

# THE SOUTH AFRICAN QUICK SERVICE RESTAURANT INDUSTRY AND THE WASTEFUL COMPANY IT KEEPS

NADENE MARX-PIENAAR, GERRIE DU RAND, HENNIE FISHER & ANNEMARIE VILJOEN  
Department of Consumer and Food Sciences, University of Pretoria, South Africa.

## ABSTRACT

Despite a tough South African (SA) economic climate, consumers are demanding broader menus, wider selections and faster food. With the sudden surge in the SA quick service industry, efficient supply chain management is pivotal for a sustainable food system. Recent estimates suggest that between one third to half of all food produced never reach the human stomach. In SA alone, annual food waste is estimated at R61.5 billion (current exchange rate R14.39 = \$1). With an average of 11 million people (almost a quarter of the population) going to bed hungry every night, addressing food wastage in SA has become a matter of great urgency. Unfortunately, information pertaining to food waste in SA tends to be limited. This study aimed at alleviating the knowledge deficit regarding food waste in the quick service restaurant (QSR) industry, focussing specifically on identifying critical areas of concern with possible mitigating strategies. The methodology involved two phases: Phase one entailed a material flow analysis that entailed a waste audit of a key QSR supply chain that documented practices and managerial protocols, which could contribute towards unnecessary wastage. Phase two involved interviewing QSR managers, which allowed identifying possible mitigating strategies. Results revealed that production, distribution and packaging (and secondary packaging in particular) warrants attention. However, in terms of human resources, findings also accentuated consumers', managers', and employees' general awareness of food waste as worrisome.

*Keywords: Consumer behaviour, developing economy, emerging context, fast foods, food waste, quick service restaurant (QSR), South Africa, supply chain.*

## 1 INTRODUCTION

Stating that the QSR industry is a high growth industry is not a groundbreaking announcement, neither is the fact that it is worth billions if not trillions. Recent research present that most consumers will visit a QSR at least once a week [1] and with consumer lifestyles becoming busier, coupled with a growing fondness for inexpensive food with no waiting time, it is expected that this industry will soar in the coming years. In emerging economies such as South Africa, a sharp rise in the adoption of western fast food will also reinforce the global QSR growth. Unfortunately, this success is often attained at a cost.

Municipal waste composition studies globally have indicated vast quantities of food are wasted and disposed while there is potentially significant opportunity to prevent food wastage at various levels throughout the supply chain [2], [3]. International trends suggest that food wastage moves up the food supply chain, from pre-consumer to post-consumer stages, as the level of development in a country increases [3]. It is therefore likely that SA, as an emerging economy, may see similar trends in food waste over time.

To date little information is available to present the issue of food waste from a SA perspective. Not only is information detailing the role of industries such as the QSR and respective supply chain members needed, but identifying critical areas of concern and recommending possible mitigation strategies, is also an urgent matter. Global estimates suggest that between one-third to half of all food produced never reach the human stomach [4]. With Food and Agriculture Organization (FAO) [5], [6] reports highlighting the fact that many SA households are indeed food insecure, SA can no longer avoid the urgent call to address the matter of unnecessary food wastage. This being said, planning and or formulating mitigation

strategies based on the currently available information is viewed as irresponsible, as this information is often not only limited but also unreliable. This is reflected in the fact that the most comprehensive report currently available on the hospitality sector dates back to 2013, with costs calculated on 2011 figures [7], [8]. Nevertheless, mitigation of food waste is greatly needed in order to ensure the welfare of SA's natural, economic and social environment.

The aim of this study was therefore firstly to attempt to alleviate the knowledge deficit regarding food waste by not only investigating current food product management and practices throughout a SA QSR supply chain, but to also identify areas of concern that contribute towards unnecessary food wastage. Secondly, the study envisaged to suggest possible supply chain solutions that could be implemented to mitigate food wastage.

