

Determining issues affecting food waste: Case study of the South African meat processing industry

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Abstract

Within the manufacturing company, production planning is considered as a vital component, and it plays a crucial role in keeping the company's competitiveness in the market where the trend of competitors is increasing dramatically during the current decade. Additionally, production planning is a key player due to the high costs associated with the energy use, raw materials, and maintenance of product line. Over the current decade, the South African meat processing industry has experiencing a serious issues relating to meat supply shortage in the market. The main cause of this crisis has been largely attributed to ineffective production planning that could not meet the high demand from consumers. Consequently, this situation has negatively affected the business, the quality and throughput of the meat produced as well as the reputation of meat manufacturing industry. It is from this backdrop that this study aims to determine the issues of waste in South African food market. The red meat manufacturing industry in the province of Gauteng was used as a case study. The results revealed that supply chain networks; food policy and regulation; market infrastructure; consumer behaviour; operational capability; supply chain partnerships; Information technology; supply chain insecurity; food characteristics.

Keywords

production planning, meat processing industry, supply shortage.

I. Introduction

Since the existent of human beings' food and its production have been an important daily element of survival. The food processing sector is globally a critical key element for economic growth and wealth (Godfray et al., 2010). Hence, the production planning process is a key player for company's competitiveness and also meeting customers' requirements as well as expectation. This is due to the fact that production planning includes all the stages from the raw material to after-sale product. When the process is well-maintained it can assist in increasing food supply by meeting the customer's satisfaction and reducing customer's dissatisfaction. In light of this, decision makers in food processing companies are requires to efficiently and effectively manage all the phases associated with production process in order to avoid any setback in the market. Particularly for the food production industry which is vital to any national state.

II. Production planning

Production planning is one of the most important activities in manufacturing enterprises. Manufacturing companies normally prepare a production plan at the end of every financial year for the next year (Lopez and Roubellat; 2008). The plan is drawn with the objective of determining the number of goods to be generated for that financial year in order to meet the demand in the market. In light of this, the production plan is generally drawn for weekly, monthly, quarterly or even yearly basis in accordance with the customers demand. Additionally, Amponsah et al (2011) argue that production planning is always designed on the availability of resources and market demand during a certain period of time. Amponsah et al (2011) further informed that production planning main goal is solely based on satisfying customers' requirements such as the quality of the goods, delivery time, demand and supply. Furthermore, production planning is also drawn in order to efficiently and effectively meets customer demand in the market at a minimum cost (Amponsah et al., 2011).

The major task regarding production planning is to set up how production has to be conducted within a firm. A schedule or plan is designed in sense where all the detail regarding the activities to be conducted are determined and the way the resources of the company must be used in order to satisfy the plan. It should be noted that production planning is generally a complex task due to the different elements that need to be taken into account. Sometimes there is a complicated relationship between the activities and the production resources. This is due to the availability of resources that often are limited and have to be deployed as effectively as possible. It is also common that the production environment contains high levels of uncertainty that adds to the complexity of the problem. Lopez and Roubellat (2008) describe production planning as a process that involves different activities to be conducted within a manufacturing industry with the objective of managing and controlling the execution of the production process. The basic duty is to conduct the production process according to the plan whilst in the meantime trying to achieve the main goal set up by the firm. In this sense, production planning can be described as a critical component of the management of a business organisation due to the fact that it directly impacts on the performance of the company.

Planning also known as forethought is a step by step concept to develop a strategy to achieve an objective or goal and this is why planning is concerned with operating and coordinating a company's resources. The motive is to ensure there is a surplus of materials required in goods and services in order to satisfy all the customers' needs and demands (Bertrand et al., 1990; Slack et al., 2007). The purpose of planning is to ensure that the day to day operations in a company runs smoothly. This involves making decisions regarding future activities and events. Therefore it is vital for operation managers to know that all decisions are not the same they differ both in time perspective, the level of precision and detail required in order to make a decision (Jonsson, 2008). Planning can also be seen as a way of preparing and gathering all information that will be needed before a decision is made. Where in the planning phase you seek and identify all the best alternatives that can be used in further activities (Fleischmann et al., 2008).

