Nudging in Supermarkets to Reduce Plastic Bag Consumption Among Customers

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Abstract

Plastic bag bans aimed at alleviating marine plastic pollution have resulted in dire, unintended consequences, indicating a shift in general behaviour, that further feeds into major international environmental catastrophes. However, nudge theory is a potential solution that has been shown to play a subtle but important role in providing options under circumstances where complex information needs to be streamlined for the wider community. It is therefore timely to look into the insights of nudge theory to encourage a positive behavioural change to reduce plastic bag consumption. Here we apply a systematic literature review to show how successful applications of nudges in supermarkets can be leveraged to reduce plastic bag consumption. We find that the current applications of nudges in various industries worldwide, including supermarkets have produced positive and encouraging results, as well as producing lasting behavioural change among the wider community. Supermarkets are identified as a powerful deployment site of these nudges due to their positioning as a dominant provider of plastic bags to the wider community, as well as being the largest and leading provider of daily food needs. Finally, we synthesise our findings to produce a coherent and testable framework of actionable interventions that supermarkets can employ to nudge customers towards reduced plastic bag reliance, accompanied with a visualised timeline of a customer shopping in a supermarket experiencing these nudges.

Keywords: nudge, behavioural science, supermarket, customer experience, plastic bag ban, plastic waste

1. Introduction

In the past decade, the world has seen a significant increase in plastic bag policies aimed at reducing plastic bag consumption, specifically through bans and pricing mechanisms. While the first plastic bag policy was implemented in 1974, more than 100 plastic bag policies have been developed and adopted in some form over the past decade alone, bringing the current global total of countries with a plastic bag policy to 127 (Nielsen et al., 2019; United Nations Environment Programme [UNEP], 2018).

Amidst the range of responses towards the global plastic bag problem, more than half of the global policies are bans, while the remainder are primarily pricing mechanisms together with an ad hoc collection of voluntary agreements and information campaigns (Nielsen et al., 2019). Bans are generally implemented by the state with the goal of reduction and ultimately, removal, accompanied by a series of methods to fulfill that goal (Jordan et al., 2003; Kronsell and Bäckstrand, 2010). A plastic bag pricing mechanism, also known as a tax or levy, relies on consumers to adjust their own behaviour according to their own self-interests, potentially reducing regulation into a financial value and creating a revenue stream that may not benefit the environment (Dryzek, 2013; Kronsell and Bäckstrand, 2010; Singh & Cooper, 2017).

Most research conducted on the effectiveness of plastic bag policies typically reported an initial reduction in single-use plastic bag consumption over a period of a month to year (Nielsen et al., 2019; Dikgang, Leiman & Visser, 2012; Wagner, 2017; Convery, McDonnell & Ferreira, 2007). However, despite the apparent success of these policies, a series of unintended consequences have surfaced as consumers shifted their behaviour towards other ways to satiate their reliance on plastic bags. These unintended consequences range from nuisances such as increased thefts of shopping carts and baskets, to increased environmental stress and health risks that have emerged from the use of reusable cloth bags, as well as the growth of black markets dealing in the illegal trade of plastic

bags, and even the surge in sales of paper bags, that are more resource-intensive, and other types of plastic bags that are thicker, artificially coloured, and chemically scented (Taylor, 2019; Martinho, Balaia & Pires, 2017; Dee, 2002; Aspin, 2012; Cadman et al., 2005; DELWP, 2017; Repp & Keene, 2012; Edwards & Fry, 2011; Muralidharan & Sheehan, 2016; Morris & Seasholes, 2014; Waters, 2015; Taylor & Villas-Boas, 2016; Dagan, 2011; Pilgrim, 2016;). Taken together, these issues demonstrate that simply banning plastic bags may not be entirely effective, as consumers' reliance on plastic bags has merely shifted towards seeking other alternatives that pose similar problems, further feeding into major international environmental catastrophes.

Considering the challenges of plastic bag bans in its efforts to change consumer behaviour, it is timely to look towards the insights of behavioural science as a potential solution to bringing about lasting behavioural change. A useful technique from the behavioural science that holds much potential for plastic bag behaviour is called "nudging". The concept of a nudge is a subtle shift in policy that helps and encourages people in the decision-making process, simplifying the choices and making it easier for them to choose based on their broad self-interests (Thaler & Sunstein, 2008).

The significance of nudges and their implications on a wide range of domains have been researched and analysed extensively by prior studies. From the shelf placement of products, increasing consumption of fruit in school, to the plate size effects on food consumption, or the influence of a default option on organ donations, nudges have played a quiet but important role in providing options under circumstances where complex information needs to be streamlined for the wider community (Goldberg & Gunasti, 2007; Rolls, Morris & Roe, 2003; Schwartz, 2007; Johnson & Goldstein, 2003). Nudges basically point people to a specific direction, but also allow them the independence to select their path. Although more recently, this idea has been developed to describe the predictable, more positive behaviour as the better option, implying a financially more attractive, or an environmentally friendlier behaviour is adopted over time (Sunstein & Reisch, 2013). Succinctly, nudging is the idea of a behaviour that customers are most content by, as perceived by themselves.

Nudges to promote sustainability have been widely discussed in academic literature, ranging from the hotel industry's efforts to encourage towel reuse rates among guests, and reducing household food waste, carbon emissions and car use, among others (Goldstein, Cialdini & Griskevicius, 2008; Von Kameke & Fischer, 2018; Thaler & Sunstein, 2008). Specifically, there have been studies on the effectiveness of nudges in supermarkets to encourage certain behaviour. However, there has not been any research looking specifically into employing nudges in supermarkets to reduce plastic bag consumption. Therefore, this paper contributes to the literature by exploring a series of nudge interventions that supermarkets could introduce to the shopping experience of customers to reduce their plastic bag consumption.

Supermarkets were chosen because of their central place in the plastic bag ecosystem. A joint report by the Environmental Investigation Agency and Greenpeace (2018) found that local supermarkets provide one of the highest interaction of people with plastic on a daily basis. A review of the top 10 supermarkets in the UK found that they are adding a total of 1.1 billion single-use plastic bags into society annually, which contributes to the 810,000 tonnes of plastic waste by supermarkets in the UK alone (Environmental Investigation Agency & Greenpeace UK, 2018). Moreover, an average person consumed more than 300 plastic bags annually, and the consumption of free plastic bags at supermarkets are found to be repetitive behaviours rooted in habits (Global Warming White Paper, 2013; Aarts & Dijksterhuis, 2000; Oulette & Wood, 1998).

Supermarkets are also the largest and most basic source of daily food needs in the world, a vital location frequently visited by people globally (Thapa et al., 2014; Glanz & Mullis, 1988; Cohen & Babey, 2012). A person spends an average of 90 hours in a supermarket each year, and more than 30 million people go grocery shopping daily, with each customer making an average of 2.2 trips weekly, spending more than 40 minutes shopping per trip (Thapa et al., 2014; Kalnikaitė, Bird & Rogers, 2013). The fundamental importance of supermarkets in providing food to people in society makes them one of the most consistent touch points of society.

Therefore, we have developed a research question as follows: *How can nudges in supermarkets mitigate the unintended consequences of plastic bag bans?*

We apply a systematic literature review method to collect data on identifying current behavioural influences in supermarkets, demonstrating a system of nudge theory that exists presently by analysing the supermarkets' customer experience in supermarkets. The results of the review show that nudges in supermarkets are prevalent and have been primarily used to influence customers to buy more, thereby prompting higher expenditure. Nudges are a good candidate for plastic use behaviour change because it gives the customers a choice, while suggesting a better one, and that supermarkets are an ideal location for their deployment given that supermarkets have employed nudges in various forms throughout the format and structure of its layout. We conclude by discussing a potential testable nudge-based framework that future researchers can apply to encourage behavioural change concerning customers' reliance on plastic bags in supermarkets, as a complement to policy responses, to mitigate the unintended consequences of plastic bag bans.

2. Method

We proceed by breaking down the research question into two distinct parts and apply a literature review method to the first part, followed by undertaking a synthesis approach in the second part, developing a framework for introducing plastic-bag reducing nudges into supermarkets. In part one, we employ a systematic literature review method to answer the following question: *What nudges already exist in supermarkets, and do they work?*

In part two, we undertake synthesis from the findings of part one to answer our research question: *How can nudges in supermarkets mitigate the unintended consequences of plastic bag bans?*

2.1 Part 1: Literature Review

A systematic literature review method was employed to evaluate research papers on the behavioural influences of supermarkets, as this method of review is useful to identify other published research papers for consolidation and to be built upon (Grant & Booth, 2009). In order to answer the research question, two groups of literature were assessed. The first group looked at current behavioural elements that are employed in supermarkets to influence customers' shopping behaviour. Secondly, we observed and discussed the relation of these behavioural nudge elements towards the growing field of nudge theory. We then applied these elements into a testable framework synthesising nudge theory elements with current supermarket behavioural influences, progressing towards a behaviour change approach in reducing customers' reliance on plastic bags.

