Coles Customer Segments Report

Baby Category

MATH 2191 Applied Research Project

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Executive Summary

The primary aim of “Coles Baby Product Customer Segments” is to build a model to segment Coles customers based on specific product categories they are purchasing. Segmenting customers based on their purchasing behaviour helps determine how these sets of customers would shop and adapt to changing market conditions and competition. This would help boost short-term sales, as well as, long-term customer loyalty. This report covers 3 major parts: material and method (data extraction, data filtering, clustering technique, model validation and profiling), customer segmentation with insights as well as relevant recommendations.

Initially, real time data of past 12 weeks was collected. Demographics of customers, detailed product description and transactional details were also generated from customer information table, product tables and transaction table respectively. Then product categories were broken down into 35 major and distinguished sub-categories. In terms of method, both K-mean and Hierarchical clustering were applied on our data. Considering of large data, efficiency and given results, K-means has a better performance was selected. Following K-means clustering analysis, a sample dataset of 10,000 customers from total 492,942 customers was used to build a model with 10 distinct clusters. Then, indices heatmap were used to discover customer spending across baby categories. Furthermore, we trained a scoring model using labelled data set and assigned cluster to remaining customers, in order to ensure the model can validate new data as the built customer segmentation that can score customers weekly. After analysing customer features along with buying behaviours, insights were gathered and major 6 different segments have been identified and named according to their attributes. Eventually, three relevant

recommendations from marketing perspective were presented based on customer segmentation results.

Coles now could have a better understanding about customers who purchase baby products by customer segmentation, it allows Coles to determine its current profitability and potential future profitability produced by each segment.

Contents

Introduction

In this report we will discuss in detail about our placement project at Coles which is category-based customer segmentation. As Coles Supermarkets is in a competitive retail industry, to gain a competitive advantage, targeted marketing strategies have been employed to focus on customer needs and their past shopping behaviour in order to increase value for the business. For example, if Coles knows how many people want only organic food, it may have ideas how many customers need to target and how many products need to stock accordingly. Then it can display on shelf wisely and put products on sales smart that finally results better sales. 'Coles remains committed to being a customer-led business and continually providing better value, quality and service to its customers across Australia ' (Wesfarmers 2017, p.23). Having a full understanding of customers and knowing their purchase behaviour patterns will help Coles takes informed decisions (Kim, Jung, Suh & Hwang, 2006).

The aim of this project is to build customer segmentation profile for Coles Customers who have purchased baby product. Unsupervised machine learning algorithms like k-means clustering will be applied to identify behaviours of customers. According to customer features, each customer can be assigned in certain groups that share same buying habits. The built scoring model can validate on new data which means it is capable of scoring customers each week, hence **Coles can use these segments to plan precise marketing strategies, it enables to enhance customer service, deliver applicable products to cater customers' specific**

preference that eventually benefit on product sales and boosts customers' satisfaction and retention.

Materials and Methods

Essentially, SQL Developer Software and R Programming Software were used to query and analyse data respectively.

First of all, we broke down baby products into 67 distinguished sub-categories (refer to Appendix 1) and adding these defined categories to PRODUCTS table were the initial and critical steps that undertaken. Different categories of these products were created based on the PRIMARY DESCRIPTION which is the basis of common classifications. However, when we calculated and considered the percentage of these 65 baby categories against total sales, it was found several categories have very low percentage of sales. Hence, we merged them in to one category, for example, we merged ECONOMY_FORMULA_INFANT, ECONOMY_FORMULA_NEWBORN, ECONOMY_FORMULA_TODDLER to ECONOMY_FORMULA, which means all economy formula for all aged baby. This process was repeated until the left are 35 major unique and distinct categories (refer to Appendix 2) with relatively valuable percentage of sales (refer to Appendix 3), it benefited in reducing the category size.

Furthermore, in order to ensure data representativeness and accuracy, the dataset used for applying further clustering analysis was pre-processed in SQL based on three factors – time, sales and visits.

Preliminaries

Data extraction, data pre-processing and final filtering rules were included in this preliminaries section.

In PRODUCTS table, total number of baby products in database before applying any filtering was 923. Baby product categories which were sold in less than 200 stores were filtered out, and only those products were sold in past 12 weeks were used. These resulted in significantly decrease in number of products as there are around 350 products which are not being sold at Coles anymore and we do not have any transactional data about these products in the past 1 year. Meanwhile, in order to remove products with low sales, we used both sales amount and sales quantity. So that products with a very low unit price are not filtered out if they are not among lowest in sales quantity. We removed products which were common among lowest 10% products in sales amount as well as lowest 10% products in sales quantity. Total number of products after all these filtering is 519.

In terms of TRANSACTIONS, transactions performed in past 12 weeks were involved in our dataset. Furthermore, only those transactions which Flybuys card was scanned by customers were filtered into our dataset and TOTAL SALES is greater than zero.

Total count of customers before any filtering was 1086524. In order to remove customers who had visited Coles too many times, the top 0.1 percentile of number of visits per customer was filtered out. In addition, customers who visited Coles too few times i.e. at most 2 times in past 12 weeks was filtered out as well. After filtering, the

number of customers in our dataset is 490183. Although there is a sharp drop in number of customers but total sales amount was only reduced by 14% as customers who visited at most twice in last 12 weeks did not contributed significantly in total sales.

Furthermore, since we have filtered out customers with low visits and also customers with too high number of visits. Both customers contribute to outliers which might skew or deviate our clusters. After exploring at the customers with high visits, it was found that these customers have transactional data which is approximately equal across all sub-categories, these customers have outliers in all sub-categories and hence removing them from the dataset would not affect the proportion of transactional data for any specific sub-category.

In the end, filtered products table, filtered transaction table and filtered customers were merged together on GROUP_LOYALTY_MEMBER_NUMBER level. Total sales amount and total basket quantity per products on SKUPLUS2 and category level for each member is stored in this table. Number of days since last visit for each member is also stored in this table. The FINAL DATASET named AA_STUDENT_BABY_MERGE1 was generated by merging this table with CAMPAIGN_ANALYTICS.ACTIVE_12M_MBR to include customer demographic details like age, gender, customer affluence, life stage and RFM segment.

The following table is an overview of our final dataset:

	COLUMN_NAME	DATA_TYPE	NULLABLE
1	GROUP_LOYALTY_MEMBER_NUMBER	VARCHAR2(32 BYTE)	Yes
2	CATEGORY	VARCHAR2(255 BYTE)	Yes
3	SKUPLUS3_MERCH_HIER_DESC	VARCHAR2(60 BYTE)	Yes
4	SKUPLUS2_MERCH_HIER_DESC	VARCHAR2(60 BYTE)	Yes
5	TOTAL_SALES_AMOUNT	NUMBER	Yes
6	TOTAL_BASKET_QUANTITY	NUMBER	Yes
7	VISITS	NUMBER	Yes
8	LAST_TRANSACTION_DATE	DATE	Yes
9	NO_OF_DAYS	NUMBER	Yes
10	MBR_AGE	NUMBER	Yes
11	AGE_BAND	VARCHAR2(10 BYTE)	Yes
12	MBR_GENDER	VARCHAR2(1 BYTE)	Yes
13	MBR_RES_STATE	CHAR(3 BYTE)	Yes
14	CUSTOMER_AFFLUENCE	VARCHAR2(60 BYTE)	Yes
15	CFSS_CLEAN	VARCHAR2(25 BYTE)	Yes
16	LIFESTAGE_LOW_NAME	VARCHAR2(200 BYTE)	Yes
17	LIFESTAGE_HIGH_NAME	VARCHAR2(100 BYTE)	Yes
18	CS_RFM_SEGMENT	VARCHAR2(200 BYTE)	Yes
19	RFM_SCORE	NUMBER	Yes
20	RFM_SEGMENT	VARCHAR2(21 BYTE)	Yes

Table 1: Overview of final table AA_STUDENT_BABY_MERGE1

RFM metrics

Own RFM segments were created for customers who purchase baby products and **will be used as customer features** in profiling later on. We marked each of recency, frequency and monetary score out of 5 and then calculated the total score.

Criteria to calculate RFM score is as follows:

- Recency**:** Customers were divided into five equal parts based on number of days since last visit. So the customers who visited most recently got maximum 5 score.
- Frequency: Customers were divided into five equal parts based on total number of times they have visited Coles to buy baby related products. So the customers with highest number of visits got maximum 5 score.

- Monetary**:** Customers were divided into five equal parts based on total amount they spent at Coles to buy baby related products. So the customers who spent most got maximum 5 score.

To calculate total RFM score, we multiplied each of the Recency, Frequency and Monetary score. The maximum score is 5x5x5 = 125. Then RFM segment were assigned to each customer based on their RFM score.

Our set criteria for each RFM segment are as following:

LEGENDS	RFM score > 64
LOYAL CUSTOMERS	27< RFM score <= 64
POTENTIAL LOYALIST	8 < RFM score <= 27
HIBERNATING CUSTOMERS	2 < RFM score <= 8
LOST CUSTOMERS	RFM score <=2

Table 2: Overview of own RFM segments

Clustering

After performing data preliminaries and building RFM metrics, we had the final dataset for further clustering analysis. The goal of clustering is to clearly identify distinct groups with their similar features. There are two methods we considered to perform clustering, K-means and Hierarchical clustering, as these are the most commonly employed clustering techniques with regards to customer segmentation (Kassambara, 2017).

Both methods have their pros and cons; however, we had to try them and see results to decide which algorithm is more suitable to apply. As outcomes of 20,000 samples or 50,000 samples showed similar result and the capability limitation of Coles R

Server, we sampled our data for 10,000 customers. It is still quite a lot of data and representative. We tried hierarchical clustering by 'ward' method, it produced massive output which was not able to show categories clearly as hierarchical method is better used for data size of small sample size (Isod & Sahu, 2013). Additionally, it also overflowed the memory of Coles Server. Whereas, when we tried k-means instead of hierarchical clustering, it was not only faster but also provided better results. **Therefore, we believed K-means clustering would be a more appropriate technique to implement on our dataset,** and we had to find the critical hyper-parameter "K" i.e. number of clusters.

Clustering Model

In order to identify the "K" hyper-parameter for K-means, elbow method and silhouette method were used. As two figures shown below, both methods confirmed K=10 is the best number of clusters as the within-cluster sum of squared errors is lowest and the average silhouette width is the highest when K=10. As we increased the number of clusters (k=11), the distance between clusters decreases and distance within clusters increases.

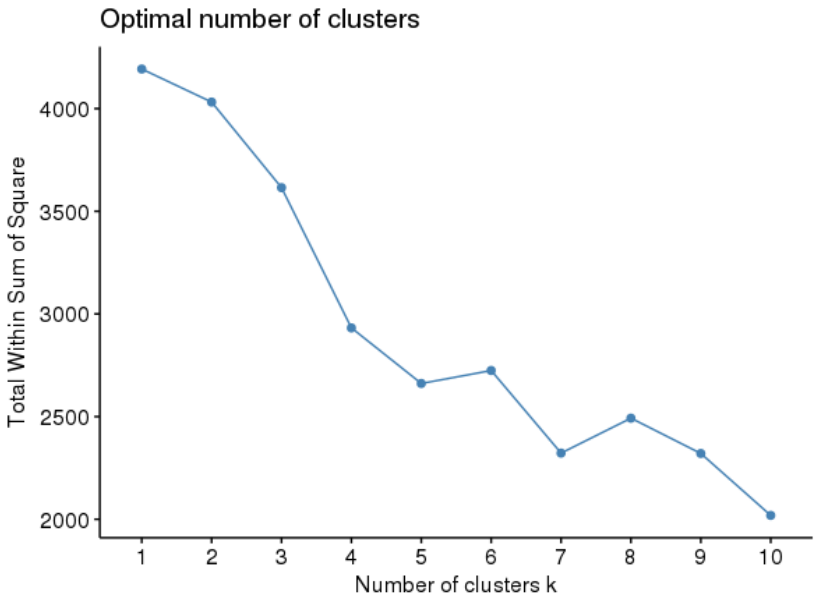


Figure 1: Finding Optimal number of clusters by Total Within sum of square

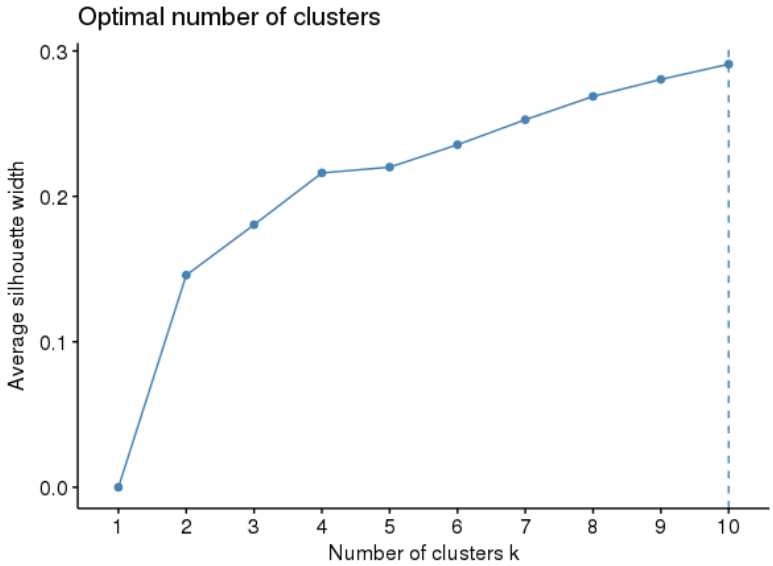


Figure 2: Optimal number of clusters by Average Silhouette width

The following silhouette plot displays a measure of average silhouette width of 0.29 and the negative silhouette index was only 0.178. By referring to Appendix 5, it reveals the negative silhouette index increased to 0.3 when we set k=11 and there is no information contained in cluster 11. Therefore, it states the best selected number of clusters is k=10.

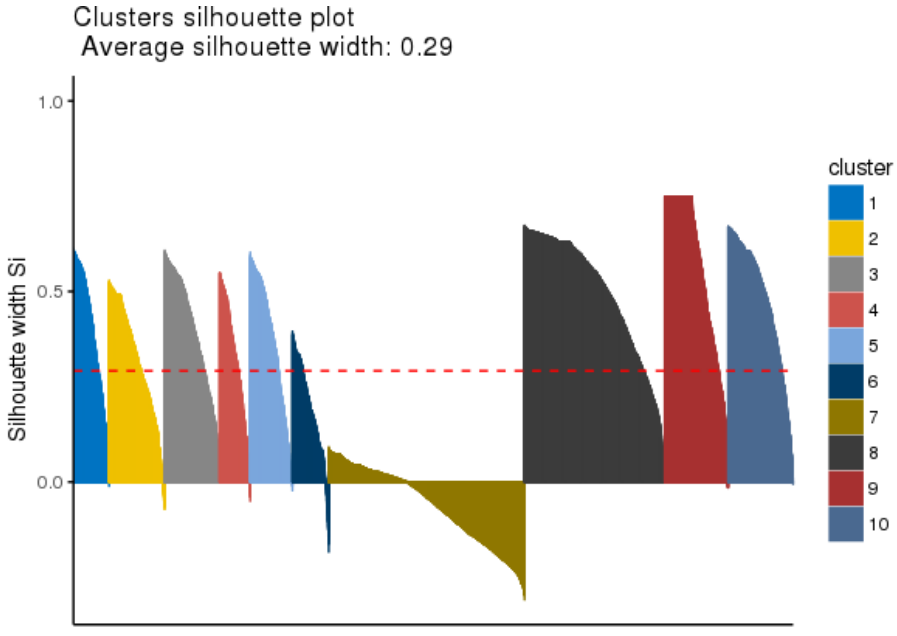


Figure 3: Clusters silhouette plot confirms K=10

Indices and Heatmap

After assigning clusters into our sample data, indices were used to analyse and represent buying behaviour of customers from each cluster across each category. The formula of indices was derived as follows:

$$\text{Indices} = \frac{\text{sales of category (i) } in\ cluster(k) * total\ sum\ of\ baby\ sales}{total\ baby\ sales\ in\ category\ (i) * total\ baby\ sales\ in\ clsuter\ (k)}$$

Where i=category 1,2,3…35 and k= 1,2,3,4,5,6,7,8,9,10.

Indices heatmaps were plotted vertically on the basis of indices. It implies over-index and under-index of baby categories by green and red colour respectively. Over-index classifies any cell that has a value greater than 1.2 whereas under-index refers to any cell has a value that is less than 0.9.

Referring to Appendix 6, it is the first generated Indices heatmap of 35 categories among 10 clusters for 10,000 random sample customers. Meanwhile, Appendix 7 is the details of assigned product categories among each cluster. To corroborate stabilization of our clustering model, no significant changes appears in indices of distinct categories across clusters is important. Thus, we repeated generate 10,000 random sample then run our model process few times. Appendix 8 is the second Indices heatmap we got and appendix 9 is the details of clustering outcomes. Indeed, this process was performed 8 times, only three outputs display in report due to consistent results. In figure 4 below, it shows the third indices heatmap we generated that approves the stabilization of our clusters as it exhibits remarkable consistency with the earlier stated heatmaps. Moreover, by analysing the over-index across different clusters, the most popular categories of baby product for customers within those clusters were identified.