## 2 THE SOUTH AFRICAN CONSUMER AND THEIR SHIFT TOWARDS FAST FOODS

When reflecting on the emergence, development and persistence of civilizations, it is evident that their development has been shaped by the supply and availability of food. For the last few decades, food has been relatively cheap, more readily available and accessible than probably any other time in history. This could partly explain why many food producers and consumers today tend to easily discard food products that no longer meet their needs or quality expectations [9]. During the twentieth century, food production morphed from the simple social act of growing and or attaining basic goods and services aimed at maintaining a households' daily life, to a multi-million-dollar industry focused on winning consumer votes. Unfortunately, this industry tends to foster ideologies such as 'the customer is king' (that contributed to consumers' sense of entitlement and lack of responsibility) that jeopardize the fulfillment of future society's needs [9]. This is reflected not only in the manner in which food is produced, managed and presented but also in the manner it is procured, consumed and ultimately discarded [10].

The new middle class South African leads an aspirational lifestyle. They are employed, they own things, they are usually well-qualified [11], [12] and, because of their lifestyle choices, they are also time poor. These lifestyles often reduce their ability to invest time and other resources in nutritionally sound eating behaviour, such as those of their elders. They partake greatly in the 'tray' of time-saving alternative food options such as take-outs and convenience food products [13], [14]. Even though South Africa was not included in a study done by Parfit *et al.* [15] on the other four BRICS countries, South Africans are just as much in the midst of what is referred to as the dietary or nutrition transition as their counterparts in the rest of Africa and the developing world. The nutrition transition is 'defined as the changes in dietary patterns and nutrient intakes when populations adopt modern lifestyles during economic and social development, urbanization and acculturation' [16]. Also referred to as the 'diet-transformation', such changes often come about as the result of many factors, such as females joining the work force and male workers who work further and further away from home, among others. These changes spur the purchasing of processed and restaurant-prepared food, i.e. fast foods. This 'diet commercialisation' has seen a shift from nurturing individuals and societies consuming predominantly food grown or produced at home to purchased food [14]. Growth in household incomes is therefore associated with changes in food consumption, and often a shift towards vulnerable items with shorter shelf lives, leading to greater food waste and a greater demand on natural and other resources.

South African middle-class consumers are increasingly starting to demonstrate behaviours like that of their western contemporaries – they have many requirements to be satisfied

before they become loyal customers. Modern consumers are very selective and have many reasons for initially choosing a food brand, and thereafter returning for more business. Customer satisfaction is considered to be the main factor for repurchase intentions by South Africans, according to research conducted in Gauteng [17], [18]. Cleanliness is a gestalt concept that is made up of hundreds of elements and details that includes food quality and freshness, which influence customer satisfaction and ultimately return business [19], [20] [21]. It could however be postulated that an over-emphasis on freshness could also lead to unnecessary food waste, particularly of items with very short shelf lives, such as fast foods. Because the food supply chain of QSR's can be considered as vulnerable in terms of food waste, it is believed that reflection and a critical assessment of this system needs to become a serious priority.

### 3 THE QUICK SERVICE RESTAURANT INDUSTRY AND FOOD SUPPLY CHAIN

Today's consumers live in a world with convenient access to an abundance of fast food outlets also known as QSR, designed to meet their ever-increasing needs and demands [22]. A QSR is defined as a type of restaurant in which cooking is done in a fast and time-conscious manner, and is identified by its insignificant table service because food is mostly consumed off-site, i.e. 'take away' [23]. In SA the QSR sector, or fast food industry, is currently experiencing massive growth. Recent studies noted a significant increase in patronage among SA consumers from 66% in 2009 to over 80% in 2015, increasing the number of consumers to 42 million people by 2017–2018 [1]. South Africa's fast-food industry was worth R300 billion in 2015. Contributing to this growth in SA is a growing black middle class and the establishment of QSRs in rural and previously disadvantaged areas [24]. This growth in QSRs simultaneously comes with a growth of supply chains, key players in ensuring that retail and food service outlets meet the demands set by consumers [25], [26]. Defined as a series of interdependent links along which food travels from farm to fork, the food supply chain ensures food is delivered in a seamless and timely manner, at a price and in a place perfectly suited to the consumer [27]. The food supply chain is managed by a wide range of disciplines with a wide range of skills, governed by a framework of quality standards and rules. Effective supply chain management in the food industry is a valuable commodity as it leads to both cost reduction and enhanced service. However, ineffective supply chain management and lack of efficiency of respective QSR'S can consequently lead to a host of problems - one of these problems being food waste [27].

