Production Planning and Customer Satisfaction in Table Water Companies in Edo State

Dr. Bernard Elaho[*]   Dr. Jones Ejechi
Department of Business Administration, Faculty of Management Sciences,
University of Benin, Benin City, Nigeria

Abstract
Purpose**:** This study aims to model the relationship between production planning and customer satisfaction in selected table water companies in Edo State. The production planning strategies analysed in this study were demand forecasting, aggregate planning, capacity utilizations and quality control; with the following dimensions in focus: product quality, product brand, availability of products, lead time and satisfaction with sales process.This study adopted a cross-sectional survey design approach. The population for this study comprised all registered table water companies in Edo State (527) and a random sample of two hundred (200) customers of table water companies in Edo State. Two (2) different sets of questionnaire were distributed to two hundred and twenty seven (227) production managers of Table water companies in Edo State and two hundred (200) randomly selected retailers of table water companies. Data collected was analyzed with descriptive statistics and then Structural Equation Modelling (SEM) software – Smart PLS (Partial Least Square) was used for model estimation. The study found out that production planning in Table water companies in Edo state does not have a significant influence on customer satisfaction. It was also discovered that out of four production planning methods (aggregate planning, capacity utilization, demand forecasting and quality control) only one (aggregate planning) had a positive and significant influence on customer satisfaction as it pertains to product quality, product brand, satisfaction with sales process, lead time and availability of products. This study presents an attempt to implement production planning techniques in table water companies in Edo state, Nigeria, with a bid to improve customer satisfaction.
Keywords: Production planning, Customer satisfaction, Table water companies, aggregate planning.
DOI: 10.7176/EJBM/11-17-08
Publication date: June 30th 2019

1. Introduction

The table water industry is one of the most competitive markets in Nigeria today. Due to the portability and affordability of table water, one sees it as a lucrative trade to venture in. However, this has also led to the proliferation of mushroom table water companies and has made it difficult for some companies to maintain their customer base. According to Gallo (2014), it is a lot easier to maintain an existing customer than getting a new one. It is this notion that drives pioneer table water companies to fight hard to remain relevant in the system and retain their existing customers. Despite this d rive to maintain existing customers and reach out to new ones, there are still some salient issues hampering the flow of products in the pure water business. These issues include delay in product delivery, low availability of products, poor quality of products, and dissatisfaction with sales process among others.

Another issue is that there is a dearth of empirical literature on implementation of production planning and customer satisfaction in table water companies (Adetayo, Dionco-Adetayo and Oladejo, 2004). Therefore, the need to further explore the influence of concept of production planning and customer satisfaction as it relates to table water companies.

The specific objectives of this study are to examine the extent to which aggregate planning affects product quality, product brand, availability of products, satisfaction with sales process and lead time ,evaluate the extent to which quality control affects product quality, product brand, availability of products, satisfaction with sales process and lead time, assess the extent to which demand forecasting affects product quality, product brand, availability of products, satisfaction with sales process and lead time, investigate the extent to which capacity utilization affects product quality, product brand, availability of products, satisfaction with sales process and lead time and to determine if there is a significant relationship between production planning and customer satisfaction in table water companies.

2. Literature Review

Very few studies have been carried out on customer satisfaction and production planning (Adetayo, Dionco-Adetayo & Oladejo, 2004) while a great number of studies have been carried out on customer satisfaction in manufacturing industries. This study highlights the relevant factors influencing customer satisfaction and the various activities of production planning.

2.1 Production planning

According to Gavett (1973) production planning is a systematic process that involves the specification of how firms deploy their production resources in such a way that will satisfy their short term and long term forecast. According to Buxxey (1989) it is the forecasting of future demands for products of a company and at the same time capturing the midterm to long term production resources with the aim of satisfying customer demand. In other words, an effective and efficient combination of human and non-human resources is expected to lead to a satisfaction of customers' expectations.

Chase and Aquilano (1977) explained that in satisfying customers' expectation, firms usually position themselves in two ways. In some cases they could be passive by merely responding to customer's demand for a product or active by influencing customer's demand for the product.

Importance of Production planning

Production planning makes provision for proper plant layout, resource utilization, material management, machine maintenance thereby resulting in qualit, productivity, profit and customer satisfaction (Dametew & Kitaw, 2017).It helps in reducing operational cost, optimization of resources and improving customer service (Mehta, 2004). Another benefit of production planning is that it helps in harmonizing sales and services in line with customers' expectation and demand (Slack, Chambers & Johnston, 2007) and gives provision for unexpected changes in client's demands and tries to fulfil these changes within the time stipulated by the clients (Lopatowska, 2015).

However Adegbuyi and Asapo (2010) summarized the importance of production planning as providing capacity to meet up with customer's demand, making sure there is steady flow and communication between all departments involved in production process, providing necessary guidelines for manufacturing, making sure the working environment is conducive enough for the employees, making sure work load is evenly distributed and finally providing supervision to ensure that delays and failures are curtailed.

The main activities in production planning can be grouped into aggregate production planning (APP), materials requirement planning (MRP), master production schedule (MPS) and capacity planning (CP) (Dametew, Kitaw, and Ebinger, 2017). These activities can further be classified into quality control (QC), demand forecasting (DF), aggregate planning (AP) and capacity utilization (CU) (Adetayo, Dionco-Adetayo and Oladejo, 2004).

2.1.1 Aggregate planning (AP): Aggregate planning (AP) is a midterm capacity plan that determines the overall levels of product output, inventory and work force in order to meet up with requirements for the next 6 to 18 months on a weekly / monthly basis in line with the business plan of the company (Chopra & Meindl, 2010; Ramezanian, Rahmani & Barzinpour, 2011). According to Dametew and Kitaw (2017) AP is responsible for the minimum cost of workforce and production plans that are required to meet the demands of customers. They summarize the inputs of a typical AP as resources, demand forecast and employment policies while its final outputs are production quantity and inventory level. According to Cheraghalikhani, Khoshalhan and Mokhtari (2019) AP is responsible for customer satisfaction level as it measures the organization's ability to meet the demands of its customers.

