IDENTIFICATION OF CAUSES OF DEMAND VARIATION AND ITS IMPACT ON SALES VOLUME - AN EXPLORATORY STUDY IN PROCESSED FOOD INDUSTRY IN BANGLADESH

MD. Fazle Rabbi, B.Sc. Engg.
Talisman (BD) Ltd, Bangladesh
Tanvir Ahmed, B.Sc. Engg.
MASCO Industries Ltd, Bangladesh
Anup Saha, B.Sc. Engg.
Shahjalal University of Science and Technology, Bangladesh
Pallab Sutradhar, B.Sc. Engg.
MASCO Industries Ltd, Bangladesh

Abstract

Demand variation is a key issue in processed food industry, because demands for processed food products vary daily. The organizations in this situation face challenges to meet customer demand. Their products have a definite shelf life and prone to be obsolete. Obsolete products are totally wastes. So, there exists a producer risk. This study has been conducted with the aim of identifying the root causes of demand variation and its impact on sales volume. For this purpose an exploratory study involving two food processing organizations and their forty eight points of sales had been performed. Each food item has different causes and consequences for demand variation. In this regard, three food items having limited shelf life had been selected to find out the causes of their demand variation. The study identified eleven causes and twelve consequences such as special occasion, duration of shelf life, wrong forecasting and so on. Then some root causes are figured out that dominates over others. The impacts of these causes on sales volume are also shown with six months demand data. The research concludes with the level of impact of the significant causes like price, occasion. Lastly some recommendations are mentioned to minimize those root causes of demand variation.

Keywords: Demand, Supply, Root Causes, Consequences

Introduction

Food industries are increasing; it is vast and diversified, categorized by different segments such as fresh food industry, organic food industry, and processed food industry. Fast food & sweet industry is one of them. This sector is increasing rapidly and competition is also increasing.

Demand variation means the day to day fluctuation of demand. Demand variation is an important feature of this sector. Inventories can improve firms' responsiveness to customer demand, but this is accomplished at a cost. Some firms have successfully employed "timely response" strategies to reduce demand variation, usually involving the extensive use of Information Systems for data collection and demand forecasting. Nonetheless, variation remains an important factor, especially in perishable food industries. Firms are thus restructuring the business processes that underlie their supply chains to better cope with demand variation. There are two types of demand variation that is faced by fast food & sweet industry. One is predictable demand variation and another is unpredictable demand variation. In this study, it is tried to find out the causes of predictable demand variation (such as season, quality, price, special occasion and so on) and its impact on sales volume for white sweet, pastry cake and bread.

The fast food industry in Asia is on in an upward trend. The demand for fast food product is now growing as it is convenience which suits the lifestyle of customers. Along with the heavily promote through media and information technology exposure, customers has variety choice of fast food pattern and restaurants. Therefore, local fast foods restaurants have to be sensitive to these changing trends and to be innovative and get prepare to change accordingly to avoid from losing their existing and future potential customers. In India young generation prefer those fast food restaurants which are control the product availability, quality, service, cleanness, etc (Anita Goyal, N.P. Singh, 2007). In Malaysia fast food outlet are available and it's increasing. These outlets are always tried to maintain some factors which keep their sells stables. These factors are product quality, product attribute, brand name, store environment, service quality, promotion, price, and brand name, customer satisfaction (Hossein Nezakati, Yen Lee Kuan and Omid Asgari). The fast food culture began its journey in Bangladesh at early nineties when the first fast food restaurant started its business in the Baily Road of Dhaka (Islam & Ullah 2010). The fast food restaurant industry worth around Tk. 8.0 million of sales only in the capital city everyday, which puts the gross revenue of these fast food retailers at Tk. 3.0 billion annually (Bhuiyan 2010). The size of the industry has become up to Tk. 1000 core and its still growing (Farhana 2011). Now not only in capital city but also other city likes Chittagong, Sylhet, Comilla, increase fast food business. The demand of fast food industry changes regularly. There are

some causes behind the demand variation. At first the study identifies the cause of demand variation and then shows its impact on sale volume.

Background of the Thesis

Now a day's market is a very competitive place. To survive in this competitive market, all companies try to fulfill the demand. But market demand is varying every moment. There are some causes behind demand variation.

According to Carey and Genevieve, five factors are most important for fast food restaurant selection; these are ranked as, (1) range of food; (2) quality of food; (3) price of food; (4) atmosphere; and (5) speed of service.

In Bangladesh, Islam and Ullah conducted a study to identify the factors related to the consumer preferences of the fast food products. They found nearness and accessibility, similar taste of fast food, cost and quality relationship, discount and taste, clean and hygiene, salesmanship and decoration, fat and cholesterol, and self-service can influence the consumers' fast foods consumption.

According to Tabassum Ayesha and Rahman Tasnuva conducted a study on "Differences in Consumer Attitude towards Selective Fast Food Restaurants in Bangladesh: An Implication of Multi attributes Attitude Model." This study recommends that the fast food restaurants of Bangladesh should focus more on food quality, price, speed of service, and environment.

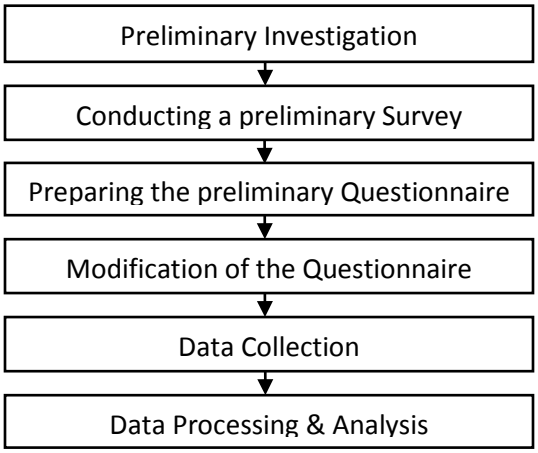
In Malaysia Hossein Nezakati, Yen Lee Kuan and Omid Asgari conducted a study on "Factors influencing customer loyalty towards fast food restaurants". They found some factors which are influenced customer loyalty towards fast food restaurants those factors are product quality, product attribute, brand name, service quality, store environment, promotion, price, brand name, customer satisfaction.

In India three dimension of fast food outlets are affecting the choice of fast food outlets by Indian consumers. The dimensions are service and delivery dimension, product dimension, and quality dimension (Anita Goyal, N.P. Singh, 2007).

Food price have a great impact on food consumption (Tatiana Andreyeva, PhD, Michael W. Long, MPH, and Kelly D. Brownell, PhD, 2010).

Greater availability has led to increased demand (Mark D. Jekanowski, James K. Binkley, and James Eales, 2001).

The methodology that had been followed during the study is given bellow



Findings and Analysis

This chapter presents key findings of the study. Quantitative information has been presented through tables and figures. It is a questionnaire based exploratory case study. Statistical analysis has been performed using MS Excel software. This research is conducted in two fast food and sweet organization and forty eight sales point in Sylhet. Yet all these factories are sweet and fast food based but different types of products are produced in these factories such as white sweet, roshomalay, chamcham, cake, pastry cake, bread, biscuit, Burger, pizza and so on. And demand variation of these factories is varied for the variation of product. The products of these factories are divided into two segments one is Bakery and another is sweet. In this study we considered only basic three items these are white sweet, bread, pastry cake. From sweet portion white sweet is selected and from the bakery portion bread and pastry cake are chosen. For analysis purpose a ranking is used scale such as 5= very high , 4= high, 3= Moderate, 2= low, 1= very low Data of six months are collected from two processed food organization and their forty eight sales points. The following sections present the findings and analysis systematically.