It should be noted that the exponential growth in this industry tends to be an unwavering phenomenon and that not even rising commodity prices, recent food safety and hygiene threats, or market saturation have had a dampening effect. This growth is however accompanied by a number of concerns, one of which is food waste, a concept which has not been extensively researched and defined in SA [4], but is a definite problem as SA's developing economy transforms into an emerging economy.

### 4 FOOD WASTE

Despite headlining many governmental, non-governmental and industry agendas, recent figures regarding food waste still indicate that approximately 50% of all food produced for human consumption is wasted [28], [26]. When converted to calories, approximately 24 percent of all calories produced is lost or wasted from farm to fork [29]. That is 1.3–1.5 billion

tonnes of food wasted annually that could have been used to address food insecurity across the globe. In SA alone, an average of 11 million people is deemed food insecure, yet the country has the highest proportion of wastage in Africa. Alarming World Bank figures indicate that SA, with its emerging economy, currently generates emission and consumption levels exceeding that of the United Kingdom [9]. Results indicate that during 2017, 10.2 million tons of food (a third of the 31 million tons of food produced) went to waste, costing the country approximately R61.5 billion per annum (current exchange rate R14.39 = \$1) [30]. Apart from the financial loss, avoidable food waste also translates into the loss of valuable resources such as water and energy. This should be viewed as a massive concern for SA which is not only currently experiencing a record drought, but was recently rated as the 30th driest country in the world.

Considering that the mitigation of food waste is an essential contributor to SA's sustainability, one would expect a heightened awareness amongst all and a serious drive for change. This is unfortunately not yet a reality, because an actual definition of food waste has not yet been agreed.

A literature review on food waste confronts one with a myriad of definitions for the concept. This lack of consensus on a workable definition fosters unnecessary confusion and antagonism. This being said, the following three principal definitions seem to be the most prominent.

1. The Food and Agriculture Organisation (FAO) defines food waste as any material intended for human consumption, at any point in the food supply chain, which is discarded, lost, degraded or consumed by pests [5].
2. Derqui *et al.* [31] explains that food waste should be viewed as the intentional discarding of food items that still have nutritional value and is thus still fit for human consumption.

The premise behind these first definitions echoes the reasoning behind the classification presented by WRAP (Waste Resources and Action Programme) [32], which states that food waste could be divided into two categories, namely avoidable and unavoidable waste. Avoidable waste is the wasting of food products or parts of products that are considered safe to consume by people, whereas unavoidable waste refers to the disposal of food products that are unacceptable for consumption under normal conditions.

3. In addition to the previous definitions, food waste is also defined as the difference between the energy value of consumed food per capita and the energy value of food needed per capita, i.e. over-nutrition [33].

Based on the different definitions and consequential interpretation of 'food waste' as a concept, it is apparent that addressing the problem of food waste poses significant challenges and that proper conceptualization of the concept is key in terms of successful mitigation.

## 5 METHODOLOGY

A case study research design was specifically chosen to first and foremost investigate and gain insight about the particular case (QSR group) and secondly to enable the identification of case-specific solutions and/or mitigating strategies. The set objectives required the implementation of a mixed methodology, i.e. collecting both quantitative and qualitative data. Data collection was completed in two main phases. The first phase was used to collect data from two respective manufacturing plants and 40 QSR stores in Gauteng, SA. A material flow analysis was used to audit respective supply chain members' protocols and practices, and



Figure 1: QSR store location and distribution.

their contribution towards waste. Although the focus was on activities that occurred prior to consumption, consumer awareness and behaviour were also noted. Exploratory Factor Analysis (EFA) of these results allowed the identification of critical areas of concern. Phase 2 involved interviewing QSR managers, and findings collected during this phase allowed the identification of possible mitigating strategies.