III. Food demand management

For some time now demand management has been seen as a crucial element in the improvement of the supply chain (Croxtton et al., 2001, Cassivi, 2006, Walters, 2006, Zokaei and Hines, 2007, Rodriguez et al., 2008) for the most part in the circumstance of fresh, unpreserved and shifting customer goods at a faster pace. (Fearne and Hughes, 1998, O'Keefe and Fearne, 2002, 2008, Cadilhon et al., 2005, Adebajo, 2009), there has been a lot done theoretical and in practical work that has been done in order to enhance the supervision of demand from early as 1958 when Forrester (1958) worked on demand amplification to recent events when Corsten and Kumar (2005) studied Efficient Consumer Response (ECR) and Collaborative Planning Forecasting and Replenishment (CPFR) (Seifert, 2004) which focused on incorporating demand management, nonetheless the main objective has been on industrial manufacturing, food industry, well established supermarket and predominantly branded food manufacturers. Yet little to none investigations has been done in regarding to service marketplaces and fresh foods, where the features of the quantity demanded, and the amount of product supply are definitely diverse. This section of the paper aims to underline the issues shaped by ultimatum intensification in (fresh) food logistics network (Taylor, 2000, Simons et al., 2003, Taylor and Fearne, 2006) as well as the advantages of partnership (O'Keefe and Fearne, 2002; Duffy and Fearne, 2004; Fearne et al., 2006, Matopoulos et al., 2007). Furthermore, several other authors conducted literature based on demand management in the perspective of work on demand intensification Forrester (1958) and Burbidge (1961), to numerous papers unfolding the occasion of ultimatum intensification in diverse situations and business segments (e.g. Saporito, 1994, Lee et al., 1997, McGuffog, 1997).

The demand for more investigation into demand management was emphasized by Simatupang and Sridharan (2002) and Kaipia et al. (2006) once they saw the crack amongst supply and demand was instigating a costly issue in the supply chains that involved overstock, discounts, excess and disposal costs. In order for these losses to be avoided or minimized Taylor (2006) recognized the requirement for an additional organized and combined methodology to demand management throughout the food supply network, he also found out that there was no research publication based primarily on demand management in agriculturally food supply network. Forecasting happens to play a significant role in demand management. Wu et al. (2004) say that forecasting play an important role in overseeing the link concerning consumer request and produce flow. In addition, they also state that estimating is a worry anxiety in several organizations. Taylor and Fearne (2006) identified that any mistakes done in the forecasting process has a substantial negative effect on the production movement and supply network. Furthermore, Aghazadeh (2004) states that in the food industry supply chain forecasting is an important factor in improving the supply chain operations.

In addition to what is currently happening in the food sector in specific the ongoing challenges of forecasting, the lack of research in forecasting has been identified, there is a substantial space within the literature on supply chain based

particularly at branded food traders. Furthermore, in accumulation to the contests based on inexact estimating, the growing use of advertisings in the food sector in the UK is a basis of included demand management difficulty. Gilbert (1999) defines sales advertising as something that is a motivation and encourage a favorable consequence and in the future (Gilbert and Jackaria, 2002) categorized UK hypermarket advertisings into “worth accumulative” (i.e. coupons and price deals) and “worth including” (e.g. loyalty cards, rewards, tasters or gifts) advertisings. One of the major issues in manufacturing inadequacies, overflows or shortage in stock and bad customer service is advertising in the UK food industry Adebanjo and Mann (2000) the study furthermore shows the necessity for additional emphasis and study on predicting for advertisings. Additionally, research that was done by Childerhouse and Towill (2000) and Barratt (2004) have seen that predicting for campaigns is a larger challenge than predicting for non-promoted goods. Barratt (2004) say that numerous firms don’t understand why their fail when it comes to promotional forecasting. This paper makes an effort to make available additional perception into the ongoing challenges of demand management and, in specific, forecasting and advertising forecasting. The emphasis on an interchange firms enables the review of this conception on a unique business model (i.e. manufacturer-trader-retailer) in association to the more usually researched manufacturer retailer model.