Demand Variation in Food Industry

After taking this research what was conducted in two sweet and fast food organization and forty eight sales points through interview and questionnaire, a view of demand variation is shown on the basis of collected data on Fulkoli and Bonoful. The normal production capacity, normal average demand, and special demand are shown below.

Table 1: Demand Pattern of Fulkoli and Bonoful (daily basis)

	Sweet(×10kg) (daily)		Bread(×100pics) (daily)		Cake(pound) (daily)	
Organization	Fulkoli	Bonoful	Fulkoli	Bonoful	Fulkoli	Bonoful
Normal Production	35	50	100	120	70	80
Normal Demand	30	40	80	105	60	70
Special Demand	350	600	120	140	210	200

The table 1 shows the normal production capacity, normal average demand, and special demand of Fulkoli and bonoful for three different items.

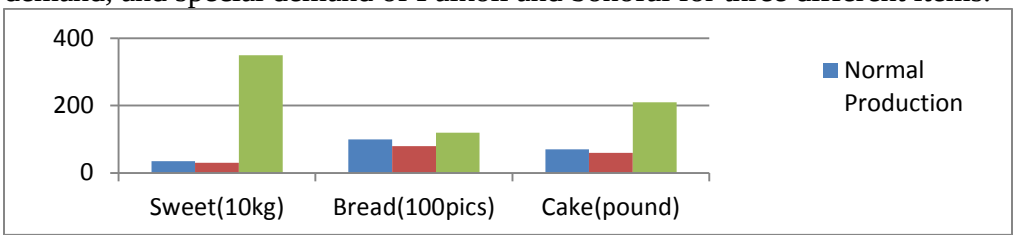


Fig 1: Demand pattern of Fulkoli

Fig 1 indicate the bar chart of normal production capacity, average demand and special demand of sweet in kg, Bread in piece, cake in pound for Fulkoli. Special demand for these three item (pastry cake, bread, white sweet) are eid, puza, pohala boishak, S.S.C and H.S.S exam result, X-mass day and so on. They manage the demand by working overtime and hiring labor.

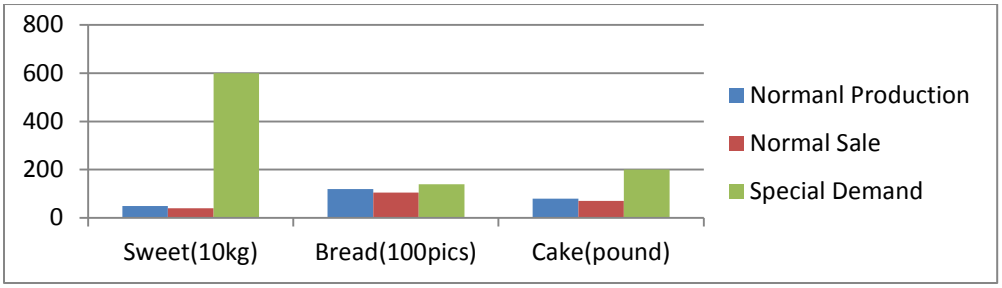


Fig 2: Demand pattern of Bonoful

Fig 2 shows the demand variation of Bonoful for special demand and normal demand. Special demand for these three item (pastry cake, bread, white sweet) are eid, puza, pohala boishak, S.S.C and H.S.S exam result, X-mass day and so on. They manage the demand by working overtime and hiring labor.

Impact of the Causes on Demand Variation

The impact of each cause on dmand variation for sweet, bakary are identified on the basis of collected data through interview and questionnaire.

To analysis purpose ,very low=1, low=2 -a ranking scale is used marking as modarate=3, high=4 and very high=5**.** The sum of the point label is shown as frequency and it is given below.

Impact of the Causes on Demand Variation (Bread)

The impact of the cause of bread is given below. Here bar chart show the level of the impact of these causes.

Fig 3: Impact of causes on demand variation (bread)

This Figure (3) show the level of impact for the demand variation of bread. From the five scale level here indicate the sum of the point of impact for each cause. From the table it is identified that Speial occasion, Buy back system, Wrong forecasting, holiday weekend, environment are the most valuable causes.

Impact of the Cause on Demand Variation (sweet)

The impact of the cause of sweet is given below. Here bar chart show the level of the impact of these causes.

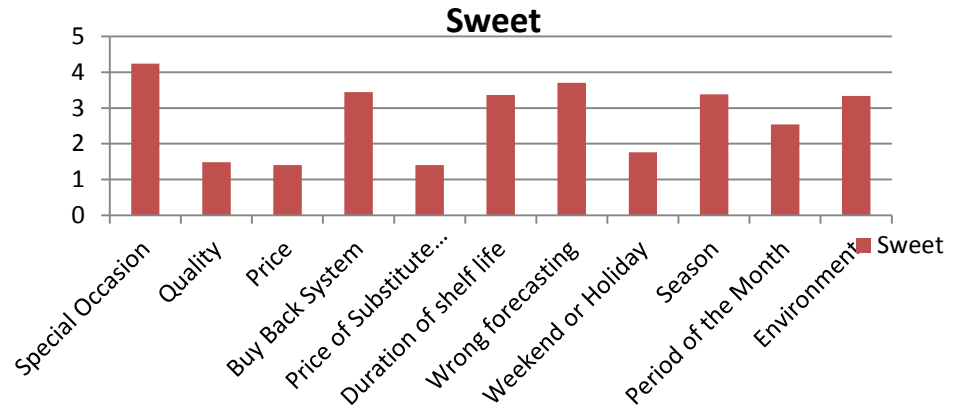


Fig 4: Impact of cause on demand variation (sweet)

This Figure (4) show the level of impact of causes on the demand variation of sweet. From the five scale level here indicate the sum of the point of impact for each cause. From the table it is identified that Speial occasion, Buy back system, Wrong forecasting, holiday weekend, shelf life, environment are the most valuable causes.

Impact of the Cause on Demand Variation (pastry cake)

The impact of the cause of cake is given below. Here bar chart show the level of the impact of these causes.

