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Original Article

AN EVALUATION OF THE OPERATIONAL EFFICIENCY OF PIZZA RESTAURANTS IN ZIMBABWE

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Abstract

The study sought to test the industry wide claim in the fast-food restaurant industry that they deliver pizza within 10 minutes of waiting. The study further sought to assess the extent to which the actual waiting period for pizza differs from the perceived waiting time. A sample of 500 pizza transactions had their order cycle time measured, and the corresponding perceived waiting time was also recorded from the surveyed respondents who had initiated the transactions. The study revealed that there are statistically significant differences between the prescribed standard waiting time and actual waiting time, and between the actual waiting time and perceived waiting time. This study therefore recommends that restaurateurs in the pizza industry must assess their human and equipment resources in order to reduce the variances in lead times. They must as well provide various materials and activities that occupy customers in order to reduce the perceived waiting time.

Keywords: prescribed standard waiting time, actual waiting time, perceived waiting time

Introduction

Pizza first appeared in the Zimbabwean fast-food market in 1994 as an initiative of Simbisa franchisee, and currently there are several pizza brands operating in the Zimbabwean fast-food market such as Pizza Inn, Pizza Hut, Pizza Slice, and Pizza Matty. Pizza is a high temperature backed savoury dish with a flattened base of dough (Limongi, Simos & Demiate, 2012) that is garnished with several savoury meats and vegetables, and topped with various ingredients such as tomatoes, cheese, pepperoni, bacon, and mushroom (Singh & Goyal, 2010). Furthermore, pizza is a distinguished confectionery product (Natal, Dantas, Vidigal, Ribeiro, Piovessan, Martino & Dias, 2014) of Italian origin (Ceccarini, 2010), that was popularised in the United States of America (USA) (Balkaran, Giampiccoli & Mtapuri, 2016), and currently ranks amongst the most popular fast foods that had received a widespread acceptance across various cultures (Caparaso, Panariello & Sacchi, 2015).

The production of pizza follows one of the two production approaches in operations management: make-to-stock and make-to-order (Chopra, Meindl & Kalra, 2016). Make-to-stock builds a pile of inventory ahead of demand resulting in the ability to instantly fulfil customer orders without any need for a lead time (Forster, Sampson, Walliam & Webb, 2019). On the contrary, make-to-order approach has got its production triggered by customer orders leading to inevitable order fulfilment lead times (Heizer & Render, 2011). The supply of pizza is one such an example of a make-to-order approach where a long-established order fulfilment lead time is 10 minutes across various pizza restaurants in Zimbabwe. It is common in the services sectors for firms to prescribe the duration of service delivery which in essence is the customer wating time (Tasar, Ventura &

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Cicekli, 2000). Customer waiting time is defined as the duration between the customer's arrival at a restaurant and the time a customer's order is ready. We often get information from operators on the duration of a journey in the passenger transport industry, duration of a hair cut in the barbershop, duration of a lecture in a classroom, and duration of performance for a live concert. Most pizza restaurants in Zimbabwe likewise indicate the duration of their order fulfilment cycle as within 10 minutes of placing an order. Order fulfilment cycle is the amount of time taken to fulfil a customer's order (Slack, Chambers & Johnston, 2010). However, such operational claims' veracity has never been tested.

Burns and Burns (2008) asserted that it is not unusual for operations management to make generalised pronouncements based on subjective, prejudiced, distorted, or unsubstantiated armchair philosophies. Therefore, there is a need to test whether the generalised order fulfilment time for pizza production in the Zimbabwean fast-food industry is indeed 10 minutes of customers' waiting time. Moreover, it is also yet to be verified whether customers can really ascertain the actual waiting time during their pizza orders' fulfilment. Therefore, the objectives of this paper are to determine whether there are statistically significant differences between standard waiting duration and actual waiting duration, and between actual waiting duration and perceived waiting duration. The rest of the study is organised as follows: literature review, followed by the methodology adopted, and then the presentation of the study results. The last sections pertain to the discussion of the results in the context of the accumulated body knowledge related to waiting time in service delivery systems.