2.1.2 Quality control (QC): Quality control can be defined as actions taken by manufacturing organizations to make sure items are produced with maximum quality (Judi, Jena & Genasan, 2011). Quality control is one of the most important practices in production. However, in production planning, quality control practices are usually embedded in the materials requirement planning activity, also known as the MRP. According to Hasson (2014), MRP determines the number of parts, components and materials required to manufacture a product. It provides updated information on which parts, components and material be ordered or produced. According to Ding and Yuen (1991), the main objectives of a good MRP are to make sure materials are available in right quantity and right time, to make sure priorities are maintained by updating records when customers change orders or there is a change in raw materials required and finally to schedule delivery when required.

2.1.3 Demand forecasting (DF): Forecasting is usually referred to as a planning tool used by companies to plan for uncertainties with aid of historical and present data for predicting future trends (Hyndman, 2009). According to Kalchschmidt (2007), demand forecasting involves estimating the demands of future customers with the help of past data. In other words an effective demand forecast increases the availability of products to consumers and helps to lower inventory levels across the supply chain. According to Xiong, Li, Bao, Hu and Zhang (2015), demand forecasting is very crucial in production planning and inventory management and techniques associated with it could either be informal and formal depending on the complexity of demand from customers. However, in production planning strategy the Master Production Schedule (MPS) takes care of forecasting issues. According to Hong-Mo Yeh (2003) the objectives of MPS is to serve as a link between expected production and actual production and it is mainly responsible for determining capacity and the required resources for production.

2.1.4 Capacity utilization (CU): According to Shahidul et al (2013), capacity utilization is the degree of usage of the production capability of a plant or firm to produce goods and services. Capacity utilization depends on demand conditions, labour challenges, plant and equipment maintenance, power supply challenges amongst others. Carvalho, Scavarda and Oliveira (2017) further defined capacity utilization as the balance between demands placed on processes and the ability to meet up with these demands. In other words when capacity of the operation is too

low, resources will be underutilized and when capacity is too high resources will be over utilized . Adetayo, Dionco-Adetayo, E. A.and Oladejo,Adeo (2009) pointed out that capacity utilization played a significant role in increasing customer satisfaction in manufacturing industries.

2.2 Customer satisfaction

According to Tse and Wilton (1998) and Oliver (1999), customer satisfaction is an assessment of the perceived difference between the expectations of customers and the actual delivery and performance of a service or product. In other words, it is a perceived evaluation of an on-going performance (Gustafsson, Johnson & Roos, 2005).

According to Eshghi, Haughton and Topi (2007) and (Sheth, 2001) customer satisfaction has led to the building of strong business brands which in turn has helped in acquiring new and prospective customers in that an increase in customer satisfaction leads to profitability and growth of business This profitability could be in terms of referrals, customer's willingness to pay for goods and services at a higher price and increased patronage of a product (Anderson & Mittal, 2000).

Factors affecting Customer satisfaction: According to Redwanuzzaman, Masud-Ul-Hasan and Rahman (2014), there are reasonable evidences that there are salient factors that affect customer satisfaction in businesses in several ways. According to Zamazalova (2008), Arefi *et al* (2014) and Steinhart, Mazursky and Kamins (2013) several determinants of customer satisfaction include: identified quality and innovation, service and support, delivery scheduling, price and utility, customer loyalty and corporate image. However, customer satisfaction determinants that are common in table water companies include: product quality, lead time (waiting time), product brand, satisfaction with sales process, availability of products amongst others.

2.2.1 Product Quality: Product quality can be defined as the ability to produce a perfect product on the first attempt (Parasuraman, Zeithaml & Berry, 1985). As regards customer's satisfaction, quality can be further defined as the perceived value a customer has on a product on first purchase (Zeithaml, 1988). In line with the above statement, Jahanshahi, Gashti, Mirdamadi, Nawaser and Khaksar (2011) are of the opinion that customers will consider a product to be of good quality and will continue to purchase it if it meets their expectations. Mendie (2005) argues that what determines the quality of water are the physical parameters like taste, colour, odour and presence of particles. Hence, to maintain customer satisfaction management of table water companies needs to ensure that water of high quality is produced on a daily basis.

2.2.2 Product Brand: The product brand of a company is the perception customers or consumers have of it. It defines what the company can do and what it cannot do. A product that does not appeal to a customer is characterized as a bad product and this goes a long way to affect the brand (Alamgir, Nasir, Shamsuddoha & Nedelea, 2010).Also customers who is satisfied with a product or service is likely to remain loyal to the company or brand (Agbor, 2011). For example, in table water business, customers are particular of the quality of water, labelling and its packaging. These have the potential of creating either a negative or positive impression in the mind of the customer. Knowing fully well that the brand can influence the purchase intention of a customer organizations need to investigate the satisfaction level of their respective customer in the market. (Wang *et al*. 2016).

2.2.3 Availability of Products: According to Goldsmith (2002); Moutinho and Bian (2011) availability of products usually increases the purchase and re-purchase intention of customers. The availability of a product and quality of service of a company is directly dependent on its inventory management (Bhausaheb & Routroy, 2010). That is to say that a company with an effective inventory management system will ensure that there is a constant supply of resources and products for continuous business operation (Thogori & Gathenya, 2014). As long as inventory levels are high, more products will be made available to customers. Hence customer's satisfaction will be achieved (Cachon & Terwiesch, 2008). On the other hand, if inventory level is too high, the problem of over stocking emerges and this could lead to wastage. In most cases, it could also cause a reduction in freshness of products leading to customer dissatisfaction (Alferoff & Knights, 2008).

2.2.4 Lead time: According to Mfwaya (2013), supply chain lead time is defined as the time from when the customer places an order (the moment you learn of the requirement) to the time it is received by the customer. According to Wilding (2003) customer satisfaction is guaranteed when suppliers deliver orders within the stipulated time. However, the duration of lead time is dependent on all operations within a facility and it also varies depending on the type of organization (Spitter, De Kok & Dellaert, 2003).

There are several factors that affect lead time in manufacturing organizations. According to Mae and Ohno (2012), machine failure can have a negative effect on the lead time in a manufacturing process. The time taken to repair a machine will increase production lead-times. Another factor is the increase in distance between customers and producers. Products may be available for supply but an increase in distance could lead to a further increase of the time it will take for customers to receive products ordered for.