## 6 RESULTS

### 6.1 Possible critical areas of concern

In order to identify critical areas of concern that contribute towards unnecessary food wastage within the QSR industry, field workers had to complete an audit scale, which included 70 statements (all scale items were self-designed). In this investigation, trained fieldworkers were instructed to respond on each individual scale item by means of a 5-point Likert-type performance scale. Scale labels ranged from 1 = Extremely concerning to 5 = Excellent. To summarize and reduce the items in terms of coherent constructs, an EFA, specifically Principal Axis Factoring, was performed. Using an Oblimin rotation with Eigen values  $>1.5$  – five factors emerged, which retained 64 of the original scale items. Cronbach's alphas for the factors were  $>0.75$ . A thorough investigation of the five factors and their respective items allowed the identification of suitable factor labels, as set out below:

- Factor 1 – Managerial efficiency and general waste awareness at the QSR ( $M = 3.69$ )
- Factor 2 – The ability of storage and primary packaging to ensure food product quality and integrity at the QSR ( $M = 3.77$ )

Table 1: Exploratory factor analysis.

	1	2	3	4	5
Principles and practices in place to assist ordering of stock at QSR	0.667				
Management's involvement with ordering of stock at QSR	0.520				
Quality check of stock at receiving QSR	0.445				
Management of faulty stock upon receiving at QSR	0.510				
Inventory management, i.e. policies and protocols e.g. FIFO at QSR	0.437				
Efficient use of equipment during production at QSR	0.425				
Effective application of recommended techniques during production at QSR	0.525				
Visibility of additional food safety protocols at QSR	0.680				
Compliance to hygiene and safety protocols at QSR	0.673				
Managements involvement and response during production at QSR	0.821				
Communication between employees and management during production at QSR	0.762				
Quality assurance throughout the production of meals at QSR	0.585				
Staff response in the event of waste at QSR	0.765				
Managements response in the event of food waste at QSR	0.900				
Staff's general awareness of food waste at QSR	0.717				
Managements awareness of food waste at QSR	0.897				
Customer awareness of food waste	0.409				
Customer satisfaction of food, i.e. food sent back	0.453				
Customer patronage at QSR	0.517				
Human handling of raw materials during preparation at QSR	0.481				
Human handling of final products at QSR	0.425				
Handling of products during receiving at QSR		0.565			
Handling of stock into storage at QSR		0.704			
State and quality of storage facility at QSR		0.711			
Sufficient use of space at storage facility at QSR		0.465			
Appropriate storage of stock at QSR		0.479			
Sufficient usage of storage facilities at production		0.555			

---

State and quality of the food prep area at QSR	0.734
Quality of equipment at QSR	0.611
Quality of packaging of stock at receiving at QSR	0.610
Packaging's ability to prolong shelf life at QSR	0.674
Packaging's ability to prevent microbial contamination at QSR	0.676
Packaging ability to prevent physical damage at QSR	0.533
Packaging allows for optimal product usage at the QSR	0.674
Packaging's ability to prevent microbial contamination during production	0.592
Principles and practices in place to assist ordering raw materials	0.429
State of equipment during processing	0.531
Efficient use of equipment during processing	0.630
Effective application of recommended techniques during production	0.662
Continuous quality control throughout production	0.790
Management involvement throughout production	0.804
Communication between employees and management throughout production	0.704
Implementation of HACCP procedures throughout production	0.797
Visibility of additional food safety protocols throughout production	0.530
Compliance to hygiene and safety protocols throughout production	0.463
Compliance to hygiene and safety protocols during distribution	0.540
Product control and maintenance during warehousing	0.428
Quality of packaging used in storage at production	0.547
Efficiency of packaging used in storage at production	0.622
Packaging's ability to prevent physical damage during production	0.898
Packaging's ability to maintain product shelf life during distribution	0.476
Packaging's appropriateness for transportation/distribution	0.728
Packaging's ability to prolong shelf life at production	0.469