Literature Review

This section is going to review literature related to standard waiting time, actual waiting time and perceived waiting time, and the relationship between these three concepts.

Standard Waiting Time and Actual Waiting Time

Waiting is inevitable and is the first encounter between a patron and a service provider (Bordoloi, Fitzsimmons & Fitzsimmons, 2019). Waiting is divided into three phases: pre-process waiting, in-process waiting, and post-process waiting. Pre-process waiting refers to the period before a consumer start to receive a service, in-process waiting pertains to the actual waiting for the service, while post-process waiting relates to the duration between placing an order and receiving an order. Waiting in a service outlet is a result of a less permanent mismatch between demand and capacity for services where demand exceed capacity. Waiting is a major source of customer dissatisfaction in most service delivery systems (Hwang, 2008), and it affects customers emotionally through inducing negative emotions such as high tensions, anger, shouting, hatred, and provocation of rebellious behaviours (De Vries *et al*., 2018). Therefore, the focus of operations management is usually on reducing waiting time as a way of shortening waiting lines (Taylor, 1994).

Operational processes that are meant to provide goods or services sometimes present variations from the prescribed standards (Chase, Aquilano & Jacobs, 2002). Variations related to operations in terms output volume and task completion time is usually divided into two parts: common variation and assignable variation (Slack *et al*., 2010). Common variation is an inherent part of every production process. Common variation is caused by random, but stable and predictable factors such as the type of equipment employed in performing the task (Chase *et al*, 2002). Assignable variation is generally not part of any production process. Although assignable variation is due to identifiable factors such as employees' actions and machine performance, its occurrence is extra-ordinary (Slack *et al*., 2010).

The reduction in common variation and elimination of assignable variation has a bearing in quality (Chase *et al*., 2002). Adherence to prescribed waiting leads to effective personal time management for customers who obviously are inherently disgusted by having to wait for more time than what is necessary (Maudie & Pierrie, 2006). Reducing delays in order

fulfilment cycles must be one of the key objectives of modern-day businesses in order to avoid unnecessary inconveniences to the customers (Slack *et al*., 2010). Based on the facts presented above, it is prudent to hypothesise that;
H^1: *There are statistically significant differences between actual waiting time and the prescribed standard waiting time*.

Actual Waiting Time and Perceived Waiting Time

Actual waiting time is a predictor of perceived waiting time. Waiting duration is normally perceived differently by customers (Sumaedi & Yarmen, 2015). Perceived waiting time is a duration which a customer subjectively state as the time he has waited to receive his order (Taylor & Fullerton, 2000). There are usually variances between the actual waiting time the customers had gone through and the perception of their waiting time (McGuire, Kimes, Lynn, Pullman & Lloyd, 2010). Such variations are mainly caused by the intolerance to waiting that characterise modern day customers (Zeithaml, Bitner & Gremler, 2013; Wu, Lu. & GE, 2013). Maudie and Pierrie (2006) hold a view full of superlatives that disparages the act of waiting such as agonising, frustrating, annoying, and demoralising.in a study by De Vries, Roy & De Koster (2018) it was revealed that waiting results in rebellious behaviours if perceived as excessive.

While acknowledging that it important to reduce the order fulfilment waiting time, Clow and Kurtz (2003) emphasised that it equally important to also reduce the customers' perceived waiting time. A catalogue of how perceived waiting time can be reduced has already been enumerated by Maister (2005) who suggested the manipulation of the perceived waiting environment with activities that occupy customers such as initiating group waiting, occupied waiting, in process waiting, and fair waiting. It is therefore prudent to anticipate that;
H^2: *There are statistically significant differences between actual waiting time and perceived waiting time*.

The reviewed literature on standard waiting time, actual waiting time, and perceived waiting time which culminated in the specification of the above stated hypotheses, led to the operationalisation and measurement of the study concepts as outlined in the methodology section below.

Methodology

This section presents the details about population and sampling, data collection and analysis procedures.

