

Indian Institute of Technology Madras

Bs in Programming and Data Science

CAPSTONE PROJECT- FINAL SUBMISSION

On Topic

**Plans for Revenue Growth and customer acquisition
for shopping complex~ “2K market.”**

for course

Business Data Management

By

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EXECUTIVE SUMMARY

To analyze the trend in sales of “2K market” using sales data from the shopping complex in NIT Tiruchirappalli. It works from morning 10 Am to night 8:30 PM. Using Analysis, Manager of “2k Market” will be smartly able to manage inventories and get an idea about practical fields for Improvement.

It will help the shopping complex to make more revenue by fulfilling dynamic customer demand. As “2k market” is the only shopping complex in NITT campus, analysis goal is to provide “**Can do**” services to the customers. Every product which a customer may need or will need must be available in the complex. It all could be possible if you predicted the dynamic nature of the customer.

To move in the direction of analysis of sales data available by shopping complex, different types of analysis will perform like univariate, Bivariate and multivariable analysis along with permuting different factors for statistical and mathematical analysis. Some of those factors are like time of sales, customer, gender, hostels which book more online deliveries, company products like by customer etc.

Results will be presented in a PowerPoint presentation. We are hoping that the results will surely be helpful for the manager of the shopping complex to make effective planning for sales and Inventories. The Analysis recommendations will be helpful to increase revenue and customers will be more comfortable to get services. Also, big e-commerce companies like Amazon, Flipkart, Big Basket won't be able to capture customers of “2K market”.

● DETAILS ABOUT THE ANALYSIS TOOLS

Sales data analysis was performed using tools like MS-excel and Python. Descriptive statistical tools like sum, average, ifs, sum if, countify, plot, Pivot table and other descriptive and visualization tools used to analyze the provided sales dataset. Also, MS word and MS PowerPoint will be used for the presentation of results.

Detailed Explanation of Analysis Process/Method

Data collected from a shopping complex, where we were interested in analyzing data using MS-excel. Some methods for justification which we will use:

- ❖ Diagnostic Analysis was performed to answer pattern embedded in sales data of “2k market” i.e., sales trend of new product launching in store”, does it relate with other factors like gender, hostel, timing, average amount of shopping, etc.
- ❖ Predictive analysis of sales trend to predict “Products in high demand and low demand” and online order analysis from different hostels. The same analysis will be done while launching new products and purchasing responses by gender. Prediction of preferred company for products in future.
- ❖ Prescriptive analysis will help us to understand that which company is preferred by students for Personal, Laundry, Dishwashing and Household cleaning, to analyze which company products we should stock more. Bivariate analysis of the above data can be done with other points to check its dependency with other variables i.e., gender, timing, day etc.
- ❖ Statistical Analysis for variables like average amount of shopping by different genders, day timing and payment method. Statistical analysis will be done for variables like visiting peak hour, online order analysis from different channels.

METADATA AND DESCRIPTIVE STATISTICS

I was provided with 5 Excel sheets of dataset. For better Analysis and to know our customer, we segmented our NIT Tiruchirappalli campus into 5 Zones. A short video introducing the shopping complex is accessible through the link: [Video Link](#).