Three separate databases (ProQuest, Google Scholar & Elsevier) were used to identify relevant papers demonstrating primary and secondary research from peer-reviewed journals, as well as government and intergovernmental reports. A combination of the following search terms was entered into these databases: "behavioural", "influence", "supermarket", "plastic bag", "nudge". The timeframe of the papers was restricted between 2008 to 2019. The decision to begin from 2008 onwards was due to the publication and popularisation of nudge theory by Thaler & Sunstein (2008). However, earlier studies on supermarkets and its behavioural influences will be included for relevance.

Figure 1 below outlined our systematic literature review method, a 4-step process was applied with the initial broad review of more than 5,000 journal articles on supermarkets' behavioural influences narrowed down to the 24 peer-reviewed journal articles focusing on behavioural nudges currently employed by supermarkets to influence the customer shopping experience. Due to the small number of studies found, a scoring criteria was deemed unnecessary to highlight the relevance and importance of the papers.

The final step of the method process puts the remaining papers against an inclusion/exclusion criteria. The papers will only be accepted if; it is a review on behavioural influences of supermarkets, grocery stores and/or retail stores; if the paper mentioned nudges in supermarkets, grocery stores and/or retail stores; if it is a study looking at elements focused on influencing customers' shopping behaviour in supermarkets, grocery stores and/or retail stores, and; if there was information on previous attempts at quantifying consumer behaviour.

Systematic literature review step	Result
Step 1 - ProQuest, Google Scholar & Elsevier search A broad search applying the terms "behavioural influence" and "supermarkets".	9,451 peer-reviewed items found. 9,351 articles, 68 reviews, 15 conference proceedings, 4 text resources, 2 newspaper articles, 1 statistical data set, and 1 on the subject of color.
Step 2 - Search Refinement We included a combination of the following terms, and its equivalence: "nudge", "grocery stores", "retail stores", "shoppers" and "customer experience". The reference lists and papers that cite each paper were also searched.	471 peer-reviewed items relevant articles were found based on their titles.
Step 3 - Review of Abstracts for Scope The abstracts of each 471 articles were reviewed for scope and kept for further review if they included behavioural elements in supermarkets, grocery and retail stores.	134 journal articles were found to have relevance in scope, with 53 found to include behavioural influences and nudge theory elements.
Step 4 - Focused Reading and Analysis A focused reading and analysis was performed on the 134 articles to determine their relevance through the inclusion/exclusion criteria.	24 journal articles contained some or a combination of the analysis criteria, which this paper aimed to identify in order for a synthesis of a testable framework. Table 1 presents further information on these articles. 63 articles were found to be irrelevant according to the analysis criteria, but were elements detailing customer and/or consumer behaviour were used for referencing. 47 articles were not used due to little or no connection to the research aim.

Figure 1: Systematic Literature Review Method.

Table 1 presents a review of the relevant studies, their study aims and their respective revelations with regard to behavioural influences in supermarkets. It should be noted that specific nudge theory elements were not detailed, and the term "nudges" or "nudge" were used loosely in some cases. However, it is noteworthy that these papers underscore the effect of supermarkets have on customers' behaviour, and how atmospheric, communicative and product interaction elements play vital roles in engaging these behaviours.

Table 1: Review of studies that focused on supermarkets and nudge elements.

No.	Paper	Year	Aim	Search words	Results
1	Layout Strategies for Retail Operations: A Case Study (Aghazadeh, S.M.).	2005	To research retail layout of a local supermarket. The five concepts of retail layout were used to determine if the supermarket was achieving an effective layout.	Layout, retail, outlet, Operations, High-draw, and Items	The paper looked at two objectives, maximise profitability per square foot of floor space and employ the five rules of thumb as guidelines. The five rules of thumb indicate the use of defaults and choice architecture as explained by Thaler & Sunstein (2008).
2	"The World for a Crooked Street": Towards a Supermarket Morphology of Shopping Aisles and Retail Layout (Juel-Jacobsen, L.G.).	2015	The influence of built environment and interior design on consumer behaviour, particularly the straight aisles and gridiron layout as the dominant principle in the organization of supermarket space.	interior design, supermarket, retail settings, layout, grid, atmospherics, servicescape, shopping aisles, consumer behavior	The paper found that the straight aisles of supermarket possess an element of human behavioural influence, including the convenient location of products and an easy route as key priorities, indicating that atmospheric elements of the linear, straight aisle possesses subtle implications within retail and shopping experience.
3	An exploratory look at supermarket shopping paths (Larson, J.S. & Bradlow, E.T.).	2005	The paper uses RFID tags to track the movements of shoppers in a supermarket, taking into account the time spent in the supermarket.	RFID (radio frequency identification); Clustering techniques; Exploratory analysis; Retailing; Shopping behavior; k-medoids clustering	The research found that shoppers in-store for shorter trips are more likely to remain on the periphery of the supermarket, and products placed in the middle of aisles received more "face time" than other placements, but significantly less "face time" as compared to those placed at the end of the aisles.
4	Customer Experience Creation: Determinants, Dynamics, and Management Strategies (Verhoef, P.C., Lemon, K.N., Parasuraman, A., Roggeveen, A., Tsiros, M., & Schlesinger, L.A.).	2009	This paper provides an overview of the existing literature on customer experience and expand on it to examine the creation of a customer experience from a holistic perspective.	Self-service; Management strategies; Retail branding; Social Environment	Supermarket nudges also take into account their largest, and main, stakeholder perceptions of their experience shopping in supermarkets, suggesting that the customer experience framework is a holistic construct, involving a customer's physical, social, emotional, affective and cognitive responses towards the retailer. The customer experience is an important aspect as it relates to social norms of the nudge theory.
5	Decision-making in the aisles: informing, overwhelming or nudging supermarket shoppers? (Kalnikaite, V., Bird, J., & Rogers, Y).	2013	This paper examined the amount and structure of product information that is most appropriate for supermarket shoppers.	Ethnography, User studies, Supermarket shopping, Food information displays, Ambient information interfaces, Mobile computing, Ubiquitous computing, Nudging behaviour change	This paper found that in supermarkets, people rapidly make decisions based on one or two product factors for routine purchases, often trading-off between price and health. For one-off purchases, shoppers can be influenced by reading customer star ratings and reviews on a mobile phone app. The researchers also highlighted the frequency an average persons spends in a supermarket, and investigates shopping practices in supermarkets, understanding that there is a severe lack in studies surrounding supermarket shopping behaviour.

6	Nudges in the Supermarket: Experience from Point of Sale Signs (Thapa, J.R., Lyford, C., Belasco,E., McCool, B., McCool, A., Pence, B., & Carter, T.).	2013	A project was designed with a supermarket in a small community to provide point of sale signs or nudges.	Supermarket, nudge, community reinforcement, obesity, food choice	While focused on healthy foods in tackling obesity, the paper found that products with attached shelf talkers have been found to have increased monthly sales, especially when the assigned messages provide information on, and reinforces healthy eating behaviour, suggesting that supermarket interventions have the potential in changing food choice behaviour, indicating the use of prompts.
7	Nudging the Trolley in the Supermarket: How to Deliver the Right Information to Shoppers (Todd, P.M., Rogers, Y., & Payne, S.J.).	2011	This paper investigates whether augmented reality can deliver relevant 'instant information' that can be interpreted and acted upon in situ, enabling people to make informed choices.	Ambient Information Interfaces, Food Information Displays, Simple Heuristics, Supermarket Shopping	This paper discusses some of the challenges involved in designing such information displays and indicate some possible ways to meet those challenges.
8	The Influence of In-Store Music on Wine Selections (North, A.C., Hargreaves, D.J., & McKendrick, J.).	1999	This field study investigated the extent to which stereotypically French and German music could influence supermarket customers' selections of French and German wines.	Choice Behavior, Consumer Behavior, Music, Wine, Consumer Attitudes & Behavior German Vs French in-Store Music, Wine Selections, Supermarket Customers	The paper found an increase in the sales of French wine when French music was played in-store, and an increase in the sales of German wine when German music was played, suggesting the atmospheric influence of subliminal messaging was at work.
9	Towards the identification of customer experience touch point elements (Stein, A., & Ramaseshan, B.).	2016	In this paper, the authors identify the elements that encompass customer experience touch points. This research was based on a qualitative research approach, using a sequential incident technique to guide the data collection.	Customer experience Touch points Retail channels Sequential incident technique	The findings uncovered seven distinct elements of customer experience touch points, which include; atmospheric, technological, communicative, process, employee–customer interaction, customer–customer interaction and product interaction elements. The findings highlight that multichannel retail touch points are made up of varying combinations of the identified elements, agreeing with Veroef et al's (2009) idea that the customer experience framework is a holistic construct, involving a customer's physical, social, emotional, affective and cognitive responses towards the retailer.
10	Using Background Music to Affect the Behavior of Supermarket Shoppers (Milliman, R.E.).	1982	This paper critically reviews the literature available and presents an empirical study that examines the effects of background music on in-store shopping behaviour.	Supermarkets, Studies, Sales Piped in Music, Consumer Behavior, Experimental/Theoretical Treatment, Marketing	Where music is thought of as entertainment, it can also be employed to achieve other objectives, such as improving store imagem make employees happier, and simulate customer purchasing. It finds that music tempo variations can significantly affect the pace of in-store traffic flow and dollar sales volume. The paper also found that music tempo can considerably influence the pace of in-store traffic flow and the daily aggregate sales volume, resulting in an increase of almost 40%.