Population and Sampling

The population in this study was all the customers who bought pizza during the first weekend of the month of October 2019 when data collection was conducted. The unavailability of a proper sampling frame of pizza customers leads to the adoption of a convenience sampling method (Saunders *et al*., 2016). A sample size of 500 respondents was chosen. The sample was drawn from Bindura town. Bindura is the provincial capital of Mashonaland Central province of Zimbabwe and it is surrounded by productive farms and mines. In fact, the Bindura town is hosted in the bread basket province of Zimbabwe.

Data Collection Procedures

In this study the waiting period assessed is the in-process waiting which is the duration between placing an order and receiving an order. Data was collected from all the pizza producing fast foods restaurants in Bindura over a period of one month. Convenience sampling though not perfectly appropriate for this type of a study where results are meant to be generalisable (Saunders, Lewis & Thornhill, 2016; Bryman, 2016) was used for contacting the respondents since a proper sampling frame was unavailable. While data for actual waiting time was collected using unobtrusive methods, data on perceived waiting time had to be collected from consenting customers. Usually in the restaurant industry the numbers of consenting respondents are very low further justifying the use of non-probability-based sampling methods.

The study made use of research assistants in data collection exercise. The research assistants made use of a stop watch to record data related to the actual waiting time from a vantage point

in target restaurants. After collecting data on actual waiting time, the assistants would proceed to collect data on perceived waiting from consenting respondents as they left the restaurant or as they sat down to eat their pizza.

Data Analysis Procedures

Data analysis was conducted in two phases using a Statistical Package for Social Scientists (SPSS) v 25. The first phase presented an analysis of descriptive statistics for the profile of the respondents and the variables studied using the arithmetic mean and the standard deviation. The second phase tested hypotheses using paired sample t-tests. The paired sample t-test, which is also referred to as the dependent sample t-test, is a statistical procedure used to assess whether the mean difference between two observations is similar. In a paired sample t-test, each subject or entity is measured twice, resulting in pairs of observations. The common applications of the paired sample t-test statistical tool include, but not limited to repeated-measures designs. The magnitude of the differences revealed from the paired t-tests were assessed using the Cohen's d value (Cohen, 1988).

Results

The results of this study include demographic profile of respondents, statistical assumptions and descriptive analysis, and hypotheses testing.

Demographic Profile of Respondents

The demographic profile of respondents the age, gender, marital status and educational levels of the respondents and the results are shown in Table 1.

Table 1: Demographic profile of respondents

Attribute	N	%
Age		
18-29	205	41.5
30-39	148	29.6
40-49	110	22.0
50-59	20	04.0
60+	7	01.4
Total	**500**	**100.0**
Gender		
Male	220	44.0
Female	280	56.0
Total	**500**	**100.0**
Marital status		
Single	295	59.0
Married	205	41.0
Total	**500**	**100.0**
Education		
Primary	116	23.2
Secondary	264	52.8
Tertiary	120	24.0
Total	**500**	**100.0**

Table 1 showed that the age group of the young adults (18-29) was highly represented in the surveyed sample (41.5%). It seems this is the age group that frequently patronise pizza restaurants. Females (56%) also dominated the number of respondents suggesting that females prefer pizza more than men or alternatively they are the once that run the errands of purchasing pizza for the whole family including men. Unsurprisingly singles (59%) dominated the surveyed respondents since it is expected that single individuals tend to have more discretional income to patronise pizza restaurants. It should be appreciated that in Africa in general and Zimbabwe in particular pizza is a status dish that is accessible to those in the high-income bracket or those with a lot of discretional income like single working people. Lastly, the majority of the respondents (52%) have a secondary education qualification which is a general requirement for most employed urbanites.

Statistical Assumptions Testing

Although *t*-tests are quite robust, it is good practice to evaluate the degree of deviation from these assumptions in order to assess the quality of the results. In a paired sample *t*-test, the observations are defined as the differences between two sets of values, and each assumption

refers to these differences, not the original data values. The paired sample *t*-test has four main assumptions: the dependent variable must be ratio, approximately normally distributed, should not contain any outliers, and the observations are independent from each other.

