%



Full measures per week

weeks	Elementary	Middle	Secondary school	Gyms	Restaurants	Bars/clubs	General stores	Contact professio	Social distan	Public transportation	Amateur sports	Events	Visitors	Work	curfew
202001															
202002															
202003															
202004															
202005															
202006															
202007															
202008															
202009															
202010															

202011	202012	202013	202021	202031	202101	202102	202103	202104	202105	202106	202107	202108	202109	202110	202111	202112
202012	closed	Remote	Remote	closed	Take-away	Closed	Closed	closed	1.5m	Altered schedule	<100	>100	max 3	at home		
202013	closed	Remote	Remote	closed	Take-away	Closed	Closed	closed	1.5m	Altered schedule	<100	>100	max 3	at home		
202014	closed	Remote	Remote	closed	Take-away	Closed	Closed	closed	1.5m	Altered schedule	<100	>100	max 3	at home		
202015	closed	Remote	Remote	closed	Take-away	Closed	Closed	closed	1.5m	Altered schedule	<100	>100	max 3	at home		
202016	closed	Remote	Remote	closed	Take-away	Closed	Closed	closed	1.5m	Altered schedule	<100	>100	max 3	at home		
202017	closed	Remote	Remote	closed	Take-away	Closed	Closed	closed	1.5m	Altered schedule	<100	>100	max 3	at home		
202018	closed	Remote	Remote	closed	Take-away	Closed	Closed	closed	1.5m	Altered schedule	<100	>100	max 3	at home		
202019	closed	Remote	Remote	closed	Take-away	Closed	Closed	closed	1.5m	Altered schedule	<100	>100	max 3	at home		
202020	50%	50%	Remote	closed	Take-away	Closed	Closed	closed	1.5m	Altered schedule		>100	max 3	at home		
202021	50%	50%	Remote	closed	Take-away	Closed	Closed	closed	1.5m	Altered schedule		>100	max 3	at home		
202022	50%	50%	Remote	closed	<30 or outside	<30 or outside	>30	closed	1.5m	masks		>100	max 3	at home		
202023	50%	50%	Remote	closed	<30 or outside	<30 or outside	>30	closed	1.5m	masks		>30	max 3	at home		
202024		50%	Remote	closed	<30 or outside	<30 or outside	>30	closed	1.5m	masks		>30	max 3	at home		
202025		50%	only exams + pra	closed	<30 or outside	<30 or outside	>30	closed	1.5m	masks		>30	max 3	at home		
202026		50%	only exams + practicals		<30 or outside	<30 or outside	>00	masks	1.5m	masks		>30	max 3	at home		
202027			only exams + practicals		<30 or outside	<30 or outside		masks	1.5m	masks			max 30			
202028			only exams + practicals		<30 or outside	<30 or outside		masks	1.5m	masks			max 30			
202029			only exams + practicals		<30 or outside	<30 or outside		masks	1.5m	masks			max 30			
202030			only exams + practicals		<30 or outside	<30 or outside		masks	1.5m	masks			max 30			
202031			only exams + practicals		<30 or outside	<30 or outside		masks	1.5m	masks			max 30			
202032			only exams + practicals		<30 or outside	<30 or outside		masks	1.5m	masks			max 30			
202033			only exams + practicals		<30 or outside	<30 or outside		masks	1.5m	masks			max 30			