2.2.5 Satisfaction with sales process: According to Dvorakova & Faltejskova (2016), for a customer to be satisfied with sales process the needs of customers have to be considered throughout the design, production and delivery stages of products and services. However, the needs and expectations of customers are not only limited

to improving quality, the sales process has to influence the customer positively in order for the customer to be satisfied. During the sales process, it is important for companies to take into account all the specifications and requirements i.e. quantity, type, delivery schedule among others in other to satisfy their customers (Girgenti, Pacifici, Ciappi & Giorgetti, 2016).

2.3 Production planning and customer satisfaction: Researchers believe that there is a link between production planning and customer satisfaction and that an improved production processes is likely to create better services which promote improved customer satisfaction and return on investment (ROI) (Christopher & Lee, 2004). Below are the relationship between production planning and some common factors responsible for customer satisfaction in a manufacturing industry:

Production Planning and Lead time: In a production planning process, lead time is dependent on the planning and scheduling activities. According to Giordano and Schiraldi (2015) for there to be improved flow in a production process, lead time needs to be properly managed with the aid of WIP (Work in Progress) inventory reduction. This will assist in reducing the production lead time, increase flexibility, reduce costs and increase quality. They further argued that lead time is directly dependent on stock inventory and that an increase in stock inventory will lead to an increased lead time.

Production planning and Product quality: Production planning control functions consist of an inspection activity which serves as a control measure by verifying the quantity of products. It is responsible for bringing products to standards (Sharma, Sharma & Sharma, 2014). In a bid to guarantee quality products for customers, manufacturers have no other choice than to incur additional cost. It is therefore necessary for firms to strike a balance between the cost incurred as a result of loss in sales due to customer's dissatisfaction with a product's quality and the cost in making sure products are produced to standard (Madadi & Wong, 2013).

Production planning and availability of product: The availablily of a product is dependent on the level of stock avaiable in the inventory (Thogori & Gathenya, 2014). According to Mpwanya (2005) inventory management ensures that organizations hold inventories at the lowest cost possible and by the same ensuring that the company has adequate and uninterrupted supplies. High inventory levels however lead to both stock holding costs and in-store logistics errors. This is because it becomes difficult for the employees to perform shelving and replenishment which makes goods physically available in the store but the employees cannot trace those products (Ton & Raman, 2005). On the other hand, low inventory levels reduce holding cost but if not controlled can lead to shortage in supply to customers.

Production planning and satisfaction with sales process: The availablily of a product is dependent on the level of stock avaiable in the inventory (Thogori & Gathenya, 2014). According to Mpwanya (2005) inventory management ensures that organizations hold inventories at the lowest cost possible and by the same ensuring that the company has adequate and uninterrupted supplies. High inventory levels however lead to both stock holding costs and in-store logistics errors. This is because it becomes difficult for the employees to perform shelving and replenishment which makes goods physically available in the store but the employees cannot trace those products (Ton and Raman, 2005). On the other hand, low inventory levels reduce holding cost but if not controlled can lead to shortage in supply to customers.

2.5.Research model and hypotheses formulation

Based on the review of existing literature, a model was proposed for the relationship between production planning and customer satisfaction as shown in Figure 1. The model describes how the various production planning techniques (Aggregate planning, quality control , capacity utilization and demand forecasting indirectly influence customer satisfaction via lead time, product brand, product quality, satisfaction with sales process and availability of products. The following hypothesis were thus derived below:

H_{o1} There is no significant relationship between aggregate planning and availability of products (Ho_{1a},), product quality (Ho_{1b}), satisfaction with sales process (Ho_{1c}.), product brand (Ho_{1d}.) and lead time (Ho_{1e}.)

H_{o2} There is no significant relationship between quality control and availability of products (Ho_{2a},), product quality (Ho_{2b}), satisfaction with sales process (Ho_{2c}.), product brand (Ho_{2d}.) and lead time (Ho_{2e}.)

H_{o3} There is no significant relationship between demand forecasting and availability of products (Ho_{3a},), product quality (Ho_{3b}), satisfaction with sales process (Ho_{3c}.), product brand (Ho_{3d}.) and lead time (Ho_{3e}.)

H_{o4} There is no significant relationship between capacity utilization and availability of products (Ho_{4a},), product quality (Ho_{4b}), satisfaction with sales process (Ho_{4c}.), product brand (Ho_{4d}.) and lead time (Ho_{4e}.)

Ho_5.   There is no significant relationship between production planning and customer satisfaction.
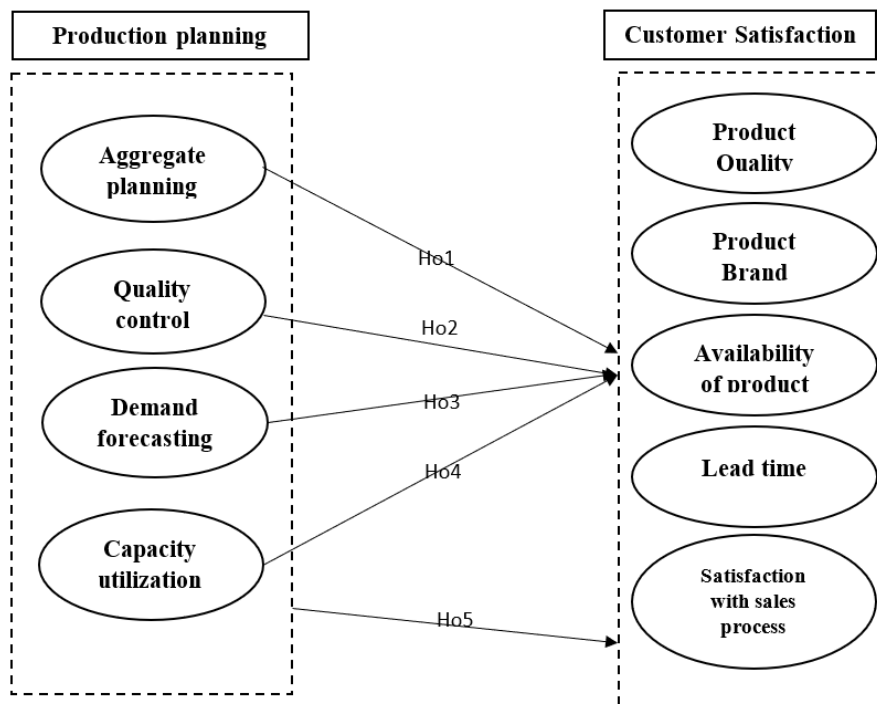
Fig 1: Conceptual framework of the relationship between production planning and customer satisfaction.