The key assumptions in studies that employ the use of paired sample t tests is that data should be randomly selected from a normally distributed sample (Wegner, 2012). There are several statistical tests for determining the normality of the distribution of collected data such as the Kolmogorov-Smirnov test and the Shapiro-Wilk test which are found in most data analysis softwares (Saunders *et al*., 2016). In this study normality tests were conducted using a Shapiro-Wilk test. The results of a Shapiro-Wilk's test of normality are shown in Table 2.

Table 2: Normality tests

	Shapiro-Wilk		
	Statistic	**df**	**Sig.**
Actual Time	2.848	500	.132
Perceived Time	2.874	500	.241

a. Lilliefors Significance Correction

The results in Table 2 show that all the measured data is normally distributed as evidenced by the insignificant *p* values, and therefore suitable for the preceding statistical tests.

Descriptive Analysis

The descriptive analyses of the data related to actual and perceived waiting time are shown in table 3.

Table 3: Descriptive statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Standard Time	10.00	500	.000	.000
	Actual Time	10.87	500	2.780	.124
Pair 2	Actual Time	10.87	500	2.780	.124
	Perceived Time	15.05	500	2.341	.105

The descriptive results in this study show that there is an average difference of 0.87 of a minute between standard order fulfilment time and actual order fulfilment waiting time. The differences between actual order fulfilment time and perceived order fulfilment waiting time were close to 5 minutes. The standard deviations for both actual waiting time and perceived waiting time were very low indicating there was a general consensus in the responses from the surveyed respondents. Stand deviation is a measure of dispersion of a data set (Levine, Stephan, Krehbiel & Berenson, 2013). A low standard deviation indicates the extent to which data points are close to the mean while high standard deviation cast doubt on the exact outcome (Swink, Melnyk, Cooper & Hartley, 2014). Whether these differences were statistically significant or were merely a product of chance, the section below on hypotheses testing will present a determination.

Hypothesises Testing

H^1 postulated that there are statistically significant differences between the standard waiting time for pizza delivery and the actual waiting time. The hypothesis is non-directional which implies a two-tailed test. H^2 in turn suggested that there are statistically significant differences between the actual waiting time and perceived waiting time for pizza. The hypothesis is also non-directional which implies a two-tailed test.

Table 4: Paired samples test

		Paired Differences					T	df	Sig.
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Standard Time Actual Time	-.870	2.780	.124	-1.114	-.626	-6.998	499	.000
Pair 2	Actual Time Perceived Time	-4.180	3.794	.170	-4.513	-3.847	-24.634	499	.000

The results from paired sample t-test showed that the mean difference between the standard waiting duration and the actual waiting duration (MD=-.870, SD=2.780. 95% CI [-1.114, -.626] was statistically significant at the .05 level of significance, t=-6.998, df=499, p<.001, d=.31. The null hypothesis which suggested that are no significant differences between the mean of the standard waiting duration and the mean of the actual waiting duration is rejected. The magnitude of the difference falls into the .20<.50 category which implies a weak difference.

The results from paired sample t-test showed that the mean difference between the standard waiting duration and the actual waiting duration (MD=-4.180, SD=3.794, 95% CI [-4.513, -3.847] was statistically significant at the .05 level of significance, t=-24.634, df=499, p<.001, d=1.10. The null hypothesis which suggested that are no significant differences between the mean of the actual waiting duration and the mean of the perceived waiting duration is rejected. The magnitude of the difference falls into the .80<1.20 category which implies a weak difference.

Discussion

The results from this study indicated that there is a slight unfavourable variance in terms of the standard pizza lead time and the actual lead time. This suggests that most pizza restaurants in Zimbabwe are failing to adhere to their prescribed standard order fulfilment lead times. The variability and uncertainty of restaurant demand makes waiting management complicated (Hwang, 2008). As has already been suggested in literature these variations are most probably due to either human factors or machine factors (Slack *et al*., 2010). A bi-pronged approach of assessing both human factors and machine factors is mostly appropriate for investigating the causes of adverse variances in operations management performance matrices.