---

Packaging's ability to protect product from physical damage during distribution						0.834
Use of equipment to load bulk stock on trucks for distribution						0.553
Human handling of bulk stock during distribution						0.577
Appropriateness of transport (trucks/vehicles) to limit damage/waste (distribution)						0.426
Quality of packaging of raw materials at receiving						0.601
Quality of checks or raw materials at receiving						0.743
Management of faulty raw materials upon arrival						0.562
Usage of equipment to move raw materials during production						0.495
Storage of raw materials during production						0.686
State and quality of storage facilities at production						0.479
Inventory management, i.e. policies and protocols followed, e.g. FIFO						0.455
SS loadings	9.937	8.724	7.338	5.865	5.332	
Proportion Variance	0.134	0.118	0.099	0.079	0.072	
Cumulative Variance	0.134	0.252	0.351	0.431	0.503	
Means	3.69	3.77	3.72	3.53	3.98	

- Factor 3 – State of equipment and standard operating procedures at production (M = 3.72)
- Factor 4 – The ability of secondary packaging to protect food product during storage and distribution (M = 3.53)
- Factor 5 – Quality control and standard operating procedures at receiving (M = 3.98)

Of the five factors all included the acceptable minimum of at least three scale items. All loadings were also above the acceptable minimum of 0.3.

Respective factor means revealed that the contents of not only Factor 1 (M = 3.69) (*Managerial efficiency and general waste awareness at the QSR*) but mostly Factor 4 (M = 3.53) (*Packaging's (Secondary packaging's) ability to protect food product during storage and distribution*) could be viewed as possible areas of concern. Calculated means were benchmarked and interpreted in terms of a popular retailing audit rating scale, which is currently used in SA retail.

Thus, any mean below 4 was regarded as a possible area of concern and any mean below 3.5 was regarded as a critical area of concern in terms of food wastage.

The fact that packaging (and secondary packaging in particular) (Factor 4) was highlighted as the most worrisome area of concern should be viewed as an opportunity in which key supply chain members could make a positive contribution. Scale items in Factor 4 reflect not only on the quality of the packaging but more specifically on packaging's ability to protect products during transport and distribution.

Although the respective means for Factors 2 and 3 were slightly better than the means presented by Factors 1 and 4, and therefore do not warrant the same attention, they are also considered as concerning.

In terms of Factor 2 (*Storage and packaging's ability to ensure food product quality and integrity*) (M = 3.77) it was noted that key supply chain members such as packaging and distribution

Table 2: Current retail audit / rating scale.

	<b>Retail rating</b>	<b>Standard</b>	<b>Audit score</b>
	Blue status	Excellent	5.0
	Green status	Good	4.5–4.9
	Pass	Fair	4.0–4.4
	Red status	Poor	3.5–3.9
	Critical failure	Critical area of concern	<3.5

subsidiaries could once again assist in making a difference. This specific factor emphasises that there is a need for packaging that could minimise food product quality and integrity concerns.

The mean and subsequent contents of Factor 5 ( $M = 3.98$ ) (*Quality control and standard operating procedures at receiving*) were interpreted as the least concerning in terms of their contribution towards food wastage. Findings from the EFA were also supported by the findings presented by the descriptive statistics, which reported that although packaging is identified as an area that warrants further attention, general awareness amongst staff, management and consumers is a serious problem that deserves urgent attention, as this ignorance results in unnecessary wastage throughout the supply chain.