3 Methodology

This section describes the methods adopted to determine the impact of production planning on customer satisfaction in selected table water industries in Edo State.

This research adopted cross-sectional survey research design because the study is a descriptive one, describing a population or subgroup within the population with respect to an outcome (Levin, 2006). It is also essential for predicting behaviour of respondents. This study made use of two target populations. The first target population comprised all registered table water companies in Edo State. The number of registered table water companies in Edo State according to the guidelines and regulations of the National Agency for Food and Drug Control is approximately five hundred and twenty-seven (527).

The sample size for the above population was determined with the aid of Yamane's formula using a 95% confidence level and a 5% error tolerance as seen below:

$$n = \frac{N}{1+N(e^2)}\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.0$$

Where n = sample size, N = population = 527, e = level of significance = 0.05

$$n = \frac{N}{1+N(e^2)} = \frac{527}{1+527(0.05^2)} = 227.40 \approx 227$$

Hence, the sample size is approximately two hundred and twenty-seven (227)

A non-probability method like convenience sampling was later used to administer questionnaires to Production managers of selected table water companies in Edo State. The second target population was an infinite one as it concentrated on all customers of table water companies in Edo State. Hence the sample size was determined through convenient sampling of 200 customers of table water companies in Benin City.

The model for this study is an adaptation of the models of Arefi *et al.* (2014), Daragai (2017) and Dametew and Kitaw (2017). In this study the researcher has decided to adopt quality of product, product brand, satisfaction with sales process (Daragai, 2017) and lead time (Arefi *et al.*, 2014). Availability of products will be tested to determine its significance to customer satisfaction. The five variables serve as dependent variables while the production planning activities - aggregate production planning, quality control, demand forecasting and capacity utilization as independent variables. The relationship between variables are shown in in the model below:

PRQ= (AP, DF, QC, CU) …………………………………………………….3.1
PRB= (AP, DF, QC, CU) …………………………………………………….3.2
AOP= (AP, DF, QC, CU) …………………………………………………….3.3
LDT= (AP, DF, QC, CU) …………………………………………………….3.4
SSP= (AP, DF, QC, CU) …………………………………………………...3.5

Mathematically, the models as specified as follows:

$PRQ_i = \propto_0 + \propto_1 AP_i + \propto_2 DF_i + \propto_3 QC_i + \propto_4 CU_i + \varepsilon_i$...........................3.6

$PRB_i = \beta_0 + \beta_1 AP_i + \beta_2 DF_i + \propto \beta_3 QC_i + \propto \beta_4 CU_i + \varepsilon_i$........................3.7

$AOP_i = \mu_0 + \mu_1 AP_i + \mu_2 DF_i + \mu_3 QC_i + \mu_4 CU_i + \varepsilon_i$...........................3.8

$LDT_i = \sigma_0 + \sigma_1 AP_i + \sigma_2 DF_i + \sigma_3 QC_i + \sigma_4 CU_i + \varepsilon_i$...........................3.9

$SSP_i = \omega_0 + \omega_1 AP_i + \omega_2 DF_i + \omega_3 QC_i + \omega_4 CU_i + \varepsilon_i$...........................3.10

Where:

PRQ   = Product quality

PRB   = Product brand

AOP   = Availability of product

LDT   = Lead time

SSP   = Satisfaction with sales process

QC   = Quality control

AP   = Aggregate planning

DF   = Demand forecasting

CU   = Capacity utilization

$\alpha_0, \beta_0, \mu_0, \sigma_0, \omega_0$ = Constant

ε = Error term

Priori expectations: $\alpha_1.....\alpha_4, \beta_1.... \beta_4; \mu_1.... \mu_4, \sigma_1.... \sigma_4, \omega_1.... \omega_4 > 0$

This study made use of primary data. Primary data was obtained from responses through 2 well-structured questionnaires that will be administered to both customers and production managers of selected table water companies operating in Edo State. For research instrument a set of 2 well-structured Likert five (5) point scale questionnaires. The first questionnaire has 18 items while the second has 20 items. The first questionnaire contains items on customer satisfaction such as product quality, product brand, and availability of products, lead time and satisfaction of sale process. All targeted towards customers of table water companies in Edo State. The second contains items on production planning such as aggregate planning, quality control, demand forecasting and capacity utilization. All targeted towards production managers of selected table water companies in Edo State.

Data was collected with the aid of two sets of well-structured 5 point Linkert scale questionnaire. The data was first of all analyzed with descriptive statistics: mean, frequency distribution, variance and standard deviation. Validity and reliability tests were then conducted on variables, thereafter factor analysis was used to test the factors in data derived from both questionnaires. Structural equational modelling (SEM) was later used to estimate the research model. To test the fitness of the model the Partial least squares (PLS) algorithm and boot strapping was adopted, the path analysis was performed and then measured with the following indices: SMRMR,NFI (Normed Fit Index), goodness of fit and Chi-Square.

This study used both Statistical Package for the Social Sciences (SPSS version 22) and Smart Partial Least Squares (Smart PLS version 3.72.7) for descriptive statistics and model estimation respectively.

4. Data presentation, analyses and interpretation

4.1 Introduction

In this chapter, data retrieved from questionnaires to customers and production manager of table water companies in Edo State respectively, were analyzed with the aid of statistical tools and then interpreted. A total of two hundred and twenty-seven (227) questionnaires were administered to production managers of table water companies in Edo State of which two hundred (200) of them were found usable. Also a total of two hundred (200) questionnaires were administered to 200 randomly selected customers of table eater companies in Edo State.