11	Revisiting the supermarket in-store customer shopping experience (Terblanche, N.S.).	2018	This paper deals with the in-store customer shopping experience of a supermarket and found that merchandise assortment, interaction with staff and the internal shop environment and customers' in-shop emotions have a strong positive and significant relationship with cumulative customer satisfaction.	Customer In-store shopping experience Supermarket	The major contributions of this study are firstly the identification of differences over time of the elements of an in-store customer shopping experience in a supermarket and the role of positive emotions that are caused by supermarket shopping environments. The paper also found 5 themes that customers relate to regarding their shopping experience, indicating that customers are highly nudgeable if those themes are exercised to shift their behaviours.
12	Contextual influences on eating behaviours: heuristic processing and dietary choices (Cohen, D.A. & Babey, S.H.).	2012	The paper looked at various contextual influences ranging from nutrition labelling, sales promotions and attractive packaging, including atmospherics such as music and scent in the supermarket environment.	Heuristics, marketing, obesity, public health.	Among others, the paper looked at supermarkets' influences on placement of products, product packaging, nutrition labelling, sales promotions, purchase quantity and the effects of atmospherics.
13	Exploring international atmospherics: The impact on shopping behaviors based on the language of the lyrics of music played in global apparel retailers' stores (Toldos, M.P. & González, E.M.).	2019	The paper examines the differential effects of the language of lyrics of the music played and explain the interactions between the music language and volume.	International retailing, Atmospherics, Music, Language of the lyrics of music, store-fit	The paper found that customers in non-English speaking country are more likely to make purchases when the music played is in English, when it reflects to store's global brand image, with its effects mediated by the time spent in store.
14	Healthy food products at the point of purchase: An in-store experimental analysis (Sigurdsson, V., Larsen, N.M., & Gunnarsson, D.).	2014	The paper studies the product placement and in-store advertisement effects on food selections of 100,000 customers in 2 different stores.	healthy food choice, in-store experiments, stimulus control, motivating operations, consumer behavior	The findings suggest that placement of products and in-store advertisement are effective means of altering unhealthy food choices at store checkouts.
15	The nudge effect in supermarket customers behaviour (Mitiu, R.D., Zidaru, A., Badiu, D., Marcu, G., & Iordanescu, E.).	2016	The paper observes customers behaviour in supermarkets who put back products from their shopping baskets in different locations because they changed their minds, introducing nudge to prevent misplacement of products.	Nudge, Supermarkets, Customer Behaviour	The paper's findings suggest that the nudges were a success in shifting the behaviour of the customers without changing their value system.

16	Parent's responses to nutrient claims and sports celebrity endorsements on energy-dense and nutrient-poor foods: an experimental study (Dixon H, Scully M, Wakefield M, Kelly B, Chapman K, Donovan R.).	2011	The paper aimed to assess parents' responses to common, misleading strategies for marketing energy-dense and nutrient poor child oriented food in grocery stores, including supermarkets.	Food promotion, parents, experiment	The effects of nutrient claims and sports celebrity endorsements are positive to shift consumer preferences towards energy-dense and nutrient-poor products that bear these promotions, especially among the majority who do not read nurtrition information panel on the products.
17	Packages with cartoon trade characters versus advertising: an empirical examination of preschoolers' food preferences (Ülger, B.).	2008	The study examines the comparison between child-appeal packages and TV advertising.	Packaging, advertising, preschoolers, food marketing	The findings suggest that packages with cartoon trade characters are more effective compared to TV advertising in pre-school food preferences.
18	Another nutritional label – experiementing with grocery store shelf labels and consumer choice (Kiesel, K., Villas-Boas, S.).	2008	This paper investigate whether information costs prevent consumers from making healthier food choices under currently implemented nutritional labels.	Supermarkets, nutritional labels, consumer choices	The results suggest that consumer purchases are affected by information costs. Low-calorie and no trans fat labels increase sales, but low fat labels decrease sales, suggesting that consumer response is also influenced by consumers' taste perceptions.
19	The science of shopping.(product placement and location in supermarkets and the effects on sales)(Sorensen, H.).	2003	This article discusses elements of a system for quantitatively analysing shopper behaviour on a wall-to-wall, entrance-to-exit basis, including measuring shopper density, flow, conversion rates, and speed of purchasing, to demonstrate the impact of location on shopper behaviour, independent of products in front of them.	Supermarket, shopper density, shopping path, shopper behaviour	The article finds that it is important to see where the customer usually go to, and to place the product to be sold there, instead of expecting them to go to the product.
20	Slotting allowances and scarce shelf space (Marx, L.M., & Schaffer, G.).	2010	The paper studies the relationship of retailer slotting allowances and manufacturers who pay to obtain prime locations.	Supermarket, shelf space, slotting allowance	The paper finds that while slotting allowances arise because of retailers's inability to accomodate more products, the scarcity of shelf space are in part due to the feasibility of slotting allowances, suggesting that slotting allowances can be anticompetitive despite their lack of effect on retail prices.
21	Determinants of shoppers' checkout behaviour at supermarkets (Miranda, M.J.).	2008	The paper looks into the belief that products bought at store checkouts are selected on hasty inclinations.	checkouts, aisles, supermarkets, shopping frequency, impulse buying	The study finds that checkout purchases are influenced by store-visit frequencies, suggesting that not all checkout purchases are impulse buys.

22	Does in-store marketing work? Effects of the number and position of shelf facings on brand attention and evaluation at the point of purchase (Chandon, P., Hutchinson, J.W., Bradlow, E.T., & Young, S.H.).	2009	The authors examine the interplay between in-store and out-of-store factors on consumer attention to and evaluation of brands displayed on supermarket shelves.	point-of-purchase marketing, merchandising, in-store decision making, attention, eye tracking	Using an eye-tracking experiment, they find that the number of facings has a strong impact on evaluation that is entirely mediated by its effect on visual attention and works particularly well for frequent users of the brand, for low-market-share brands, and for young and highly educated consumers who are willing to trade off brand and price. They also find that gaining in-store attention is not always sufficient to drive sales.
23	The sound of silence: Why music in supermarkets is just a distraction (Hynes N., & Manson, S.).	2016	The study examines the role of both planned and other sounds within the supermarket environment, investigating the cognizant and emotional reactions of supermarket customers.	Music, supermarket, Consumer Aleatory, Renao, Mood	The research suggests that customers can desconstruct the soundscape and isolate elements that provoke different emotional reactions, with marginal effect. The further imply that customers are largely unaware of music within the supermarkets.
24	The effects of background music on consumer responses in a high-end supermarket (Vida, I., Obadia, C., & Kunz, M.B.).	2007	The study examines the effects of in-store background music valence and music fit with the overall store image on consumer evaluative and behavioural responses in the context of a high-end supermarket.	Atmospherics, music valence, store image, appraisal of retail offering, appraisal of sales personnel	The results found that shoppers' liking of music in the natural retail setting with perceived music fit with store image positively affected the length of shopping time, indirectly influencing shoppers' expenditure.