You can get a rough estimate about

North Zone: area near Main Entry Gate,

South Zone: straight opposite to North zone or back area

East Zone: Area to left Side of North Zone

West Zone: Area to right side of North zone

Central Zone: central area of NITT campus



Results and Findings

Dataset-1

	A	B	C	D	E	F	G	H	I	J
1	Order ID	Customer N	Category	Sub Category	Order Date	Region	Sales	Discount	Profit	State
2	OD1	Harish	Oil & Masala	Masalas	8/11/2017	North	1254	0.12	401.28	Tamil Nadu
3	OD2	Sudha	Beverages	Health Drinks	8/11/2017	South	749	0.18	149.8	Tamil Nadu
4	OD3	Hussain	Food Grains	Atta & Flour	12/6/2017	West	2360	0.21	165.2	Tamil Nadu
5	OD4	Jackson	Fruits & Veggies	Fresh Vegetables	11/10/2016	South	896	0.25	89.6	Tamil Nadu
6	OD5	Ridhesh	Food Grains	Organic Staples	11/10/2016	South	2355	0.26	918.45	Tamil Nadu
7	OD6	Adavan	Food Grains	Organic Staples	9/6/2015	West	2305	0.26	322.7	Tamil Nadu
8	OD7	Jonas	Fruits & Veggies	Fresh Vegetables	9/6/2015	West	826	0.33	346.92	Tamil Nadu
9	OD8	Hafiz	Fruits & Veggies	Fresh Fruits	9/6/2015	West	1847	0.32	147.76	Tamil Nadu
10	OD9	Hafiz	Bakery	Biscuits	9/6/2015	West	791	0.23	181.93	Tamil Nadu

The top 10 samples of the dataset are part of more than 9000 data samples which were recorded from 2015-2018. We could use this dataset to know about relationship between parameters like

which region of campus demanding which categories of products. For example South region occupied by UG students, so their product choice will be preferably food items and daily requirement items. On other hand east region has more professors than students, so that customer segment will focus on buys Milk, clothing, house products, vegetables and fruit. On performing Bivariate analysis between region vs category of product sales in units. The analysis says that.

- Sales in the South region are weak, customers are less interested in shopping at shopping complex.
- Shopping complexes will think about providing more facilities like quick delivery, online purchase options for regions like central and south regions.

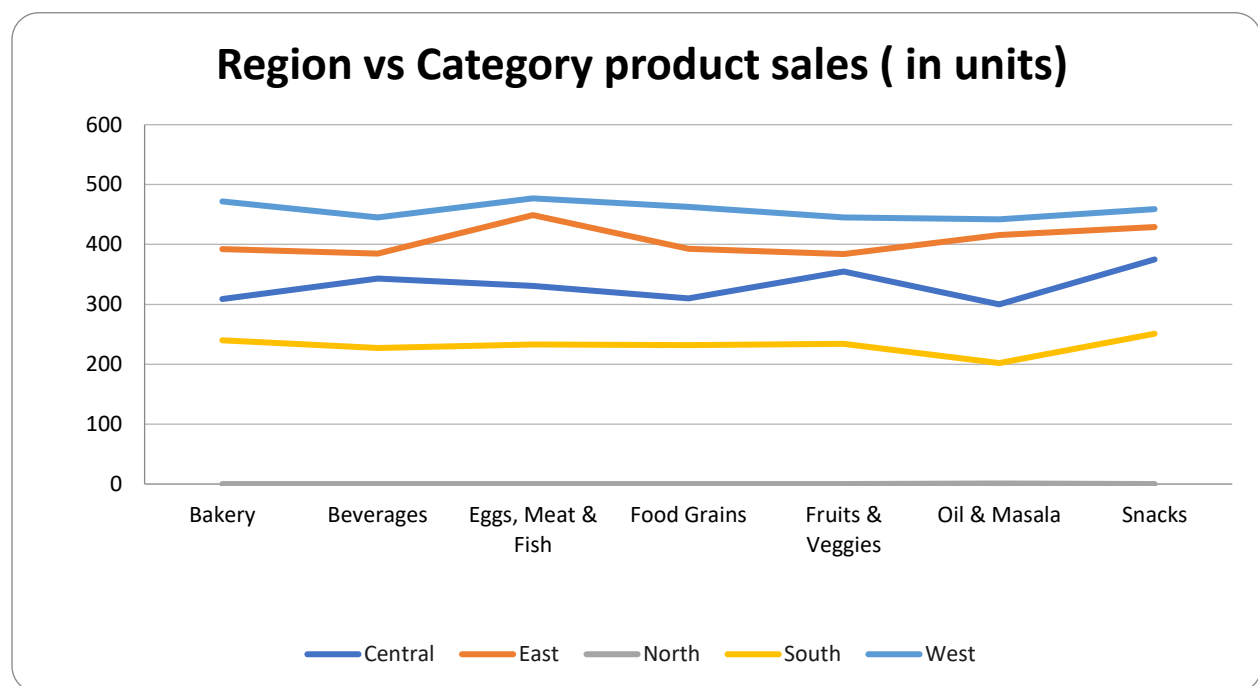


Figure: Plot showing relationship between sales in units for different regions for different product categories.