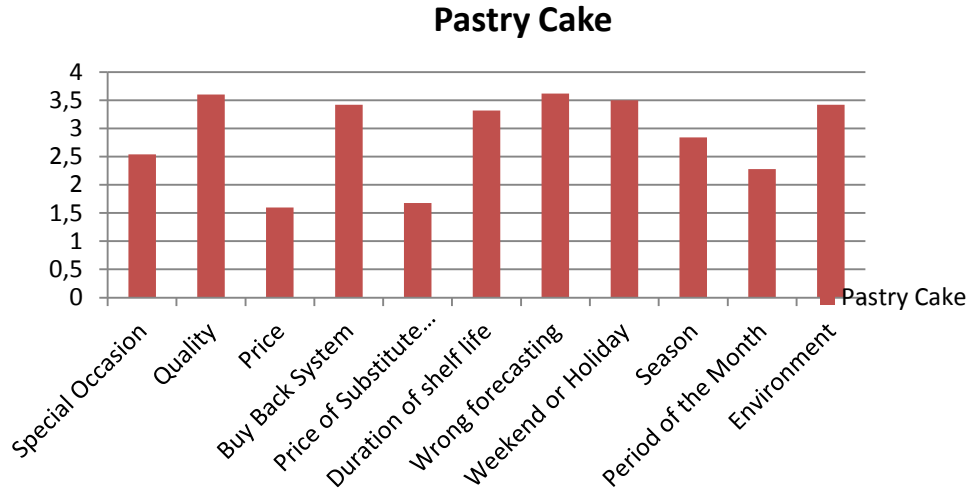


Fig 5: Impact of cause of demand variation for cake

This Figure (5) show the level of impact for the demand variation of bread. From the five scale level here indicate the sum of the point of impact for each cause. From the table it is identified that Speial occasion, Buy back system, Wrong forecasting, holiday weekend, shelf life, environment are the most valuable causes.

Analysis of Data Based on Frequencies

Principal components analysis is used to obtain the optimal ways of combining factors into a small number of variables and factor analysis is employed to get co-relationship among the factors (Doloi, 2009; Long et al., 2004). The validity and reliability of questionnaires (in terms of internal consistency) is tested by the Cronbach's alpha (Cα) of each variable (Teerajetgul et al., 2009). Although there is no acceptable limit of Cα, as it can be extended by large number of variables (Zhang, 2005). Numerous statistical tests such as Kaiser-Meyer-Olkin measure of sampling adequacy (KMO MSA) and Bartlett's test of sphericity are applied to test the adequacy of the collected data for factor analysis (Field, 2005). The value of KMO MSA can be varied from 0 to 1. It is advisable to have minimum value of

KMO MSA is 0.5; value near to 1 is more reliable result by factor analysis (Kaiser, 1974). Moreover, for the accurate factor analysis, the strength of the data is measured by the communality of each factor used in factor analysis. The value 0.4 to 0.7 of communality has been recommended for any further analysis in principle components analysis (Costello and Osborne, 2005).

The analysis of qualitative data is based on a ranking scale such a 5= very high, 4= high, 3= Moderate, 2= low, 1= very low. Data for white sweet is analysis separately. For bread and pastry cake analyses are done combined.

Table 2: Descriptive statistics of causes of Bread and Pastry cake

	N	Minimum	Maximum	Std. Deviation	Mean
Wrong Forecasting	100	2.00	4.00	.51434	3.5900
Weekend or Holiday	100	3.00	5.00	.61101	3.4800
Environment	100	2.00	4.00	.53182	3.4000
Buy Back System	100	1.00	4.00	.71038	2.9800
Duration of Shelf life	100	2.00	4.00	.65528	2.9300
Quality	100	1.00	5.00	1.13155	2.8200
Period of the Month	100	1.00	4.00	.72048	2.3100
Season	100	1.00	4.00	.85375	2.2800
Special occasion	100	1.00	4.00	.76910	2.1200
Price of Substitute Product	100	1.00	3.00	.70632	1.8100
Price	100	1.00	3.00	.70525	1.7400
Valid N (list wise)	100				

Table 2 shows the Mean and Standard Deviation of the causes of demand variation of Bread

Table 3: Descriptive statistics of causes of Sweet

Sweet

Factor	N	Minimum	Maximum	Std. Deviation	Mean
Special occasion	50	2	5	0.6869	4.24
Wrong Forecasting	50	3	5	0.61445	3.7
Buy Back System	50	3	4	0.50143	3.44
Season	50	2	4	0.53031	3.38
Duration of Shelf life	50	3	4	0.48487	3.36
Environment	50	2	4	0.51942	3.34
Period of the Month	50	1	4	0.70595	2.54
Weekend or Holiday	50	1	3	0.62466	1.76
Quality	50	1	3	0.57994	1.48
Price	50	1	3	0.53452	1.4
Price of Substitute Product	50	1	3	0.53452	1.4
Valid N (list wise)	50				

Table 3 shows the Mean and Standard Deviation of the causes of demand variation of Sweet.

Factor Analysis Data Reduction For Causes

By using factor analysis (data reduction technique), the less important causes are reduced. The data obtain from processed food industry have been used for this purpose and the result is given in the chart.

It can be ignored the values from the factor analysis which is below 0.50. Except these conditions, there are some causes which are important.

Factor Analysis for Sweet

The rotation is to reduce the number factors on which the variables under investigation have high loadings. Rotation does not actually change anything However makes the interpretation of the analysis easier. Looking at the table in appendix B found the extraction matrix. These factors can be used as variables for further analysis. After factor analysis, there are eight causes behind demand variation which are relatively important for sweet shown below in table:

Table 4: Relatively important causes identified by factor analysis for sweet:

Communalities

	Initial	Extraction
Special occasion	1.000	.616
Buy Back System	1.000	.557
Duration of Shelf life	1.000	.812
Wrong Forecasting	1.000	.737
Weekend or Holiday	1.000	.682
Season	1.000	.766
Period of the Month	1.000	.725
Environment	1.000	.680

Extraction Method: Principal Component Analysis.

Factor Analysis for Bread and pastry cake

Similarly after factor analysis, there are eight causes behind demand variation which are relatively important for bread shown below in table:

Table 5: Relatively important causes identified by factor analysis for bread and Pastry cake:

Communalities

	Initial	Extraction
Special occasion	1.000	.666
Quality	1.000	.723
Price	1.000	.871
Price of Substitute Product	1.000	.834
Wrong Forecasting	1.000	.653

Weekend or Holiday	1.000	.679
Period of the Month	1.000	.837
Environment	1.000	.680

Reduction of these factors into the critical variables by principle components analysis prior to principle components analysis, strength of each factor is examined by communality to decide the accuracy of factor analysis (Ng and Tang, 2010). The communities of all factors are shown in Table (4, 5,). It reveals that each factor has communality greater than 0.5, which suggests their accuracy valid for factor analysis. Principle components analysis with varimax orthogonal rotation is used to reduce 11 factors into highly demand variation. Table 6, 7, shows a total of, 4 variables are developed, with Eigen values greater than 1.00.