Product Group	Geography	Week	Customer Basis (PST)	Total € Sales	Card € Sales	Total Units	Card Units	Customers	Customer Penetration	€ per Customer	Unit per Customer	Total Average Item Value	Card Average Item Value	Total Baskets	Card Baskets	Total Basket Penetration	Total Average Basket Size	Card Average Basket Size	Total Markdown	Card Markdown	Universe Penetration	Share of Universe	Lockdown	Update
Bier	All	202001	All	€ 5.693.944,15	€ 5.693.944,15	1.613.826	1.613.826	490.370	16,88%	€ 11,61	3,29	€ 3,53	€ 3,53	617.281	617.281,00	4,09%	€ 41,80	€ 41,80	€ 2.652.670,32	€ 2.652.670,32	25,46%	23,48%		
Bier	All	202002	All	€ 3.393.503,43	€ 3.393.503,43	1.189.210	1.189.210	345.957	11,34%	€ 9,81	3,44	€ 2,85	€ 2,85	459.953	459.953,00	2,83%	€ 39,45	€ 39,45	€ 912.323,72	-€ 912.323,72	19,28%	17,65%		
Bier	All	202003	All	€ 3.645.289,94	€ 3.645.289,94	1.280.458	1.280.458	375.055	12,32%	€ 9,72	3,41	€ 2,85	€ 2,85	494.720	494.720,00	3,07%	€ 39,48	€ 39,48	€ 1.180.688,04	€ 1.180.688,04	19,84%	18,34%		
Bier	All	202004	All	€ 3.952.773,41	€ 3.952.773,41	1.425.860	1.425.860	393.154	12,94%	€ 10,05	3,63	€ 2,77	€ 2,77	524.458	524.458,00	3,27%	€ 39,87	€ 39,87	€ 1.336.948,97	€ 1.336.948,97	21,37%	18,33%		
Bier	All	202005	All	€ 3.852.236,73	€ 3.852.236,73	1.288.058	1.288.058	383.446	12,66%	€ 10,05	3,36	€ 2,99	€ 2,99	507.249	507.249,00	3,19%	€ 39,55	€ 39,55	€ 1.062.167,08	€ 1.062.167,08	21,05%	18,97%		
Bier	All	202006	All	€ 4.660.325,12	€ 4.660.325,12	1.347.354	1.347.354	425.919	14,00%	€ 10,94	3,16	€ 3,46	€ 3,46	559.236	559.236,00	3,50%	€ 40,43	€ 40,43	€ 1.777.428,37	€ 1.777.428,37	22,38%	22,44%		
Bier	All	202007	All	€ 3.960.325,99	€ 3.960.325,99	1.350.114	1.350.114	373.619	12,36%	€ 10,60	3,61	€ 2,93	€ 2,93	495.611	495.611,00	3,16%	€ 39,44	€ 39,44	€ 1.332.215,62	€ 1.332.215,62	20,64%	19,75%	Lockdown 1 in	
Bier	All	202008	All	€ 4.813.053,18	€ 4.813.053,18	1.466.522	1.466.522	444.500	14,69%	€ 10,83	3,30	€ 3,28	€ 3,28	583.174	583.174,00	3,71%	€ 39,05	€ 39,05	€ 2.103.734,99	€ 2.103.734,99	23,69%	21,59%	Lockdown 1 in	
Bier	All	202009	All	€ 4.705.458,42	€ 4.705.458,42	1.548.988	1.548.988	443.237	14,58%	€ 10,62	3,49	€ 3,04	€ 3,04	584.853	584.853,00	3,67%	€ 40,98	€ 40,98	€ 2.151.723,68	€ 2.151.723,68	23,68%	21,81%	Lockdown 1 in	
Bier	All	202010	All	€ 4.202.601,33	€ 4.202.601,33	1.313.322	1.313.322	413.043	13,36%	€ 10,17	3,18	€ 3,20	€ 3,20	543.775	543.775,00	3,33%	€ 40,88	€ 40,88	€ 1.366.708,26	€ 1.366.708,26	21,58%	20,12%	Lockdown 1 in	
Bier	All	202011	All	€ 4.443.760,58	€ 4.443.760,58	1.415.559	1.415.559	423.308	13,43%	€ 10,50	3,34	€ 3,14	€ 3,14	568.226	568.226,00	3,21%	€ 45,93	€ 45,93	€ 1.016.456,80	€ 1.016.456,80	20,96%	17,44%	Lockdown 1 in	