The research outcomes were presented in the following order. First of all, the description of production planning (aggregate planning, demand forecasting, capacity utilization and quality control) and customer satisfaction (product quality, product brand, satisfaction with sales process, availability of product and lead time). Secondly test of measurement model was conducted both groups: production planning and customer satisfaction. Thirdly, structural models were duly estimated. Finally, research hypotheses were tested and findings were discussed.

4.2. Description of Dependent and Independent Variables

There are 5 independent variables and 4 dependent variables. Each item in the variables in table Table 3 were structured in 5-point Likert scale of 5, 4,3, 2, 1 for Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree respectively. The weighted mean score was calculated by multiplying the frequency of each point by them weight and later divided by the total number of respondents. The results for the variables are shown below:

Table 1: Description of variables

S/N	Variables	Mean Score
	Dependent Variables	
1	Product quality	3.01
2	Product brand	2.06
3	Satisfaction with sales process	2.42
4	Availability of Product	2.60
5	Lead time	2.41
	Independent Variables	
1	Aggregate Planning	3.03
2	Quality control	2.51
3	Demand forecasting	2.62
4	Capacity utilization	2.65

Source: Researchers' field work (2018)

The mean score of 2.5 revealed that an average number of respondents agreed with the items used to measure customer satisfaction. Similarly, the mean score of 2.70 revealed that an average number of respondents agree with the items used to measure production planning activities.

4.3 Model estimation and Interpretation

Test for Structural model

When testing a structural PLS (Partial Least Squares) two parts have to be considered. First of all measurement of the relationship between observable variables and their latent variables in the model by computing path coefficients and secondly constructing a structural model for describing the relationship between endogenous latent variables and other latent variables (Tenenhaus *et al*.2005). In computing the path coefficient a bootstrapping procedure is conducted in order to determine the significance of each path coefficient of the various constructs (Chin, 2003). Below is the bootstrap path diagram for the t-statistics.
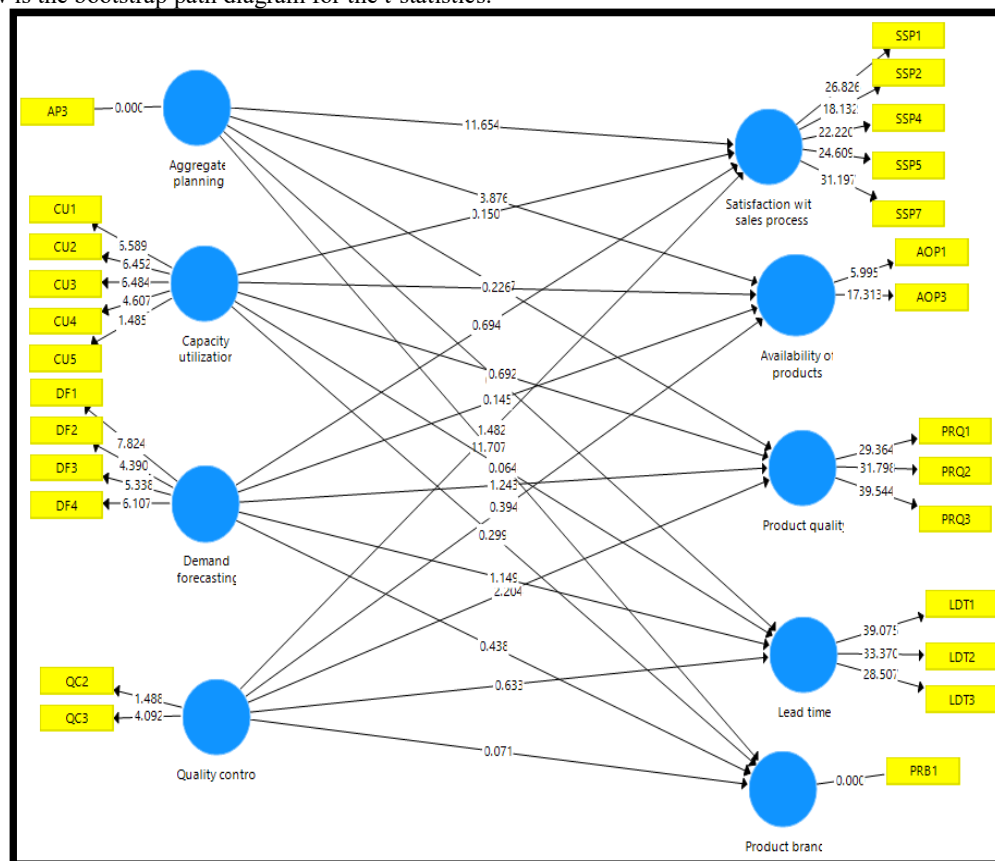

Fig 2: Bootstrap Path Diagram showing T-statistics

Table 2: Path coefficients along with their Boot strap values and t-values

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	t Statistics (O/STDEV)	P Values
AP -> AOP	0.28	0.28	0.07	3.96	0.00
AP -> LDT	0.37	0.37	0.06	6.46	0.00
AP -> PRB	0.79	0.79	0.07	11.54	0.00
AP -> PRQ	0.71	0.70	0.04	18.33	0.00
AP -> SSP	0.63	0.64	0.05	11.75	0.00
CU -> AOP	0.02	0.02	0.08	0.24	0.81
CU -> LDT	-0.01	0.01	0.11	0.06	0.95
CU -> PRB	-0.02	-0.02	0.05	0.33	0.74
CU -> PRQ	0.06	0.09	0.09	0.67	0.50
CU -> SSP	0.01	0.02	0.07	0.16	0.87
DF -> AOP	-0.01	-0.02	0.09	0.15	0.88
DF -> LDT	-0.09	-0.09	0.08	1.14	0.25
DF -> PRB	-0.02	-0.02	0.06	0.45	0.65
DF -> PRQ	-0.09	-0.09	0.06	1.33	0.18
DF -> SSP	-0.05	-0.04	0.08	0.67	0.50
QC -> AOP	0.03	0.03	0.08	0.39	0.69
QC -> LDT	0.07	0.04	0.10	0.65	0.52
QC -> PRB	0.00	-0.01	0.06	0.07	0.94
QC -> PRQ	0.18	0.16	0.08	2.21	0.03
QC -> SSP	0.17	0.14	0.12	1.44	0.15

Source: Researcher's Construction (2018)

Table 3: R Square for dependent variables

	R Square	R Square Adjusted
AOP	0.08	0.06
LDT	0.15	0.13
PRB	0.63	0.62
PRQ	0.53	0.52
SSP	0.43	0.42

Source: Researcher's Construction (2018)

Relationship between capacity utilization and customer satisfaction

From table 2 there is no significant relationship between capacity utilization and availability of product (β =0.02, t= 0.24).Also there is no significant relationship between capacity utilization and product quality (β = 0.06, t = 0.67), no significant relationship between capacity utilization and satisfaction with sales process (β = 0.01, t = 0.16),capacity utilization and product brand (β = 0.02, t = 0.33) and no significant relationship between capacity utilization and lead time(β = -0.01, t=0.06).