In below Figure a1 and a2, figure a2 shows that subcategories of product like bread and buns, cookies, Health drink and soft drink are major products which are in demand in shopping complex.

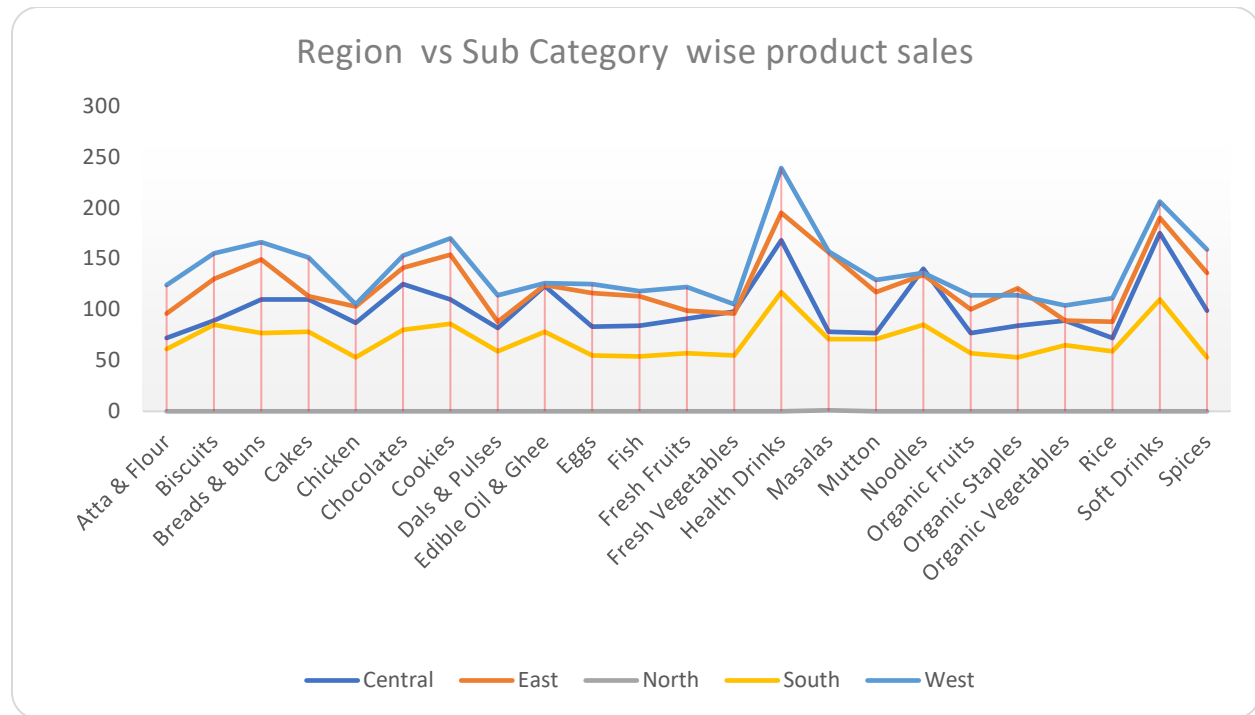


Figure a1: Plot showing relationship between sales in units for different regions for different sub product categories.