## 6.2 Possible mitigating strategies and recommendations

Interviews were held with QSR owners and managers to gain insight into possible mitigating strategies that could curb food wastage in the supply chain. The findings presented four topics as key possibilities for mitigating food wastage throughout the QSR supply chain.

### 6.2.1 Reflecting on current habits/practices: Define and benefit

Suggestion:

It is of great importance to define the term food waste. This is essential so that all supply chain members are on the same page and are able to recognize the problem and subsequently address the issue. Mitigating current habits might initially cost some investment (financial and time) but in terms of future prospects it will most certainly benefit the relevant industry in terms of minimizing loss in future revenue. Added benefits include the creation of a more sustainable food chain, which is beneficial to all in SA.

### 6.2.2 Assigning responsibility: Identifying prominent agents of change and critical relationships

Suggestion:

Identify, train and support a team of e.g. staff members that could assist in training and maintenance of more sustainable operating procedures (SOP's) and waste management. This team should also assist in fostering a culture of support and care – emphasizing the relationship between all supply chain role players in order to address wastage holistically. Results identified a critical need to not only raise awareness but to properly educate all stakeholders. Key topics to address include defining what the company considers as waste and possible suggestions on how to mitigate waste. Findings emphasised the demand for strategic dialogue and knowledge transfer sessions, which would create synergy and collaboration between supply chain members to identify strategies, future policies and initiatives.

### 6.2.3 Creating opportunities for action: setting realistic goals

#### Suggestion:

Set parameters/standards that not only allow for the control of wastage but also the capturing of waste at each supply chain area.

### 6.2.4 Educating all in terms of SDG 12: Customizing knowledge to demographic characteristics

#### Suggestion:

The South African rainbow nation poses a unique challenge in that education on the topic of food wastage may not be as simple as it sounds. It is important to acknowledge the differences amongst our citizens and structure educational campaigns accordingly.

## 7 CONCLUSIONS

According to the FAO, roughly one-third of global food production is wasted each year. This level of inefficiency is unacceptable because of the grave implications it holds for a sustainable future. The fact that food waste has significant detrimental economic, social and environmental impacts, is uncontested. The magnitude and complexity of the global food waste problem has brought it to the forefront on not only international agendas, but also in South Africa where the problem of food insecurity amongst many of our households is becoming critical. Sustainable development has been defined by the World Commission on Environment and Development as ‘meeting the needs of the present without compromising the ability of future generations to meet their own needs’. In this context, the QSR food supply chain is closely related to sustainability as production must be augmented to meet the needs of future populations. With the rapid growth in the QSR industry, sustainable food supply chains should be prioritized. Unfortunately, very little research has been done in this field. This is partially due to weaknesses in the methodological approaches used to understand this complex problem.

The researchers trust that findings from this study should alleviate some of the knowledge deficits regarding food waste in particularly the contribution of current food product management/practices throughout the QSR supply chain. Although results from this study confirmed that food is wasted throughout the QSR supply chain, significant opportunities to reduce waste through innovative packaging improvements and the implementation of pertinent/vernacular waste awareness campaigns and supporting systems, were identified. It is further believed that the ongoing investigation and dissemination of knowledge pertaining to this problem is essential for change. As the age-old saying states, ‘knowledge is power and with power comes change’.

## REFERENCES

- [1] Murray, F., South African Food Service Industry Report 2016, <https://www.franchisedirect.co.za/information/southafricanfoodserviceindustryreport2016/> (accessed 13 November 2018).
- [2] Marx-Pienaar, N., Du Rand, G., Viljoen, A. & Fisher H., Food wastage: A concern across the South African quick service restaurant supply chain. *WIT Transactions on Ecology and the Environment* (ISSN 1743–3541) WIT Press, 2018. <https://doi.org/10.2495/wm180221>
- [3] Rada, E.C., Energy from municipal solid waste. *Energy Production and Management in the 21st Century*, **190**, pp. 945–957, 2014. <https://doi.org/10.2495/eq140892>