2.2 Part 2: Synthesis

The aim of this research is to produce a behavioural framework that supermarkets can apply in their stores to help customers reduce their reliance on plastic bags, bringing about lasting behaviour change in society at large that would contribute towards mitigating the plastic problem. We conduct an analysis of our findings on two key terms in supermarkets, behavioural influences and nudges. We then look at current academic literature and compare the trends of behavioural influences and nudges in the supermarkets on prevalent issues that are discussed, in an effort to understand the current climate on general behaviour studies surrounding supermarkets. We then identify current behavioural influences that work as nudges in supermarkets, before drawing our conclusions on these nudges and their effectiveness. We will then elucidate our findings on key nudges that work in supermarkets and their pivotal effects on affecting behaviour change among customers, before employing the lens of the 'customer experience' towards formulating a framework (Stein & Ramaseshan, 2016). By focusing on the customer experience, any set of nudges that are successful in supermarket strategies identified in part 1 can be brought together in a coherent framework, as experienced by the customer themselves during their supermarket trips (Stein & Ramaseshan, 2016).

2.2.1 Customer Experience as a lens on nudges in supermarkets

Retailers, including supermarkets, commonly acknowledge customer experience as a crucial factor towards maintaining a competitive advantage over other stores, due to the increasing power of customers as well as the growing number of channels through which the power can be practiced (Stein & Ramaseshan, 2016). Verhoef et al. (2009) suggested that the customer experience framework is a holistic construct, involving a customer's physical, social, emotional, affective and cognitive responses towards the retailer. In a similar approach, Stein & Ramaseshan (2016) established a series of elements surrounding customer experience in the form of touch points and episodes that are experienced along the supermarket shopping experience. Table 2 described the seven distinct themes relating to these customer experience touch points as established by Stein and Ramaseshan (2016).

Table 2: Customer Experience Touch Points (Stein & Ramaseshan, 2016).

Touch Points	Description
Atmospheric	Physical characteristics and observable surroundings when interacting with any part of the retailer.
Technological	Customer's direct interaction with any form of technology during encounter with a retailer
Communicative	One-way communication from retailer to customer, including promotional and informative messages
Process	Actions or steps taken by customers in order to achieve a particular outcome with a retailer
Employee-customer interaction	Direct and indirect interactions customers have with employees
Customer-Customer Interaction	Direct and indirect interactions customers have with other customers
Product Interaction	Direct or indirect interactions customers have with the core tangible or intangible product offered by retailer

We adopted the customer experience touch point elements by Stein and Ramaseshan (2016) to look at how nudge interventions can be introduced into the supermarket experience through their framework. While customer experience touch points usually occur in various retail channels, and pre- and post-purchase, it understood that these touch points are not linked to a company, implying that there are indirect interactions arising during spontaneous encounters with a company's associated products, service and/or brands, including criticism conversations, news reports and reviews. Although it is broadly established that customer experience is difficult

to measure and assess due to its subjectivity, the framework by Stein and Ramaseshan (2016) was able to capture the dynamism and process of customer experience, thus allowing a better understanding of the distinct touch point elements that occur throughout a customer's journey, including the search, evaluation, purchase and after-sale phases of the experience (Verhoef et al., 2009; Stein & Ramaseshan, 2016). Another paper looking at customers' shopping experience also found similar recurring themes relating to strong, positive and significant relationships with increasing customer satisfaction. They found that products on discounts, layouts allowing easy in-store movements, eye-catching displays of products, friendly staff, equitable quality and price, and sharing experiences with other customers are most important to customers in their shopping experience in supermarkets (Terblanche, 2018).

We then present a synthesised framework, combining the customer experience touch points, elements of known nudges in supermarkets, and potential actionable interventions, as the answer to the research question. The series of potential actionable interventions, where each intervention draws on known nudge-in-supermarket designs, with specific customer experience touch points, could produce degrees of successes in reducing customer reliance on plastic bags.

3. Results

3.1 Part 1: Literature Review

The initial broad review on behavioural influences in supermarkets found more than 9,000 peer-reviewed items. Notably, 471 journal articles were found only on "nudges" and "nudging" in supermarkets. This disparity suggested that while it is highly recognised that supermarkets do engage in behavioural influences, the terms "nudge" and "nudging" in the realm of supermarkets is fairly new in determining the type of behavioural influences that supermarkets currently apply. Furthermore, most of the articles on both the behavioural influences and nudges implemented by supermarkets are largely focused on studies surrounding healthy eating and tackling obesity.

The field of behavioural influences in supermarkets studying healthy eating saw a total of 2,485 journal papers published, with more than 70% of it published after 2008, when Thaler and Sunstein released their seminal book, *Nudge*. Likewise, the studies of behavioural influences in supermarkets on obesity saw more than 75% of its 2,314 journal papers published after 2008. In the realm of nudging in supermarkets towards healthy eating, a total of 238 journal papers were found, but more than 90% of these were published after 2008. Similarly, in the field of supermarket nudging in tackling obesity, a total of 203 journal papers were found, with more than 90% of them published after the release of the book on nudge theory. This suggests an increasing interest in the field of nudge theory towards discussing the two most prevalent issues in supermarkets. Figure 2 below shows the comparison of academic interests in both fields of behavioural influences and nudges on two most prevalent issues in supermarkets.

Figure 2 demonstrates that the field of nudges is still in its infancy as compared to the maturity of behavioural influences in addressing healthy eating and obesity in supermarkets. Whilst there are currently between 200-250 papers studying the effect of nudges on healthy eating and obesity, the field of behavioural influences reached the same number more than 15 years ago, and currently sees ten times more peer-reviewed papers than the field of nudges. Notably, studies tackling obesity using nudges in supermarkets first arose in 2003, when the study of behavioural influences on both healthy eating and obesity were already beginning to soar.

A review of supermarkets and plastic bags identified almost 3,000 peer-reviewed articles. However, a search on the behavioural influences of supermarkets on plastic bag usage found less than 50 articles. Noticeably, a search for literature on supermarkets' nudges regarding plastic bag use found no related papers.
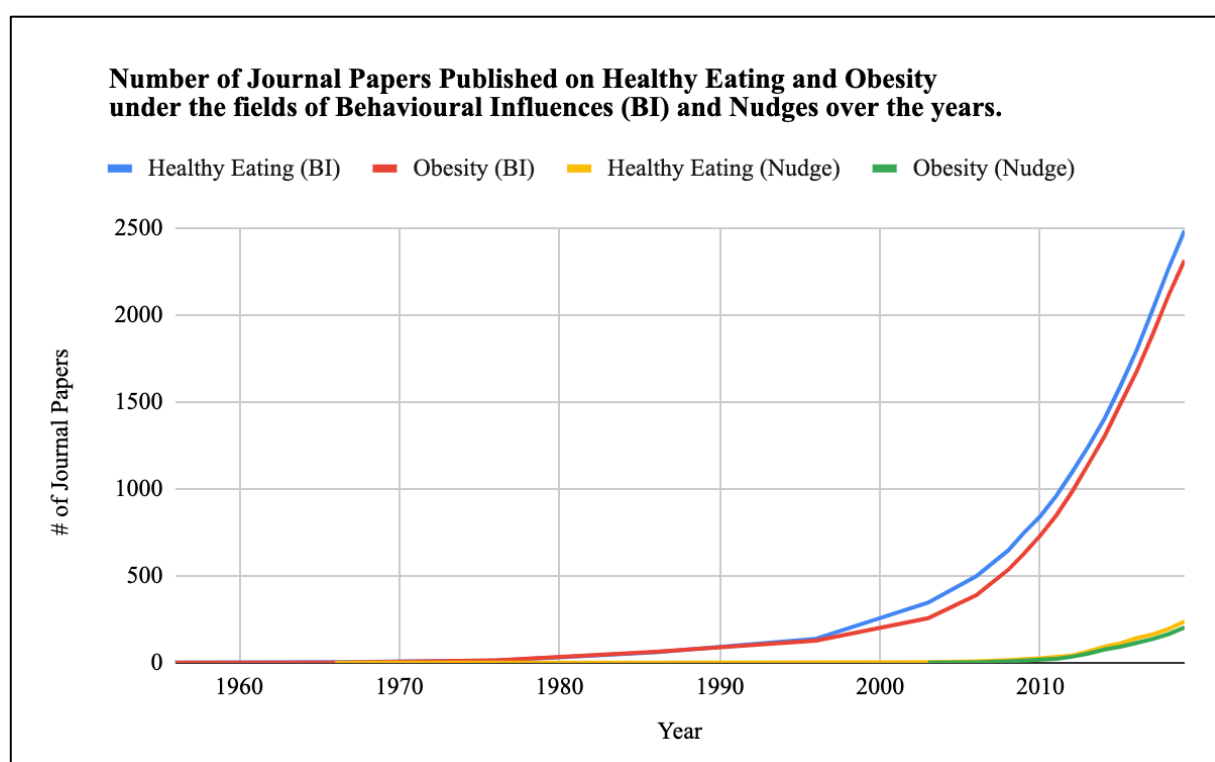
Figure 2: Number of Journal Papers Published on Healthy Eating and Obesity under the fields of Behavioural Influences (BI) and Nudges over the years.