Bier	All	202012	All	€ 4.424.315,38	€ 4.424.315,38	1.585.877	1.585.877	425.458	14,86%	€ 10,40	3,73	€ 2,79	€ 2,79	584.246	584.246,00	3,74%	€ 43,28	€ 43,28	€ 1.258.292,17	€ 1.258.292,17	22,12%	18,21%	Lockdown 1 in	
Bier	All	202013	All	€ 4.463.269,38	€ 4.463.269,38	1.425.963	1.425.963	429.769	16,78%	€ 10,39	3,32	€ 3,13	€ 3,13	572.877	572.877,00	4,53%	€ 47,81	€ 47,81	€ 1.346.535,71	€ 1.346.535,71	23,77%	19,16%	Lockdown 1 in	
Bier	All	202014	All	€ 4.882.310,04	€ 4.882.310,04	1.536.254	1.536.254	473.289	18,94%	€ 10,32	3,25	€ 3,18	€ 3,18	620.688	620.688,00	5,13%	€ 48,62	€ 48,62	€ 1.130.386,60	€ 1.130.386,60	27,10%	21,44%	Lockdown 1 in	
Bier	All	202015	All	€ 6.691.559,05	€ 6.691.559,05	2.030.744	2.030.744	603.040	23,08%	€ 10,10	3,37	€ 3,00	€ 3,00	793.180	793.180,00	6,15%	€ 51,48	€ 51,48	€ 1.904.781,28	€ 1.904.781,28	32,64%	22,93%		
Bier	All	202016	All	€ 5.587.232,71	€ 5.587.232,71	1.853.651	1.853.651	552.089	21,49%	€ 10,12	3,36	€ 3,01	€ 3,01	721.328	721.328,00	5,89%	€ 46,59	€ 46,59	€ 1.692.174,60	€ 1.692.174,60	30,57%	24,12%		
Bier	All	202017	All	€ 7.327.396,62	€ 7.327.396,62	2.236.681	2.236.681	659.808	24,22%	€ 11,11	3,39	€ 3,28	€ 3,28	872.300	872.300,00	6,37%	€ 47,53	€ 47,53	€ 2.922.124,54	€ 2.922.124,54	33,64%	26,05%		
Bier	All	202018	All	€ 5.805.354,54	€ 5.805.354,54	1.772.565	1.772.565	543.580	19,99%	€ 10,68	3,26	€ 3,28	€ 3,28	706.703	706.703,00	5,29%	€ 48,47	€ 48,47	€ 1.713.338,21	€ 1.713.338,21	28,77%	23,17%		
Bier	All	202019	All	€ 7.439.444,52	€ 7.439.444,52	2.384.038	2.384.038	666.183	23,68%	€ 11,17	3,58	€ 3,12	€ 3,12	875.683	875.683,00	6,23%	€ 48,22	€ 48,22	€ 2.668.123,44	€ 2.668.123,44	33,55%	25,59%		
Bier	All	202020	All	€ 5.971.498,08	€ 5.971.498,08	1.962.352	1.962.352	576.243	20,30%	€ 10,36	3,41	€ 3,04	€ 3,04	743.607	743.607,00	5,32%	€ 48,94	€ 48,94	€ 1.808.862,91	€ 1.808.862,91	29,09%	22,51%		
Bier	All	202021	All	€ 8.250.062,50	€ 8.250.062,50	2.376.058	2.376.058	682.465	23,79%	€ 12,09	3,48	€ 3,47	€ 3,47	894.827	894.827,00	6,25%	€ 47,96	€ 47,96	€ 2.948.917,08	€ 2.948.917,08	33,40%	26,46%		
Bier	All	202022	All	€ 7.694.620,18	€ 7.694.620,18	2.328.992	2.328.992	686.161	23,33%	€ 11,21	3,39	€ 3,30	€ 3,30	898.245	898.245,00	6,03%	€ 49,06	€ 49,06	€ 2.041.012,07	€ 2.041.012,07	32,91%	24,86%		
Bier	All	202023	All	€ 6.367.149,28	€ 6.367.149,28	1.993.886	1.993.886	612.858	21,08%	€ 10,39	3,25	€ 3,19	€ 3,19	789.545	789.545,00	5,53%	€ 47,64	€ 47,64	€ 2.078.887,27	€ 2.078.887,27	30,58%	23,27%	Lockdown 1 out	
Bier	All	202024	All	€ 7.467.005,60	€ 7.467.005,60	2.261.178	2.261.178	645.519	21,57%	€ 11,57	3,50	€ 3,30	€ 3,30	827.793	827.793,00	5,56%	€ 47,65	€ 47,65	€ 3.308.901,48	€ 3.308.901,48	31,32%	25,51%	Lockdown 1 out	
Bier	All	202025	All	€ 6.500.184,13	€ 6.500.184,13	2.107.296	2.107.296	613.164	20,53%	€ 10,60	3,44	€ 3,08	€ 3,08	786.817	786.817,00	5,26%	€ 46,27	€ 46,27	€ 1.912.109,45	€ 1.912.109,45	30,41%	24,55%	Lockdown 1 out	