- [4] Oelofse, S.H.H. & Marx-Pienaar, N.J.M.M., Household food wastage. A case study of middle to high income urban households in the city of Tshwane. *Wastecon*, (1), pp. 51–56, 2016.
- [5] Food and Agricultural Organisation (FAO). Food wastage footprint: Impacts on Natural Resources. Summary Report. Rome: *Food and Agricultural Organisation of the United Nations (FAO), Natural Resources and management Department*, Rome, Italy, 2013.
- [6] Food and Agricultural Organisation (FAO). Definitional Framework of Food Loss. Working paper. *Save Food & Food Agriculture Organisation of the United Nations*, Rome, Italy, 2017.
- [7] WRAP. Consumer attitudes to food waste and food packaging. [online], available from [http://www.wrap.org.uk/sites/files/wrap/Report%20-%20Consumer%20attitudes%20to%20food%20waste%20and%20packaging\\_0.pdf](http://www.wrap.org.uk/sites/files/wrap/Report%20-%20Consumer%20attitudes%20to%20food%20waste%20and%20packaging_0.pdf) (accessed 26 November 2018).
- [8] Tatum, M., The global food waste scandal. [online], available from: <https://www.the-grocer.co.uk/home/topics/waste-not-want-not/the-global-food-waste-scandal/548612.article> (accessed 28 November 2018).
- [9] Marx-Pienaar, N.J.M.M. & Erasmus, A.C., Status consciousness and knowledge as potential impediments of households' sustainable consumption practices of fresh produce amidst times of climate change. *International Journal of Consumer Studies*, **38**(4), pp. 419–426, 2014. <https://doi.org/10.1111/ijcs.12111>
- [10] Ferreira, D., Marx-Pienaar, N.J.M.M. & Sonnenberg, N.C., Postmodern consumers' consciousness of climate change and actions that could mitigate unsustainable consumption. *Journal of Family Ecology and Consumer Sciences*, Special edition, pp. 13–24, 2016.
- [11] Handley, A., Varieties of capitalists? the middle–class, private sector and economic outcomes in Africa. *Journal of International Development*, **27**(5), pp. 609–627, 2015. <https://doi.org/10.1002/jid.3113>
- [12] Resnick, D., The political economy of Africa's emergent middle class: Retrospect and prospects. *Journal of International Development*, **27**(5), pp. 573–587, 2015. <https://doi.org/10.1002/jid.3110>
- [13] Popkin, B.M., Nutrition, agriculture and the global food system in low and middle income countries. *Food Policy*, **47**, pp. 91–96, 2014. <https://doi.org/10.1016/j.food-pol.2014.05.001>
- [14] Reardon, T., Tschirley, D., Minten, B., Haggblade, S., Liverpool-Tasie, S., Dolislager, M., Snyder, J. & Ijumba, C., Transformation of African agrifood systems in the new era of rapid urbanization and the emergence of a middle class. *Beyond a Middle Income Africa: Transforming African Economies for Sustained Growth with Rising Employment and Incomes*. IFPRI, Washington DC. <http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/130005>, 2015
- [15] Parfitt, J., Barthel, M. & Macnaughton, S., Food waste within food supply chains: quantification and potential for change to 2050. *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, **365**(1554), pp. 3065–3081, 2010. <https://doi.org/10.1098/rstb.2010.0126>
- [16] Vorster, H.H., Kruger, A. & Margetts, B.M., The nutrition transition in Africa: can it be steered into a more positive direction? *Nutrients*, **3**(4), pp. 429–441, 2011. <https://doi.org/10.3390/nu3040429>
- [17] Dhurup, M., Mafini, C. & Malan, J., Consumer responses to salient image attributes in restaurant selection in southern Gauteng, South Africa. *Mediterranean Journal of Social Sciences*, **4**(3), 283, 2013. <https://doi.org/10.5901/mjss.2013.v4n3p283>