Table 6 Four variables are found by principle components analysis for sweet

Variable No	Variable labels	Eigen value	Percentage of variance	Factors	Factor loading
1	Customer oriented (3)	1.894	23.67	Period of the month	.851
				Environment	.711
				Special Occasion	.557
2	Management Policy (2)	1.388	17.35	Season	.723
				Buy Back System	.677
3	Time & experience oriented(2)	1.149	14.365	Weekend	.826
				Wrong forecasting	.677
4	Product Oriented (1)	1.057	11.543	Duration of shelf Life	.907

Table 7 Four variables are found by principle components analysis for Bread and Pastry cake

Variable No	Variable labels	Eigen value	Percentage of variance	Factors	Factor loading
1	Management decision(2)	1.702	21.272	Special occasion	.717
				Quality	.817
2	Time and Experience (2)	1.282	16.059	Wrong forecasting	.791
				Holiday	.666
3	Customer oriented (2)	1.169	14.613	Period of the month	.747
				Environment	.739
4	Management policy (2)	1.065	13.308	Price	.815
				Price of substitute product	5.00

Reliability Test for the Causes of demand variation

KMO MSA and Bartlett's test of sphericity are measured to test the adequacy of the collected data from respondents used in factor analysis. KMO for Sweet in this analysis is 5.72 and for combined analysis of bread and pastry cake is 4.55. Before factor analysis of the sources, reliability test is performed to see that the data is reliable or not. Reliability ranges from 0 to 1. If the error variance increases, reliability decreases. From experiment it is found that the value of reliability of data is more or equal to 0.50 then it will give reliable results.

For the analysis, a software named "SPSS" is used to test the reliability that it is either reliable or not.

Table 8 Reliability of data for sweet

Reliability Statistics

Cronbach's Alpha	N of Items
.586	11

Table 9 Reliability of data for Bread and pastry cake

Reliability Statistics

Cronbach's Alpha	N of Items
.666	11

Discussion of variables

Special occasion Such as Eid, Puza, pohalaboishak, H.S.C. Result, S.S.C Result and other public exam result, cris-mass Day are create demand variation for processed food industry. Culturally these days are important and people celebrate these days with other.

Quality is the customer expectation. It may be taste or other product dimension. Quality creates demand variation because in the competitive market customer counts the product quality. So Quality plays an important role in demand variation for processed food industry.

Like quality, price is another factor which play important role for demand variation. Because customer always looking for low price. Generally demand decrease with high price.

The food products are become waste after a certain period so the various buy back policy make impact on the demand variation. By this the manufacturer takes some risk of uncertainty and this increase the demand.

Price of substitute products also fluctuate demand label because if the price of substitute products are decrease than the demand of the product decrease.

The duration of shelf life also create demand variation. If the shelf life is high it creates low demand variation, if the shelf life is low it creates

high demand variation. Because for the low shelf life product will be waste after some time and wholesaler do not take the risk and it decrease the demand.

Generally companies follow some forecasting method (it may be only historical data) if they make any mistake then it will create Demand variation. For general scenario this wrong forecasting creates high demand variation.

Week end (Friday) and other holiday create much more demand than other normal days. Because in the holiday people get time to celebrate time with friends, family, and relatives. On the other hand in a busy day people may not have enough time to go the fast food out let. Even though they need to go but cannot go due to business.

Various seasons create various demands for processed food industry. For example the summer season when the local fruits are available in the market this season decrease the demand of processed food items. In winter season when homemade cakes are available the demand of fast food decreases.

Generally the first half of the month customer demands is high because they have enough money in hand rather than end of the month. For most of the middle class family they feel short of money in the last half of the month so this period create low demand of fast food item.

Environment means the working environment, the service quality, service man behavior, number of sales point. For example if any news media publishes that X Company makes food items in a dirty environment then it will decrease the demand of the company. Availability of the sales point also increases the sales because it saves the transport money.

Impact of Cause of Demand Variation on Sales Volume

To show the impact of these causes on sales volume here the previous six month supply and demand data were collected. The data are shown in figure bellow:

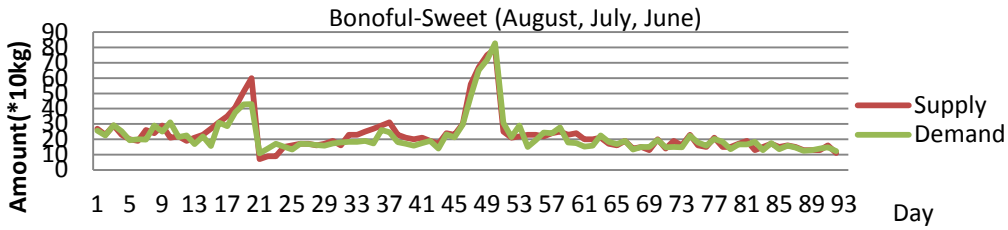


Fig 6: Demand and supply pattern for Bonoful

The figure indicates the demand and the supply of sweet of bonoful for the month of August, July and June. From this figure it shown that the demand varies with period of the month, week end /holiday, special occasion

or other reason. In the month of July there are extreme changes in demand due to H.S.C result.

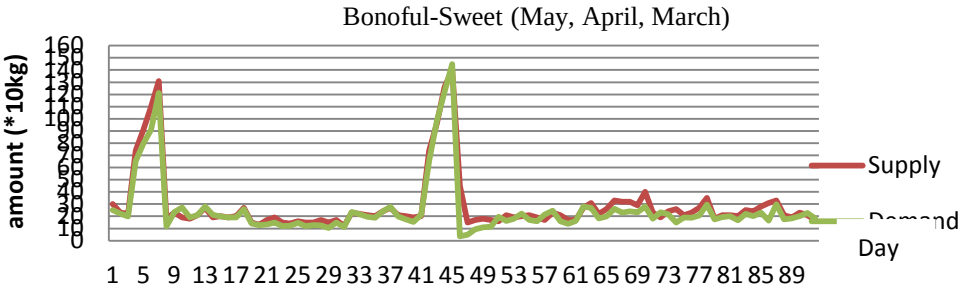


Fig 7: Demand and supply pattern for Bonoful

The figure above indicates the demand and the supply of sweet of bonoful for the month of May, April, March. From this figure it shown that the demand varies with period of the month, week end /holiday, special occasion or other reason. In the month of May and April there are extreme changes in demand due to S.S.C result and pohela boishak.

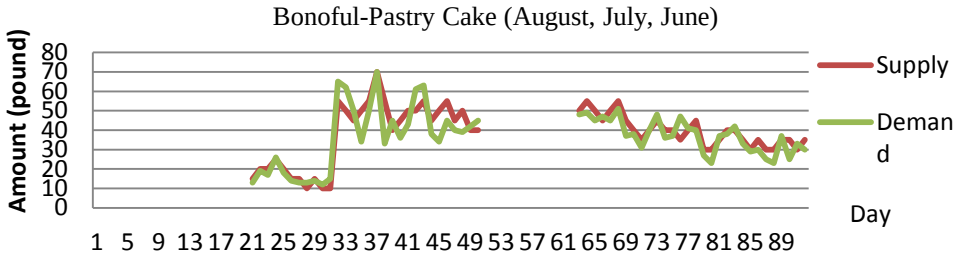


Fig 8: Demand and supply pattern for Bonoful

The figure indicates the demand and the supply of Pastry cake of bonoful for the month of August, July and June. From this figure it shown that the demand varies with period of the month, week end /holiday, special occasion or other reason. In the month of August and July some portion of the days demand and supply are zero for the month of Ramadan. And also after EID the demands were low.