Bier	All	202026	All	€ 7.029.795,04	€ 7.029.795,04	2.207.252	2.207.252	663.428	22,05%	€ 10,60	3,33	€ 3,18	€ 3,18	874.267	874.267,00	5,74%	€ 45,44	€ 45,44	€ 1.239.735,91	€ 1.239.735,91	31,68%	24,35%	Lockdown 1 out	
Bier	All	202027	All	€ 6.236.754,50	€ 6.236.754,50	1.918.338	1.918.338	554.816	18,30%	€ 11,24	3,46	€ 3,25	€ 3,25	714.154	714.154,00	4,80%	€ 47,13	€ 47,13	€ 2.032.055,12	€ 2.032.055,12	27,02%	21,79%	Lockdown 1 out	
Bier	All	202028	All	€ 5.983.897,44	€ 5.983.897,44	1.721.943	1.721.943	508.287	16,97%	€ 11,77	3,39	€ 3,48	€ 3,48	660.083	660.083,00	4,48%	€ 45,85	€ 45,85	€ 2.084.211,75	€ 2.084.211,75	25,73%	22,10%	Lockdown 1 out	
Bier	All	202029	All	€ 6.699.644,45	€ 6.699.644,45	1.972.322	1.972.322	584.495	19,75%	€ 11,46	3,37	€ 3,40	€ 3,40	757.192	757.192,00	5,23%	€ 45,30	€ 45,30	€ 2.241.160,92	€ 2.241.160,92	29,28%	24,71%	Lockdown 1 out	
Bier	All	202030	All	€ 6.354.729,80	€ 6.354.729,80	1.975.154	1.975.154	567.092	19,55%	€ 11,21	3,48	€ 3,22	€ 3,22	736.658	736.658,00	5,17%	€ 45,72	€ 45,72	€ 2.050.755,26	€ 2.050.755,26	29,27%	24,48%	Lockdown 1 out	
Bier	All	202031	All	€ 6.763.226,50	€ 6.763.226,50	2.186.867	2.186.867	609.409	21,13%	€ 11,10	3,59	€ 3,09	€ 3,09	798.802	798.802,00	5,64%	€ 44,05	€ 44,05	€ 2.260.623,44	€ 2.260.623,44	31,36%	25,20%		
Bier	All	202032	All	€ 8.523.754,40	€ 8.523.754,40	2.511.495	2.511.495	731.858	25,00%	€ 11,65	3,43	€ 3,39	€ 3,39	966.305	966.305,00	6,57%	€ 44,94	€ 44,94	€ 2.609.904,43	€ 2.609.904,43	35,11%	27,94%		
Bier	All	202033	All	€ 8.587.049,56	€ 8.587.049,56	2.591.374	2.591.374	735.662	24,77%	€ 11,67	3,52	€ 3,31	€ 3,31	981.615	981.615,00	6,56%	€ 43,97	€ 43,97	€ 2.439.161,34	€ 2.439.161,34	34,27%	27,84%		
Bier	All	202034	All	€ 6.566.942,23	€ 6.566.942,23	2.219.559	2.219.559	640.407	21,07%	€ 10,25	3,47	€ 2,96	€ 2,96	842.894	842.894,00	5,55%	€ 42,54	€ 42,54	€ 2.087.578,91	€ 2.087.578,91	31,16%	24,76%		
Bier	All	202035	All	€ 5.850.149,12	€ 5.850.149,12	2.012.796	2.012.796	545.852	17,25%	€ 10,72	3,69	€ 2,91	€ 2,91	712.043	712.043,00	4,53%	€ 43,62	€ 43,62	€ 2.352.568,07	€ 2.352.568,07	26,15%	21,98%		
Bier	All	202036	All	€ 5.504.869,47	€ 5.504.869,47	1.668.886	1.668.886	502.042	15,79%	€ 10,96	3,32	€ 3,30	€ 3,30	657.197	657.197,00	4,17%	€ 43,48	€ 43,48	€ 1.525.378,67	€ 1.525.378,67	24,14%	21,41%		
Bier	All	202037	All	€ 5.720.374,97	€ 5.720.374,97	1.701.623	1.701.623	525.809	16,82%	€ 10,88	3,24	€ 3,36	€ 3,36	690.225	690.225,00	4,46%	€ 42,58	€ 42,58	€ 1.770.841,57	€ 1.770.841,57	26,21%	23,04%		
Bier	All	202038	All	€ 5.730.114,19	€ 5.730.114,19	1.991.748	1.991.748	560.804	17,92%	€ 10,22	3,55	€ 2,88	€ 2,88	750.290	750.290,00	4,82%	€ 40,47	€ 40,47	€ 1.767.808,21	€ 1.767.808,21	27,39%	22,59%	Lockdown 2 in	