3.1.1 What nudges already exist in supermarkets, and do they work?

In a summary review, the papers we found suggested that supermarkets have been including behavioural influences throughout the customer shopping experience without explicitly mentioning "nudges" or "nudging". The following sections will highlight the behavioural influences that are currently utilised during supermarket shopping experience to influence customers' decision making and choice.

3.1.1.1 Defaults & Ease: Supermarket Layouts

The concept of defaults focused on making certain options and products more visible, enabling a more automatic behaviour in customers, potentially increasing their chances of impulse buying certain products. In order to increase the salience of these products, supermarkets have removed, reduced and even introduced, certain barriers to promote the behaviours that encouraged more buying (Suntein, 2014; Kahneman, 2011).

One of the more ubiquitous behavioural elements in a supermarket lies in the basis of its layout. The straight aisle and grid-like layout have become the prevailing standard in supermarket organisation, and the supermarket shopping experience established that a typical customer travels up and down the aisle of a store, pausing at various category locations, deliberating their set of options, choosing their perceived best options, and repeating this process until their supermarket journey is complete (Juel-Jacobsen, 2015; Larson, Bradlow & Fader, 2005). Furthermore, the linear, straight element of a supermarket aisle encourages and restricts certain movements, leading to certain behavioural outcomes. While seemingly innocent and insignificant in its implementation, the linear, straight aisle possesses subtle implications within the retail and shopping experience. Customers first have the choice of entering the aisle, and if they so choose to enter, they are then encouraged to navigate the supermarkets within its predefined structure, concurrently compelled to obey the rationale of the linear design of the supermarket, driven towards moving in straight lines (Juel-Jacobsen, 2015).

As an attempt to influence customers into staying in-store longer and spending more, supermarkets have been

applying strategic store layouts to maximise profitability. The main objectives of retail layout focus on maximising space, while also offering a variety of products in a positive manner. Although supermarkets have applied different layout strategies to various degrees and effects, there are some basic rules-of-thumb that most supermarkets follow, such as placing attractive items around the perimeter of the store, prominent locations for high-stimulus and high-priced items, "power-items" on both ends of the aisle for higher visibility and exposure rate, and communicating the store's mission by placing the message near the entrance of the store (Aghazadeh, 2005).

These rules-of-thumb correlates with research studying movement patterns of shoppers in a supermarket. To understand supermarket travel behaviours, research found that shoppers in-store for shorter trips are more likely to remain on the periphery of the supermarket, and products placed in the middle of aisles received significantly less "face time" than those placed at the ends of aisles (Larson, Bradlow & Fader, 2005). Shoppers are also found to spend 60%-80% of their shopping time wandering aimlessly, as they deviate from paths they would normally choose as the quickest way to their intended item, effectively influenced to buy more than twice the number of product types than those who deviate least (Cohen & Babey, 2012).

3.1.1.2 Contextual Suggestions: Shelf-Talkers & Posters

Another common element of a supermarket is its placement of "Shelf-Talkers", textual signs providing various types of context that are attached to shelves working as attention seeking tools to induce a customer to stop and look at the product they are attached to (Thapa et al., 2013; Cohen & Babey, 2012). Shelf-talkers have been used in a variety of ways in supermarkets, ranging from the display of special sale prices, comparing prices with other similar products, and showing the health ratings of certain food products (Cohen & Babey, 2012).

Contextual suggestions through product packaging are especially effective on children. The attractions through promotions, contests, collectibles, cartoon characters and celebrity figures have the ability to alter perceptions of the customer on the product. Specifically, products with celebrity endorsement are perceived by parents of young children to be healthier despite its lower health rating (Dixon et al., 2011). Children also preferred items with a cartoon character on the package as opposed to a similar product with an ordinary packaging (Ülger, 2009). Branded products are also preferable to similar products that are packaged differently (Robinson et al., 2007). The health rating perception of celebrity endorsement, preference towards cartoon packages by children, and desiring branded products over similarly categorised items are nudges that shift customers towards a certain product over the others.

The subtle but significant influence of contextual suggestions should not be ignored. A study on obesity utilizing contextual suggestions found that few people have the ability to ignore or resist these contextual nudges routinely (Cohen & Babey, 2012). Furthermore, the contextual influences through textual signages in supermarkets are effective in increasing sales of products that displayed a variation of health information. The display of healthier labels has also been found to increase sales of a product as compared to a similar product without health labels (Kiesel & Villas-Boas, 2008). These signs, aimed at reducing the risk of obesity through healthier eating, found that textual signs in supermarkets are effective in nudging customers towards healthier food choices. Despite its short-term experiment, the research suggested that because eating is habitual in its behaviour, it is logical to assume that the short-term positive results can translate into a long-term success (Cohen & Babey, 2012; Sigurdsson, Larsen & Gunnarsson, 2014). These findings suggest that nudging through contextual suggestions can produce lasting behavioural change in tackling obesity, shifting consumers towards healthier eating.

3.1.1.3 Prompts, Reminders, Salience: Product Placement

A review paper on eating behaviours by Cohen and Babey (2012) looked at the behavioural effects of supermarkets on the selection of healthy food choices. The placement of items on shelves play a part in influencing customers on their choice of products to purchase. Customers perceive an item more positively when it is placed higher (Meier & Robinson, 2004; Schubert, 2005). Specifically, items placed at the average eye-level, or just slightly below, sell better than those in lower and higher shelves. Furthermore, items displayed at end-of-aisle locations sell up to 5 times more than items located elsewhere, accounting for up to 40% of all supermarket sales (Sorensen,

2003).

Placement in the middle of supermarket aisles also generated greater attention to the products, with randomization of food products by name and type in these locations generating a slight increase in sales, suggesting that customers' interests in other novel products are potentially increased to the point of purchase when exposed to them (Chandon et al., 2009; Larson, 2006).

These behavioural findings coincided with the demand of shelf space and locations by vendors when selling their products in supermarkets. Vendors will pay supermarkets for specific shelf space, with higher amounts paid for spaces with high salience (Marx & Shaffer, 2010). Product placement at checkout counters, especially products that are considered impulse-buy items, make up 46% of all supermarket sales, suggesting that checkout counters are prime locations (Miranda, 2008). Another study focused on promoting healthy food products found that a simple placement shift of replacing unhealthy food products with healthier options at checkout counters increased the sales of said healthy food products, suggesting that customers can be unconsciously nudged towards purchasing more of the products that are placed in prime, high salience locations (Sigurdsson, Larsen & Gunnarsson, 2014). Moreover, high salience of products in prime locations also have the ability to overwhelm a customer's cognitive and careful decision making, potentially rendering the customer's supermarket shopping plan moot (Cohen & Babey, 2012).

The evidence stemming from product placement alone presented a strong fundamental outcome that nudges in supermarkets can be effective. The mere shift of a product towards check-out counters, eye-level shelves, mid and end aisle locations, or along the periphery, produced staggering sales effects, potentially accounting for more than 50% of total supermarket sales (Sorensen, 2003; Chandon et al., 2009; Larson, 2006; Miranda, 2008; Sigurdsson, Larsen & Gunnarsson, 2014).

By this logic, the reverse should work to produce an opposite effect, suggesting that a shift in placement away from prime locations and reducing a product's salience, should cause the product's sales figures to drop, leading to lower consumption by the customers. In the context of plastic bags and other products with heavy plastic packaging, the placement of these items can play a part in reducing plastic consumption among customers. Supermarkets adopting this practice could help promote reduced plastic packaging towards vendors, allowing them to purchase prime locations only through lower plastic presence in their products.

3.1.1.4 Prompts, Reminders, Subliminal Messaging: Music and Lyrics

It has been argued that music in supermarkets is used merely to distract customers from other noises that may affect customer mood or spending habits (Hynes & Manson, 2016). However, music in supermarkets does more than just distract. The use of music as a form of subliminal messaging have been found to have an effect on customer behaviour. Musical elements such as rhythm, pitch, genre, tempo and volume have been found to affect customers in their purchasing behaviour. A wine store selling French and German wines saw an increase in the sales of French wine when French music was played in-store. (North, Hargreaves & McKendrick, 1999). Research have also found that music tempo can considerably influence the pace of in-store traffic flow and the daily aggregate sales volume, resulting in an increase of almost 40% (Milliman, 1982). The implication of this finding also suggested that slower music can result in slower customer movement, keeping them in store for longer to encourage more purchases. However, the opposite may also be true, in that faster music can speed up customer movement to increase sales volume as well (Milliman, 1982).