- [18] Cant, M. & Erdis, C., *Incorporating Customer Service Expectations in the Restaurant Industry: The Guide to Survival*, 2012.
- [19] Mhlanga, O., Moolman, H. & Hattingh, Z., Expectations and experiences of customers in formal full service restaurants in Port Elizabeth. *African Journal for Physical Health Education, Recreation and Dance*, **19(4–2)**, pp. 1111–1122, 2013.
- [20] Petzer, D. & Mackay, N., Dining atmospherics and food and service quality as predictors of customer satisfaction at sit down restaurants. *African Journal of Hospitality, Tourism and Leisure*, **3(2)**, pp. 1–14, 2014.
- [21] Chinomona, R. & Dubihlela, D., Does customer satisfaction lead to customer trust, loyalty and repurchase intention of local store brands? The case of Gauteng Province of South Africa. *Mediterranean Journal of Social Sciences*, **5(9)**, p. 23, 2014.
- [22] Aarnio, T., & Hämäläinen, A., Challenges in packaging waste management in the fast food industry. *Resources, Conservation and Recycling*, **52(4)**, pp. 612–621, 2008. <https://doi.org/10.1016/j.resconrec.2007.08.002>
- [23] Holmes, T., SA's ferocious fast food appetite. *Mail and Guardian*, Online, <https://mg.co.za/article/2016-04-11-sa-has-an-appetite-for-fast-food> (accessed 26 April 2017).
- [24] Maharaj, Y., Fast Food Industry report South Africa: Is SA's love for fast food defying banting? *Insight Survey B2B Market Research*, Cape Town, 2015.
- [25] Gustafsson, K., Johnson, G., Smith, D. & Sparks, L., *Retaining Logistics and Fresh Food Packaging: Managing Change in the Supply Chain*, Kogan page Ltd: London, 2006.
- [26] Verghese, K., Lewis, H., Lockrey, S. & Williams, H., Packaging's role in minimizing food loss and waste across the supply chain. *Packaging Technology and Science*, **28(7)**, pp. 603–620, 2015. <https://doi.org/10.1002/pts.2127>
- [27] Bourlakis, M.A. & Weightman, P.W.H., *Food Supply Chain Management*, Blackwell Publishing: United Kingdom, 2004.
- [28] WWF. Food loss and waste: Facts and Futures. WWF South Africa, Online, [http://awsassets.wwf.org.za/downloads/WWF\\_Food\\_Loss\\_and\\_Waste\\_WEB.pdf](http://awsassets.wwf.org.za/downloads/WWF_Food_Loss_and_Waste_WEB.pdf) (accessed 2 February 2018).
- [29] Lipinski, B., Hanson, C., Lomax, J., Kitinoja, L., Waite, R. & Searchinger, T., *Reducing Food Loss and Waste*. World Resources Institute Working Paper, June, 2013.
- [30] Nahman, A. & De Lange, W., Cost of food waste along the value chain: Evidence from South Africa. *Waste Management (NY)*, **33(11)**, pp. 2493–5000, 2013. <https://doi.org/10.1016/j.wasman.2013.07.012>
- [31] Derqui, B., Fayos, T. & Fernandez, V., Towards a more sustainable food supply chain: Opening up invisible waste in food service. *Sustainability*, **8(7)**, p. 693, 2016. <https://doi.org/10.3390/su8070693>
- [32] Waste Resources and Action Programme. Household Food and Drink Waste in the United Kingdom, Online, [http://www.wrap.org.uk/sites/files/wrap/Household\\_food\\_and\\_drink\\_waste\\_in\\_the\\_UK\\_-\\_report.pdf](http://www.wrap.org.uk/sites/files/wrap/Household_food_and_drink_waste_in_the_UK_-_report.pdf) (accessed 26 October 2017).
- [33] Smil, V., Improving efficiency and reducing waste in our food system. *Environmental Sciences*, **1(1)**, pp. 17–26, 2004. <https://doi.org/10.1076/evms.1.1.17.23766>