Bier	All	202039	All	€ 5.476.705,83	€ 5.476.705,83	1.662.094	1.662.094	517.695	16,27%	€ 10,58	3,21	€ 3,30	€ 3,30	679.227	679.227,00	4,39%	€ 43,38	€ 43,38	€ 1.521.969,25	€ 1.521.969,25	25,01%	20,69%	Lockdown 2 in	
Bier	All	202040	All	€ 5.378.178,01	€ 5.378.178,01	1.757.912	1.757.912	506.145	15,83%	€ 10,63	3,47	€ 3,06	€ 3,06	669.608	669.608,00	4,29%	€ 42,99	€ 42,99	€ 1.812.880,67	€ 1.812.880,67	23,28%	20,37%	Lockdown 2 in	
Bier	All	202041	All	€ 5.256.590,18	€ 5.256.590,18	1.626.638	1.626.638	491.661	15,54%	€ 10,69	3,31	€ 3,23	€ 3,23	647.705	647.705,00	4,29%	€ 42,63	€ 42,63	€ 1.778.509,01	€ 1.778.509,01	23,83%	20,47%	Lockdown 2 in	
Bier	All	202042	All	€ 5.933.462,97	€ 5.933.462,97	1.715.341	1.715.341	517.652	16,61%	€ 11,46	3,31	€ 3,46	€ 3,46	678.986	678.986,00	4,57%	€ 44,39	€ 44,39	€ 1.914.167,86	€ 1.914.167,86	24,87%	22,26%	Lockdown 2 in	
Bier	All	202043	All	€ 5.591.511,89	€ 5.591.511,89	1.744.977	1.744.977	510.900	16,41%	€ 10,94	3,42	€ 3,20	€ 3,20	676.314	676.314,00	4,57%	€ 44,03	€ 44,03	€ 1.632.585,21	€ 1.632.585,21	24,09%	19,57%	Lockdown 2 in	
Bier	All	202044	All	€ 5.294.841,48	€ 5.294.841,48	1.693.892	1.693.892	501.260	15,26%	€ 10,56	3,38	€ 3,13	€ 3,13	663.144	663.144,00	4,22%	€ 44,21	€ 44,21	€ 1.267.831,37	€ 1.267.831,37	22,82%	19,07%	Lockdown 2 in	
Bier	All	202045	All	€ 5.886.434,05	€ 5.886.434,05	1.796.033	1.796.033	533.384	16,27%	€ 11,04	3,37	€ 3,28	€ 3,28	698.105	698.105,00	4,51%	€ 44,15	€ 44,15	€ 1.500.646,45	€ 1.500.646,45	24,92%	22,13%	Lockdown 2 in	
Bier	All	202046	All	€ 6.113.099,32	€ 6.113.099,32	1.914.056	1.914.056	542.055	16,16%	€ 11,28	3,53	€ 3,19	€ 3,19	713.465	713.465,00	4,51%	€ 43,85	€ 43,85	€ 1.826.409,12	€ 1.826.409,12	25,36%	21,34%		
Bier	All	202047	All	€ 5.776.600,81	€ 5.776.600,81	1.887.853	1.887.853	533.107	16,38%	€ 10,84	3,54	€ 3,06	€ 3,06	708.740	708.740,00	4,57%	€ 42,29	€ 42,29	€ 1.836.317,47	€ 1.836.317,47	23,56%	21,05%		
Bier	All	202048	All	€ 6.503.074,48	€ 6.503.074,40	1.845.890	1.845.890	560.397	17,16%	€ 11,60	3,29	€ 3,52	€ 3,52	731.923	731.923,00	4,68%	€ 45,54	€ 45,54	€ 1.686.496,79	€ 1.686.496,79	26,07%	23,07%		
Bier	All	202049	All	€ 5.759.006,19	€ 5.759.006,19	1.831.003	1.831.003	523.175	15,94%	€ 11,01	3,50	€ 3,15	€ 3,15	686.870	686.870,00	4,40%	€ 45,78	€ 45,78	€ 1.436.787,93	€ 1.436.787,93	24,55%	20,67%		
Bier	All	202050	All	€ 6.072.282,54	€ 6.072.282,54	1.763.113	1.763.113	523.587	15,78%	€ 11,60	3,37	€ 3,44	€ 3,44	685.404	685.404,00	4,36%	€ 46,35	€ 46,35	€ 1.733.527,14	€ 1.733.527,14	23,25%	20,59%		
Bier	All	202051	All	€ 8.528.634,43	€ 8.528.634,43	2.563.979	2.563.979	664.301	19,83%	€ 12,84	3,86	€ 3,33	€ 3,33	866.474	866.474,00	5,40%	€ 53,28	€ 53,28	€ 3.941.335,12	€ 3.941.335,12	27,95%	21,85%		