Relationship between aggregate planning and customer satisfaction

From table 2 there is a significant relationship between aggregate planning and availability of products(β = 0.28, t = 3.96),a significant relationship between aggregate planning) and product quality (β = 0.71, t = 18.33), a significant relationship between aggregate planning and satisfaction with sales process (β = 0.63, t = 11.75),a significant relationship between aggregate planning and product brand (β = -0.79, t = 11.54) and a significant relationship between aggregate planning   and lead time (β = 0.37, t = 6.46).

Relationship between demand forecasting and customer satisfaction

From table 2 it can be seen that there is no significant relationship between demand forecasting and availability of product (β = -0.01, t = 0.15), also there is no significant relationship between demand forecasting and product quality (β = -0.09, t = 1.33), no significant relationship between demand forecasting and satisfaction with sales process (β = -0.05, t= 0.67), no significant relationship with demand forecasting and product brand (β = -0.02, t = 0.45) and finally no significant relationship between demand forecasting and lead time (β = -0.09, t = 1.14).

Relationship between quality control and customer satisfaction

From table 2 it can be seen that there is a significant relationship between quality control and product quality (β = 0.18, t = 2.21) but no significant relationship between quality control and availability of product (β = 0.03, t=0.39), no significant relationship between quality control and satisfaction with sales process (β = 0.47,t = 1.44), no significant relationship between quality control and product brand (β = 0.00, t = 0.07) and no significant relationship between quality control and lead time (β = 0.07, t = 0.65).

Table 2 reveals that AOP, SSP, LDT, PRQ and PRB are significantly and positively influenced by AP at p<0.05.

Hence we reject hypothesis **Ho₁ₐ - Ho₁ₑ** which states that there is no significant relationship between aggregate production planning and customer satisfaction (availability of products, product quality, and satisfaction with sales process, product brand and lead time).

Model fit

There are several fit criteria for a good structural model in PLS. Such as the Standardized root mean square residual (SRMR), Q-square statistics and Goodness of Fit (GoF). Below are the results for model fit criteria:

Table 4:   Fit summary

	Saturated Model	Estimated Model
SRMR	0.07	0.08
d_ULS	1.49	2.46
d_G1	1.13	1.31
d_G2	0.86	0.95
Chi-Square	908.19	993.13
NFI	0.75	0.73

Source: Researcher's Construction (2018)

SRMR: From table 4 SRMR is 0.08 for the estimated model. According to Hu and Bentler (1998) a model has good fit when SRMR is less than 0.08. On the contrary, Henseler *et al* (2014) cite that a more tolerant value would be a SRMR that is less than 0.10.Based on the latter, the research model is said to be of good fit.

*Q-statistics***:** From tables 5 and 6 below the values of Q -statistics for both communality and redundancy are greater than 0 indicating that the research model has predictive relevance (Fornell & Cha, 1994).

Goodness of Fit : Merging data of Table 5, 6 and 7 we have the model evaluation for Goodness- of- Fit (GoF) as seen below:

Table 5: Cross validate Communality

	SSO	SSE	Q² (=1-SSE/SSO)
AOP	400.00	317.07	0.21
LDT	600.00	289.75	0.52
PRB	200.00	0.00	1.00
PRQ	600.00	332.20	0.45
SSP	1,000.00	493.16	0.51

Source: Researcher's Construction (2018)

Table 6: Cross validate Redundancy

	SSO	SSE	Q² (=1-SSE/SSO)
AOP	400.00	383.22	0.04
LDT	600.00	542.40	0.10
PRB	200.00	82.14	0.59
PRQ	600.00	395.63	0.34
SSP	1,000.00	736.57	0.26

Source: Researcher's Construction (2018)

Table 7: Model Evaluation for Goodness -of –Fit(GoF)

Block	R2	Communality	Redundancy
AOP	0.08	0.21	0.04
LDT	0.15	0.52	0.10
PRB	0.63	1.00	0.59
PRQ	0.53	0.45	0.34
SSP	0.43	0.51	0.26
Average	0.364	0.538	0.226

GoF= √ Average R² *Average Communality =√0.19583 = 0.442

Source: Researcher's Construction (2018)

From table 7, the overall fit of the model was 0.442 (44.2%)(Tenenhaus *et al*., 2005).

4.4 Discussion of findings

Firstly, the study found that there is a positive and significant relationship between aggregate planning and the five dimensions of customer satisfaction (satisfaction with sales process, availability of products, product quality,

product brand and lead time). Results of previous studies concluded that aggregate planning had an influence on the affordability of goods to customers which was attributed to healthy collaboration between resellers and manufacturers and an optimized production cost model (Kokemuler, 2017). This was reflected in 63% impact of aggregate planning on satisfaction with sales process in Table 2. This indicated that a reasonable number of table water companies in Edo state have an effective and reliable sales process.

Secondly, results showed that there is a negative and non-significant relationship between demand forecasting, capacity utilization, quality control and the five dimensions of customer satisfaction (satisfaction with sales process, availability of products, product quality, product brand and lead time). Second, results showed that there is a negative and non-significant relationship between demand forecasting and the five dimensions of customer satisfaction (satisfaction with sales process, availability of products, product quality, product brand and lead time). According to research findings from the work of Kalchschmidt (2007), firms who adopted a well-structured forecasting technique were seen to have improved their operational performance and productivity while those who failed to give a clear presentation of demand fell short of performance and productivity.This could be as a result of the poor presentation of forecast data. This explains why some customers of table water companies experience shortage of products demanded for.