It is also interesting to note that the lyrics accompanying music in songs possessed the ability to relay information in a more effective way that conventional informational campaign lacked. Music without lyrics lacked a clear meaning that would otherwise be better interpreted with words and language, and is therefore considered to be inefficient to deliver information (Patel, 2008). Lyrics in music should also be "fuzzy", disregarding an explicit characterisation either by undetermined boundaries, or with adaptable value and content under different circumstances, in order to remain fresh and relevant to the listeners (Publicover et al., 2018). Furthermore, there is a correlation with supermarket reputation and customers' perception of music suitability, with a positive

correlation increasing length of shopping time and resulting in increased customer expenditure (Vida, Obadia & Kunz, 2007).

The language perception of music is also particularly significant in countries with other dominant languages besides English. Customers in non-English speaking countries are reported to buy more when music lyrics in stores are in English, as it is aligned with the stores' global brand image (Toldos, González & Motyka, 2017). This increased spending power coincided with customers spending more time in-store, which is consistent with Milliman's (1982) earlier studies.

3.2 Part 2 Synthesis: A framework for Nudges in Supermarkets to Reduce Plastic Bag Behaviour

In this part, we shall synthesise from the findings of part 1, and apply the 'customer experience' framework by Stein and Ramaseshan (2016) introduced in Table 2 to develop a coherent framework for nudges in supermarkets applied to the plastic bag problem.

3.2.1 The Framework Synthesis

For the purposes of this paper, we will specifically look at the touch point elements that are within the control of the retailer. Additionally, we recall that the purpose of a nudge is to promote the simplicity of choices, allowing the ease of navigation of these choices, as they engage the automatic part of human thinking, allowing external influences to guide the chooser and taking away the burden from the customer (Thaler & Sunstein, 2008). Therefore, the following proposed framework will only engage with the four touch points that do not require the customer to make conscious decisions, namely atmospheric, communicative, employee-customer interaction and product interaction. Table 3 presents a proposed, synthesised outline of interventions that could be carried out by the retailer, the nudges associated with these interventions, and the touch points engaged.

Table 3: Framework synthesising customer experience elements, nudge theory elements with suggested interventions.

Item	Touch Points	Nudges	Suggested Intervention
A	Atmospheric Communicative	Subliminal Messaging Prompts/Reminders Priming	Songs with appropriate lyrics promoting environmental behaviour (Milliman, 1982; North, Hargreaves & McKendrick, 1999; Publicover et al., 2018; Toldos, González & Motyka, 2017).
B	Atmospheric Communicative Product Interaction	Prompts/Reminders	Shelf Talkers along shelves selling bin-liners and plastic garbage bags (Thapa et al., 2013; Cohen & Babey, 2012).
C	Atmospheric Communicative Product Interaction	Prompts/Reminders	Shelf Talkers along sections selling reusable bags of various materials (Thapa et al., 2013; Cohen & Babey, 2012).
D	Atmospheric Communicative Product Interaction	Prompts/Reminders	Shelf-Talkers comparing items on product to plastic ratio (Thapa et al., 2013; Cohen & Babey, 2012).

E	Atmospheric Communicative Product Interaction	Prompts/Reminders Social Norms	"Footprint" stickers to lead customers towards non-plastic/reusable bags for purchase (Cohen & Babey, 2012; Spanjaard & Garlin, 2017).
F	Atmospheric Communicative Product Interaction	Prompts/Reminders	Placards on shopping carts informing people about negative effects of plastic bag use, conveying "social norms" (Cohen & Babey, 2012; Mitiu et al., 2016)
G	Atmospheric Communicative Product Interaction	Prompts/Reminders Social Norms	Placards on shopping carts with messages on current reduced plastic bag use in the supermarket, conveying "social norms" (Cohen & Babey, 2012; Mitiu et al., 2016).
H	Atmospheric Communicative	Prompts/Reminders Disclosure Priming	Supermarket mission statement involving green messages printed across huge sections of the wall near checkouts (Larson, Bradlow & Fader, 2005)
I	Atmospheric Communicative	Prompts/Reminders Social Norms	Supermarkets to indicate green messages in their mission statement, or include them in their displayed value system, locating them near entrances and service centres (Aghazadeh, 2005).
J	Communicative Product Interaction Employee- Customer Interaction	Defaults Prompts/Reminders Disclosure	By default, supermarkets will not provide free plastic bags (Johnson & Goldstein, 2003). Bags provided at checkouts only by customer request. Checkout personnel informing customers on plastic bag use consequences when the customer asks for one.
K	Atmospheric Communicative Product Interaction	Prompts/Reminders Priming Social Norms	Posters with messages like "Only 1% of shoppers asked for plastic bags, be the 99%." to be placed at adjacent carparks, supermarket entrances, before checkout counters and peppered throughout the store.
L	Atmospheric Product Interaction	Prompts/Reminders Defaults	Placement of plastic bags and other heavy plastic packaged items in non-prime locations, reducing salience, and thereby reducing consumption (Sigurdsson, Larsen & Gunnarsson, 2014).
M	Atmospheric Product Interaction Communicative	Prompts/Reminders Social Norms Priming Subliminal Messaging	End-aisle poster placement with messages indicating reduced plastic bag use, negative effects of plastic bag use and disposal, and reminders to use own bags (Sorensen, 2003).
N	Atmospheric Communicative Product Interaction	Prompts/Reminders Priming Social Norms	Posters at supermarket exit thanking customers for choosing the environmentally friendlier option (Cohen & Babey, 2012;

A clearer way of seeing this framework in effect is presented in Figure 3, in the form of a linear timeline representing a typical customer's supermarket trip. The potential placement of the interventions that are highlighted earlier in Table 2 are indicated alongside the timeline, with faded ends to serve as a reminder that these

interventions often do not have a hard beginning or end, taking into account the subjectivity of customer experience while understanding its dynamism and process (Stein & Ramaseshan, 2016).

3.2.2 Visualisation of The Framework Synthesis
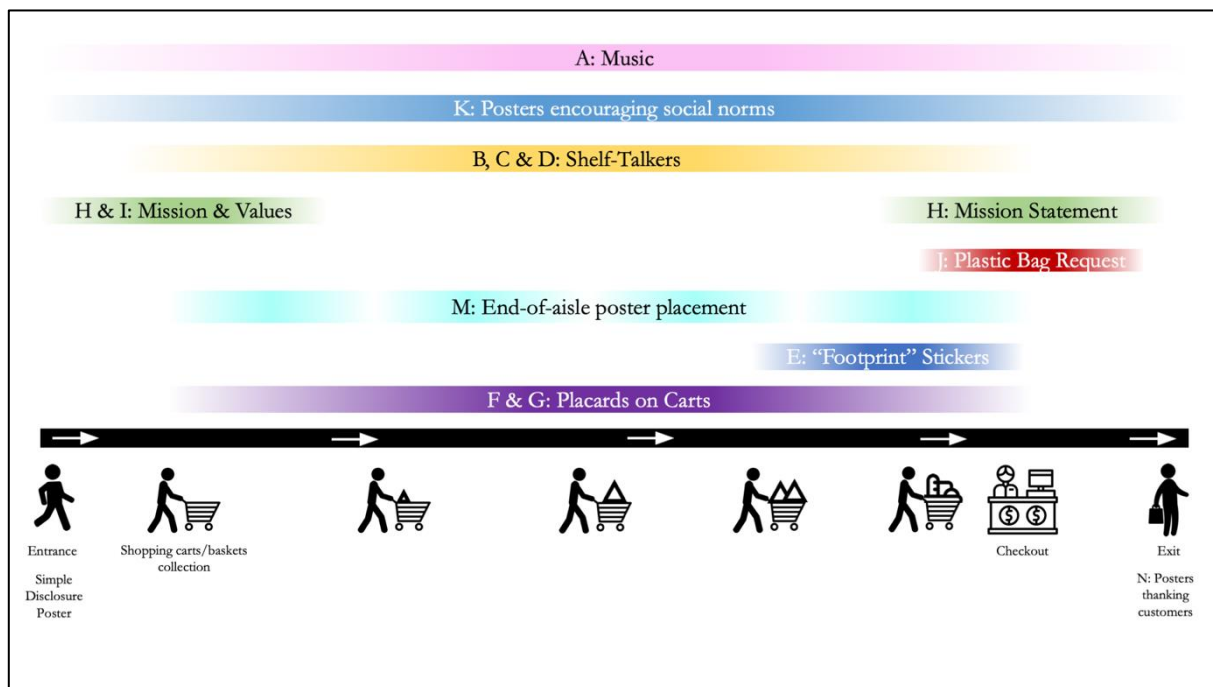
Figure 3: Visualised framework of a customer's supermarket journey and potential nudges encountered.