CATEGORY	1	2	3	4	5	6	7	8	9	10
A2_FORMULA_INFANT	0.33594644	0.000000000	0.64018127	0.00000000	0.00000000	7.32969774	1.65297674	0.04119782	0.000000000	0.00000000
A2_FORMULA_NEWBORN	0.14777701	0.000000000	0.52378461	0.49610122	0.00000000	7.29366024	1.53867692	0.00000000	0.000000000	0.00000000
A2_FORMULA_TODDLER	0.04244620	0.006109748	0.30139001	0.00000000	0.09496273	9.37656184	0.11929308	0.02114235	0.024308007	0.01378604
APTAMIL_FORMULA_INFANT	0.10228460	0.728116638	0.24750107	0.00000000	0.26404170	5.60632848	2.94035707	0.09075060	0.000000000	0.02061984
APTAMIL_FORMULA_NEWBORN	0.16673725	0.255058015	0.30402736	2.51350106	0.24505385	3.15197087	3.13552178	0.10113240	0.126997399	0.00000000
APTAMIL_FORMULA_TODDLER	0.03209099	0.038409428	0.12821696	0.01432769	0.08118420	9.50114249	0.06742824	0.09178568	0.009605468	0.03580885
BELLAMYS_ORGANIC_FORMULA_INFANT	1.26161292	0.568657802	0.55842607	0.00000000	0.18960263	3.01199109	3.72897947	0.27628878	0.000000000	0.40444123
BELLAMYS_ORGANIC_FORMULA_NEWBORN	0.50032565	0.072715723	0.47976253	3.80718388	0.33752804	0.78466914	3.59826263	0.14416163	0.202172405	0.07321839
BELLAMYS_ORGANIC_FORMULA_TODDLER	0.07495610	0.000000000	0.41373210	0.00000000	0.26255754	8.35459401	0.62698895	0.06853060	0.039640246	0.15900046
COLES_BABY_ACCESSORIES	0.82366057	0.487144189	0.39892855	0.82826735	0.64902346	0.05117631	2.61636948	0.72456498	1.957146842	1.46371827
COLES_FOOD_AND_FORMULA	0.30227417	4.563478627	0.90800946	0.05334250	0.80331808	0.15263349	2.17957343	0.26315086	0.231332276	0.54288710
COLES_NAPPIES_INFANT	0.33895048	1.323456018	1.58642174	0.11784407	0.27302884	0.05454663	3.64169994	0.17363388	0.255529223	2.23488918
COLES_NAPPIES_NEWBORN	0.94400710	0.358129637	2.35476641	1.48431234	0.08623915	0.06168759	3.25003327	0.08400063	0.763794862	0.61302900
COLES_NAPPIES_TODDLER	0.30749140	0.183647841	0.31964909	0.18720128	0.33595327	0.13116358	0.23936624	0.18256078	0.129963165	7.98300336
ECONOMY_FORMULA	0.10402079	0.183071136	8.31066589	0.32355568	0.17022960	0.46865741	0.17637411	0.10970759	0.003637861	0.15007993
ECONOMY_NAPPIES	8.14486150	0.149509231	0.25787855	0.22018136	0.48641028	0.06669725	0.20800155	0.18001605	0.044739472	0.24170475
HUGGIES_ACCEESSORIES	1.09800050	0.598016756	0.50368004	1.73804776	1.06578172	0.16310086	2.19296986	1.48050612	0.622767697	0.53712868
HUGGIES_NAPPIES_INFANT	0.44211935	1.168435946	1.65557760	1.55328642	0.12877227	0.21240563	4.18234182	0.43999947	0.142836961	0.07422455
HUGGIES_NAPPIES_NEWBORN	0.14873673	0.063876967	0.37824762	8.74286752	0.11455711	0.03004601	0.18249858	0.18765518	0.065685006	0.08582926
HUGGIES_NAPPIES_TODDLER	0.53695861	0.351976385	0.57085450	0.58047829	0.66972949	0.20517162	0.54634850	6.15111961	0.125774450	0.26158855
ORGANIC_BABY_FOOD	0.67156433	3.470833797	1.07181151	0.13617722	0.64453484	0.16101471	2.80041574	0.42499925	0.278742087	0.33990653
ORGANIC_DRY_SNACKS_AND_MEALS	0.65180067	1.800593587	0.79065991	0.41134889	0.95037653	0.69518392	3.09573581	0.79461476	0.344051487	0.46563444
OTHER_BABY_ACCESSORIES	0.58075867	0.404685981	0.35557414	0.63029036	0.63390582	0.09155251	0.59992107	0.45822692	5.357750046	0.88733449
OTHER_DRY_SNACKS_AND_MEALS	0.52528621	2.880224297	0.95235643	0.26651545	0.78325720	0.31489718	2.72425842	0.78609519	0.448531485	0.31857814
OTHER_NAPPIES	0.94431924	0.436599376	0.06535868	1.42622040	0.99244244	0.01373323	3.47911073	1.89001581	0.149399505	0.60280059
PREMIUM_BABY_ACCESSORIES	0.86781506	0.695390723	0.83623296	1.35214303	0.73909688	0.28354353	2.86957306	0.66396965	1.026395720	0.66583938
PREMIUM_BABY_FOOD	0.32987154	6.948423357	0.64186756	0.16944670	0.39209087	0.09506910	0.63504617	0.33187221	0.208460410	0.24785208
PREMIUM_DRY_SNACKS_AND_MEALS	0.61014843	2.689205048	0.92722828	0.26762807	0.71016984	0.37720817	2.56714079	0.60914642	0.694876728	0.54724822
PREMIUM_NAPPIES_INFANT	2.31404297	0.201902032	1.30949926	2.69517946	0.85217840	0.01435582	2.08618468	0.12287613	0.086305852	0.31747541
PREMIUM_NAPPIES_NEWBORN	0.73704051	0.000000000	0.88159899	4.26576367	0.81276318	0.24452006	1.78843745	0.23639109	0.865472997	0.16801205
PREMIUM_NAPPIES_TODDLER	0.38490735	0.187567543	0.30199875	0.10372520	8.14482304	0.19441296	0.22060965	0.19233855	0.077936421	0.19168054
S26_DIET_SPECIFIC_FORMULA_NEWBORN	1.23088351	0.000000000	1.84037657	1.92986939	0.00000000	0.00000000	4.32338568	0.00000000	0.000000000	0.67548485
S26_FORMULA_INFANT	0.91845858	2.270488777	0.04660223	0.30287652	0.82116655	0.39590243	4.47605355	0.59220604	0.006210379	0.17003494
S26_FORMULA_NEWBORN	0.76331922	0.461197382	0.12046948	3.82972105	0.09490226	0.31654784	4.28780378	0.08832409	0.005492224	0.03222267
S26_FORMULA_TODDLER	0.64928213	0.447649809	0.46138399	0.26833709	1.05383018	1.20099568	3.30344830	1.20520112	0.256642406	1.15322928

Figure 4: Indices heatmap of 35 categories among 10 clusters (the third time generated heatmap to ensure the stabilization of model)

Cluster 1	Economy nappies, Premium nappies infant
Cluster 2	Coles food and formula, Organic baby food, Organic dry snacks and meals, Other dry snacks and meals, Premium baby food, Premium dry snacks and meals, S26 formula infant
Cluster 3	Coles nappies newborn, Economy formula
Cluster 4	Aptamil Formula newborn, Bellamy's organic formula newborn, Huggies accessories, Huggies nappies newborn, Premium nappies infant, Premium nappies newborn, S26 formula newborn
Cluster 5	Huggies nappies toddler
Cluster 6	A2 Formula infant, A2 Formula newborn, A2 formula toddler, Aptamil Formula infant, Aptamil Formula newborn, Aptamil formula toddler, Bellamy's organic formula infant, Bellamy's organic formula toddler
Cluster 7	Aptamil Formula infant, Aptamil Formula newborn, Bellamy's organic formula infant, Bellamy's organic formula newborn, Coles baby accessories, Coles Nappies infant, Coles nappies newborn, Huggies accessories, Huggies nappies infant, Organic baby food, Organic dry snacks and meals, Other dry snacks and meals, other nappies, premium baby accessories, premium dry snacks and meals, premium nappies infant, Premium nappies newborn, S26 diet specific formula newborn, S26 formula infant, S26 formula newborn, S26 formula toddler
Cluster 8	Huggies accessories, Huggies nappies toddler
Cluster 9	Coles baby accessories, Other baby accessories
Cluster 10	Coles nappies infant, Coles nappies toddler

Table 4: Assigned product categories among each cluster

Figure 5 states the customer percentage among each cluster we calculated. Cluster 7 has the highest customer proportion (27.21%), it associates with large number of baby products clustered in cluster 7. Whereas, Cluster 8 only has two product categories, Huggies accessories and Huggies nappies toddler, it has the second highest (19.47%) customer proportion. It is driven by high customer loyalty, as referring to appendix 10 indices heatmap for each category with their total sales, we found Huggies nappies toddler has the second highest sales proportion among 35 categories.

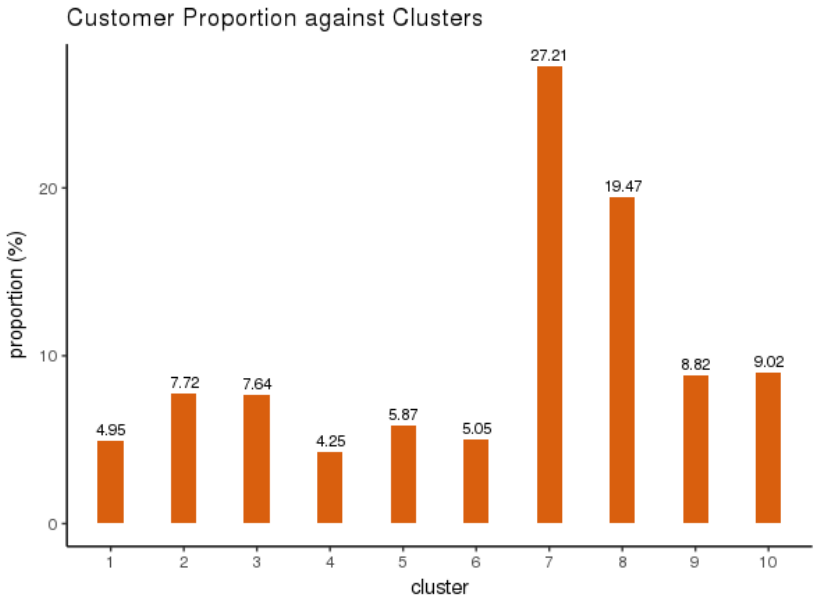


Figure 5: Customers Percentage among each cluster

Model Validation

Based on clustering result, a scoring model was trained using sample data and assigned remaining customers into corresponding clusters. Relying on the shortest distance between each instance and centroid of each cluster, it determines which cluster the instance belongs to. The results for the whole population and sample dataset were compared through indices heatmap. Referring to appendix14, Heatmap supports the consistency of clusters after scoring out-of-sample customers, as it seems there were not many differences especially for over-index cells. Additionally,

according to table 5, there are very close cluster sizes between sample clustering model and population model.

Sample			Population		
Cluster	Size	Percentage	Cluster	Size	Percentage
1	495	4.95%	1	24580	4.99%
2	772	7.72%	2	37896	7.69%
3	764	7.64%	3	37267	7.56%
4	425	4.25%	4	20266	4.11%
5	587	5.87%	5	30318	6.15%
6	505	5.05%	6	23233	4.71%
7	2721	27.21%	7	138505	28.10%
8	1947	19.47%	8	95458	19.40%
9	882	8.82%	9	42503	8.62%
10	902	9.02%	10	42916	8.71%

Table 5: Cluster statistics for selected sample and whole population

We also created new datasets using same data filtering rules that comprises of transactions of 12 weeks and 24 weeks prior to our current dataset simultaneously. Then clustering was processed again to generate clusters to validate if similar results could be produced. Referring to Appendix 15 and 16, index heatmaps shows each cluster has quite same product categories assigned into. Appendix 17 and 18 indicates the size of each cluster is also very similar to our current outcome.

Overall, these results validate the model we built can handle new data that has the capability of scoring segments each week.

Customer Features Profiling

The aim of profiling is to know customers better and describe persona. After analysing and identifying differentiated customers' buying behaviour of each cluster, we retrieved each customer within our clusters. The further profiling was performed based on customer features (demographics, geographies, spending behaviours and interests) such as: Age, State, Gender, Affluence, Low Level Life Stage, CFSS and RFM segments.

Profiling allowed us to identify common customer features of each cluster constitutes which age group, state, gender, affluence level, what low level life stage (Young single, Young couple without kids, Young family with baby etc.) they are in, which CFSS (Fine Eaters, Fine Eaters etc), which Coles RFM segment (Mega Shopper, Heavy users etc) and our RMF segment (Hibernating customers, Legend etc) they belong to.

We applied same indices method mentioned above to calculate and generate heatmaps for customers features. This enabled to detect the most common characteristics of customers in each Baby cluster.

Customer features heatmaps are exhibited below:

Age

AGE_BAND	1	2	3	4	5	6	7	8	9	10
18-24	0.6995639	1.0614695	1.7747300	1.2228456	0.7382969	0.8735394	0.8652469	0.7903555	0.8918335	1.0821188
25-29	0.9393715	1.0019342	1.3768506	0.9129654	1.0146393	1.0516931	1.1206973	0.7041084	0.5115450	1.3661953
30-34	1.0378349	0.8526973	1.0470941	1.1173589	1.0423719	1.3035078	1.0038298	1.0176665	0.5531823	1.0244566
35-39	1.1402199	0.8572419	0.7796834	0.9425001	1.1561608	1.0595206	1.0582589	1.1293972	0.8134246	1.0635926
40-44	1.0759024	1.0809745	0.8787140	0.7047786	0.9200594	0.9170623	0.7607016	1.2688830	1.4203501	0.9725742
45-49	0.9433486	1.2208026	0.6764479	0.5691215	0.7872075	0.6132818	0.7641061	1.1672783	2.5230836	0.7353220
50-54	0.5529257	1.3316954	1.1050661	0.8271014	0.4916350	0.5853178	0.9391322	0.9769841	2.4848401	0.7053022
55-59	0.8905175	1.2026227	0.9752232	1.2964227	0.6339846	0.4722139	1.2373008	0.8467483	2.0222708	0.4226954
60-64	0.5809780	1.7243888	0.7425239	1.9451313	0.7641966	0.4245336	0.9788323	0.8546277	1.5197344	0.4650535
65-69	0.5866768	1.7286395	0.3105617	0.9437226	0.8167168	0.2302923	1.2919264	1.1454902	2.4279740	0.5179998
70-74	0.2673729	1.2379909	0.3321373	1.4682498	1.5012534	0.5387623	1.0471192	0.5267187	2.4930210	0.5873744
75 or over	0.8656138	1.3464269	0.7560613	1.1223368	0.2485368	1.2614529	0.6670189	0.3899178	2.9673166	0.3753181
Under 18	7.3143105	0.0000000	0.9086020	0.0000000	0.0000000	0.0000000	0.7072894	0.0000000	1.0697981	0.0000000

Figure 6: Overview of Indices heatmap about 10 clusters among Age

Based on figure 6, it implies customers of cluster 8 are mostly middle-aged people between 35-39. It is reasonable that cluster 8 involves Huggies accessories, Huggies nappies toddler, middle aged people have the financial capability to afford premium brands for their baby. However, majority customers assigned in cluster 9 aged above 40, these group people seem to purchase baby accessories as gifts as cluster 9 involves Coles baby accessories and Other baby accessories, which is expected. It is worth to notice that customers of cluster 2 are mostly aged between 60-69 and people of cluster 3 are aged 18-29.

Gender

MBR_GENDER	1	2	3	4	5	6	7	8	9	10
F	1.0081947	1.0775262	1.0171229	1.0383975	0.9777819	0.7297746	1.038903	1.0519908	1.0544072	1.0059012
M	0.9560428	0.8004543	0.9296301	0.9220079	1.0105899	1.7602548	0.896394	0.8600324	0.8858273	0.9787664

Figure 7: Overview of Indices heatmap about 10 clusters among Gender

In terms of customers gender (figure 7), there are insignificant over-index of gender in any clusters which means cluster are almost equally distributed among gender except cluster 6. Cluster 6 over indexes in male, it reveals most customers who would like to purchase cluster 6 baby categories are male (refer to Appendix 11). It is interesting that we also found products in cluster 6 are all premium brand formula, such as A2 Formula infant, A2 Formula newborn, A2 formula toddler, Aptamil Formula infant, Aptamil Formula newborn, Aptamil formula toddler, Bellamy's organic formula infant, Bellamy's organic formula toddler.

State

MBR_RES_STATE	1	2	3	4	5	6	7	8	9	10
ACT	0.3205988	1.7395758	1.2507725	1.0269785	0.6443569	0.6229419	1.0869976	1.4788045	0.9671288	0.8618446
NSW	0.9464316	1.1194891	1.0728893	0.9698128	0.8949151	0.9423748	1.1022333	1.0387045	1.0987090	0.8144405
NT	1.3565653	0.6611762	0.7649737	0.3485116	1.9133322	0.3082905	1.4188049	1.1526673	0.3916037	1.6840747
QLD	1.0547404	0.9570061	1.0523996	1.0398051	0.9962396	0.8989212	0.9720489	0.9686441	1.0584828	1.0017122
SA	1.0860392	1.1146693	1.0152017	1.0514081	0.7317512	0.8253369	0.8653594	0.9476303	1.1119160	1.2506879
TAS	1.0425739	1.0221132	1.0109799	0.8827948	1.2869838	0.4593607	1.0493122	1.0305021	0.8869191	1.3284604
VIC	1.0852858	0.8856527	0.9282211	0.8921500	0.9966159	1.2883176	0.9181974	0.9703196	0.9397772	1.0954628
WA	0.7397159	0.9406194	0.8758913	1.2806531	1.2136499	1.0038358	1.0253820	1.0179385	0.9113673	0.9909468

Figure 8: Overview of Indices heatmap about 10 clusters among State

From figure 8, it indicates customers of cluster 1 and cluster 7 are mostly from NT. While cluster 3 does not over-index in any state, it caused by the number of customers falling in this cluster are almost equally distributed. Moreover, customers of cluster 4 and cluster 6 is over-index in WA and VIC respectively.