III.1. The current situation of food supply

Over the past decades the demand for food has increased and now we at a place where human consumption is 30% greater than nature’s ability to regenerate (Staniskis, 2012). The main cause of this is the overflow of human population. The population has drastically grown from 2.53billion in 1950 to about 7.32 in 2015 (Statista, 2015) and because of this increase the amount of food needed has tripled.

For this reason, the food supply chains (FSC) that was being exercised then is no longer capably to handle demand, hence they need to be reformed. Folkerts and Koehorst (1998) describe food supply chain as “a set of mutually dependent groups that work in sync to manage the movement of goods and services alongside the value-added chain of farming and food products, in order to achieve outstanding consumer value at the minimum expenses.” As a result of globalization, FSC are increasing and because of this cross-border relationship are becoming more necessary (Folkerts and Koehorst, 1998), but then again greater amounts of food manufacturing are necessary to feed the population. With this being said the more firms being created for mass production courses more harm to the environment (Nellemann et al., 2009).

Attention brought to the environment with regard to supply chain management known as sustainable supply chain management (SSCM). The problem comes in when you try to incorporate the two theories of supply chain management and sustainability (Touboulic and Walker, 2015), for instance, Seuring and Müller (2008) outlined SSCM as “the management of resource, statistics and investment flows in addition to collaboration between corporations along the supply chain at the same time taking aims from all three dimensions of maintainable growth, specifically; financial, ecological and social, into account which are derived from consumer and shareholder requests.” This explanation concisely features three main characteristics:

- ✓ Collaboration among the members of the supply chain,
- ✓ The Triple Bottom Line (TBL) and
- ✓ Consideration to the supply chain stakeholders.

To accomplish SSCM under the difficult conditions of the food supply chain’s altering requirements; the focus of sustainable consumption and production (SCP) has to be taken into account. Food and farming structures have transformed in the past years and this has an effect on consumption and manufacturing patterns (Haen and Requillart, 2014). SCP main goal is maintainable growth in particular; its aim is having more cost-effective production at the same time consuming smaller quantity of resources in addition to enhancing value to the goods during which less pollution and waste is being created in the process. Furthermore, these processes will assistance in accomplishing the needs of the customers with less power, water, or waste (Department for Environment, Food and Rural Affairs, 2003). For this reason, SCP was described by the UK Department for Environment, Food and Rural Affairs as “an incessant economic and social development that regards the borders of the earth’s environments and meets the requirements and ambitions for everyone in regards to a better life not just for now but also for upcoming generations.” Previously, SCP was the talk of the town. At the Rio Earth Summit in 1992, world leaders stated that one of the key reasons for the decline in global environment was because of unmaintainable pattern of consumption and production (UN, 1992). At the Rio+20 conference that took place in 2012, the world leaders adopted a 10-Year framework of programs to develop the global collaboration and to assistance in the initiatives with regard to SCP in emerged and in emerging nations. It

was also identified that with the intention of attaining maintainable growth, SCP will have to have a greater priority (Akenji and Bengts-son, 2014).

III.2 Dynamics of food production planning (The food market)

Over the past decades, customers favored raw and fresh foods over preserved and packaged (Goyal and Singh, 2007; Pysarchik et al., 1999; Ling et al., 2004; Shaw et al., 1993). With the development of hypermarket and supermarket culture, the customer first choice of parcelled food goods has improved considerably in the recent years (Silayoi and Speece, 2004). However, the divergence between taste of urban and countryside consumers is unceasingly declining (Shrivastava and Praveer 2009). In various ways, countryside customers have quite diverse ingesting as well as shopping pattern than urban customers. There are vast opportunities for the retailers that can be encashed if they go into countryside markets with appropriate formats in order to serve the countryside customers. The main aspects such as improved purchasing power of the customer in a thriving economy, altering lifestyle, better readiness to try with new products and flavours, desire for suitability in packaged food goods and a growth in the amount of employed females have led to the intense development in ingesting of parcelled food goods (Goyal and Singh, 2007). In addition, urban customers have been gradually reacting towards modifications in excellence food consumption and becoming extra conscious in relations to dietetic diet, healthy living and food security matters. To meet these embryonic trends, retailing is undertaking extraordinary revolution with a number of national and multinational organizations trying to seize the enormous and exponentially rising customer market.