Covid dashboard

The purpose of this dashboard is to provide you with relevant product performances during lockdowns based off of your event impact analyzer MEX report.

How do consumers react when a lockdown starts? How do they respond when they end?
What happens when the offices close and the kids can't go to school?

This dashboard will give you the tools to answer questions like these. It will allow you to quickly switch between lockdowns, provide a full list of active measures during and before a lockdown together with relevant data to provide more insight into how consumers behave during a lockdown.

Dashboard setup

- **Build new event impact analyzer report**
  - Select "KPI's over time"
  - Select all weeks 202001-202213
  - Select stores [redacted] vs Bricks"
  - Enable Mex
  - Run report
- **Copy data to dashboard**
  - Open dashboard document on "**raw data**" sheet
  - Download and open Mex report of "KPI's over time"
  - Select cell B6 and then hold ctrl+shift while tapping arrow right once then arrow down to select the entire table of data and copy it using ctrl+c
  - In the dashboard document, select cell A1 and paste using ctrl+v to paste the new data in the "raw data" sheet of the dashboard.
- **Update the dashboard**
  - Press the "**update**" button to the right of the raw data table to update the figures, product groups to the new data.

You may create and select your own product groups, customer segmentation and household panel!

Covid calendar explained

In sheet "**Covid Calendar**", a full list of active measures during every week of the lockdowns is given. From this list, 3 lockdowns and 1 curfew period were identified and matched with sales data the following periods were set:

- **Lockdown 1:** weeks 202011-202026
- **Lockdown 2:** weeks 202042-202125
- **Lockdown 3:** weeks 202144-202212
- **Curfew:** weeks 202103-202116

Looking at the data, it is found that the most activity in performance happens during the first few weeks of a lockdown after which most metrics stabilize again until the lockdown ends. For this reason this dashboard looks at the **first 4 weeks** of every selected lockdowns' start or end (event) and compares it to the 4 weeks leading up to that period (comparison).

Lockdown X

Predetermined transitions:

weeks	Lockdown 1 in	Lockdown 1 out	Lockdown 2 in	Lockdown 2 out	Lockdown 3 in	Lockdown 3 out	Curfew in	Curfew out
Comparison	202007	202023	202038	202121	202140	202208	202052	202113
Comparison	202008	202024	202039	202122	202141	202209	202053	202114
Comparison	202009	202025	202040	202123	202142	202210	202101	202115
Comparison	202010	202026	202041	202124	202143	202211	202102	202116
Event	202011	202027	202042	202125	202144	202212	202103	202117
Event	202012	202028	202043	202126	202145	202213	202104	202118
Event	202013	202029	202044	202127	202146	202214	202105	202119
Event	202014	202030	202045	202128	202147	202215	202106	202120