Third, results showed that capacity utilization did not significantly influence the five dimensions of customer satisfaction (availability of products, product quality, satisfaction with sales process, product brand and lead time) in table water firms in Edo State. This was confirmed in Trupkin's (2015) empirical work where relationship was established between inventory levels and capacity utilization. It was discovered that reduction in inventory level was as a result of a rigid capacity utilization employed by the firm. This is common in most water firms were the challenge of unstable power supply reduces the firms' capability to produce to capacity. Hence, inventory level is shortened leading to poor availability of products to customers.

Fourth, results show that quality control did not significantly influence customer satisfaction in terms of availability of products, satisfaction with sales process, product brand and lead time. Finally, it was found out that reason for the presence of more non-significant influences on customer satisfaction than significant influences could be as a result of the findings of Hairulliza, Ruzzakiah and Devendran (2011) which deduced that firms have their strengths and weaknesses when implementing quality control techniques depending on their size. According to Hanida, Hairulliza, Norazlin, Noraidah (2009), some firms find it difficult adopting real-time data analysis and process monitoring techniques due to their small size. This is common with small table water firms were manual techniques are still used for quality control which often leads to delay in production processes. This indirectly hampers the timely delivery of finished products and the availability of finished products.

5. Conclusion and Recommendations

This study empirically investigated the relationship between production planning and customer satisfaction in table water firms in Edo State. It provided theoretical evidence that production planning does not significantly affects customer satisfaction in table water companies in Edo state. It further concludes that aggregate planning has a stronger significance to customer satisfaction compared to other production planning innovative techniques as it significantly influences the quality of table water produced, its brand, its availability, the lead time and satisfaction with sales process.

Based on the analyses and findings from this study, the following recommendations are made:

- that table water companies in Edo State should adopt innovative processes for their present production process by adopting cost effective innovative techniques like AGILE manufacturing, which encourages flexible production and on schedule delivery.
- that management of table water companies should encourage open practices like inviting professionals and experts the table water production to deliver trainings on innovative production process for their personnel, engaging in research and development so as to stay abreast of new technologies and marketing strategies. Tainted
- that management of table water firms partner with local agencies like National Agency for Food and Drug Administration and Control (NAFDAC) and Standard Organization of Nigeria (SON) to enhance quality and productivity in the table water industry.
- results of this study can serve as a guide to production managers in production of durable and quality products for customer consumption at an affordable and competitive price .
- results of this study can also serve as a guide to production managers in proper inventory management so as to produce and deliver goods when needed in a timely and organized manner.

References
Adegbuyi, P.A.O. & Asapo, E.S. (2010). The Effect of Production Planning and Budgeting on Organizational Productivity. *Leonardo Electronic Journal of Practices and Technologies*, *16*, p.201-217.

Adetayo, J. O., Dionco-Adetayo, E. A., & Oladejo, A. A. (2004). Production planning and control practices

influencing consumer satisfaction in Nigerian manufacturing industry. *Journal of Social Sciences,* 9(1), p.57-62.

Agbor, J. M. (2011). The Relationship between Customer Satisfaction and Service Quality: a study of three Service sectors in Umea. Master's Theses: Umea School of Business.

Anderson, E. W., & Mittal, V. (2000). Strengthening the satisfaction-profit chain. *Journal of Service Research, 3*(2), p.107-120.

Arefi, M. F., Tavakoli, G., Heidari, O., & Lashkajani, M. M. (2014). Towards a conceptual model of customer satisfaction manufacturing organizations and presenting a three. phases approach. *International Journal of Management, Accounting and Economics,* 3(7), p.411-443.

Bhausaheb, A. N., & Routroy, S. (2010). Evaluation of Inventory Performance for Perishable Products Through Simulation*, Journal of Operations Management.* (9), p.71-72.

Cachon, G., & Terwiesch, C. (2009). *Matching supply with demand: An introduction to operations management.* Irwin Professional Pub.

Carvalho, A. N., Scavarda, L. F., & Oliveira, F. (2017). An optimization approach for capacity planning: modeling insights and empirical findings from a tactical perspective. Production, 27, e20170014. DOI: http://dx.doi.org/10.1590/0103-6513.001417

Chase, R. B., & Aquilano, N. J. (1977). *Production and operations management: A life cycle approach* .McGraw-Hill/Irwin.

Cheraghalikhani, A., Khoshalhan, F., & Mokhtari, H. (2019). Aggregate production planning: A literature review and future research directions. *International Journal of Industrial Engineering Computations*, 10(2), p.309-330.

Chin, W. W. (2003). PLS Graph 3.0. Houston: Soft Modelling Inc.

Chopra, S. & Meindl, P. (2010). *Supply Chain Management, Strategy, Planning, and Operation* (New Jersey: Pearson education)

Christopher, M. & Lee, H. (2004). Mitigating supply chain risk through improved confidence. International Journal of physical distribution and Logistics management, 34(5), p.388-396.

Cronbach, L. J. (1988). Internal consistency of tests: Analyses old and new. *Psychometrika,* 53,63-70.

Dametew, A. W., Kitaw, D., & Ebinger, O. (2017). The Roles of TQM and JIT for basic metal industries global competitiveness. *Industrial Engineering and Management,* 6, 212.

Ding, F.Y.,& Yuen, M.N. (1991). A Modified MRP for a Production System with the Coexistence of MRP and Kanbans. *Journal of Operations Management* 10(2), p.267-277.

Eshghi, A., Haughton, D., & Topi, H. (2007). Determinants of customer loyalty in the wireless telecommunications industry. *Telecommunications policy*, 31(2), p.93-106.

Field, A. (2009). *Discovering Statistics Using SPSS: Introducing Statistical Method* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Gallo, A. (2014). The value of keeping the Right customers. *Harvard Business Review*, (10), -3.

Gavett L.J. & Silver,M. (1973). *Production Management Analysis*. 2nd Ed. New York: Harcourt Brace Jovanovich Inc.