Consumers have lost trust in conventional products and are now opting to go with a more healthy living and this is why organic farming is becoming popular day by day, for example (Yona Sidere, et al,2005) states that this is because of what has been happening over the decade furthermore the growing nervousness when it comes to the utilization of insecticides in agricultural and antibiotics in livestock food (Yona Siderer ,Alain Maquet , 2005). The increasing in carbon-based farming comes from a diversity of rationales: (1) to reserve the meriting ability of farmers in order to feed a world that need fewer manufacturers to feed the well-nourished portion of the world's inhabitants.; (2) to reserve rural area surrounding; (3) to use agriculture techniques that will preserve the soil and play a role in sustainability (Mayfield, Holt, & Tranter. 2001).The aforementioned components supplies are integrated with the ever increasing demand due to well-being uncertainties as stated above. Nonetheless the prospective consumer does not get the recognition they deserve this comes from the overall advertising entitlements and the public observation of natural food goods, consequently the trade in organic food is growing, however the market demand is not steady (Hamm, 2001).

European is one of the emerging markets when it comes to organic food and other countries are slowly following as well. The desire for more healthy food is increasing in EU and North America has also doubled in the last decade; these are the two core organic food markets (Willer and Kilcher, 2011).The growing significance of the natural food industry is possibly a consequence of superior curiosity in both a nutritious and nontoxic diet and an enhanced surroundings (Squires et al., 2001; Zanolini, 2004; Knudson, 2007). Nonetheless, foreseeing forthcoming improvement of the organic food market is a hard duty, granted nearly total non-existence time-series statistics on manufacture capacities, and additional market statistics, such as national and external exchange. The sector extension in the first period of this century and the latest improvements of farming policy have impacted to the intensification in the hesitation concerning how the sector will affect its own forthcoming in the light of historical development, present and upcoming economic cycles, and policy modifications. Identifying this non-existence of data and the absence of adequate accord in the middle of researchers (Zanolini et al., 2000; Gambelli and Zanolini, 2004) on what might influence the forthcoming of the organic sector, an explorative 'managerial' method to situation investigation has been implemented.

This depends on instinctive reasoning and biased valuations and discriminations of a particular collection of specialists who are selected from the midst influential organic sector shareholders and students (van der Heijden, 1996; van der Heijden et al., 2002) There is an increasing structure of verification that econometric models are not a vast assistance in the industry of expectation (Makridakis et al., 1982, 1993; Taleb, 2010) although it has been disclosed that "statistical sophisticated approaches or difficult approaches do not unavoidably offer additional precise predictions than humbler ones"(Makridakis and Hibon, 2000). The detail is that "the expectedness of essentially all intricate methods influencing our lives is low, while the hesitation encompassing our forecasts cannot be dependably assessed" (Makridakis and Taleb, 2009). Human judiciousness can be exhibited to deliver a significant benefit to predicting correctness but it can as well be subject to wide prejudice, which has a tendency to be decrease when predicting is done as a collective (Snizek, 1989, 1990; Ang and O'Connor, 1991). Nevertheless, there is massive confirmation that

illustration that hypercritical predicting can be as unscrupulous as the more mechanical geometric models (Makridakis and Taleb, 2009). Contrasted to the high-level of misconception connected with all forms of point or possibility predicting, situation examination offers a redundant, methodical method that – when some circumstances are encountered – can be far less prone to what Orrel and McSharry (2009) titled the ‘heartening delusion of control’. Situation examination does not effort to deliver predictions, but merely products explanatory, redundant descriptions that try to take into consideration the impression of low possibility, high-impact proceedings, that can turn out to be extremely risky, as was exposed by the 2007/2008 subprime and credit crunch. (Wright and Goodwin, 2009)