Event Impact Analyzer

Use cases

Showing product groups' performance during selected lockdown period and showing growth/decline to comparison period

Tutorial

1. Graph shows data from selected filters on the left. Use the metric 1 and 2 options to show multiple metrics in the same figure. Change to % change from values to show weekly growth vs absolute values.
2. The table below shows all product groups' growth vs the comparison period for every metric. Best and worst performers are highlighted to the right of the table. Values are dynamically updating as filters on the left are changed.
3. Table on the top right shows the selected lockdown period and presents the active covid measures during the comparison period and selected period.
4. Full values are displayed in the table at the bottom

Customer

Use cases

Comparing customer segmentations to each other to show shopping behavior among different types of customers during lockdowns

Tutorial

1. Graph shows data from selected filters on the left and above. Use the buyer group 1 and 2 options to show multiple buyer groups in the same figure and use the metric option to select which metric to show. Change to % change from values to show weekly growth vs absolute values.
2. Table shows all customer groups' growth vs the comparison period for every metric. Best and worst performers are highlighted to the right of the table. Values are dynamically updating as filters on the left are changed.
3. Bar chart on the right shows growth for all customer groups for selected metric.
4. Full values are displayed in the table at the bottom

Product groups

Use cases

Comparing 2 product groups in greater detail during a lockdown period

Tutorial

1. Graph shows data from selected filters on the left and bottom. Use the 2 different product group filters to show 2 product groups in the same figure. Use the metric option to show a different metric in the graph. Change to % change from values to show weekly growth vs absolute values.
2. Spider chart on the right shows the growth during the selected period of all metrics from the 2 selected product groups. Underneath this graph the actual values are displayed highlighting the better performing product group.
3. Full values are displayed in the table at the bottom

Online vs Bricks

Comparing online vs offline sales during lockdowns and showing exclusivity

Tutorial

1. Graph shows data from selected filters on the left and above comparing values from bricks and [redacted] use the metric option to select which metric to show. Change to % change from values to show weekly growth vs absolute values.
2. Table below shows growth for every metric in every geography.
3. The overlapping chart on the top right shows customer exclusivity for every geography.
4. Full values are displayed in the table at the bottom

Appendix E – Questionnaire results

Questions

Please assess dashboard by adding “x” at position

Example shown in first 5 scores

annoying			x					**enjoyable**
not understandable					x			**understandable**
creative	x							**dull**
easy to learn		x						**difficult to learn**
valuable						x		**inferior**
boring								**exciting**
not interesting								**interesting**
unpredictable								**predictable**
fast								**slow**
inventive								**conventional**
obstructive								**supportive**
good								**bad**
complicated								**easy**
unlikable								**pleasing**
usual								**leading edge**
unpleasant								**pleasant**
secure								**not secure**
motivating								**demotivating**
meets expectations								**does not meet expectations**
inefficient								**efficient**
clear								**confusing**
impractical								**practical**
organized								**cluttered**
attractive								**unattractive**
friendly								**unfriendly**
conservative								**innovative**

Results

Each X's position (from 1 to 7) was placed for each participant per score.

	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6	Participant 7
1	4	5	5	6	4	4	4
2	2	2	4	5	5	4	5
3	2	2	5	3	2	2	4
4	2	2	2	6	4	5	3
5	4	2	6	2	2	2	3
6	6	6	5	5	5	5	3
7	4	6	6	5	6	6	5
8	4	4	4	5	5	5	4
9	6	1	2	1	2	2	4
10	7	4	3	2	3	2	3
11	7	5	6	5	6	6	6
12	4	2	3	3	2	2	3
13	2	4	3	6	3	3	6
14	4	6	5	6	5	6	6
15	3	5	4	5	3	2	4
16	4	5	5	5	5	6	5
17	4	2	5	3	1	2	4
18	4	2	3	3	3	2	4
19	4	2	3	3	4	3	5
20	4	5	5	5	5	5	5
21	3	5	5	3	3	3	3
22	5	6	5	5	6	5	5
23	6	3	5	4	4	6	3
24	6	3	5	4	5	4	3
25	6	2	6	3	2	3	3
26	2	3	4	5	5	5	4