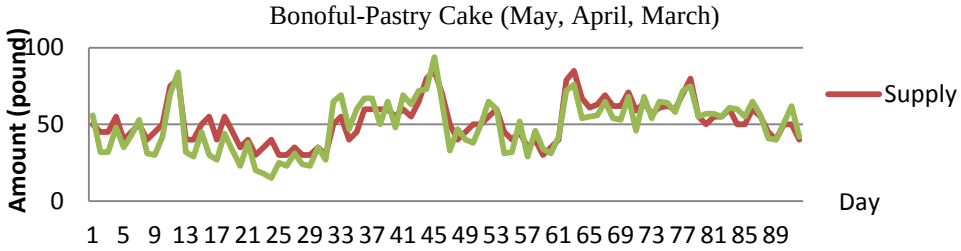


Fig 9: Demand and supply pattern for Bonoful

The figure above indicates the demand and the supply of Pastry cake of bonoful for the month of May, April, March. From this figure it shown that the demand varies with period of the month, week end /holiday, special occasion or other reason. In this time period the demand are remain normal, there is no extreme change in demand.

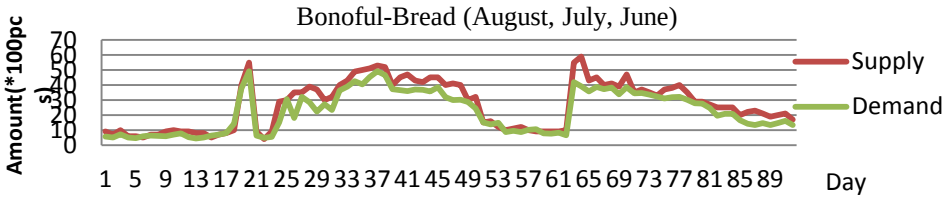


Fig 10: Demand and supply pattern for Bonoful

The figure indicates the demand and the supply of Bread of bonoful for the month of August, July and June. From this figure it shown that the demand varies with period of the month, week end /holiday, special occasion or other reason. In the month of August and July some portion of the days demand and supply were very low for the month of Ramadan. And also after EID the demands were low.

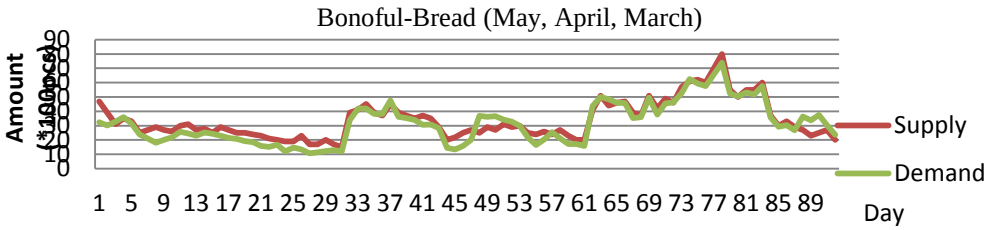


Fig 11: Demand and supply pattern for Bonoful

The figure above indicates the demand and the supply of Bread of bonoful for the month of May, April, March. From this figure it shown that the demand varies with period of the month, week end /holiday, special occasion or other reason. In this time period the demand are remain low in the month of May and April due to seasonal effect.

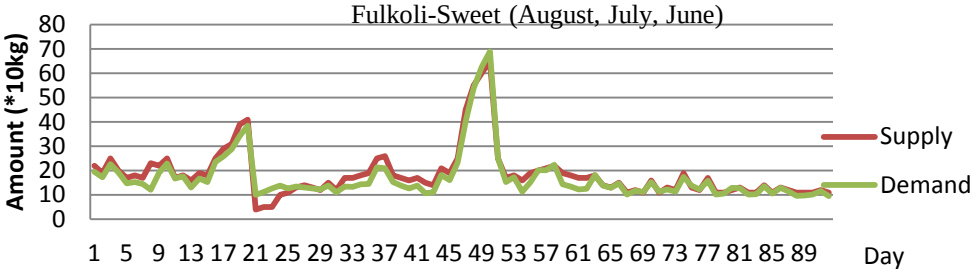


Fig 12: Demand and supply pattern for Fulkoli

The figure indicates the demand and the supply of sweet of Fulkoli for the month of August, July and June. From this figure it shown that the demand varies with period of the month, week end /holiday, special occasion or other reason. In the month of July there are extreme changes in demand due to H.S.C result

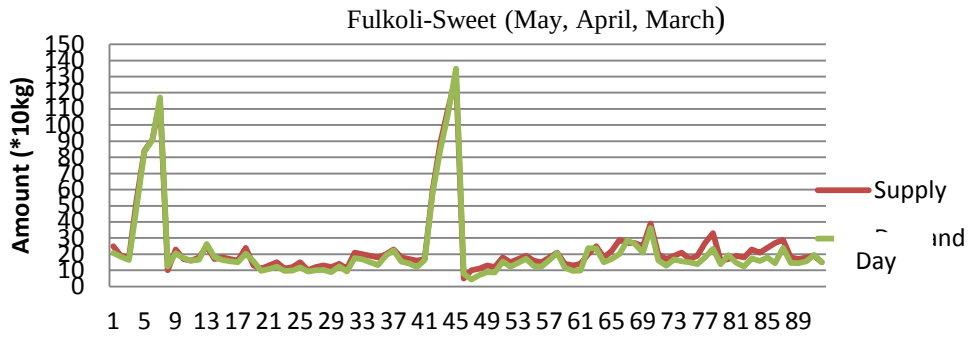


Fig 13: Demand and supply pattern for Fulkoli

The figure above indicates the demand and the supply of sweet of Fulkoli for the month of May, April, March. From this figure it shown that the demand varies with period of the month, week end /holiday, special occasion or other reason. In the month of May and April there are extreme changes in demand due to S.S.C result and pohela boishak

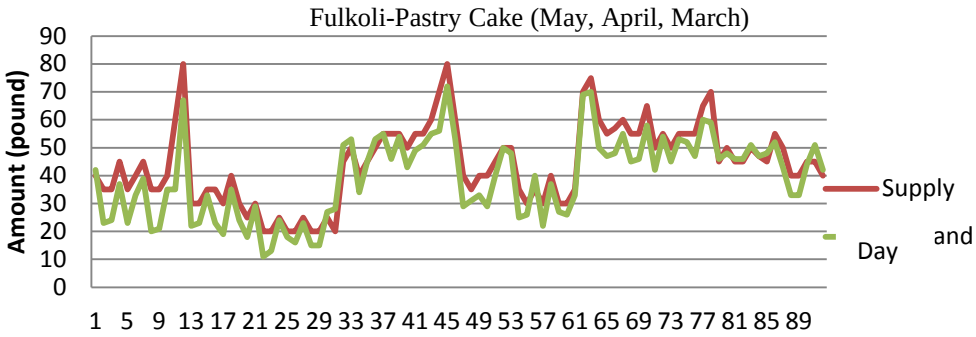


Fig 14: Demand and supply pattern for Fulkoli

The figure above indicates the demand and the supply of Pastry cake of Fulkoli for the month of May, April, March. From this figure it shown that the demand varies with period of the month, week end /holiday, special occasion or other reason. In this time period the demand are remain normal, there is no extreme change in demand.