Customer features were discussed above are related to customer demographic and geographic. spending behaviours and interests features of customers from each cluster will be explored next.

Affluence

CUSTOMER_AFFLUENCE	1	2	3	4	5	6	7	8	9	10
HIGH AFFLUENCE	1.0638082	1.0787578	0.8002655	1.1265160	1.1632068	0.7531694	1.1331810	1.1953101	0.8660520	0.8197333
LOW AFFLUENCE	0.9900659	0.8115107	1.2583214	0.8892630	0.7974889	1.1548294	0.8843386	0.8089809	1.2220790	1.1831222
MID AFFLUENCE	0.9762279	1.0573644	0.9770778	0.9822587	1.0172277	1.0380549	0.9865480	0.9930239	0.9641125	1.0081042

Figure 9: Overview of Indices heatmap about 10 clusters among Affluence level

Figure 9 shows customer affluence of each clusters. It suggests low affluence customers from cluster 3, cluster 6, cluster 9 and cluster 10, and high affluence customers from cluster 4, cluster 5, cluster 7 and cluster 8.

Low Level Life Stage

LIFESTAGE_LOW_NAME	1	2	3	4	5	6	7	8	9	10
01 YOUNG SINGLE	0.6419572	1.3700873	0.6354723	1.6157350	0.6758402	2.0789327	0.7332831	0.8790803	0.9242619	0.4453500
02 YOUNG COUPLE, NO KIDS	0.8423067	0.7650820	1.1095402	1.5885343	0.5338329	2.2274452	0.9359019	0.8074909	0.7117697	0.4780963
03 YOUNG FAMILY w/ BABY	0.8878840	1.7265465	1.8119923	0.6592686	0.9747628	0.9736632	1.4316456	0.5349588	0.3246569	0.6746214
04 YOUNG FAMILY w/ BABY & OTHER CHILDREN	0.5857117	1.5427759	2.9066312	0.7730967	0.5582811	0.6400039	1.3853186	0.3893993	0.1573471	1.0614344
05 YOUNG FAMILY w/ 2-10	1.2477358	0.4739635	0.6293740	0.9457294	1.4676236	0.6201881	0.7715195	1.2660571	0.6942746	1.8835345
06 MIDDLE-AGED SINGLE	1.0571565	0.7429684	0.7914534	1.7507936	0.8672369	1.0433603	0.8543206	0.9904932	0.8283253	1.0738916
07 MIDDLE-AGED COUPLE, NO KIDS	0.9293352	1.1541369	0.9506756	1.0599915	0.8903360	1.0405000	1.0987154	0.9895449	1.3165644	0.5702001
08 MIDDLE-AGED FAMILY w/ BABY	0.8690808	1.3742751	1.0627253	0.3408904	1.1526013	1.7154780	1.8593759	0.8679659	0.3915522	0.3660550
09 MIDDLE-AGED FAMILY w/ BABY & OTHER CHILDREN	0.5606067	1.6339152	1.5902164	0.5863833	0.8584668	1.2794846	1.4346377	0.7070745	0.3074808	1.0417340
10 MIDDLE-AGED FAMILY w/ OLDER CHILDREN	1.2950207	0.6692199	0.4912302	0.8155613	1.1066338	0.7329221	0.6400031	1.4280288	1.5347362	1.2866439
12 OLDER FAMILY w/ BABY & OTHER CHILDREN	0.0000000	2.0918156	1.4431054	0.0000000	0.0000000	3.5670424	0.7489111	0.0000000	0.0000000	2.1491256
13 OLDER FAMILY w/ OLDER CHILDREN	0.6647264	0.5129698	0.1548262	0.4055860	0.7634303	0.0000000	2.3622400	1.5330691	2.0659997	1.5371526
14 OLDER COUPLE, NO KIDS	0.6872742	1.4901812	0.8457852	1.3143609	0.8011072	0.4872154	1.0623521	0.8472443	2.0873189	0.3771607
15 OLDER SINGLE	0.5526394	1.3327256	0.2145320	2.5851665	0.3526110	0.1590830	0.9218382	0.9824742	2.3238500	0.5750802

Figure 10: Indices heatmap about 10 clusters among Low level Life Stage

Low level life stage is a crucial customer features for customers who purchase baby products, as it has family information involved like marriage statues or whether the customer is having kids and babies.

As discovered above, customers of cluster 6 are likely to be male. When we considered life stage of these customers, Figure 10 implies the life stage of these customers are various. Cluster 6 is over index in young single, young couple without kids, middle-aged family with baby, middle-aged family with baby and other children, older family with baby and other children. Customers who are young single and young couple with no kids seem to purchase products from cluster 6 (premium brand formula). Whereas over-index of cluster 9 is more spread across life stage like middle-aged couple no kids, middle-aged family with older children, older family with older children, which is meaningful that older family like grandparents could purchase these affordable baby accessories and give to their grandsons as gifts.

CFSS (Customer Features Shopping Segments)

CFSS_CLEAN	1	2	3	4	5	6	7	8	9	10
A. All About The Far East	0.5831498	0.3804170	0.8126516	0.2351976	0.6167668	5.43714129	0.7440644	0.3219848	0.3577929	0.5108339
B. Fine Eaters	1.4159977	0.7857988	0.8264656	1.1689113	1.3392701	0.69413510	1.3175112	1.1718237	0.9593843	0.3207022
C. Fresh Foodies	0.9120759	0.9346993	1.0368542	1.2151266	1.0592541	0.43356958	1.1643647	1.1989186	0.9576730	1.0874640
D. Store Cupboard Staples	1.2250648	0.9572007	0.6753016	1.3454628	1.0109357	0.40554471	0.8598442	0.9378714	1.1049381	1.4778360
E. Easy Eaters	0.8560456	1.2009477	1.0966327	0.8856738	1.0330286	0.38570335	1.0554335	0.8530315	1.7556067	0.8778965
F. Cooking On a Budget	0.8835596	0.9367383	1.2751673	1.1134852	0.8788244	0.08200739	0.8516021	0.8320091	1.1186873	2.0279193
G. Sweet Tooth Fanatics	1.0014934	1.4891560	1.1833934	1.0532196	0.8852513	0.37266784	1.0180410	0.6595962	1.3486821	0.9884993
H. Feed Your Family	1.0909857	1.1061114	0.9173878	0.8000399	1.1221621	0.53556348	0.9006465	1.3609729	0.9579670	1.2081631
I. Meat And Two Veg	1.0790727	1.3189604	1.1406724	1.2431357	0.9793087	0.47570815	1.0688135	1.0659567	1.0760878	0.5522840

Figure 11: Indices heatmap of 10 clusters among CFSS

Figure 11 shows the indices heatmap of CFSS (Customer Features Shopping Segments) which is was aggregated by Coles using segmentation. There are 9 different categories in which different clusters over index. CFSS are highly relevant to baby product as baby food and formula is a large scale in baby category.

Cluster 1, cluster 3 and cluster 9 are mainly over index in Store Cupboard Staples, Sweet Tooth Fanatics and Easy Eaters respectively. In general context of nutriology, these people not very concerned about diet are easy with eating. While cluster 4, cluster 5, cluster 7 and cluster 8 over index in Fresh Foodies, Fine Eaters and Feed Your Family. It seems these customers are happy to pay more for quality and enjoy nutritional diets. Cluster 6 was also found over indexes in all about the far east which means they huge focus on Asian product especially for the stock cupboard.

The following two features is related RFM metric which has 3 important features, i.e. recency, frequency and monetary. They can provide more insight into customer buying behaviour.

Coles RFM segments

CS_RFM_SEGMENT	1	2	3	4	5	6	7	8	9	10
1.Mega shoppers	0.8919199	1.1339070	0.9126386	0.9608109	0.7559066	1.2536402	1.0398846	1.1393570	1.0627426	0.8491927
2.Heavy users	1.0008984	0.9232256	1.0246642	1.0524121	1.0586354	0.9004244	0.9879852	1.0280860	1.0055097	1.0181589
3.Occasional bigger spenders	1.1991939	1.2011428	1.0993960	0.8954064	0.8972104	1.2720397	0.9681977	0.8698127	0.7808693	0.8167311
4.Frequent small baskets	0.9450561	0.8904249	0.9777416	0.7308458	1.0643511	1.1103198	1.0169389	0.8252693	1.0668223	1.3722302
5.Infrequent small shopper	1.1600499	1.5407964	0.6512407	1.0707897	1.1728826	0.8348309	1.0462582	0.5873967	1.0278087	0.9079462
6.Incidental shoppers	0.3828625	2.5483017	1.7835055	1.8688436	0.0000000	0.0000000	1.5827152	0.9381896	0.6299757	0.2656062

Figure 12: Indices heatmap overview of 10 clusters among Coles RFM

In figure 12 above, it displays customer shopping feature based on segments from Coles. Even we observed preciously that cluster 6 is low affluence class customer and male, they were found are heavy shoppers and occasional bigger spenders. It is underlying that they may not only purchase baby products for their own families, they shop with a clear purpose and always do massive shopping. Furthermore, both cluster 4 and cluster 7 are over-index in Incidental shoppers.

Own built RFM segments

RFM_SEGMENT	1	2	3	4	5	6	7	8	9	10
HIBERNATING CUSTOMERS	0.9438658	1.0879822	0.4526171	0.9340298	0.8562837	0.25343588	0.8317956	0.8071734	2.8451210	0.9876955
LEGEND	0.8342317	1.1773841	1.5922372	0.6625217	0.9162831	1.68242485	1.3048804	0.9701131	0.1089424	0.7509815
LOST CUSTOMERS	0.6114001	2.3817730	0.2629027	0.4017448	0.5941572	0.04061489	0.8458997	0.5152222	2.9922636	1.3540217
LOYAL CUSTOMERS	1.1151490	0.8347444	0.9412114	1.2277686	1.0562114	0.88740646	0.9132362	1.2106915	0.5998557	1.2137254
POTENTIAL LOYALIST	1.0981404	0.8585862	0.7546134	1.1735422	1.1124631	0.81523380	0.8672144	0.9353991	1.3701593	1.0146482

Figure 13: Indices heatmap about 10 clusters among our RFM segments

Last but importantly, the RFM segments we built (Figure 13) also confirms that cluster 6 and cluster 7 are legend. Moreover, cluster 10 is Coles loyal customers. Another interesting point needs to be noticed is cluster 5 is equally distributed across all RFM segments.

Results

Based on profiling results, we enable to divide customers into specific groups of individuals that shares similar characteristics.

Table 6 is an overview of our profiling, it identities customers preference on baby products, such as nappies preference, food/formula preference and other accessories preference and customers features for each cluster.

Cluster	Nappies Preference	Food/Formula Preference	Other Preference	Baby Age	Age	Gender	State	Affluence	LifeStage	Customer Segments
1	Economy	-	-	Infant/ newborn	Under18, 35-39		NT	-	Middle-Aged Family with older children	Frugal Buyers
2	Coles	Premium	-	Infant	60-64, 65-69		ACT	-	Young single, Uoung family with baby,Middle aged family with baby, middle-aged family with baby and other children, older family with baby and other children, older couple no kids	Fine Mums
3	Coles	Economy	-	Infant/ newborn	18-24, 25-29			Low Affluence	Young family with baby, Young family with baby and other children, middle-aged family with baby and other children	Frugal Buyers
4	Huggies	Premium	Premium	Infant/ newborn	60-64, 30-34		WA	High Affluence	Young single, Young couple no kids, Middle-aged single, older single	New Mums
5	Premium	-	-	Toddler	35-39		NT,TAS, WA	High Affluence	Young family with 2-10	Fine Mums
6	-	Premium	-	-	30-34	MALE	VIC	Low Affluence	Young single, Young couple no kids, middle-aged family with baby, older family with baby and other children, middle-aged family with baby and other children	Daigou
7	Coles	Premium/Organic	Premium	-	-		NT	High Affluence	Young family with baby, Middle-aged family with baby, Middle-aged family with baby and other children, Older family with older children	Nature Lovers
8	Huggies	Premium	Huggies	Toddler	40-44		ACT	High Affluence	Middle-aged family with older children, older family with older children	Fine Mums
9	-	-	Economy/ Coles	-	Above 40			Low Affluence	Middle-aged couple no kids, Middle-aged family with older children, Older family with older children	Frugal Buyers
10	Coles	-	Coles	Toddler/ infant	25-29		NT,SA, TAS	Low Affluence	Young family with 2-10, middle-aged family with older childrem, older family with baby and other children, older family with older	Coles Loyalists

Table 6: Overview of profiling with customer segments and customer features

Customer segmentation of baby products is classified as follow and the details will be discussed in next section:

- New mums / New Grandparents (Cluster 4)
- Frugal Buyers
    - The Value Savers (Cluster 3)
    - Economic Families (Cluster 1 & 9)

- Nature Lovers (Cluster 7)
- Daigou (Cluster 6)
- Coles Loyalists (Cluster 10)
- Fine Mums
    - Experienced Parents (Cluster 8)
    - Young Family Stars (Cluster 5)
    - Oldie Goldie (Cluster 2)

Moreover, to prove sufficient accuracy of segmentations like if customer segments may alter when baby grows, we verified customer segments of one customer belongs to was New Mums, and then became to Frugal Buyers according to time period changes in our dataset. Thus, customer segments we identified can be used for whole customers who purchase baby products.

Customer Segmentation

The details of our customer segments are described following.

New Mums/New Grandparents

This is a segment of customers who most likely to step into a new phase of their lives with a new born baby. It makes up about 17% of total visits within the baby category. This segment also generates 17% of total sales from Baby. They are characterized by picking up products for new born babies.

The segment customers from different ages. Hence, we identified them new mums and new grandparents. As some new mums might not be very experienced purchasing baby products, the elders might buy baby products for them.

As figure 14 shown, it indicates the most popular purchased products of New Mums are Huggies Nappies Newborn, Premium Nappies Newborn and Aptamil Formula Newborn.

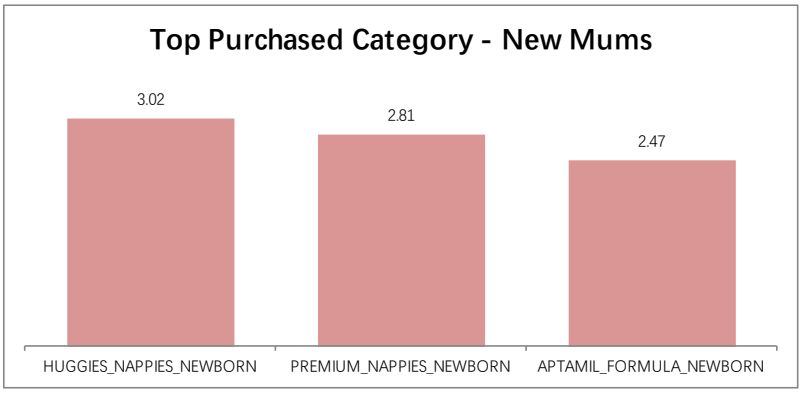


Figure 14: Bar Chart of top purchased categories of New Mums

Frugal Buyers

Frugal Buyers consists of two different sub-segments (Note: Cluster 1 and Cluster 9 were combined into Economic Families due to very similar profiling results).

1. The Value Savers:

Most of the customers in this segment are low affluent.

The value savers are young families between the age of 18-29 with baby or baby and older children.

From figure 12, it found that they consist of the segment that prefers buying economy products on the whole. They are interested purchasing valuable Coles nappies and economy food and formula. It seems that this segment is not brand specific and would prioritizes saving money over picking specific brands.

Furthermore, they contribute towards 12% of the total sales of Baby category. They visit about 10% of the total population.

2. Economic Families

The biggest difference in Economic Families when compared to The Value Savers is the age. This segment heavily consists of customers below 18 and above 35 years. The understanding is that customers above the age of 35 consist of middle aged families with baby and older children.

This segment also largely consists of low affluent customers which is very similar to The Value Savers. It makes up 8% of sales and 9% of visits. And a huge proportion of customers are driven from NT. They make up 8% of sales and 9% of visits.

It is likely that they have no specific preference in food or formula, however, they prefer purchasing economy nappies.