Girgenti, A., Pacifici, B., Ciappi, A., & Giorgetti, A. (2016). An Axiomatic Design Approach for Customer Satisfaction through a Lean Start-up Framework, Procedia CIRP, 53, 151-157.

Goldsmith, R. E. (2002). Explaining & predicting consumer intention to purchase over the Internet: An exploratory study. *Journal of Marketing Theory and Practice, 10*, 22–28.

Gustafsson, A., Johnson, M. D., & Roos, I. (2005). The effects of customer satisfaction, relationship commitment dimensions, and triggers on customer retention. *Journal of marketing, 69*(4), 210-218.

Hairulliza, M. J., Noraidah, S.A., & Teoh, K.F. (2010). The Design for Real-Time Paper Perforation Quality Control. Lecture Notes in Engineering and Computer Science. IMECS 2010, 3,1849-1851.

Hairulliza, M.J., Ruzzakiah,J & Devendran,G. (2011*). Quality Control Implementation in Manufacturing Companies: Motivating Factors and Challenges, Applications and Eexperiences of Quality Control.* Prof. Ognyan Ivanov (Ed.),InTech, Available from: http://www.intechopen.com/books/applications-and-experiences-of-quality-control/quality-controlimplementation-in-manufacturing-companies-motivating-factors-and-challenges

Hanida, A. S., Norazlin, K., Noraidah S.A., & Hairulliza, M.J. (2009). Statistical Process Control in Plastic Packaging Manufacturing: A Case Study, 2009 International Conference on Electrical Engineering and Informatics, 5-7 August 2009, Selangor, Malaysia, 199-203.

Hu, L.T., & Bentler, P. M. (1998). Fit indices in covariance structure modelling: Sensitivity to under parameterized model misspecification, *Psychological Methods 3(*4): 424-453.

Hyndman, R.J. (2009, November). Business forecasting methods. Retrieved from https://robjhyndman.com/papers/businessforecasting.pdf.

Jahanshahi, A. A., Gashti, M. A. H., Mirdamadi, S. A., Nawaser, K., & Khaksar, S. M. S. (2011). Study the effects

of customer service and product quality on customer satisfaction and loyalty. *International Journal of Humanities and Social Science, 1*(7), 253-260.

Judi, H. M., Jenal, R., & Genasan, D. (2011). Quality control implementation in manufacturing companies: Motivating factors and challenges. In Applications and Experiences of Quality Control. InTech..

Kano, N., Seraku, N., Takahashi, F. & Tsjui,S.(1984).Attractive Quality And Must-Be Quality*, Hinshitsu 14*(2),147-156.

Levin, K. A. (2006). Study design III: Cross-sectional studies. *Evidence-based dentistry, 7*(1), 24.

Lopatowska, J. (2015). Improving the production planning and control Process. *Journal of Management and Finance,13*(4).

Madadi, N., Roudsari, A. H., Wong, K. Y., & Galankashi, M. R. (2013, September). Modeling and simulation of a bank queuing system. In *Computational Intelligence, Modelling and Simulation (CIMSim), 2013 Fifth International Conference on*(pp. 209-215). IEEE.

Mpwanya, M. F. (2005). Inventory management as a determinant for improvement of customer service (Doctoral dissertation, University of Pretoria).

Nasir, M. A. K., & Abubakar, U. (2010). Analysis of pure water production: a case study of ten (10) randomly selected pure water firms in Minna, Niger state. *Global Jour. of Maths. and Stat. 2(2*),153-159.

Oliver, R.L. (1999). Whence consumer loyalty? *Journal of Marketing, 63*(4), 33-44.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1985). A conceptual model of service quality and its implications for future research.*The Journal of Marketing,* 41-50.

Pearce, P. L., & Moscardo, G. M. (1984). Making sense of tourists' complaints.*Tourism*

Rahman, M. H., Redwanuzzaman, M., Masud-Ul-Hasan, M., & Rahman, M. A. (2014). Factors Affecting Customer Satisfaction on Grameenphone Users in Bangladesh. *Global Journal of Management and Business Research*.

Shahidul, M., Syed Shazali, S. T., Abdullah, Y., Ting, C. H., Hishamuddin, A. H., Azrin, M. S., & Adzlan, A. F. (2013). Measuring Machinery Capacity Utilization and Its Impact on Manufacturing Performance and Environment*. Journal of manufacturing Operations research and Sustainability*, 7-12.

Sharma, D.,Sharma, D. & Sharma, J.P.(2014). Production Planning and Control. *International Journal of Scientific Research Engineering and Technology (IJSRET), 3*(3), 2278–0882.

Sheth, J. N. (2001). A model of industrial buyer behaviour. *The Journal of Marketing*, 50-56.

Slack, N., Chambers, S., & Johnston, R. (2007).*Operations Management*, Pearson Education Limited England.

Spitter, J. M., De Kok, A. G., & Dellaert, N. P. (2003). Cost implications of planned lead times in supply chain operations planning. Beta, *Research School for Operations Management and Logistics*.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International journal of medical education, 2*, 53.

Thogori, M., & Gathenya, J. (2014). Role of Inventory Management on Customer Satisfaction among the Manufacturing Firms in Kenya: A Case Study of Delmonte Kenya. *International Journal of Academic Research in Business and Social Sciences*, *4*(1), 108.

Ton, Z., & Raman, A. (2010). The effect of product variety and inventory levels on retail store sales: A longitudinal study. *Production and Operations Management*, *19*(5), 546-560.

Tse,D.K., & Wilton,P.C.(1988).Models of Consumer Satisfaction Formation: An Extension. *Journal of Marketing Research, 25*(2), 204-212 .

Xiong, T., Li,C., Bao,Y., Hu, Z., & Zhang,L. (2015). A combination method for interval forecasting of agricultural commodity futures prices, Knowledge-Based Systems.430-2014.

Yamane, T. (1967). Statistics: An Introductory Analysis, 2nd Edition, New York: Harper and Row.

Zamazalova, M. (2008). Customer satisfaction. *Acta Oeconomica Pragensia, 4,* 76-82.

Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: a means-end model and synthesis of evidence. *The Journal of Marketing,* 2-22.