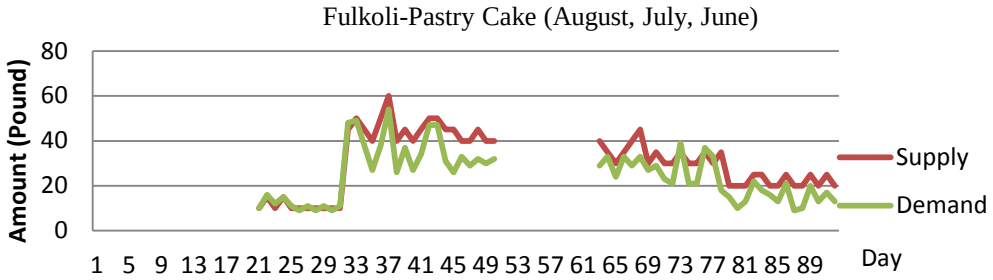


Fig 15: Demand and supply pattern for Fulkoli

The figure indicates the demand and the supply of Pastry cake of Fulkoli for the month of August, July and June. From this figure it shown that the demand varies with period of the month, week end /holiday, special occasion or other reason. In the month of August and July some portion of the days demand and supply are zero for the month of Ramadan. And also after EID the demands were low.

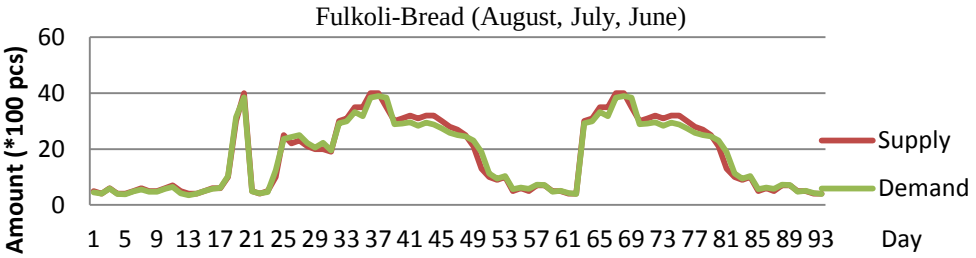


Fig 16: Demand and supply pattern for Fulkoli

The figure indicates the demand and the supply of Bread of Fulkoli for the month of August, July and June. From this figure it shown that the demand varies with period of the month, week end /holiday, special occasion or other reason. In the month of August and July some portion of the days demand and supply were very low for the month of Ramadan. And also after EID the demands were low.

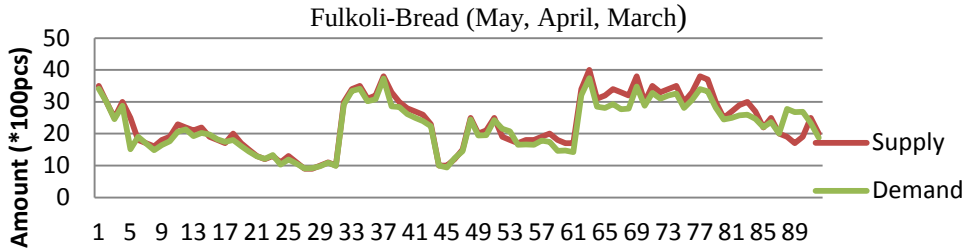


Fig 17: Demand and supply pattern for Fulkoli

The figure above indicates the demand and the supply of Bread of bonoful for the month of May, April, March. From this figure it shown that the demand varies with period of the month, week end /holiday, special occasion or other reason. In this time period the demand are remain low in the month of May and April due to seasonal effect.

As theses figure indicates that the demands were vary day to day. There are some causes for these variations. It is clearly shown that the cause make impact on sales volume. The special occasion like Eid (20 august), S.S.C result (7 may), H.S.S result (19 July), pohalaboishak (14 April), holiday/week end (Friday, public holiday), period of the month (demand are high for first half) , Season (summer the fruit season generally show the low demand, also winter season pitha pulli utsob show low demand that show in the figure).

Consequence of Demand Variation

The consequences of demand variation are identified in this section on the basis of collected data from two fast food and sweet organization and forty eight sales points. The consequences are also different for different food item.

Consequence of Demand variation for Bread

The consequences of demand variation for breab are given below. Here also pie chart indicate the percentage of the consequence.

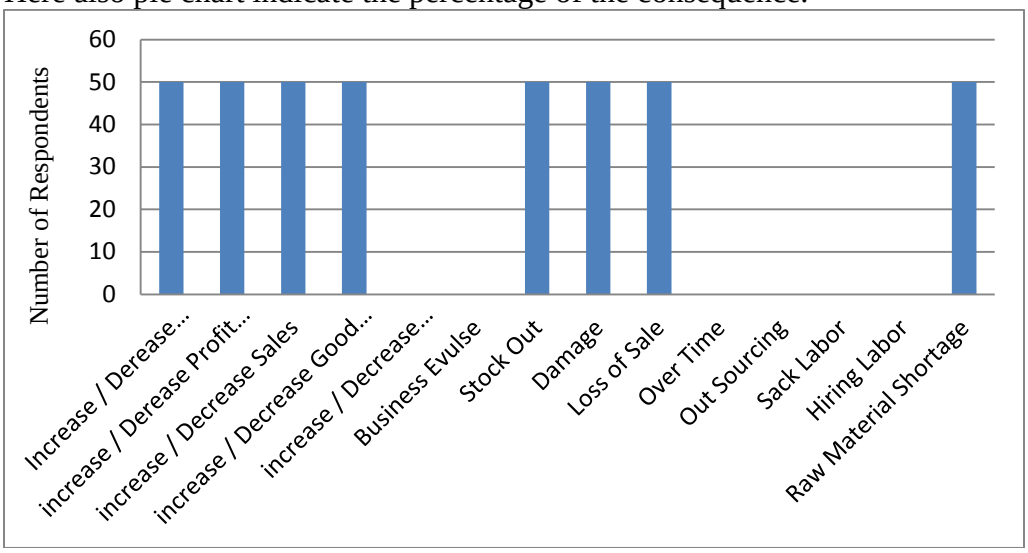


Fig 18: Consequences of demand variation for Bread

The Figure above indicate the consequence of demand variation for Bred. The frequency of the each consequence are shown in this chart.

Consequence of Demand variation for Sweet

The consequences of demand variation for sweet are given below. Here also pie chart indicate the percentage of the consequence.