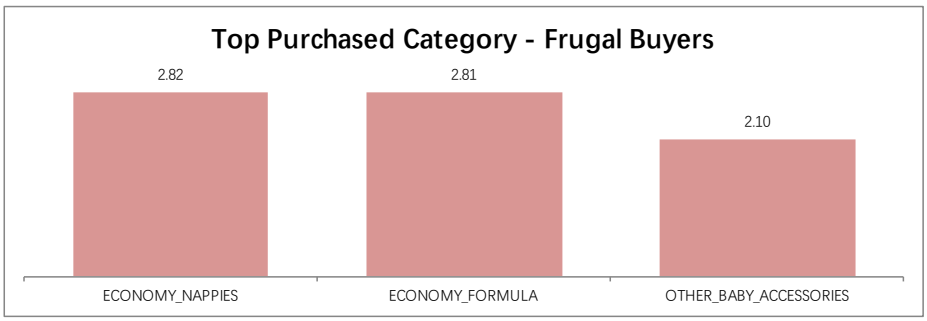


Figure 15: Bar Chart of top purchased categories of Frugal Buyers

Nature Lovers

The second largest segment who purchase across various categories in baby. It has the highest percentage of visits in baby category, and contributes a whopping 27% of total sales from 33% of total visits.

Nature Lovers those who in high affluence class, and like premium brand but also organic products. According to figure 16 and Appendix 10, it displays that they have interest of premium brand formula such as A2 and Aptamil, additionally, they mainly purchase S26 formula which is a famous organic and diet specific brand. In terms of nappies and accessories, they are more likely to buy Huggies brand. As this segment buys plenty of organic premium products thus contributing a huge amount of sales.

Nature lovers is the group of people Coles should focus on, as understanding and catering needs of this segment could maintain and increase sales of baby products.

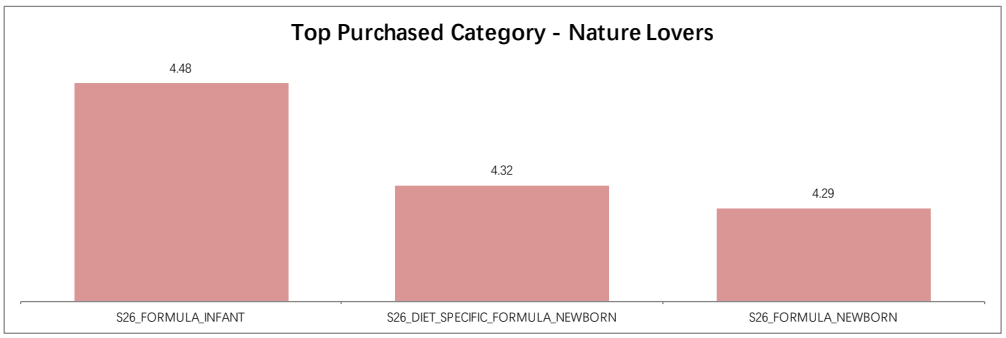


Figure 16: Bar Chart of top purchased categories of New Mums

Daigou

The most highlighted customer segment, Daigou are customers who purchase Baby products, especially baby formula, for commercial purposes rather than only personal purposes. This segment consists of all ages, however there are clues to identify them that most of them are males, and they only purchase formula and no other baby products.

Figure 18 also shows the top purchased products by Daigou are all premium brand formula. These customers buy formula in bulk and distribute to other countries. They even established own logistics, own e-commerce website.

Daigou were featured in news several times in the past, causing a shortage of food and formula for customers in the Australian market. However, as mentioned above, it was bit surprised that Daigou also occupies the second least customer percentage among all segments. And we can see this segment only contributes approximately 4% of total sales and 5% of total visits. The sales of this segment were expected to be much higher. It may be caused by that only Coles customers who swipe their Flybuys card were taken into consideration, most of these customers might make transactions without their Flybuys cards and hence we were not be able to track all Daigou transactions.

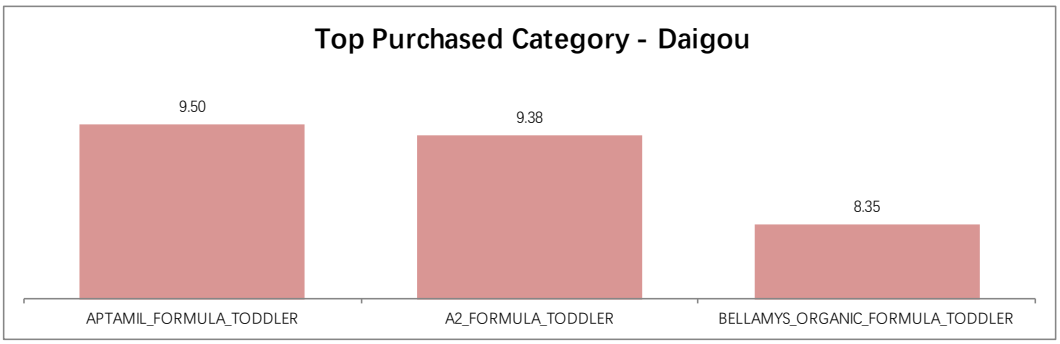


Figure 17: Bar Chart of top purchased categories of New Mums

Coles Loyalists

This segment consists of customers who purchase Coles private label products. As we can see from figure 18, they love purchasing Coles nappies and Coles accessories. It contributes to 9% of total population which is equivalent, another crucial factor is this segment has customers from all age groups.

A reason to be worried is the fact that this segment contributes only 2% to total sales and only 4% of total visits. Even if this segment has only 4% visits, it should ideally contribute to around 4% sales however, it is only at 2% which is very low.

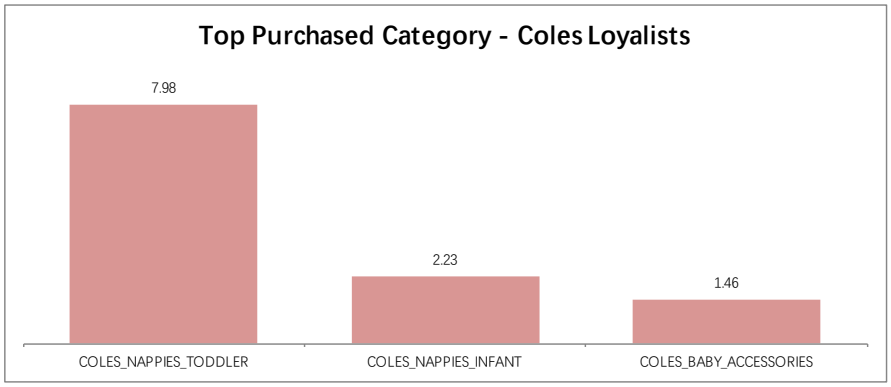


Figure 18: Bar Chart of top purchased categories of New Mums

Fine Mums

This is the largest segment who purchase different categories in baby products. It is also the most revenue generating segment in the category. 31% of the total population fall in this segment, and this segment alone contributes to 42% of the total revenue. Moreover, it is further divided into three sub-segments.

It seems customers who are defined as Fine mums are in high affluence class. Meanwhile, all the customers in this segment pick premium brands leads to generate high revenue as figure 19 draws.

1. Experienced Parents:

This largest sub-cluster, it generates about 67% of the total sales for this cluster. Characterized by customers who are between age of 40-44, the assumption is these customers are probably having a second or third child. They look for specific premium products only. They prefer only Huggies Nappies and premium food and premium formula. Hence, they do end up generating some sales. This segment contributes only 6% of total visits and 28% of total visits within the cluster, these customers probably buy in bulk for the month and hence don't make multiple visits.

2. Young Family Stars:

Mostly younger families between the age of 35-39. Very similar to The Singles, they prefer only picking premium products over all. The major difference being they are families. They do not contribute as much as The Singles sub-segment at only 11% of the sales within this segment

3. Oldie Goldie:

Older families that only purchase premium products and brands, this sub-segment prefers purchasing Huggies Nappies and Premium food and formula products. This sub-cluster generates 16% of the sales to this cluster. They seem to take a liking for nappies as the most purchased product sub-categories are Huggies Nappies for Newborns, Premium Nappies Toddler and Huggies Nappies Toddler.

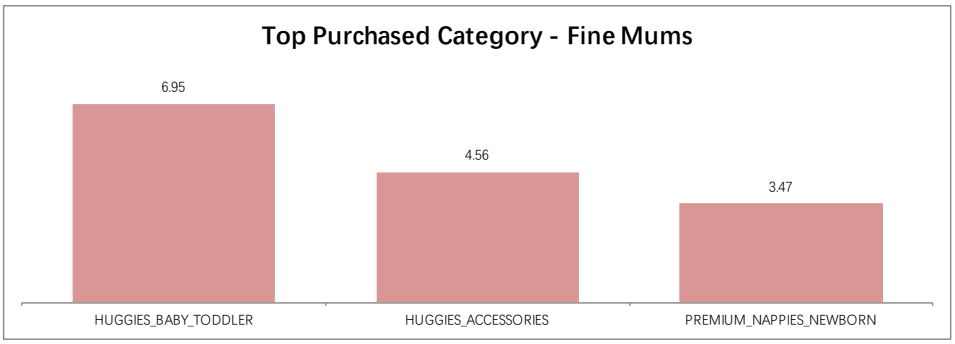
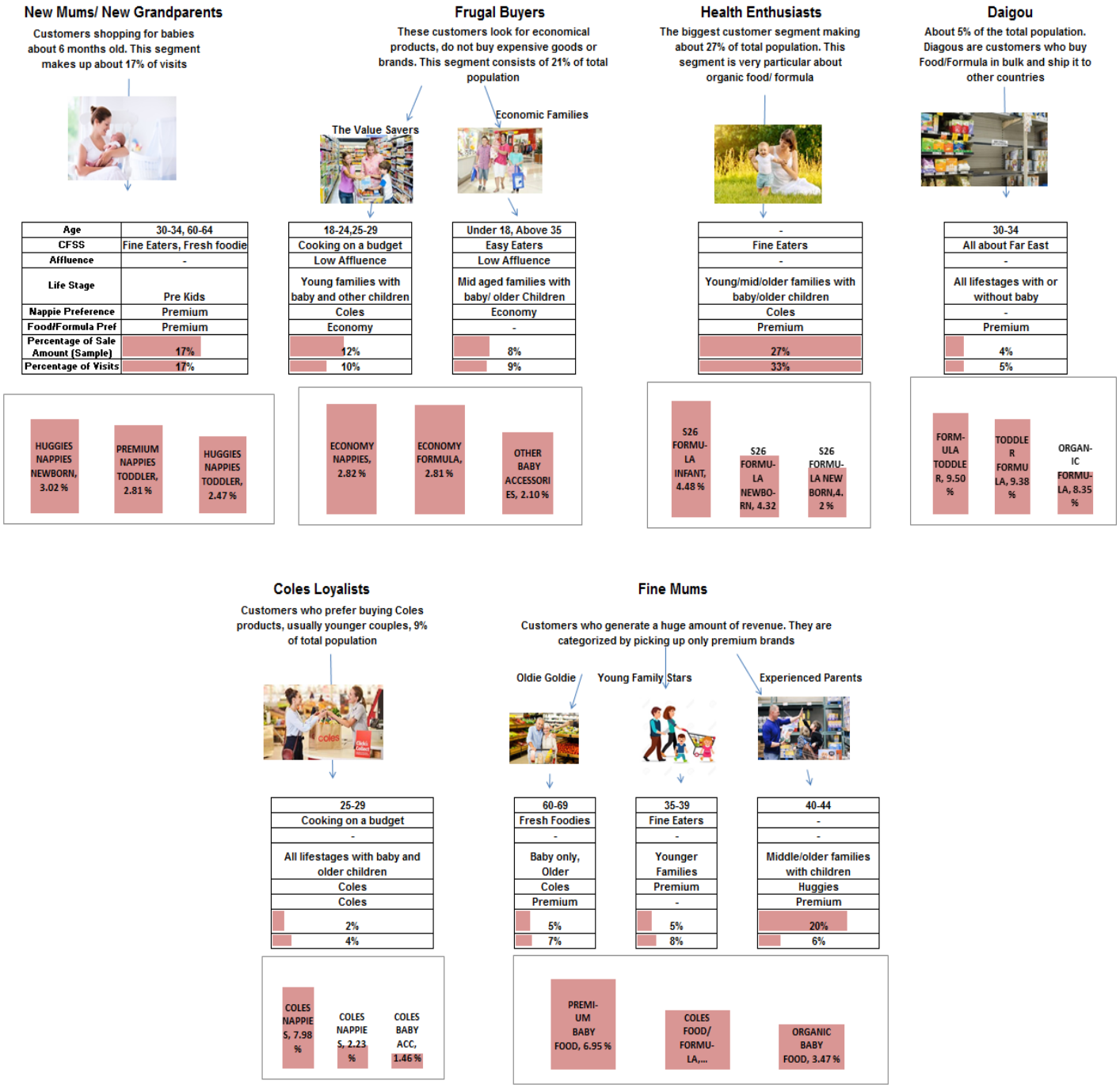


Figure 19: Bar Chart of top purchased categories of New Mums

Infographics

The infographic of all customer segments of baby products is shown below:



Recommendation

Customer segmentation is all about working out what our consumers demand and serving them in a smarter way. It ultimately benefits Coles and make a stronger sales output over time. Coles can determine current profitability and estimate future profitability produced of each segment.

Customers who purchase baby products have been identified into 6 main segments. There are segments needs to be drawn more attention as potentially high revenue could be gained: New mums, Daigou, Nature Lovers, Fine Mums, and Coles Loyalists. Furthermore, the model we build allows to score segments each week. Insights can be derived by regular analysis on baby customers to better understand the drivers of behaviour change. It assists Coles to evaluate their performance by observing customer responses to corresponding marketing campaigns.
Coles can also optimise its marketing channel mix like using right promotion to target right consumers, it drives Coles to win further reputation on customer satisfaction.
There are three possible marketing strategies we recommend to reach higher sales:

Strategy 1: Communication Customization

Rationale:

Customer relationship management is a significant key of business success. Customizing communication with target customers enables to attain a closer relationship. It boosts customer satisfaction and strengthens customer loyalty by offering personalised shopping communications (Berry, 1995). It was found customization can elevate customer retention, loyalty and engagement, and these existing customers can spontaneously advocacy to potential buyers (Spaulding &

Perry, 2013). Customizing communication also helps to reach specific consumers because it enables companies to understand customers' needs that effectively helps keeping tracking and updating customer profiles.

Tactics:

- Customization e-mails

Addressing readers' name in subscribed e-mails. With personal touch and interactive content, it grabs customer attention and induces them to check the offer provided. For example, we also suggest to attach electric booklet of parenting newborns in emails.

- Customization promotion

Offering relevant product in priority according to each customer segment. For example, top purchased products like Aptamil Formula newborn should be included in promotions catalogue send to New Mums. It may remind them to shop that can potentially motivate customers to shop more.

Strategy 2: Online Sales

Rationale:

Online and in-store are two key distribution channels for baby products. Since the awareness of hygiene and nutritional requirement for babies is emerging, economic conditions are rising. Online channel is gaining across buyers all over the world and it is expected to rise at a higher pace over the forecast period (IBISWorld, 2018). It is the opportunity for Coles that Coles has its well-established online shopping website and application.

Tactics:

- Boost online shopping of local customers

It seems customers like Fine Mums and Nature Lovers like Huggies Nappies. As these nappies account heavily in revenue, and nappies are significant recurring expenditure items for baby. Coles could offer special discount and free Same-day delivery for customers who purchase designated nappies in bulk online. It promotes online sales and saves in-store space for other profitable baby products.

- Build Online Platform to sell across the world

Under the premise of satisfying domestic demand, Coles can replace the role of Daigou that establishing its own express and logistics, direct selling baby products like baby formula to other countries.

Strategy 3: Private Label Products

Rationale:

According to Wesfarmers (2017), Coles aims to have private label products constitute around 40% of its product range over the next five years. Private label products imply lower prices for customers and higher margins for retailers. Coles could also use its private label baby product to build in its trusted value position.

Tactics:

- New products development

Coles Loyalists tend to purchase Coles Private Label products like Coles nappies and Coles baby accessories, but it seems they don't have a particular preference on baby food and formula. It may be caused by too few products offered. Therefore, Coles could leverage resources to develop and market new products in baby food and formula field. In addition, as baby nappies has higher demand and more profitable, Coles could launch diverse nappies in partitioning.

Contribution

Every group member equally and critically contributed in the tasks for this project. Cheng CHEN conceived the ideas and structure; Shiting YIN and Waleed Shafqat cleaned the data; Shiting YIN designed methodology and built the modelling; Shiting YIN and Mohith Paul Koshy analysed the data; Cheng CHEN led the writing of the report.