Inferences as to human factors that are likely to cause these variations can be drawn from the prevailing hyperinflationary environment that is characterised by high levels of austerity measures. Generally, in struggling economic environments employees tend to be less motivated resulting in poor service delivery as evidenced by prolonged lead times. Moreover, during economic turbulences there are high employee turnovers. High employee turnovers lead to regular deployments of new employees as boundary spanners. Whenever there is a new employee at a workstation it usually takes a longer period of time to adjust to the new system and start efficiently deliver the services (Hoffman, Bateson, Wood & Kenyon, 2009). During the induction period when new employees are adjusting to the new systems operational efficiencies tend to take a nosedive. Therefore, it is advisable that restaurateurs must come up with innovative employee motivation strategies that enhance employee retention and reduce employee turnover (Sturman & Ford, 2011). In the event of a new employee recruited then quick and thorough training sessions should be conducted before they are unleashed to man the boundary spanning roles (Zeithaml *et al*., 2013).

Delays in lead times can also be attributed to inefficient production equipment that has been underserviced (McGuire, Kimes, Lynn, Pullman & Lloyd, 2010). In the prevailing austerity environment, it is not unusual to find that most business operators have exceeded the prescribed equipment operating hours before major maintenance services. Thus, lack of timely maintenance services is likely to lead to prolonged production and service delivery lead times which eventually lead to customer dissatisfaction (Fullerton & Taylor, 2015).

This study also revealed that there is an adverse variance in terms of the actual waiting time and perceived waiting time. The findings that perceived waiting duration was found to be longer than the actual waiting duration lend some empirical support to earlier studies by Lee and Lambert (2000) which had the same findings. This confirms that actual waiting time almost always differs from perceived waiting time. This variance is most likely to have been caused by shortage of initiatives that may occupy customers while they are waiting for their orders. Extant services marketing literature has suggested that unoccupied waiting feels longer (Maister, 2005). Master (2005) suggested that customers must be provided with activities that keep them occupied while waiting for their orders in the perceived waiting environment. Such activities include providing reading material such as menus and magazines, television, and more recently free internet access.

Managerial Implications

Generally, waiting is unacceptable since it affects the levels of perceived service quality, customer satisfaction, and eventually customers' revisit or repurchase intentions (Chuo & Heywood, 2014). Management should strive to keep customers' waiting to the minimum. Therefore, the fact that there were some variances between the actual waiting time and the perceived waiting time implies that management need to implement some practical measures to reduce perceived waiting time. Maister (2005; 1985) prosed a raft of psychological measures that may lessen the duration of the perceived waiting time such as avoiding waits that ae unoccupied, uncertain, unexplained, pre-process, solo, and unfair. Practically, this may mean offering complimentary beverages and providing menu lists (Taylor, 1995).

Management must also invest in technology that expedite the production and delivery of customers' orders. Such technology includes the automated pizza cutting machines which are prevalent in developed markets, but largely unavailable in most of the local pizza restaurants. The automated pizza cutting machines cut pizzas as large as 12 inches into eight equal slices in less than 20 seconds, and can also slice pizzas as large as 21 inches into 12 equal slices (Saeed, Sattar & Ferguson, 2020).

Limitations and Further Research

Waiting in restaurants has attracted attention of many researchers (Hernandez-Maskivker, Nicolau, Ryan & Valverde, 2019), but most studies including this study did not assess the causes of the failure to match the prescribed waiting time and the reasons behind the exaggerated customers' perceived waiting duration in the restaurant industry. Future researches should therefore investigate various causes of customers' waiting and possible ways of reducing the waiting duration. Moreover, there are some service experiences where waiting does not always result in negative customer outcomes (Chu et al., 2019). Therefore future studies should also investigate positive outcomes from waiting.

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