IV. Results

IV. 1. Food characteristics

Four substances, perishability, quality variation, seasonality, and bulkiness, are extremely connected to the challenge Food characteristics and signify the natural physiognomies of goods. Fresh products are bulky and unpreserved. Bulkiness bring about complexity in physical handling and distribution and perishability limits the marketable life of the products, the time period over which it can be processed, and the capability to stock it (and, in that way, the capability to balance supply and demand over time). Perishability also decreases the manufacturers haggling power with consumers (particularly, with those who have alternate supply sources), and causes quality worsening during shipping and packing, therefore demanding that the produce be graded for quality at each step, and in so doing, rising transaction price). The goods demonstrate quality difference from unit to unit and from one resource stage to other. Furthermore, both the quality and quantity of products at agri-food manufacturing phase is prone to climate conditions. Food characteristics therefore play as a test hindering the decrease of waste.

IV.2. Supply chain insecurity

Four elements, demand insecurity, supply insecurity, cost insecurity, and process insecurity, are extremely connected to the challenge Supply chain insecurity and they signify the insecurity present in AFSC. In South Africa, phases in AFSC are uninformed of inventory policy of other phases. There is a shortage of scientific method in establishing reorganization quantity and bunch size of the goods, which is vital, given that the goods varies in shelf lives and have diverse supply and demand designs (Joshi et al., 2009). Additionally, natural outcomes (e.g., harvest damage caused by unfavourable climate or pest) and human performance (e.g., lack betting) adds to supply and process insecurity. In India, food grains have least support costs set by the government. The government is the main consumer of grains and retails them in wholesale storehouses at endowed taxes. The set price of the fresh goods, nevertheless, rest mainly on supply and demand. Supply chain insecurity therefore acts as a test hindering the decrease of waste.

IV. 3. Information technology

Four elements, absence of scientific knowledge, absence of pursuing technology, absence of communication, and absence of technical support, are extremely connected to the challenge Information technology and they signify (mainly) the absence of use of information technology in South African food manufacturing sector. Agri-food has a habit of having various challenges to determine (or study) - quality characteristics. It is also challenging to measure the value allocated to these characteristics by the customers. This generates a challenge for educational grading and classification of goods (with, for instance, the subject matter and nutritional value). Information technology smooths the progress of communication among supply chain phases and enhances decision-making (for example, by use of mechanized demand estimating). Manufactured goods tracing permits one to establish the condition the goods is, at any point of time (Rijswijk and Frewer, 2008). Incessant observing of the leftover shelf life of goods allows appropriate actions to be taken before the quality of goods falls lower than a satisfactory level.

IV.4. Supply chain partnerships

Four items, absence of organization, absence of trust, absence of collaboration, and absence of supply chain contracts, are extremely connected to the challenge Supply chain partnerships and they signify the absence of supply chain co-operation in South African food market. The South African food manufacturing comprises of numerous loosely combined players with a huge number of intercessors among manufacturers and customers. Retailers or commission managers link unorganised traders with agriculturalists and there is much statistics irregularity. Supply chain contracts among phases decrease the effects of supply and demand variations but are lacking. There are very insufficient

consumers in most areas and the minor, discrete manufacturers face a condition of anticompetitive competition and a lack of forward incorporation. An organization difficulty exists as the reaping program for diverse traders do not intersect but vary over time. Absence of supply chain partnership therefore acts as a challenge hindering the decrease of waste.

IV. 5. Operational capability

Four items, insignificant harvesting preparation, inadequate transportation preparation, inadequate packaging effectiveness, and insignificant packing facility, are extremely connected to the challenge operational capability and they signify the functioning disorganization. Agri-food manufacture in India is dispersed over a big environmental area. The random manufacturing outline of the numerous small agriculturalists adds to the struggle of collecting crop information. As a result of the size of India, and its miscellaneous population and food customs, collecting statistics considering customer preferences is also hard, consequently outcomes in insignificant harvesting development, and frequently overflow/lack of agri-food. The above elements also add to insignificant transportation scheduling and possibly great transportation price. Furthermore, the amount produced of a small manufacturer makes an investment in packing amenities or standardised containers unappealing (which in turn raise handling events and quality examinations activities, involving extra transaction price). Operational disorganization therefore acts as a challenge hindering the decrease of waste.