Appendix

Appendix 1: Break down of baby product categories 67 categories

A2 FORMULA_INFANT	A2 formula for infant baby
A2 FORMULA_NEWBORN	A2 formula for newborn baby
A2 FORMULA_TODDLER	A2 formula for toddler baby
APTAMIL FORMULA_INFANT	Aptamil formula for infant baby
APTAMIL FORMULA_NEWBORN	Aptamil formula for newborn baby
APTAMIL FORMULA_TODDLER	Aptamil formula for toddler baby
BABY ACCESSORIES	All other baby accessories
BABY ACCESSORIES_INFANT	All accessories for infant baby
BABY ACCESSORIES_NEWBORN	All accessories for newborn baby
BABY ACCESSORIES_TODDLER	All accessories for toddler baby
BELLAMYS DRY SNACKS/MEALS_INFANT	All other Bellamy's dry snacks and meals for infant baby
BELLAMYS ORGANIC FORMULA_INFANT	Bellamy's organic formula for infant baby
BELLAMYS ORGANIC FORMULA_NEWBORN	Bellamy's organic formula for newborn baby
BELLAMYS ORGANIC FORMULA_TODDLER	Bellamy's organic formula for toddler baby
COLES ACCESSORIES	All other Coles accessories
COLES FOOD_INFANT	Coles food for infant baby
COLES FOOD_NEWBORN	Coles food for newborn baby
COLES FORMULA_INFANT	Coles formula for infant baby
COLES FORMULA_TODDLER	Coles formula for toddler baby
COLES NAPPIES_INFANT	Coles nappies for infant baby
COLES NAPPIES_NEWBORN	Coles nappies for newborn baby

COLES NAPPIES_TODDLER	Coles nappies for toddler baby
DRY SNACKS/MEALS_INFANT	All dry snacks and meals for infant baby
DRY SNACKS/MEALS_NEWBORN	All dry snacks and meals for newborn baby
DRY SNACKS/MEALS_TODDLER	All dry snacks and meals for toddler baby
ECONOMY ACCESSORIES	All other economy baby accessories
ECONOMY BABY WIPES	All other economy baby wipes
ECONOMY FORMULA_INFANT	All economy formula for infant baby
ECONOMY FORMULA_NEWBORN	All economy formula for newborn baby
ECONOMY FORMULA_TODDLER	All economy formula for toddler baby
ECONOMY NAPPIES	All other economy nappies
ECONOMY NAPPIES_INFANT	All economy nappies for infant baby
ECONOMY NAPPIES_NEWBORN	All economy nappies for infant baby
ECONOMY NAPPIES_TODDLER	All economy nappies for toddler baby
ECONOMY ORGANIC FORMULA	All economy organic baby formula
ECONOMY TOILETRIES	All economy toiletries
HUGGIES BABY WIPES	Huggies baby wipes
HUGGIES NAPPIES_INFANT	Huggies nappies for infant baby
HUGGIES NAPPIES_NEWBORN	Huggies nappies for newborn baby
HUGGIES NAPPIES_TODDLER	Huggies nappies for toddler baby
NON SCAN SALES_	
ORGANIC DRY SNACKS/MEALS_INFANT	All organic dry snacks and meals for infant baby
ORGANIC DRY SNACKS/MEALS_NEWBORN	All organic dry snacks and meals for newborn baby

ORGANIC DRY SNACKS/MEALS_TODDLER	All organic dry snacks and meals for toddler baby
ORGANIC FOOD_INFANT	All organic food for infant baby
ORGANIC FOOD_NEWBORN	All organic food for newborn baby
ORGANIC FOOD_TODDLER	All organic food for toddler baby
PREMIUM ACCESSORIES	All other premium accessories
PREMIUM ACCESSORIES_INFANT	All premium accessories for infant baby
PREMIUM ACCESSORIES_NEWBORN	All premium accessories for newborn baby
PREMIUM ACCESSORIES_TODDLER	All premium accessories for toddler baby
PREMIUM BABY WIPES	Premium baby wipes
PREMIUM DIET SPECIFIC DRY SNACKS/MEALS	Premium diet specific dry snacks and meals
PREMIUM DRY SNACKS/MEALS_INFANT	Premium dry snacks and meals for infant baby
PREMIUM DRY SNACKS/MEALS_NEWBORN	Premium dry snacks and meals for newborn baby
PREMIUM DRY SNACKS/MEALS_TODDLER	Premium dry snacks and meals for toddler baby
PREMIUM FOOD_INFANT	Premium food for infant baby
PREMIUM FOOD_NEWBORN	Premium food for newborn baby
PREMIUM FOOD_TODDLER	Premium food for toddler baby
PREMIUM NAPPIES	All other premium nappies
PREMIUM NAPPIES_INFANT	Premium nappies for infant baby
PREMIUM NAPPIES_NEWBORN	Premium nappies for newborn baby

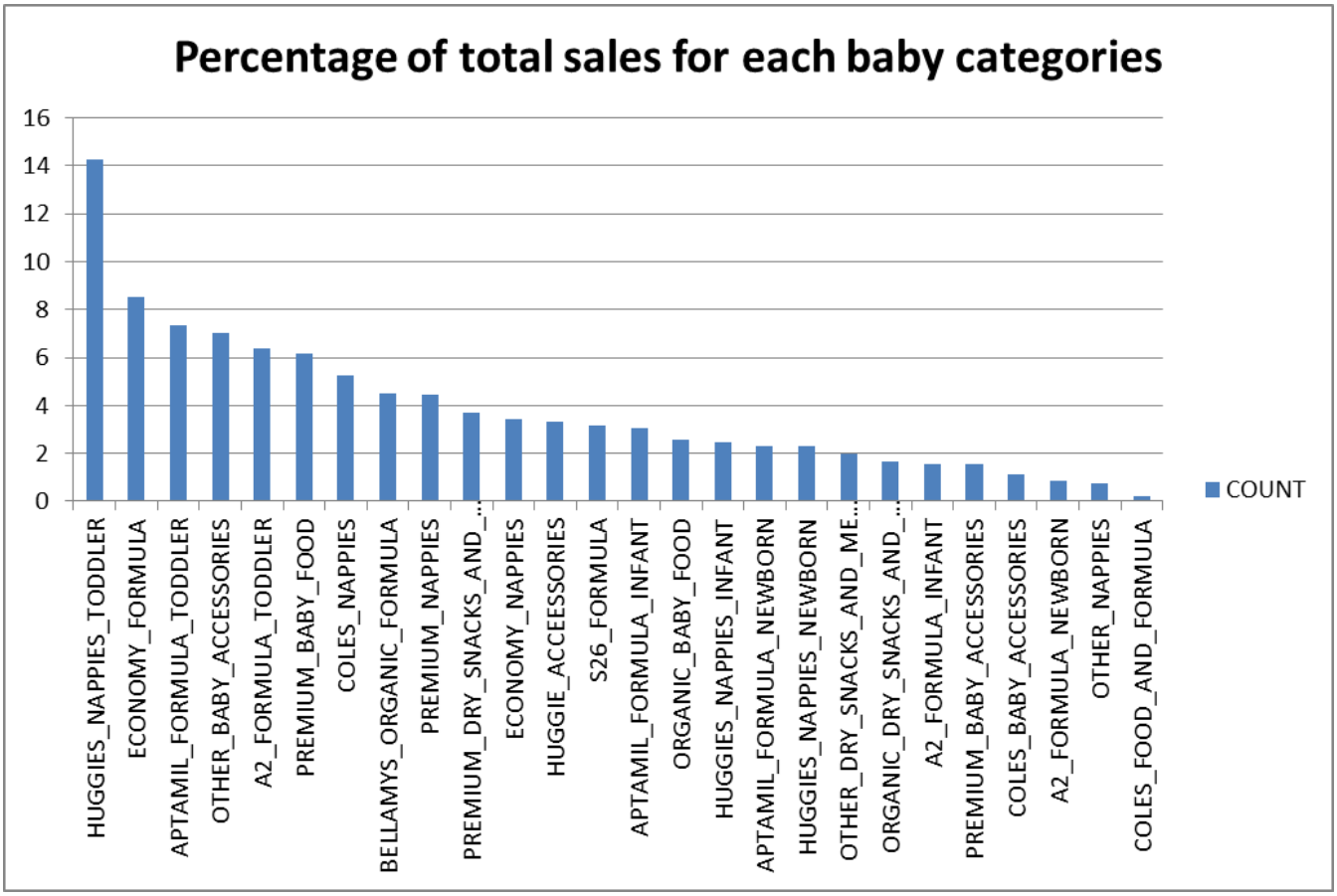
PREMIUM NAPPIES_TODDLER	Premium nappies for toddler baby
PREMIUM TOILETRIES	All premium toiletries
S26 DIET SPECIFIC FORMULA_NEWBORN	S26 diet specific formula for newborn baby
S26 FORMULA_INFANT	S26 formula for infant baby
S26 FORMULA_NEWBORN	S26 formula for newborn baby
S26 FORMULA_TODDLER	S26 formula for toddler baby

Appendix 2: The final 35 categories of baby products with brief description

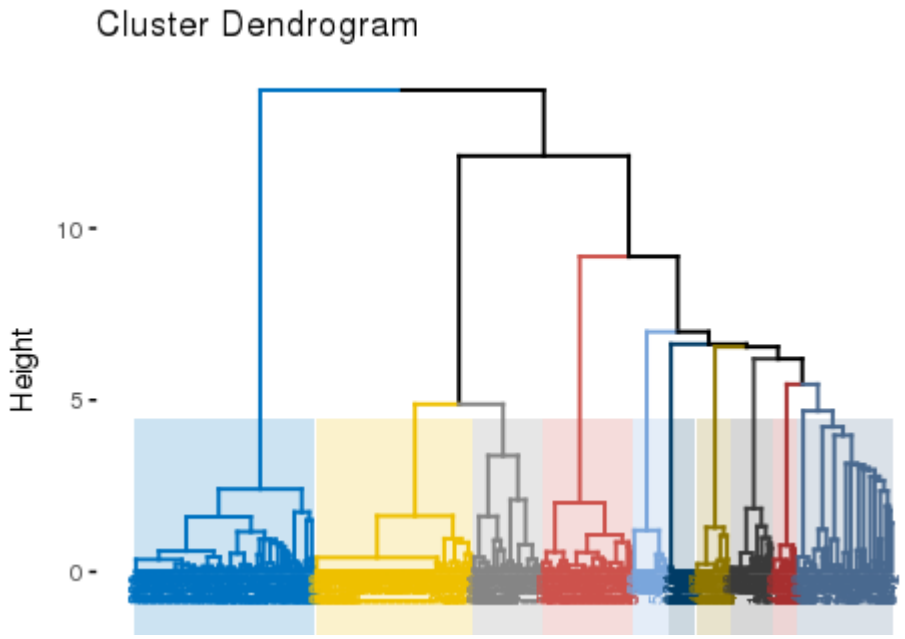
A2_FORMULA_INFANT	A2 formula for infant baby
A2_FORMULA_NEWBORN	A2 formula for newborn baby
A2_FORMULA_TODDLER	A2 formula for toddler baby
APTAMIL_FORMULA_INFANT	Aptamil formula for infant baby
APTAMIL_FORMULA_NEWBORN	Aptamil formula for newborn baby
APTAMIL_FORMULA_TODDLER	Aptamil formula for toddler baby
BELLAMYS_ORGANIC_FORMULA_INFANT	Bellamy's organic formula for infant baby
BELLAMYS_ORGANIC_FORMULA_NEWBORN	Bellamy's organic formula for newborn baby
BELLAMYS_ORGANIC_FORMULA_TODDLER	Bellamy's organic formula for toddler baby
COLES_BABY_ACCESSORIES	All other Coles accessories
COLES_FOOD_AND_FORMULA	Coles food and formula for all aged baby
COLES_NAPPIES_INFANT	Coles nappies for infant baby
COLES_NAPPIES_NEWBORN	Coles nappies for newborn baby
COLES_NAPPIES_TODDLER	Coles nappies for toddler baby
ECONOMY_FORMULA	Economy formula including economy organic formula for all aged baby

ECONOMY_NAPPIES	Economy nappies for all aged baby
HUGGIE_ACCEESSORIES	All Huggies baby accessories
HUGGIES_NAPPIES_INFANT	Huggies nappies for infant baby
HUGGIES_NAPPIES_NEWBORN	Huggies nappies for newborn baby
HUGGIES_NAPPIES_TODDLER	Huggies nappies for toddler baby
ORGANIC_BABY_FOOD	All organic baby food
ORGANIC_DRY_SNACKS_AND_MEALS	All organic dry snacks and meals
OTHER_BABY_ACCESSORIES	All other baby accessories
OTHER_DRY_SNACKS_AND_MEALS	All other dry snacks and meals for baby
OTHER_NAPPIES	All other baby nappies
PREMIUM_BABY_ACCESSORIES	All premium accessories
PREMIUM_BABY_FOOD	All premium food for infant baby
PREMIUM_DRY_SNACKS_AND_MEALS	All premium dry snacks and meals and diet specific dry snacks and meals for baby
PREMIUM_NAPPIES_INFANT	Premium nappies for infant baby
PREMIUM_NAPPIES_NEWBORN	Premium nappies for newborn baby
PREMIUM_NAPPIES_TODDLER	Premium nappies for toddler baby
S26_DIET_SPECIFIC_FORMULA_NEWBORN	S26 diet specific formula for newborn baby
S26_FORMULA_INFANT	S26 formula for infant baby
S26_FORMULA_NEWBORN	S26 formula for newborn baby
S26_FORMULA_TODDLER	S26 formula for toddler baby

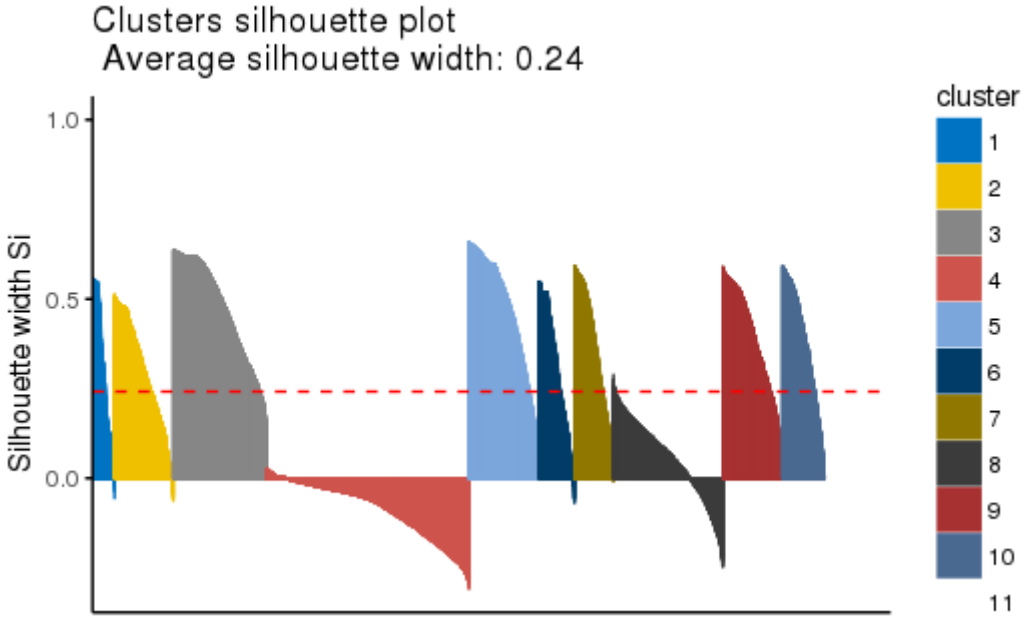
Appendix 3: The percentage of final baby categories against total sales



Appendix 4: Outcome of Hierarchical clustering



Appendix 5: Cluster silhouette plot with k=11



Appendix 6: Indices heatmap of 35 categories among 10 clusters 10,000 random sample