3.2.2.1 Entrance

Upon a customer's entry into a supermarket, one of the first nudges should be posters (Item K) containing information reminding customers to bring their own bags. Supermarkets should also use the placement of informational posters on entrances to disclose their intentions on nudging customers towards lower plastic bag reliance, to avoid manipulation of customers without their knowledge, and risking a bad reaction (Thaler & Sunstein, 2008; Sunstein, 2014). By pairing it with another nudge element of simplicity, one example of a message can be: "We are committed to environmental protection through guiding customers towards less plastic bag use." (Sunstein, 2014). Another nudge element that will greet customers at the entrance is music (Item A). Through a rotation of songs with lyrics promoting environmental behaviour, customers will connect the reputation of the supermarket with its environmental values, further enhancing the supermarket experience through the lens of sustainability (North, Hargreaves & McKendrick, 1999; Publicover et al., 2018; Toldos, González & Motyka, 2017; Patel, 2008; Vida, Obadia & Kunz, 2007). For a short time at the entrance, an additional nudge (Item H & I) can be effected through the green messages displayed within the supermarket's mission statement and/or value system (Larson, Bradlow & Fader, 2005; Aghazadeh, 2005).

3.2.2.2 Collection of Shopping Cart/Basket

As the customer proceeds to get a shopping basket or shopping carts, information on the placards of shopping carts or on stickers at the base of shopping baskets (Item F & G) will begin their nudge through conveying the negative effects of plastic use and disposal, or communicate the reduced plastic bag consumption of the supermarket, revealing the social norms of the shoppers in that particular supermarket, or chain (Cohen & Babey, 2012; Mitiu et al., 2016). As the shopping basket gets filled, the message on the stickers may get "drowned out" from the products that occupy the space. This may work better for placards on shopping trolleys, as the placard at the end

of the trolley constantly faces the customer throughout the shopping trip. The duration of this nudge will potentially last for an average of 40 minutes, usually ending at the checkout counter (Kalnikaitė, Bird & Rogers, 2013). However, certain supermarkets allow for customers to push their trolleys to their cars at adjacent carparks, increasing the duration of this particular nudge.

3.2.2.3 Customer Shopping

Now that the customer begins to browse the aisles, "shelf-talkers" (Item B, C & D) will commence their contextual nudging effect. For the main aisles selling various products, "shelf-talkers" should provide information of product to plastic ratio to allow customers to compare different products, leading to a greater understanding of the consequences of selecting a particular product over another. For aisles selling reusable bags of various materials, plastic bin-liners and garbage bags, the "shelf-talkers" (Item B & C) should indicate if the plastic bags are thicker, artificially coloured and/or chemically scented, and show the number of times alternative material bags need to be reused to offset the emissions required to manufacture one bag, while also suggesting that customers deliberate on their choices (Thapa et al., 2013; Cohen & Babey, 2012). It should be noted that the comparing of products fall under the element of anchoring, a behavioural nudge as stated by Thaler & Sunstein (2008), where a known and comparable product is used to adjust the customer's belief about another similar product. This suggests that using "shelf-talkers" to allow customers to compare products based on the product to plastic ratio will shift the customer's perceptions on the brand value and reputation of certain products, likely leading to customers choosing products with lesser plastic packaging. These could potentially have knock-on effects on vendors wishing to sell their products at supermarkets with strong environmental values, as they will then have to adjust to customers' demands for less plastic packaging.

Depending on the size of the supermarket and a customer's shopping intentions, it is assumed that the customer will encounter an end-of-aisle location at some point. Therefore, the timeline labelled *M: End-of-aisle poster placement* is dashed as seen in Figure 3 above, indicating the intermittent engagement of this particular element. The high salience of products at these locations can be translated into higher visibility for posters that are placed in those same locations as well (Sigurdsson, Larsen & Gunnarsson, 2014, Sorensen 2003). Placing posters (Item M) at end-of-aisle locations repeating a series of messages that "shelf-talkers" and shopping trolley placards are displaying can nudge the customer towards reduced plastic consumption. The repetitive subliminal messages of social norms communicated as well as the contextual implications suggesting negative effects of plastic bag use and disposal will potentially have an intrinsic advantage in getting the message across strongly to the customer (Sorensen 2003; Thapa et al., 2013; Cohen & Babey, 2012, Mitiu et al., 2016).

3.2.2.4 Checkout Counters

Towards the end of the customer's supermarket shopping trip, with purchases in hand, they will then proceed to the checkout counters. It is at this crucial time that the customer will begin to think about the various options available to them when it comes to bagging their products. "Footprint" stickers (Item E) with contextual suggestions along the floor of the supermarket can lead them towards sustainable, environmentally friendly options (Cohen & Babey, 2012; Spanjaard & Garlin, 2017). Along the shelves of these options should also be labelled with "shelf-talkers" (Item C), indicating the various impacts each item can have and the actions needed to mitigate these impacts when used by the customer (Thapa et al., 2013; Cohen & Babey, 2012). These "footprint" stickers should be placed near checkout counters in order to address the customer's need before payment is made, potentially eliminating the next step in the customer's shopping experience.

At the checkout counter, should the customer require a plastic bag, they will then need to request it from the checkout employee. This is a nudge (Item J) removing the default option of the employee routinely bagging the products with a plastic bag (Johnson & Goldstein, 2003). Upon the request of a plastic bag, the employee would then comply while informing the customer of the current plastic bag problem and the potential harm of disposing the particular number of bags that is requested. This act further reinforces the contextual suggestions that have been nudging the customer throughout the supermarket shopping experience, increasing the salience of these nudges as the customer gets reminded of the experience. It is also at this time that the supermarket's mission statement indicating green messages (Item H), is seen by the customer easily as it is printed across large sections

of the wall near the checkouts (Larson, Bradlow & Fader, 2005).

3.2.2.5 Exit

Approaching the exit of the supermarket, the customer's experience with nudges is rounded off with posters encouraging social norms (Item N). This could be in the form of thanking the customers for choosing the environmentally friendlier option, in spite of the customer's actual choices, indicating to the customer that a majority of shoppers subscribe to using less to no plastic in their shopping choices, further reinforcing the contextual suggestions, social norms, and the series of nudges experienced by the customer throughout the shopping experience (Cohen & Babey, 2012). Item L is not featured in this image as it a "reverse nudge" aimed at removing the salience of plastic bags, plastic alternatives and products with heavy plastic packaging. In Item L's case, it is the removing of defaults that nudges the customer away from plastic consumption, leaving it entirely up to the customer to make a purposeful action or to actively choose to purchase these plastic items (Sunstein, 2014).

3.2.2.6 Overall Experience

It should be noted that the most prevalent element throughout the shopping trip is the continuous broadcast of songs in the supermarket, as it will be experienced by the customer the minute they enter the supermarket, to the moment they leave (Milliman, 1982; North, Hargreaves & McKendrick, 1999; Publicover et al., 2018; Toldos, González & Motyka, 2017). Simplicity is also important in the messages of the posters, "shelf-talkers", placards, values and mission statements, including the interaction of the employees with customers. Campaigns and programmes usually fail due to the unneeded complexity that caused confusion, deterring the required participation by customers for nudges to have impact (Sunstein, 2014). Furthermore, nudges in supermarkets can go beyond the boundaries of their store. Adjacent carparks and walkways outside the stores can include the posters of contextual suggestions, reminding customers to bring their own bags from their cars or nearby homes, reducing the effect of absent-mindedness and/or inertia (Sunstein, 2014). The supermarket experience will also be repeated quite frequently, as an average customer visits a supermarket more than twice a week, thereby increasing the salience, subliminal messages, prompts and reminders with each visit (Thapa et al., 2013).

3.2.3 Simple Disclosure

Supermarkets should also exercise the best practice of being transparent in their use of these behavioural influences, allowing the customers to be aware of the nudge implemented, allowing them the choice to avoid it instead of being covert (Thaler & Sunstein, 2008; Sunstein, 2014). In order to avoid the ethical conundrum of unknowingly manipulating customers, supermarkets should indicate in their stores, preferably at the entrances, that they are implementing a series of behavioural influences to help consumers reduce their reliance on plastic bags. These types of disclosure policies can be highly effective when paired with simplicity. A simple message like "We are committed to help you reduce your reliance on plastic bags through a change in our environment." allows consumers to get the message succinctly. A more complete and detailed disclosure can be made available online for customers who are interested to know more. Such disclosure allows consumers to maintain their freedom of choice, and also prevents a bad aftertaste should customers only realise the nudge later and get enraged at the perceived manipulation (Sunstein, 2014).