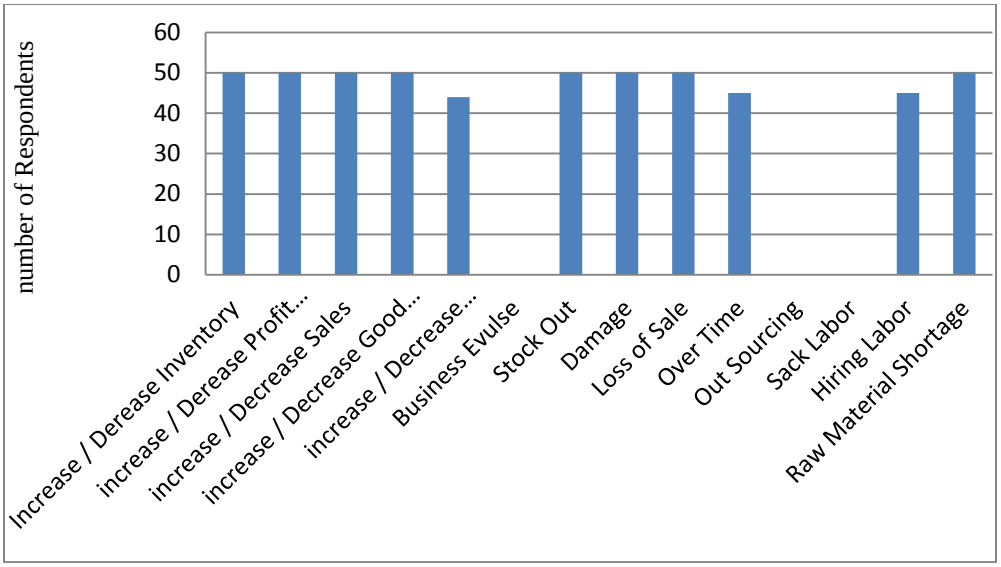


Fig 19: Consequences of demand variation for sweet

The Figure above indicate the consequence of demand variation for Sweet. The frequency of the each consequence are shown in this chart.

Consequence of Demand variation for pastry cake

The consequences of demand variation for pastry cake are given below. Here also pie chart indicate the percentage of the consequence.

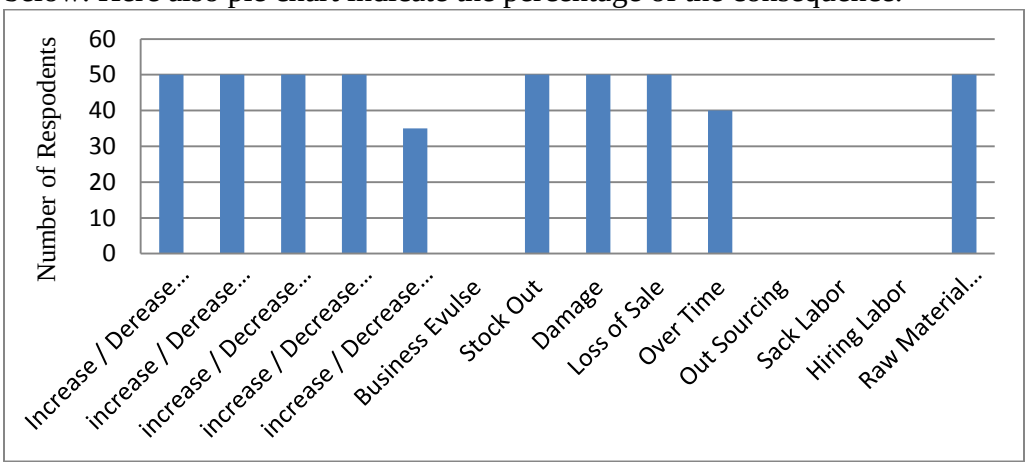


Fig 20: Consequences of demand variation for pastry cake

The Figure above indicate the consequence of demand variation for Pastry Cake. The frequency of the each consequence are shown in this chart.

Impact of Special Occasion on Demand Variation

To identify how much the special occasion impact on demand variation, the co-efficient of variance is calculated. The co-efficient of variance for a single variable aims to describe the dispersion of the variable

in a way that does not depend on the variable's measurement unit. If the co-efficient of variance is higher than the dispersion is greater in the variable. The co-efficient of variance for a model aims to describe the model fit in terms of the relative sizes of the squared residuals and outcome values. The lower co-efficient of variance, is the smaller the residuals relative to the predicted value. This is suggestive of a good model fit.

For this analysis, three special period of demand are collected that are S.S.C result, H.S.C result and pohela boishak .special demand and average normal demand are gathered to find out the label of impact. The demand is shown in the table below

Table 10: Demand Pattern of White Sweet for Fulkoli (Special Occasion)

Date	Normal Demand (Per Kg)	Special Demand (Per kg)
Pohela Boishak(14 april)	180	2700
S.S.C. Result (12 may)	187	1870
H.S.C Result (24 july)	185	1295

The table indicates the amount of normal demand and special demand of Fulkoli.

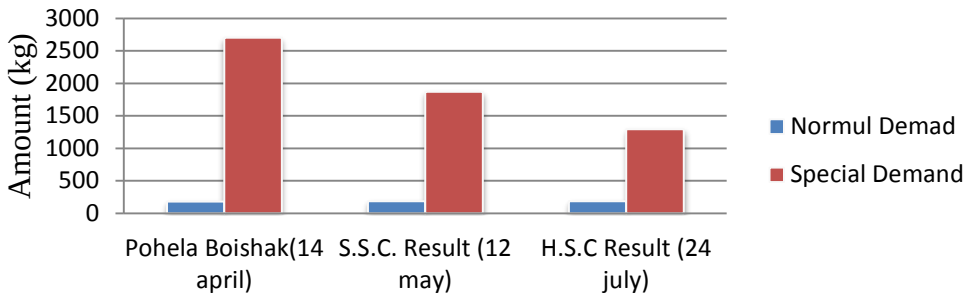


Fig 21: Demand pattern for Fulkoli (Bar Chart)

To find the co-efficient of variance of demand variation for special occasion the figure above shown the average normal demand and some special demand.

Mean of normal demand = (180+187+185) ÷3 = 184

Variance = $\frac{(184-180)^2+(184-187)^2+(184-185)^2}{3}$ =8.66

Standard deviation = $\sqrt{8.66}$ =2.943

So co- efficient of variance for normal demand = $\frac{standard\ deviation}{average\ demand}$ =$\frac{2.943}{184}$ =.016

Mean of special demand = (2700+1870+1295) ÷3 =1955

Variance = $\frac{(1955-2700)^2+(1955-1870)^2+(1955-1295)^2}{3}$ =332616.66

Standard deviation = $\sqrt{332616.66}$ = 576.73

So co- efficient of variance for special demand = $\frac{standard\ deviation}{average\ demand}$ = $\frac{576.73}{1955}$ =.295

So it is clearly shown that the special occasion has higher demand variation than the normal demand as greater value of CV indicates dispersion in the variable.

Impact of Price on Demand Variation

For this purpose fifteen day demand of normal white sweet (140/= per kg) and Rossomalai (240/= per kg) is collected .The data is shown in the figure below:

Table 11: Demand Pattern for Fulkoli (Price Variation)

Date	Demand of White Sweet(140/= per kg)	Demand of Rossomalai Sweet(240/= per kg)
1	200	50
2	180	55
3	190	60
4	185	110
5	210	100
6	200	46
7	190	58
8	187	80
9	183	70
10	200	40
11	175	46
12	180	80
13	170	35
14	175	40
15	180	42

To find out the co-efficient of varience of demand variationn for price the figure above show the fifteen days demand of two items with price variation.Figure show the 15 days demand of white sweet and rosomalai.