CATEGORY	1	2	3	4	5	6	7	8	9	10
A2_FORMULA_INFANT	0.000000000	7.79119439	0.2157250	0.00000000	0.00000000	0.000000000	1.77174011	0.10437104	0.04231879	0.13463070
A2_FORMULA_NEWBORN	0.238363472	6.21560714	0.3521032	0.00000000	0.13819002	0.285606129	2.54489424	0.08239674	0.00000000	0.14263704
A2_FORMULA_TODDLER	0.006450321	9.48284828	0.2510101	0.00000000	0.02482020	0.000000000	0.12426929	0.06721491	0.00000000	0.04338689
APTAMIL_FORMULA_INFANT	0.038550055	6.06367262	0.2347292	0.01396112	0.09966962	0.097856551	2.44713272	0.21095497	0.18063854	0.59261460
APTAMIL_FORMULA_NEWBORN	0.110364160	3.51108741	0.3950992	0.07550000	0.16438857	0.703694399	4.44111788	0.09735552	0.11082616	0.39056668
APTAMIL_FORMULA_TODDLER	0.062396593	9.40171683	0.2261845	0.00000000	0.03069945	0.008516946	0.07409324	0.08992560	0.04172619	0.01474065
BELLAMYS_ORGANIC_FORMULA_INFANT	0.477726418	3.72789300	0.2712855	0.00000000	0.47717618	0.265726767	3.71128780	0.15008746	0.42484479	0.49397207
BELLAMYS_ORGANIC_FORMULA_NEWBORN	0.000000000	3.57361626	0.1789162	0.00000000	0.06982590	0.456849617	4.34655359	0.20665688	0.40240721	0.76517430
BELLAMYS_ORGANIC_FORMULA_TODDLER	0.000000000	8.67730933	0.2790072	0.00000000	0.26579979	0.000000000	0.55598305	0.08799001	0.07348751	0.06042306
COLES_BABY_ACCESSORIES	1.032425875	0.06593694	0.2132429	1.52007265	0.63525499	4.324507478	0.53520809	0.43237379	0.51707388	0.72390343
COLES_FOOD_AND_FORMULA	0.539966329	0.14659005	0.9584079	0.32620249	0.47432222	0.382964184	3.06365132	0.36386250	3.47085817	0.27317487
COLES_NAPPIES_INFANT	2.358385065	0.16637650	1.9567422	0.12629149	0.29742575	0.338474166	3.18993838	0.11781051	0.98875175	0.45980414
COLES_NAPPIES_NEWBORN	1.986246127	0.00000000	1.8332432	0.39700181	0.23010823	2.356602175	2.83281967	0.10290270	0.13551461	0.10856143
COLES_NAPPIES_TODDLER	7.927917272	0.16473342	0.3481935	0.15730970	0.30751074	0.137434547	0.27656435	0.19438539	0.20411100	0.28184094
ECONOMY_FORMULA	0.092357882	0.45377786	8.4625036	0.03043719	0.21372626	0.087715706	0.21849846	0.13774548	0.17115061	0.13207660
ECONOMY_NAPPIES	0.229016240	0.09132539	0.2256468	0.04684111	0.54844718	0.117905940	0.27182807	0.14890110	0.13913946	8.17994866
HUGGIES_ACCEESSORIES	0.531656474	0.24592045	0.6251305	0.59946224	1.08275227	1.318204995	2.57680227	1.50248626	0.65648325	0.89106135
HUGGIES_NAPPIES_INFANT	0.160908924	0.10804452	1.9172595	0.27696809	0.31582244	0.476291781	4.87893477	0.49804714	0.93629636	0.43142647
HUGGIES_NAPPIES_NEWBORN	0.141173896	0.03666219	0.6737990	0.13348822	0.40031082	6.858305052	0.56971476	0.52157603	0.13333297	0.49143707
HUGGIES_NAPPIES_TODDLER	0.276710824	0.23502429	0.5090290	0.15960389	0.61096592	0.187279066	0.70562768	6.54336432	0.30234319	0.48005182
ORGANIC_BABY_FOOD	0.327292153	0.20833124	0.8655581	0.31844380	0.70812181	0.362369086	3.33190079	0.44958831	2.81447060	0.61392417
ORGANIC_DRY_SNACKS_AND_MEALS	0.400056164	0.51210484	0.6950377	0.30462704	1.19063852	0.723402589	2.90229517	0.66244688	1.70003319	0.70935792
OTHER_BABY_ACCESSORIES	0.868580646	0.08452630	0.3429439	5.41302951	0.51522930	0.741515564	0.52516292	0.46889260	0.45516659	0.58485271
OTHER_DRY_SNACKS_AND_MEALS	0.474895590	0.34559282	0.7090456	0.30837945	1.14045137	0.638005222	3.31470775	0.67282700	1.70962651	0.48636899
OTHER_NAPPIES	0.268328965	0.09335540	0.2513522	0.26866920	0.55128111	0.692803654	4.16107256	1.96102486	0.15885486	1.59326045
PREMIUM_BABY_ACCESSORIES	0.541124202	0.16274339	0.5641184	0.79715705	0.56191419	5.324300857	0.57691304	0.50681559	0.45112530	0.51378852
PREMIUM_BABY_FOOD	0.240033166	0.11302809	0.6298456	0.21800467	0.42469832	0.223305844	0.78046696	0.31041169	6.83945866	0.22074697
PREMIUM_DRY_SNACKS_AND_MEALS	0.463404433	0.31547697	0.8335415	0.30304511	0.72971460	0.304811134	2.80510309	0.63055525	2.48065560	0.73172235
PREMIUM_NAPPIES_INFANT	0.058260588	0.00000000	2.7920444	0.12413766	1.08808465	1.911316782	2.63958657	0.03609347	0.00000000	1.35047572
PREMIUM_NAPPIES_NEWBORN	0.000000000	0.00000000	0.7147536	1.29668913	1.44052842	2.132943742	3.12410751	0.19351286	0.03078440	1.06667931
PREMIUM_NAPPIES_TODDLER	0.171324733	0.14485182	0.3036852	0.04993659	8.17908037	0.120585644	0.26470117	0.20559561	0.17112682	0.38891207
S26_DIET_SPECIFIC_FORMULA_NEWBORN	0.000000000	0.00000000	0.4071182	0.00000000	0.00000000	0.000000000	7.97030830	0.49963127	1.12294222	0.00000000
S26_FORMULA_INFANT	0.166907880	0.13193831	0.1333132	0.28818813	1.19524538	0.114591951	5.85562683	0.23401596	0.71143881	1.16873358
S26_FORMULA_NEWBORN	0.038812719	0.28489411	0.3236512	0.20654533	0.44184849	2.091855493	5.72860441	0.17979640	0.34098496	0.36300690
S26_FORMULA_TODDLER	1.044430037	0.80331632	0.7867446	0.14626387	0.88311697	0.024613778	4.57028563	0.78390270	0.13091657	0.80639753

Appendix 7: Assigned product categories among each cluster

Cluster 1	Coles nappies infant, Coles nappies newborn, Coles nappies toddler
Cluster 2	A2 Formula infant, A2 formula newborn, A2 formula toddler, Aptamil Formula infant, Aptamil Formula newborn Aptamil formula toddler, Bellamy's organic formula infant, Bellamy's organic formula newborn, Bellamy's organic formula toddler
Cluster 3	Coles nappies infant, Coles nappies newborn, Economy formula, Premium nappies infant
Cluster 4	Other baby accessories
Cluster 5	Premium nappies toddler
Cluster 6	Coles baby accessories, Coles nappies newborn, Huggies nappies newborn, Premium baby accessories, Premium nappies infant, Premium nappies newborn
Cluster 7	Aptamil formula newborn, Bellamy's organic formula infant, Bellamy's organic formula newborn, Coles food and formula, Coles nappies infant, Coles nappies newborn, Huggies accessories, Huggies nappies infant, Organic baby food, Organic dry snacks and meals, Other dry snacks and meals, Other nappies, Premium dry snack and meals, Premium nappies infant, Premium nappies newborn, S26 formula infant, S26 formula newborn, S26 formula toddler, S26 diet specific formula newborn
Cluster 8	Huggies nappies toddler
Cluster 9	Coles food and formula, Organic baby food, Organic dry snacks and meals, Premium baby food, Premium dry snacks and meals
Cluster 10	Economy nappies

Appendix 8: Second time to generate heatmap to check the stabilization of our clusters

CATEGORY	1	2	3	4	5	6	7	8	9	10
A2_FORMULA_INFANT	0.00000000	0.34777688	0.37541272	0.4959298	0.000000000	1.0770171	0.0000000	7.7038634	0.00000000	0.00000000
A2_FORMULA_NEWBORN	0.00000000	0.38174437	0.00000000	0.8808147	0.344846556	0.5985872	0.0000000	7.2797952	0.51421190	0.00000000
A2_FORMULA_TODDLER	0.00000000	0.19500083	0.00000000	0.1406394	0.113600623	1.3766506	0.2974996	7.8766090	0.00000000	0.00000000
APTAMIL_FORMULA_INFANT	0.00000000	0.40953608	0.48368379	0.6517315	0.000000000	0.5029285	0.2989230	7.3786325	0.00000000	0.27456464
APTAMIL_FORMULA_NEWBORN	0.68202125	0.16718118	0.23587130	0.5586219	0.114380340	0.4211305	0.3202790	5.2495201	2.20874190	0.04225254
APTAMIL_FORMULA_TODDLER	0.10711700	0.44106323	0.04140905	0.4081276	0.051405724	1.0602504	0.3781856	6.9381707	0.04682407	0.32744665
BELLAMYS_ORGANIC_FORMULA_INFANT	0.00000000	0.00000000	0.00000000	0.0000000	0.000000000	0.6114089	1.5108369	7.8777542	0.00000000	0.00000000
BELLAMYS_ORGANIC_FORMULA_NEWBORN	0.00000000	0.41958069	0.00000000	0.2528121	0.000000000	1.0124056	0.7086839	5.8253174	1.42418210	0.35701817
BELLAMYS_ORGANIC_FORMULA_TODDLER	0.21209064	0.37601012	0.34882811	0.3569244	0.000000000	1.0320305	1.0256171	6.5184410	0.12985814	0.00000000
COLES_BABY_ACCESSORIES	1.12712385	0.52860093	0.51484295	0.6635212	1.975842150	0.2568460	0.6671865	2.3165494	0.77082998	1.17855709
COLES_FOOD_AND_FORMULA	1.09934248	0.54059449	3.45297304	0.4812677	0.142885511	0.7306696	0.3382115	2.3105905	0.23860929	0.66485591
COLES_NAPPIES_INFANT	0.30193469	0.24479961	1.33414556	0.7011612	0.481174798	1.2177025	0.1933123	3.1561626	0.30934794	2.06025871
COLES_NAPPIES_NEWBORN	1.28603968	0.03891702	0.20312303	0.1861346	0.511372522	1.5580989	0.3867496	2.5836366	1.47903396	1.76689412
COLES_NAPPIES_TODDLER	0.09390587	0.16096642	0.26832327	0.3565990	0.131141089	0.3823744	0.3013415	0.2401242	0.18821577	7.93180652
ECONOMY_FORMULA	0.04712435	0.12127509	0.27327418	0.1617596	0.005702937	8.6807204	0.2065145	0.2270229	0.16636813	0.11023783
ECONOMY_NAPPIES	0.06742175	0.16229494	0.16710819	8.2486022	0.058105047	0.2614543	0.5090706	0.2326764	0.07377450	0.21949205
HUGGIES_ACCEESSORIES	0.43973272	0.93057712	0.38616891	0.4548500	0.394020412	0.4147436	0.7199538	0.5016714	3.40942202	0.34885989
HUGGIES_NAPPIES_INFANT	0.58416572	0.56117457	1.19328823	0.4164823	0.131925941	1.9531827	0.3238971	3.7508697	1.02409626	0.06091743
HUGGIES_NAPPIES_NEWBORN	0.33162089	0.33522688	0.07526419	0.2457515	0.125206037	0.4465066	0.2087604	0.2914976	7.85245646	0.08770945
HUGGIES_NAPPIES_TODDLER	0.12737129	6.36008578	0.45967827	0.4330392	0.139648048	0.5864227	0.6827476	0.5412225	0.37201767	0.29776692
ORGANIC_BABY_FOOD	0.60644024	0.52571497	3.03560162	0.5668709	0.287574414	1.0375953	0.6995279	2.7285443	0.22898931	0.28314098
ORGANIC_DRY_SNACKS_AND_MEALS	0.94612824	0.74937726	1.90442218	0.7600500	0.465240720	0.6669214	0.9085526	2.8149562	0.60791259	0.17643877
OTHER_BABY_ACCESSORIES	0.87702960	0.44984778	0.36496999	0.5614826	5.007322261	0.3444728	0.5714863	0.4442755	0.52881651	0.85029664
OTHER_DRY_SNACKS_AND_MEALS	0.71250235	0.70171681	2.50257527	0.5823544	0.442646127	0.8114223	0.9605817	2.5686683	0.44251960	0.27501323
OTHER_NAPPIES	0.23960229	2.09621721	0.13737186	0.9471988	0.408118442	0.2350617	0.3520217	3.6894297	1.48517293	0.40980586
PREMIUM_BABY_ACCESSORIES	6.64342833	0.30207243	0.27613487	0.3659092	0.397989848	0.3522641	0.3403344	0.3754060	0.65876949	0.28769130
PREMIUM_BABY_FOOD	0.36399741	0.31980630	6.63840636	0.3395990	0.181147337	0.7194324	0.3992230	0.6050492	0.18062544	0.25271362
PREMIUM_DRY_SNACKS_AND_MEALS	0.84054978	0.62550143	2.58698519	0.5078240	0.335179109	0.8200781	0.7300017	2.7204655	0.42975920	0.38365608
PREMIUM_NAPPIES_INFANT	0.91020464	0.14144127	0.00000000	1.7631027	0.507643515	1.9816546	0.3091690	2.6010396	1.69307210	0.09267246
PREMIUM_NAPPIES_NEWBORN	1.11705908	0.11706832	0.02916255	1.0560733	1.141779740	0.5862421	0.9480854	2.8687477	1.92360699	0.21217481
PREMIUM_NAPPIES_TODDLER	0.05981236	0.25158465	0.21060779	0.4570922	0.066976240	0.2404977	8.1619354	0.2489378	0.11872883	0.18382701
S26_DIET_SPECIFIC_FORMULA_NEWBORN	0.00000000	1.18397085	0.00000000	0.0000000	2.628674869	1.0401687	0.0000000	3.8625772	1.28460837	0.00000000
S26_FORMULA_INFANT	0.00000000	0.74891238	1.46963137	0.5003346	0.000000000	0.2457247	1.1282828	5.4965123	0.17220870	0.23839314
S26_FORMULA_NEWBORN	0.63014555	0.28847854	0.34408331	0.5365701	0.418719406	0.6701143	0.3921692	4.4926446	1.91288635	0.31418674
S26_FORMULA_TODDLER	0.21947232	0.83066649	0.60423046	0.4833844	0.183174480	0.1319178	1.6519702	4.4355974	0.12953944	1.33004711

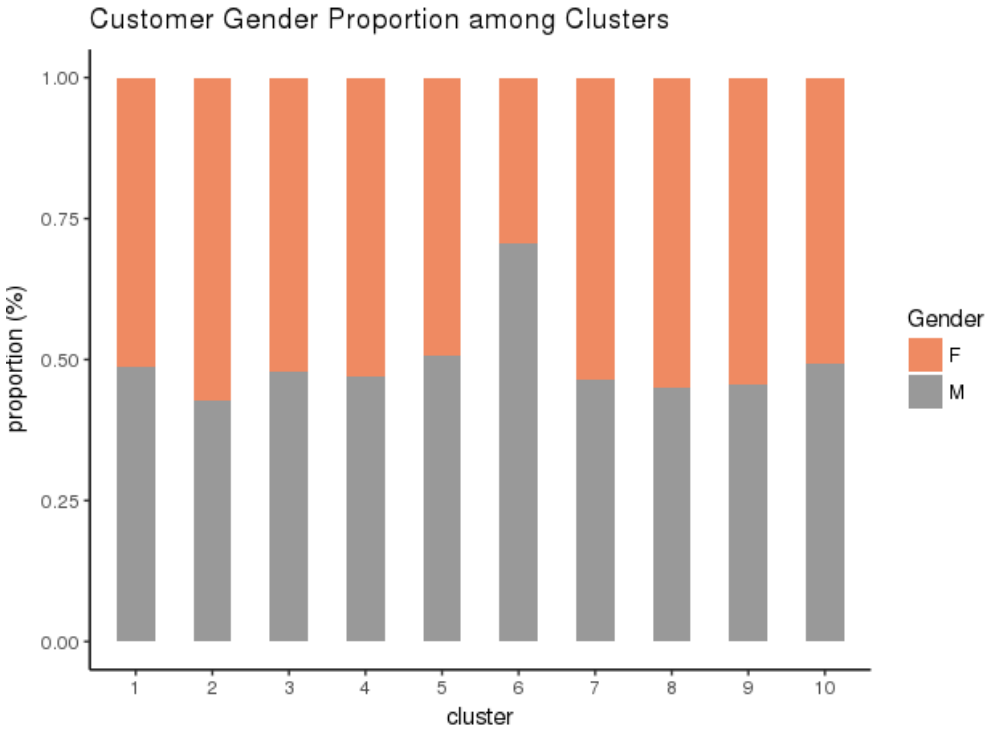
Appendix 9: Assigned product categories among each cluster

Cluster 1	Premium baby accessories
Cluster 2	Huggies nappies toddler, other nappies
Cluster 3	Coles food and formula, Organic baby food, Organic dry snacks and meals, other dry snacks and meals, premium baby food, Premium dry snacks and meals
Cluster 4	Economy nappies, premium nappies infant
Cluster 5	Coles baby accessories, Other baby accessories, S26 diet specific formula newborn
Cluster 6	Economy formula, Coles nappies newborn, Huggies nappies infant, Premium nappies infant
Cluster 7	Premium nappies toddler
Cluster 8	A2 Formula infant, A2 formula newborn, A2 formula toddler, Aptamil Formula infant, Aptamil Formula newborn Aptamil formula toddler, Bellamy's organic formula infant, Bellamy's organic formula newborn, Bellamy's organic formula toddler, Coles baby accessories, Coles food and formula, Coles nappies infant, Coles nappies newborn, Huggies nappies infant, Organic baby food, Organic dry snacks and meals, other nappies, Premium dry snacks and meals, Premium nappies infant, Premium nappies newborn, S26 diet specific formula newborn , S26 formula infant, S26 formula newborn, S26 formula toddler
Cluster 9	Huggies accessories, Huggies nappies newborn, Premium nappies infant, Premium nappies newborn
Cluster 10	Coles nappies infant, Coles nappies newborn, Coles nappies toddler