IV. 6. Consumer behaviour

Four items, absence of consciousness, customer attitude, customer behaviours, and consumerism, are extremely connected to this challenge and they imitate the behavioural characteristics of the customer in food market. At the customer end, food waste happens for a number of combined reasons, which differ depending on the performance of household customers (Parfitt et al., 2010). These consist of, an absence of consciousness, purchasing in surplus of need, inappropriate food packing,

IV.7. Market infrastructure

Three elements, insufficient market structure, absence of processing resource, and absence of cold chain and packing, are extremely connected to the challenge market infrastructure and they signify the absence of market structure resources in South Africa. In South Africa, the existing cold packing volume is 32 million metric tonnes despite the fact that its authentic requirement is 61 million metric tonnes. Furthermore, non-refrigerated automobiles transport a huge amount of unpreserved food items (Balaji and Arshinder, 2016). India processes an extremely tiny sum of the food that it produces (relative to other emerging countries). Private investment in current processing, packing, shipping and trading resources is absent as a result of the huge unit functional priced in the primary years, in conjunction with the hesitation about upcoming agri-food supply. Absence of market structure therefore acts as a challenge hindering the decrease of waste.

IV.8. Food policy and regulation

Three elements, insufficient food policy, inadequate regulatory outline, and absence of quality & safety methods, are extremely connected to the challenge food policy and regulation and signify the insufficient food policy and regulatory characteristics. Food policies and regulations address quality and security of goods, economic support, and consciousness program. In India, the information applicable to the quality of goods is not obtainable at any step. There is an absence of consciousness of procedures for quality control and of standards (Shukla et al., 2014). Furthermore, the rigorous wellbeing, safety and value standards requisite by foreign consumers, and the cost inducement proposed by them for quality goods, consequence in the export of the finest quality goods. Insufficient food policy, rule, and its consciousness therefore act as a challenge hindering the decrease of waste.

IV.9. Supply chain networks

Three elements, incompetent obtaining channels, incompetent distribution systems, and incompetent transportation systems, are extremely connected to the challenge supply chain networks and signify the inefficiency in supply chain systems. India's worldwide logistics performance directory has dropped from 37 in the year 2007, to 54 in 2014. This is as a result of incompetent permission process (missing straightforward and foreseeable formalities), inadequate

quality of distribution infrastructure (harbours, rail line, infrastructures, information technology), and insufficiency of quality logistics facilities (LPI, 2014). The condition of infrastructures in most parts is bad. Attributable to geologically dispersed manufacturers, the gathering of goods is an expensive process. In a number of areas, particularly in the Northeastern part of the country, the agriculturalist must travel in excess of 50 km to get to the market. Incompetent supply chain network therefore acts as a challenge hindering the decrease of waste in food supply chain.

V. Conclusion

Within the manufacturing company, production planning is considered as a vital component, and it plays a crucial role in keeping the company's competitiveness in the market where the trend of competitors is increasing dramatically during the current decade. Additionally, production planning is a key player due to the high costs associated with the energy use, raw materials, and maintenance of product line. Over the current decade, the South African meat processing industry has experiencing a serious issue relating to meat supply shortage in the market. The main cause of this crisis has been largely attributed to ineffective production planning that could not meet the high demand from consumers. Consequently, this situation has negatively affected the business, the quality and throughput of the meat produced as well as the reputation of meat manufacturing industry. It is from this backdrop that this study aims to determine the issues of waste in South African food market. The red meat manufacturing industry in the province of Gauteng was used as a case study. The results revealed that supply chain networks; food policy and regulation; market infrastructure; consumer behaviour; operational capability; supply chain partnerships; Information technology; supply chain insecurity; food characteristics.

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