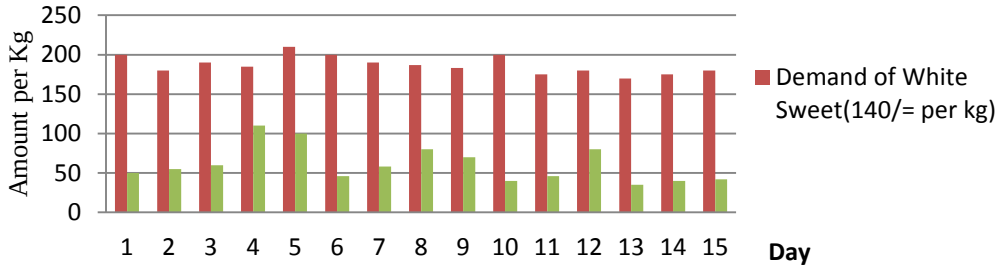


Fig 22: Demand pattern for Fulkoli (Bar Chart)

This figure also showed the 15 days demand variation of these two items.

Mean of normal sweet demand = (200+180+190+185+210+200+190+187+183+200+175+180+170+175+180) ÷15 =187

Variance =

$$\frac{(187-200)^2+(187-180)^2+(187-190)^2+(187-185)^2+(187-210)^2+(187-200)^2+(187-190)^2+(187-187)^2+(187-183)^2+(187-200)^2+(187-180)^2+(187-175)^2(187-170)^2+(187-175)^2+(187-180)^2}{15}$$

=119.866

Standard deviation = $\sqrt{119.866}$ =10.95

So co- efficient of variance for low price sweet demand = $\frac{standard\ deviation}{average\ demand} = \frac{10.95}{187}$ = .059

Mean of high price sweet demand =

(50+55+60+110+100+46+58+80+70+40+46+80+35+40+42)÷15=60.8

Variance = 481.78

Standard deviation = $\sqrt{481.78}$ = 21.95

So co- efficient of variance for high price sweet demand = $\frac{standard\ deviation}{average\ demand} = \frac{21.95}{60.8}$ =.361

So it is clearly shown that the higher price sweet has higher demand variation than the normal price demand.

Conclusion

Demand variation of perishable food items is a burning issue in fast food and sweet organization. It decreases the profit margin, increase the producer risk, destroy food and affect the production and business decision. For this reason the objectives of this research are to find out the root causes and their impact. The study was performed by questionnaire in two fast food organization and their forty eight sales points in Sylhet. This study has extracted an overall scenario about the causes and their impact on sales volume for three selected food item these are sweet, pastry cake and bread. For each food item causes were identified from whom some causes dominant on other causes. Such causes are special occasion, duration of shelf life, wrong forecasting, period of the month, quality. In this research 11 causes and also 11 consequences are identified. Form them some root causes are figured out that dominant on others. For these consequences companies have to pay a lot of money or time and the both are loss for industries. In this research, it is found that there is a chance to loss the good will of the company due to fail to meet the demand. The impacts of these causes on sales volume are also shown. Now the competition in the food industry is

increasing and the demand of customers are volatile. But demand variation is an obstacle for processed food organization to sustain in this competitive environment and save food. So it is the time to minimize these causes to a lower level and for this purpose the findings of this research can be use to get knowledge about the variation of demand.

References:

Mendelson H., and Pillai R., "Industry Clockspeed: Measurement and Operational Implications", Manufacturing and Service Operations Management, 1998, forthcoming.

Anand, Krishnan S., and Mendelson H., "Information and Organization for Horizontal Multi- market coordination", Management Science, December 1997, 43(12):1609-1627.

Perishable products, Website: http://vlex.in/vid/performance-perishable-products-through (last modified on 11 August 2008. Retrieved: April, 23, 2011).

Website: http://www.uk.atosconsulting.com/en-uk/ (last modified on 17 July 2010, Retrieved: March, 3, 2011).

Demand (definition), Website: http://www.investorwords.com/1396/demand.html (last modified on 12 January 2010, Retrieved: June, 21, 2011).

Wikipedia, Demand, Website: http://en.wikipedia.org/wiki/Demand(economics) (last modified on 21 August 2010, Retrieved: july,29,2012).

O'Sullivan, A. & Sheffrin, S, Microeconomics 4th ed. p. 62. Pearson 2005.

Goodwin, N, Nelson, J; Ackerman, F & Weissskopf, T: Microeconomics in Context 2nd ed. Sharpe 2009.

Colander, David C. Microeconomics 7th ed. p. 84. McGraw-Hill 2008.

Goodwin, Nelson, Ackerman, & Weissskopf, Microeconomics in Context 2nd ed. (Sharpe 2009), p. 88.

Wikipedia, Demand, Website: http://en.wikipedia.org/wiki/Demand_(economics) (last modified on 29 July 2010, Retrieved: July, 29,2012)

O'Sullivan, A. & Sheffrin, S, Microeconomics 4th ed. p. 74–75. Pearson 2005.

Website: http://ideas.repec.org/p/msm/wpaper/(last modified on 3 April 2011, Retrieved: June, 21,2011).

Wikipedia, Uncertainty, Website: http://en.wikipedia.org/wiki/Uncertainty (last modified on 27 June 2010, Retrieved: July, 29, 2012).

Website: http://www.nvcc.edu/home/mheslop/fds.htm (last modified on 2 March 2010, Retrieved: November, 9, 2011).

Website: http://www.nd.edu/~cwilber/econ504/504book/outln3b.html (last modified on 17 August 2010, Retrieved: June, 11, 2012).
The bullwhip-effect Website: http://www.quickmba.com/ops/bullwhip-effect/ (last modified on 1 June 2009, Retrieved: January, 11, 2012).
Coefficient of variance Website: http://www.ats.ucla.edu/stat/mult_pkg/faq/general/%20coefficient%20of%20variation.htm (last modified on 8 March 2010, Retrieved: July, 4, 2012).
Carey, RA & Genevieve, L 1995, „USA snapshots: Factors influencing choice of sit-down restaurant", USA Today, 23 June.
Islam, N & Ullah, SGM 2010, "Factors Affecting Consumers" Preferences On Fast Food Items In Bangladesh", The Journal of Applied Business Research, vol. 26, no. 4.
Tabassum Ayesha and Rahman Tasnuva, "Differences in Consumer Attitude towards Selective Fast Food Restaurants in Bangladesh: An Implication of Multi attributes Attitude Model", World Review of Business Research Vol. 2. No. 3. May 2012. Pp. 12–27.
Imam Faruk M., Statistical Package for Social Sciences (SPSS), 4th Edition, Systech Publications Ltd, 2009.
Hossein Nezakati, Yen Lee Kuan and Omid Asgari, "Factors influencing customer loyalty towards fast food restaurants", 2011 International Conference on Sociality and Economics Development IPEDR vol.10 (2011).
Anita Goyal, N.P. Singh, "Consumer perception about fast food in India: an exploratory study", British Food Journal, Vol. 109 Iss: 2, pp.182 – 195,2007.
Tatiana Andreyeva, PhD, Michael W. Long, MPH, and Kelly D. Brownell, PhD, "The
Impact of Food Prices on Consumption: A Systematic Review of Research on the Price
Elasticity of Demand for Food". Vol 100, No. 2 | American Journal of Public Health, February 2010.
Mark D. Jekanowski, James K. Binkley, and James Eales, "Convenience, Accessibility, and the Demand for Fast Food". Journal ofAgricultural and Resource Economics 26(1):58-74.