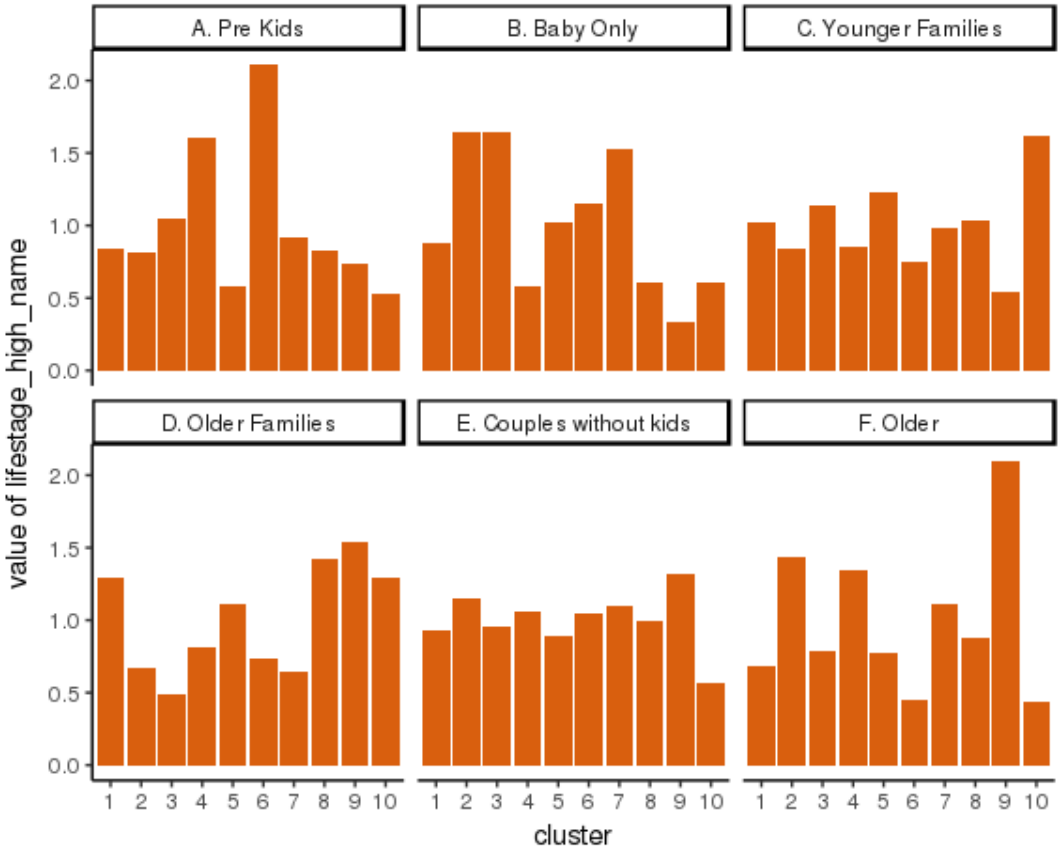
Appendix 10: Indices heatmap for categories among clusters with total value

CATEGORY	1	2	3	4	5	6	7	8	9	10	total
OTHER_BABY_ACCESSORIES	0.5808	0.4047	0.3556	0.6303	0.6339	0.0916	0.5999	0.4582	5.3578	0.8873	0.1479
HUGGIES_NAPPIES_TODDLER	0.5370	0.3520	0.5709	0.5805	0.6697	0.2052	0.5463	6.1511	0.1258	0.2616	0.1079
COLES_NAPPIES_TODDLER	0.3075	0.1836	0.3196	0.1872	0.3360	0.1312	0.2394	0.1826	0.1300	7.9830	0.0796
PREMIUM_BABY_FOOD	0.3299	6.9484	0.6419	0.1694	0.3921	0.0951	0.6350	0.3319	0.2085	0.2479	0.0758
ECONOMY_NAPPIES	8.1449	0.1495	0.2579	0.2202	0.4864	0.0667	0.2080	0.1800	0.0447	0.2417	0.0710
PREMIUM_NAPPIES_TODDLER	0.3849	0.1876	0.3020	0.1037	8.1448	0.1944	0.2206	0.1923	0.0779	0.1917	0.0669
ECONOMY_FORMULA	0.1040	0.1831	8.3107	0.3236	0.1702	0.4687	0.1764	0.1097	0.0036	0.1501	0.0654
HUGGIES_NAPPIES_NEWBORN	0.1487	0.0639	0.3782	8.7429	0.1146	0.0300	0.1825	0.1877	0.0657	0.0858	0.0580
PREMIUM_BABY_ACCESSORIES	0.8678	0.6954	0.8362	1.3521	0.7391	0.2835	2.8696	0.6640	1.0264	0.6658	0.0420
HUGGIES_ACCEESSORIES	1.0980	0.5980	0.5037	1.7380	1.0658	0.1631	2.1930	1.4805	0.6228	0.5371	0.0381
APTAMIL_FORMULA_TODDLER	0.0321	0.0384	0.1282	0.0143	0.0812	9.5011	0.0674	0.0918	0.0096	0.0358	0.0378
A2_FORMULA_TODDLER	0.0424	0.0061	0.3014	0.0000	0.0950	9.3766	0.1193	0.0211	0.0243	0.0138	0.0233
COLES_BABY_ACCESSORIES	0.8237	0.4871	0.3989	0.8283	0.6490	0.0512	2.6164	0.7246	1.9571	1.4637	0.0224
ORGANIC_BABY_FOOD	0.6716	3.4708	1.0718	0.1362	0.6445	0.1610	2.8004	0.4250	0.2787	0.3399	0.0209
PREMIUM_DRY_SNACKS_AND_MEALS	0.6101	2.6892	0.9272	0.2676	0.7102	0.3772	2.5671	0.6091	0.6949	0.5472	0.0181
OTHER_DRY_SNACKS_AND_MEALS	0.5253	2.8802	0.9524	0.2665	0.7833	0.3149	2.7243	0.7861	0.4485	0.3186	0.0179
ORGANIC_DRY_SNACKS_AND_MEALS	0.6518	1.8006	0.7907	0.4113	0.9504	0.6952	3.0957	0.7946	0.3441	0.4656	0.0141
BELLAMYS_ORGANIC_FORMULA_TODDLER	0.0750	0.0000	0.4137	0.0000	0.2626	8.3546	0.6270	0.0685	0.0396	0.1590	0.0140
HUGGIES_NAPPIES_INFANT	0.4421	1.1684	1.6556	1.5533	0.1288	0.2124	4.1823	0.4400	0.1428	0.0742	0.0139
APTAMIL_FORMULA_INFANT	0.1023	0.7281	0.2475	0.0000	0.2640	5.6063	2.9404	0.0908	0.0000	0.0206	0.0097
APTAMIL_FORMULA_NEWBORN	0.1667	0.2551	0.3040	2.5135	0.2451	3.1520	3.1355	0.1011	0.1270	0.0000	0.0085
OTHER_NAPPIES	0.9443	0.4366	0.0654	1.4262	0.9924	0.0137	3.4791	1.8900	0.1494	0.6028	0.0072
S26_FORMULA_TODDLER	0.6493	0.4476	0.4614	0.2683	1.0538	1.2010	3.3034	1.2052	0.2566	1.1532	0.0058
A2_FORMULA_INFANT	0.3359	0.0000	0.6402	0.0000	0.0000	7.3297	1.6530	0.0412	0.0000	0.0000	0.0051
S26_FORMULA_NEWBORN	0.7633	0.4612	0.1205	3.8297	0.0949	0.3165	4.2878	0.0883	0.0055	0.0322	0.0041
COLES_NAPPIES_INFANT	0.3390	1.3235	1.5864	0.1178	0.2730	0.0545	3.6417	0.1736	0.2555	2.2349	0.0040
S26_FORMULA_INFANT	0.9185	2.2705	0.0466	0.3029	0.8212	0.3959	4.4761	0.5922	0.0062	0.1700	0.0037
BELLAMYS_ORGANIC_FORMULA_NEWBORN	0.5003	0.0727	0.4798	3.8072	0.3375	0.7847	3.5983	0.1442	0.2022	0.0732	0.0030
PREMIUM_NAPPIES_INFANT	2.3140	0.2019	1.3095	2.6952	0.8522	0.0144	2.0862	0.1229	0.0863	0.3175	0.0028
COLES_NAPPIES_NEWBORN	0.9440	0.3581	2.3548	1.4843	0.0862	0.0617	3.2500	0.0840	0.7638	0.6130	0.0026
A2_FORMULA_NEWBORN	0.1478	0.0000	0.5238	0.4961	0.0000	7.2937	1.5387	0.0000	0.0000	0.0000	0.0023
COLES_FOOD_AND_FORMULA	0.3023	4.5635	0.9080	0.0533	0.8033	0.1526	2.1796	0.2632	0.2313	0.5429	0.0022
PREMIUM_NAPPIES_NEWBORN	0.7370	0.0000	0.8816	4.2658	0.8128	0.2445	1.7884	0.2364	0.8655	0.1680	0.0018
BELLAMYS_ORGANIC_FORMULA_INFANT	1.2616	0.5687	0.5584	0.0000	0.1896	3.0120	3.7290	0.2763	0.0000	0.4044	0.0016
S26_DIET_SPECIFIC_FORMULA_NEWBORN	1.2309	0.0000	1.8404	1.9299	0.0000	0.0000	4.3234	0.0000	0.0000	0.6755	0.0004

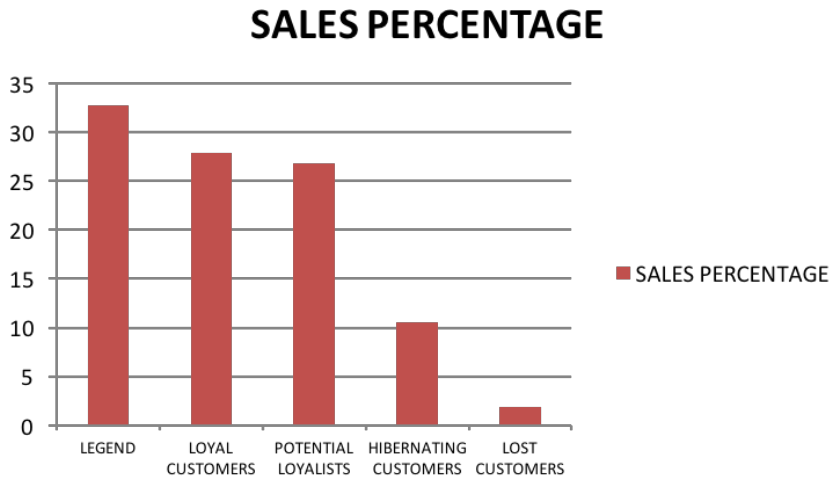
Appendix 11: Customer gender proportion among clusters



Appendix 12: Bar chart of High level life stage among clusters



Appendix 13: Own built RFM segments



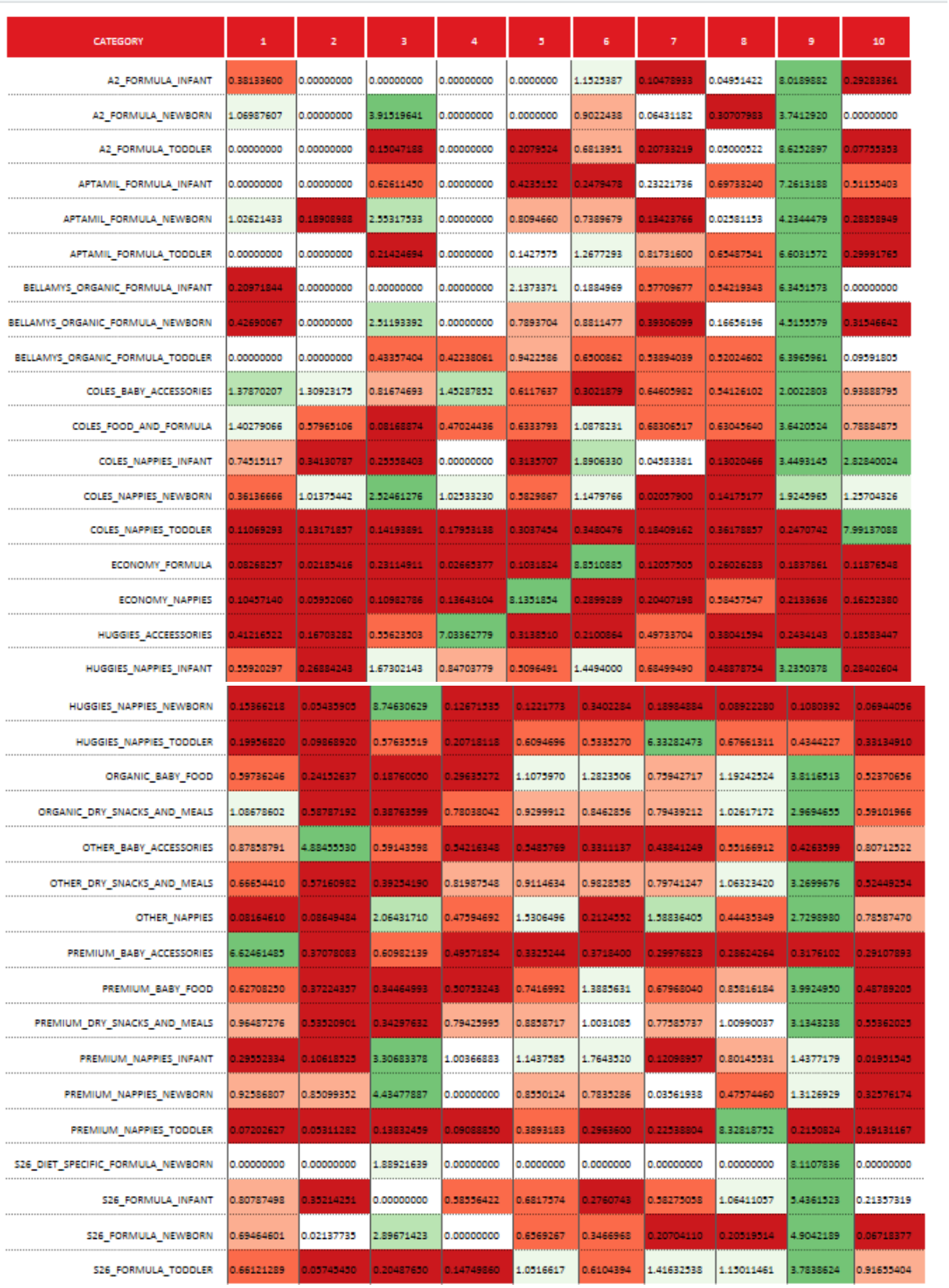
Appendix 14: Heatmap of whole population to ensure the model can score new customers

CATEGORY	1	2	3	4	5	6	7	8	9	10
A2_FORMULA_INFANT	0.11216219	0.14747587	0.4377212	0.05171783	0.1197615	8.87109825	1.7979540	0.08053409	0.001691682	0.01817011
A2_FORMULA_NEWBORN	0.14720401	0.07877569	0.4531753	0.73800911	0.1262644	7.11008075	1.9865690	0.07831480	0.037191556	0.03077347
A2_FORMULA_TODDLER	0.08034499	0.02949052	0.4135821	0.03068917	0.1423272	18.75296092	0.1701073	0.09577776	0.004516317	0.02448926
APTAMIL_FORMULA_INFANT	0.21069285	0.37355077	0.2879810	0.07608643	0.1956727	5.58466362	2.2485010	0.12063031	0.013287994	0.05083851
APTAMIL_FORMULA_NEWBORN	0.28123323	0.24386237	0.3572435	1.43965313	0.1791460	2.40916559	2.5800091	0.10995341	0.055858547	0.06283757
APTAMIL_FORMULA_TODDLER	0.09692311	0.08038044	0.3042414	0.02155782	0.2062933	18.66814615	0.1286272	0.15045292	0.016338400	0.07057394
BELLAMYS_ORGANIC_FORMULA_INFANT	0.33642624	0.23646688	0.2665422	0.04155015	0.3504507	2.27175121	2.7173795	0.21408476	0.035603244	0.07515931
BELLAMYS_ORGANIC_FORMULA_NEWBORN	0.48992475	0.17268750	0.2943161	1.17047618	0.2226938	1.55791170	2.7447490	0.12633853	0.055165527	0.05040183
BELLAMYS_ORGANIC_FORMULA_TODDLER	0.14383556	0.07253420	0.4436611	0.05503786	0.3337097	13.67417191	0.8727470	0.17750590	0.016405409	0.06465175
COLES_BABY_ACCESSORIES	0.61380426	0.41055198	0.2371512	0.65929078	0.5858021	0.05200040	1.9643511	0.48281163	1.421084751	0.99179214
COLES_FOOD_AND_FORMULA	0.51212380	3.13942924	0.7143485	0.18649424	0.5253242	0.10304830	1.7279287	0.31800369	0.371135437	0.63373202
COLES_NAPPIES_INFANT	0.45796621	0.93913218	1.2424060	0.17675693	0.1663286	0.13570892	2.2134150	0.07807462	0.275139209	1.45154899
COLES_NAPPIES_NEWBORN	0.40751933	0.32631217	1.3349873	1.42341880	0.1577457	0.05215764	2.1430882	0.07642801	0.662448726	1.25085809
COLES_NAPPIES_TODDLER	0.35140364	0.25073800	0.3862297	0.19179916	0.3521969	0.11725480	0.2794853	0.19411186	0.159723341	8.83273577
ECONOMY_FORMULA	0.16788059	0.27810935	10.7375467	0.32320536	0.2356813	0.62455853	0.2008207	0.15576761	0.027272959	0.14126896
ECONOMY_NAPPIES	13.61440377	0.25897286	0.4495917	0.25589077	0.8764059	0.14525698	0.3741128	0.27901200	0.097214647	0.32616964
HUGGIES_ACCEESSORIES	0.63455333	0.47118387	0.4447984	1.29783308	0.7886881	0.14799114	1.7855452	1.08452919	0.442693500	0.45687552
HUGGIES_NAPPIES_INFANT	0.32438063	0.66102790	1.1943566	1.04066439	0.1995190	0.13276014	2.4780544	0.36093515	0.093476663	0.08230571
HUGGIES_NAPPIES_NEWBORN	0.30865294	0.14228751	0.6171415	17.24307666	0.2342678	0.05649887	0.3556182	0.38774354	0.139915809	0.16063610
HUGGIES_NAPPIES_TODDLER	0.33021464	0.24763250	0.3521793	0.34619242	0.3925779	0.16040954	0.3370824	4.00490685	0.071010355	0.17841514
ORGANIC_BABY_FOOD	0.50077261	2.54657677	0.7071386	0.16149753	0.5559237	0.23326534	1.9880302	0.37290737	0.223430893	0.27446249
ORGANIC_DRY_SNACKS_AND_MEALS	0.57750634	1.37786073	0.5645861	0.29999950	0.6879437	0.50108490	2.1017339	0.51457538	0.349853566	0.27543646
OTHER_BABY_ACCESSORIES	0.62149884	0.42722687	0.3771325	0.69669647	0.6069220	0.08606183	0.6269227	0.48215962	5.628659434	0.95089610
OTHER_DRY_SNACKS_AND_MEALS	0.50967653	1.74430472	0.5963128	0.21178585	0.7502336	0.30811960	2.0150095	0.53843046	0.321201265	0.32043367
OTHER_NAPPIES	0.89010202	0.15453244	0.1424129	1.15013586	0.3576223	0.04873611	2.0821989	1.18554010	0.188690417	0.35016959
PREMIUM_BABY_ACCESSORIES	0.61399415	0.49384144	0.5426803	1.04351831	0.5592376	0.17924854	2.0946449	0.50997563	0.863107812	0.49298150
PREMIUM_BABY_FOOD	0.33390012	7.47893135	0.7272004	0.20803163	0.4521850	0.13543857	0.6887995	0.37699888	0.222837511	0.28595806
PREMIUM_DRY_SNACKS_AND_MEALS	0.50478982	2.01204493	0.6651692	0.28124273	0.6130373	0.30761395	1.9362916	0.51466266	0.346439253	0.37333048
PREMIUM_NAPPIES_INFANT	1.46380222	0.28214097	1.4814745	2.26072450	0.9019492	0.07965217	2.1163063	0.07077169	0.244395036	0.13474064
PREMIUM_NAPPIES_NEWBORN	0.99046414	0.10264315	0.8010817	2.54716677	0.8914540	0.08936927	2.1718219	0.09268257	0.800872848	0.24308284
PREMIUM_NAPPIES_TODDLER	0.61416052	0.26564549	0.4539090	0.15912648	11.6819776	0.25468055	0.3122584	0.30428901	0.073774079	0.28221549
S26_DIET_SPECIFIC_FORMULA_NEWBORN	0.27377708	0.56234492	0.5765599	1.14173350	0.3720675	0.03104525	2.7566022	0.18363217	0.058435079	0.15045615
S26_FORMULA_INFANT	0.38002450	0.96081758	0.1175075	0.13058807	0.3819632	0.12031158	2.8019340	0.27657500	0.039201714	0.22454755
S26_FORMULA_NEWBORN	0.32756794	0.31922695	0.2948361	2.51496667	0.1784598	0.09980258	2.7439643	0.14219910	0.081466062	0.14022670
S26_FORMULA_TODDLER	0.44394341	0.33848368	0.3011130	0.12221298	0.7936092	0.52188951	2.3848514	0.64486802	0.050260115	0.58974527