4. Discussion

To our knowledge, this study is the first to integrate the current behavioural influences of supermarkets on customers, the identification of nudge theory through these influences, and synthesising the findings into a framework that mitigates the unintended consequences of a plastic bag ban through the implementation of potential behavioural influences throughout the supermarket shopping experience.

As understood in this paper, we found an increasing number of plastic bag bans being implemented worldwide, and saw a correlated increase in the number of unintended consequences that emerged alongside the bans, concluding that human behaviour towards plastic bag consumption have not changed, but merely shifted (Nielsen et al., 2019; UNEP, 2018). Recognising that the unintended consequences could lead to globally catastrophic issues if left unchecked, we proceeded to locate the leading source of plastic bags supply into society, and determined it to be supermarkets in modern society. Supermarkets are also found to have included behavioural elements in influencing customers to increase their expenditure, and we used nudge theory to identify and categorise the current behavioural influences that exist in supermarkets, establishing that the current behavioural practices of supermarkets can be adapted to help shift customers away from their reliance on plastic bags. Supermarkets are also one of the most consistent touch points of an average individual, and we looked at elements of a supermarket that could have behavioural influences on a customer's shopping experience. We then found a framework focused on the customer shopping experience highlighting distinct themes of the customer experience touch points. We determined that 4 themes are relevant towards the behavioural influences of a supermarket, shifting the responsibility away from the customer and towards the supermarket, and synthesised our findings with nudge theory.

The implementation of nudges holds a unique position. Done well, they can bring about lasting behavioural change. The impacts of nudges have been felt worldwide and through a variety of industries, playing a quiet by important role in providing simple options under the pressure of complex issues (Baldwin, 2014; Rolls, Morris & Roe, 2002; Wansink, 2006; Schwartz, 2007; Lehner, Mont & Heiskanen, 2016). Moreover, nudges are usually cheap to implement despite their compelling potential, and they provide an encouraging alternative to traditional tools that are usually flawed in their applications (Hilton et al., 2019). If an implemented nudge does not show signs of feasibility, the failure does not seem to contribute to, nor introduce, grave outcomes (Hilton et al., 2019).

The synthesised framework presented in Table 2 provides an illustration of some elements that supermarkets can adopt towards reducing plastic bag reliance among their customers. This framework is based on the evidence of successful nudges currently in application globally, including those presently applied in supermarkets, and further incorporates the success of these behavioural influences with proposed actionable interventions based on these nudges. The framework is then rounded off with the customer experience touch point elements, understanding that the customer is the central figure in the reception of these nudges, potentially producing lasting behavioural change. It should be noted that the application of the framework is contingent on the geographic and cultural locations of the supermarkets, and future research on experimenting with this framework is required to measure its effectiveness.

The design of the interventions requiring printed text such as posters and "shelf-talkers" need to take into account the use of colours and images, as they possess cultural and geographical implications. It is possible that different colours, as well as different combinations of colours may induce different reactions among different customers (Madden, Hewett & Roth, 2000). Colours mean different things to different cultures, and strategies to implement visual communications such as posters and "shelf-talkers" require a customised strategy by supermarkets, further emphasising the need for supermarkets to discern their customer demographic (Madden, Hewett & Roth, 2000).

Supermarkets intending to employ this framework will first need to understand their customer demographic and undertake research of their own to better discern the needs, barriers and drivers of their customer base, in order to ensure the effectiveness of the nudges. For example, in crafting certain messages as prompts, reminders, and shelf-talkers, supermarkets should consider the cultural implications of certain words, jargon and images that may affect their customers differently. What could be used in a Western country, should be altered appropriately to be used in an Asian country (Madden, Hewett & Roth, 2000). The same should be applied in the function of songs and music in various supermarkets. English lyrics may not have the same effect in a largely non-english speaking demographic of a certain supermarket customer base, while genres that appeal to most teenagers may not work for supermarkets with a larger demographic of young families or the elderly shopping (Toldos, González & Motyka, 2017).

It should be pointed out that supermarkets do not need to employ the full experience of the framework, but rather, be able to pick and choose the different elements that suit their stores and the demographics of their customers

best. A stage-by-stage approach to implementing these nudges would be advisable as a form of experimentation. Due to the speedy and low-cost nature of testable nudges, experimenting with nudges cautiously allows for constant data collection and improvements (Sunstein, 2014). As well, a sudden introduction of the full spectrum of nudges as seen in our framework may result in an overwhelming surge of information that could complicate and confuse the customer and render the nudge ineffective (Sunstein, 2017).

This paper presented a framework that holds the potential to address the plastic bag problem, and by extension, the global plastic problem at large. Moving forward, it would be worthwhile to put the framework to test. Further research is required to develop an experimental method to test the framework in the real world. As specified in this paper, the application of behavioural nudges is contextual, and each application on specific geographic and cultural locations will require specific analyses of the demographic of each supermarket. Supermarkets will also need to be receptive to the idea of selling and providing less plastic bags, and in the future, less plastic packaging.

Aside from the focus on customer behavioural influences, supermarkets also hold the ability to reduce plastic packaging from vendors by controlling their placement and space on shelves. Perhaps instead of the current fiscal measurement where vendors pay more for better locations, supermarkets could adopt a plastic-to-product ratio on the vendors' products, decreasing costs of product placement based on the amount of plastic used in packaging by volume and/or weight. Supermarkets could also pressure vendors selling branded items to reduce plastic packaging the same way.

5. Future

The increasing awareness of the marine plastic pollution issue, leading to an increased understanding of the plastic bag problem by the wider community cannot be ignored (Xing & Liu, 2018; Xanthos & Walker, 2017; Filho et al., 2019). Despite this, there remains a cognitive dissonance among supermarket shoppers who are aware and concerned about the plastic problem, and yet continue to consume plastic bags during their trips to the supermarkets due to automatic behaviour activated around familiar surroundings (Danner et al., 2008; Neal et al., 2011). Furthermore, the implementation of bans in certain countries and states desiring to reduce plastic bag use have given rise to unintended consequences that have led to greater environmental stresses that could worsen the current situation. This underscores the need for nudges to engage the community to help them shift their behaviour towards less plastic bag use.

The proposal presented in this research paper is aligned with various non-academic articles by Spanjaard and Garlin (2017), Thornton (2017) and Mortimer (2017), that suggests a need for an approach that changes the behaviour of customers, as opposed to merely shifting it to another problem. Spanjaard and Garlin (2017) emphasised that the ban needed to encourage a permanent change in the behaviour of shoppers in order for the environmental benefits to be fulfilled, and highlighted the potential harms of unintended consequences that emerged from these bans. Thornton (2017) further outlined the need to prevent the emergence of more problems from banning plastic bags, suggesting that the motivation for supermarkets to ban plastic bags may actually just be an economic incentive. Furthermore, Mortimer (2017) established that major supermarkets in Australia stand to save up to A$1 million a year by not providing plastic bags. This is not including the sale of reusable bags, that have created a new revenue stream, totaling A$71 million in gross profits for supermarkets. While it is laudable that supermarkets take a hardline approach of a ban on plastic bags, it may not have been a difficult decision economically.

Supermarkets have a responsibility to initiate postitive behavioural change among their customers to reduce plastic bag consumption, and this responsibility is made greater with the feasible opportunities made possible through elements of nudge theory. With their successes in nudging customers towards different positive behaviours, and as a major contributor of plastic bags towards society, supermarkets should seek to nudge their customers towards reduced plastic bag consumption.

However, the issues arising from the use of plastic bags, along with the unintended consequences of a plastic bag ban, are complex with many different stakeholders holding various levels of responsibilities in managing and

overcoming the global plastic issue. Tackling the plastic bag issue is difficult, and it is only one cog in the machinations of the greater plastic problem. Nevertheless, something of a light at the end of the tunnel could be coming into view. A recent paper, led by Australian businessman Andrew "Twiggy" Forrest (2019), presented a global solution to the plastic waste crisis, highlighting the complexity of the issue, and yet, presenting hope to an otherwise hopeless problem. The paper proposed "the Contribution", also known as the "Sea The Future" initiative, suggesting that plastic waste can be transformed into a "cashable commodity" through a voluntary pricing on fossil fuel-derived plastic led by the global plastics industry (Forrest et al., 2019). Despite its seemingly simple and elegant solution, it is a hopeful process that first requires the global cooperation of the plastics industry. As with this paper, we present our framework in the hope that it is a small but significant step towards reducing plastic consumption, and so, nudge the world towards understanding the critical nature of plastic, a valuable material that can be dangerous if taken for granted.

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