Appendix 15: Heatmap of 12 weeks prior data to our current dataset to ensure validation

CATEGORY	1	2	3	4	5	6	7	8	9	10
A2_FORMULA_INFANT	6.27447973	0.00000000	0.21557466	0.247762597	0.00000000	0.522332080	2.44859986	0.24277887	0.04847220	0.00000000
A2_FORMULA_NEWBORN	7.13126946	0.00000000	0.00000000	0.039353565	0.00000000	0.000000000	2.08741133	0.54687886	0.19508679	0.00000000
A2_FORMULA_TODDLER	9.65833778	0.01748813	0.05305056	0.007506383	0.00000000	0.009826768	0.03420039	0.15546624	0.04345362	0.02066813
APTAMIL_FORMULA_INFANT	6.32220768	0.05370164	0.43546291	0.444208459	0.03641734	0.000000000	2.34694091	0.19542880	0.10722022	0.05841204
APTAMIL_FORMULA_NEWBORN	2.87111382	0.10993778	0.40149250	0.605513936	0.02649353	0.292502909	4.87966126	0.59190204	0.16678157	0.05460065
APTAMIL_FORMULA_TODDLER	9.40115211	0.06678077	0.15570182	0.038517428	0.00000000	0.076220231	0.06897744	0.09970519	0.09294502	0.00000000
BELLAMYS_ORGANIC_FORMULA_INFANT	3.01391396	0.34292856	0.30306261	0.915705290	0.39388472	1.157793470	3.65089996	0.10963203	0.11217941	0.00000000
BELLAMYS_ORGANIC_FORMULA_NEWBORN	1.83846921	0.00000000	0.67813533	0.901555396	0.59770365	0.426579148	5.07058955	0.39717425	0.08979347	0.00000000
BELLAMYS_ORGANIC_FORMULA_TODDLER	8.63229963	0.07894446	0.20377243	0.048969588	0.00000000	0.209396229	0.46459379	0.28469313	0.07733075	0.00000000
COLES_BABY_ACCESSORIES	0.05360563	1.25090189	0.70226595	0.603079616	1.48094410	1.008884369	2.21956365	0.31911766	0.61952186	1.74211527
COLES_FOOD_AND_FORMULA	0.10841618	0.75925568	0.82173429	2.603518943	0.60060673	0.449302731	2.59837540	1.41077381	0.33160138	0.31641485
COLES_NAPPIES_INFANT	0.30053315	1.57495505	0.09009577	1.909762122	0.62430369	0.827787911	2.86267497	1.51767167	0.11825309	0.17396038
COLES_NAPPIES_NEWBORN	0.04390440	1.20928631	0.06327858	0.555234879	2.22904113	0.533001581	2.37719718	1.82963263	0.07026820	1.08915511
COLES_NAPPIES_TODDLER	0.04466831	7.98475576	0.27193064	0.246213448	0.14105055	0.332456921	0.27288344	0.36459216	0.16234045	0.17900831
ECONOMY_FORMULA	0.40509455	0.14026589	0.18828982	0.196289489	0.03717404	0.210746671	0.17683941	8.48865791	0.13771450	0.01892771
ECONOMY_NAPPIES	0.06415442	0.12182455	0.43385905	0.118468336	0.07699719	8.465603109	0.24589399	0.26021352	0.12830998	0.08467585
HUGGIES_ACCEESSORIES	0.20839269	0.48635410	1.18587433	0.570045563	1.30894400	0.755822956	2.43702171	0.59731638	1.61055946	0.83966881
HUGGIES_NAPPIES_INFANT	0.32578607	0.06004854	0.41715325	1.209136738	0.57874409	0.631117531	4.46389440	1.68243889	0.55836622	0.07331427
HUGGIES_NAPPIES_NEWBORN	0.10052679	0.36172297	0.19973759	0.361729687	1.06722969	0.674506914	4.89862415	1.26432004	0.72681391	0.34478825
HUGGIES_NAPPIES_TODDLER	0.25134942	0.32476041	0.64235247	0.352357090	0.21011832	0.529833944	0.62999973	0.57027650	6.36626103	0.12269108
ORGANIC_BABY_FOOD	0.28124664	0.30881851	0.71323260	3.336310899	0.46584478	0.423794948	2.58670170	1.04814941	0.53952883	0.29637168
ORGANIC_DRY_SNACKS_AND_MEALS	0.84667701	0.30528383	0.88694079	1.752284578	1.04468418	0.585094501	2.56645028	0.80418909	0.66631984	0.54207591
OTHER_BABY_ACCESSORIES	0.06579948	0.91042573	0.60232425	0.407124706	0.90194671	0.497618641	0.56192629	0.35488834	0.44609429	5.25185158
OTHER_DRY_SNACKS_AND_MEALS	0.32506913	0.61420195	0.87912554	2.312588204	0.86489954	0.383804668	2.79342811	0.74186795	0.68551521	0.39949970
OTHER_NAPPIES	0.03439135	0.27181065	0.66344337	0.321841619	0.56903322	2.125997902	3.78216887	0.44689419	1.64570560	0.13871322
PREMIUM_BABY_ACCESSORIES	0.08570577	0.25565029	0.39151015	0.306676402	7.08623175	0.335983388	0.43670288	0.36060915	0.34160064	0.37932958
PREMIUM_BABY_FOOD	0.10376053	0.28896079	0.46596036	6.607244831	0.36917724	0.342823200	0.56258503	0.67620334	0.33828345	0.24499923
PREMIUM_DRY_SNACKS_AND_MEALS	0.39174977	0.41466415	0.82943902	2.980157998	0.83064757	0.560876259	1.97334932	0.88109093	0.67625538	0.46176960
PREMIUM_NAPPIES_INFANT	0.03747845	0.00000000	0.99931411	0.372124709	1.76480448	1.857255029	2.60379760	1.69164786	0.06583563	0.60574214
PREMIUM_NAPPIES_NEWBORN	0.00000000	0.02014987	1.16460505	0.147211041	2.26970435	1.622881319	2.89924613	0.67086556	0.11864631	1.08669037
PREMIUM_NAPPIES_TODDLER	0.09926717	0.09079083	8.65101605	0.131229981	0.06706599	0.271910229	0.19883587	0.27021947	0.17806706	0.04159734
S26_DIET_SPECIFIC_FORMULA_NEWBORN	0.00000000	0.00000000	2.10363148	2.346880186	0.00000000	0.000000000	4.14701535	0.00000000	1.40247298	0.00000000
S26_FORMULA_INFANT	0.03030156	0.65341547	1.26651884	2.140893014	0.07046200	1.085495600	4.29963496	0.04401040	0.40926817	0.00000000
S26_FORMULA_NEWBORN	0.06616850	0.41666172	0.16689297	0.515217830	0.92319306	0.744029838	6.01714480	0.80209913	0.21180298	0.13678917
S26_FORMULA_TODDLER	0.70925613	0.51941907	1.78600248	0.672919645	0.10234360	0.956630322	3.75724842	0.23649136	1.17660983	0.08287715

Appendix 16: Heatmap of 24 weeks prior data to our current dataset to ensure validation



CATEGORY	1	2	3	4	5	6	7	8	9	10
A2_FORMULA_INFANT	0.38133600	0.00000000	0.00000000	0.00000000	0.0000000	1.1525387	0.10478933	0.04851422	8.0189882	0.29283361
A2_FORMULA_NEWBORN	1.06987607	0.00000000	3.91519641	0.00000000	0.0000000	0.9022438	0.06431182	0.30707983	3.7412920	0.00000000
A2_FORMULA_TODDLER	0.00000000	0.00000000	0.15047188	0.00000000	0.2079524	0.6813951	0.20783219	0.05000522	8.6252897	0.07755353
APTAMIL_FORMULA_INFANT	0.00000000	0.00000000	0.62611450	0.00000000	0.4235152	0.2479478	0.23221736	0.69733240	7.2613188	0.51155403
APTAMIL_FORMULA_NEWBORN	1.02621433	0.18908988	2.55317533	0.00000000	0.8094660	0.7389679	0.13423766	0.02581153	4.2344479	0.28858949
APTAMIL_FORMULA_TODDLER	0.00000000	0.00000000	0.21424694	0.00000000	0.1427575	1.2677293	0.81731600	0.65487541	6.6031572	0.29991765
BELLAMYS_ORGANIC_FORMULA_INFANT	0.20971844	0.00000000	0.00000000	0.00000000	2.1373371	0.1884969	0.57709677	0.54219343	6.3451573	0.00000000
BELLAMYS_ORGANIC_FORMULA_NEWBORN	0.42690067	0.00000000	2.51193392	0.00000000	0.7893704	0.8811477	0.39306099	0.16656196	4.5155579	0.31546642
BELLAMYS_ORGANIC_FORMULA_TODDLER	0.00000000	0.00000000	0.43357404	0.42238061	0.9422586	0.6300862	0.53894039	0.52024602	6.3965961	0.09591805
COLES_BABY_ACCESSORIES	1.37870207	1.30923175	0.81674693	1.45287852	0.6117637	0.3021879	0.64605982	0.54126102	2.0022803	0.93888795
COLES_FOOD_AND_FORMULA	1.40279066	0.57965106	0.08168874	0.47024436	0.6333793	1.0878231	0.68306517	0.63045640	3.6420524	0.78884875
COLES_NAPPIES_INFANT	0.74515117	0.34130787	0.25558403	0.00000000	0.3135707	1.8906330	0.04583381	0.13020466	3.4493145	2.82840024
COLES_NAPPIES_NEWBORN	0.36136666	1.01375442	2.52461276	1.02533230	0.5629867	1.1479766	0.02057900	0.14175177	1.9245965	1.25704326
COLES_NAPPIES_TODDLER	0.11069293	0.13171857	0.14193891	0.17953138	0.3037454	0.3480476	0.18409162	0.36178857	0.2470742	7.99137088
ECONOMY_FORMULA	0.08268257	0.02185416	0.23114911	0.02665877	0.1031824	8.8510883	0.12037305	0.26026283	0.1837861	0.11876548
ECONOMY_NAPPIES	0.10457140	0.03952060	0.10982786	0.13643104	8.1351854	0.2899289	0.20407198	0.58457547	0.2133636	0.16252380
HUGGIES_ACCEESSORIES	0.41216522	0.16703282	0.55623503	7.03362779	0.3138510	0.2100864	0.49733704	0.38041594	0.2434143	0.18583447
HUGGIES_NAPPIES_INFANT	0.55920297	0.26884243	1.67302143	0.84703779	0.5096491	1.4494000	0.68499490	0.48878754	3.2350378	0.28402604
HUGGIES_NAPPIES_NEWBORN	0.15366218	0.05435905	8.74630629	0.12671535	0.1221773	0.3402284	0.18984884	0.08922280	0.1080392	0.06944056
HUGGIES_NAPPIES_TODDLER	0.19956820	0.09868920	0.57635519	0.20718118	0.6094696	0.5335270	6.33282473	0.67661311	0.4344227	0.33134910
ORGANIC_BABY_FOOD	0.59736246	0.24152637	0.18760050	0.29635272	1.1075970	1.2823506	0.75942717	1.19242524	3.8116513	0.52370656
ORGANIC_DRY_SNACKS_AND_MEALS	1.08678602	0.58787192	0.38763599	0.78038042	0.9299912	0.8462856	0.79439212	1.02617172	2.9694655	0.59101966
OTHER_BABY_ACCESSORIES	0.87858791	4.88455530	0.59143598	0.54216348	0.5485769	0.3311137	0.43841249	0.55166912	0.4263599	0.30712522
OTHER_DRY_SNACKS_AND_MEALS	0.66654410	0.57160982	0.39254190	0.81987548	0.9114634	0.9828585	0.79741247	1.06323420	3.2699676	0.52449254
OTHER_NAPPIES	0.08164610	0.08649484	2.06431710	0.47594692	1.5306496	0.2124552	1.58836405	0.44435349	2.7298980	0.78587470
PREMIUM_BABY_ACCESSORIES	6.62461485	0.37078083	0.60982139	0.49571854	0.3325244	0.3718400	0.29976823	0.18624264	0.3176102	0.29107893
PREMIUM_BABY_FOOD	0.62708250	0.37224357	0.34464993	0.50753243	0.7416992	1.3885631	0.67968040	0.85816184	3.9924950	0.48789205
PREMIUM_DRY_SNACKS_AND_MEALS	0.96487276	0.53520901	0.34297632	0.79425995	0.8858717	1.0031085	0.77585737	1.00990037	3.1348238	0.55362025
PREMIUM_NAPPIES_INFANT	0.29552384	0.10618525	3.30683378	1.00366883	1.1437585	1.7643520	0.12098857	0.80145531	1.4377179	0.01951545
PREMIUM_NAPPIES_NEWBORN	0.92586807	0.85099352	4.43477887	0.00000000	0.8550124	0.7835286	0.03561938	0.47574460	1.3126929	0.32576174
PREMIUM_NAPPIES_TODDLER	0.07202627	0.05311282	0.13832459	0.09088850	0.3893183	0.2963600	0.22588804	8.32818752	0.2150824	0.19131167
S26_DIET_SPECIFIC_FORMULA_NEWBORN	0.00000000	0.00000000	1.88921639	0.00000000	0.0000000	0.0000000	0.00000000	0.00000000	8.1107836	0.00000000
S26_FORMULA_INFANT	0.80787498	0.35214251	0.00000000	0.58556422	0.6817574	0.2760743	0.58275058	1.06411057	5.4361523	0.21357319
S26_FORMULA_NEWBORN	0.69464601	0.02137735	2.89671423	0.00000000	0.6569267	0.3466968	0.20704110	0.20519514	4.9042189	0.06718377
S26_FORMULA_TODDLER	0.66121289	0.05745450	0.20487650	0.14749860	1.0516617	0.6104394	1.41632538	1.15011461	3.7838624	0.91655404

Appendix 17: Cluster size of 12 weeks prior data to our current dataset

	cluster	size	ave.sil.width
1	1	486	0.19
2	2	894	0.48
3	3	562	0.36
4	4	775	0.32
5	5	418	0.34
6	6	407	0.41
7	7	2796	-0.06
8	8	725	0.41
9	9	2075	0.49
10	10	862	0.55

Appendix 18: Cluster size of 24 weeks prior data to our current dataset

	cluster	size	ave.sil.width
1	1	453	0.36
2	2	920	0.60
3	3	430	0.30
4	4	292	0.42
5	5	484	0.37
6	6	728	0.41
7	7	1884	0.48
8	8	623	0.35
9	9	3259	-0.02
10	10	927	0.46

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