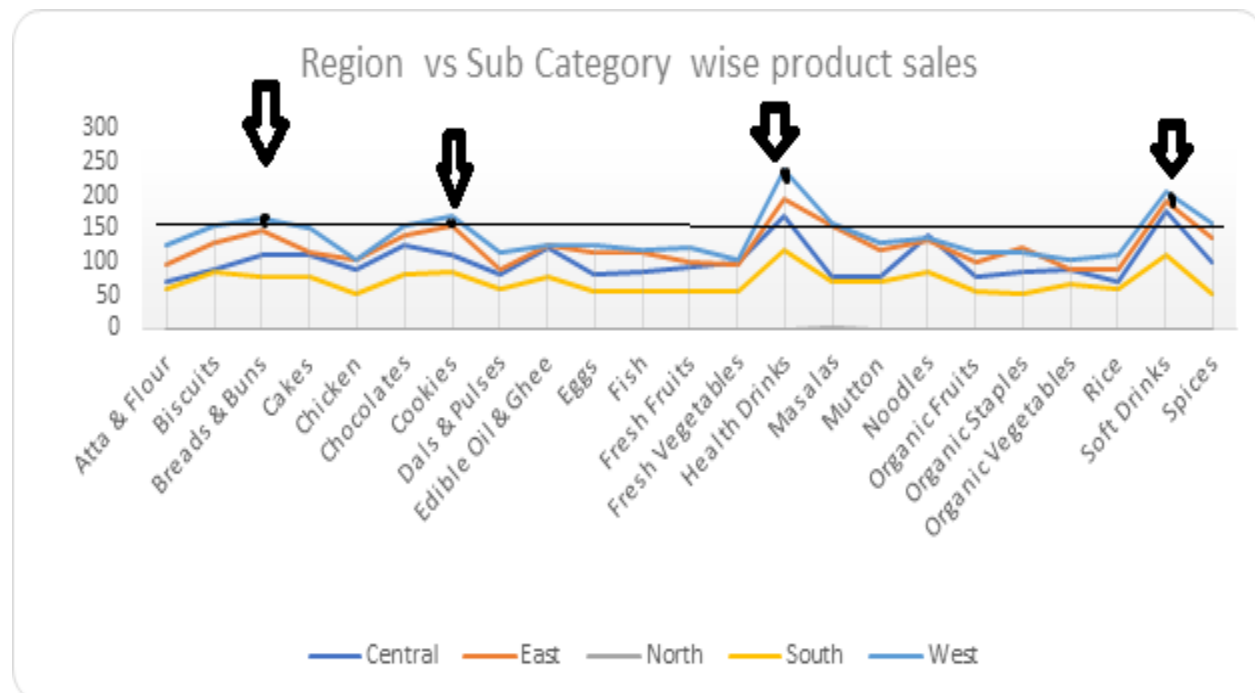


Figure a2: It is the same as Figure a1 and indicates 4 arrows which indicate major subcategory product sales.

Dataset-2

Given top 10 samples of dataset is part of more than 2,000 samples record from year 2019 to 2020. This dataset can be used to get pattern about customer nature. To know on which day mostly customers are available and free for shopping on which day of week.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	datetime	day of week	total	place	ang butter	plain bre	jam	american	croissant	caffe latte	tiramisu	cacao dee	pain au ch	almond c	croque m	mad garli	milk tea	gateau ch	pandoro c
2	7/11/2019 15:35	Thur	23800		1			1			3								
3	7/11/2019 16:10	Thur	15800		1						1								
4	7/12/2019 11:49	Fri	58000								14								
5	7/13/2019 13:19	Sat	14800		1	1													
6	7/13/2019 13:22	Sat	15600		2						1								
7	7/13/2019 14:54	Sat	15800		1												1		
8	7/13/2019 15:08	Sat	15800		1														
9	7/13/2019 15:09	Sat	14000								2	1							
10	7/13/2019 15:23	Sat	19100		2	1					1								

Below is a histogram plot showing sales of different category products on different days of week, given Tuesday is off for the shopping complex. We can clearly conclude that max sales is nearly on week-end, Sunday is busiest day.

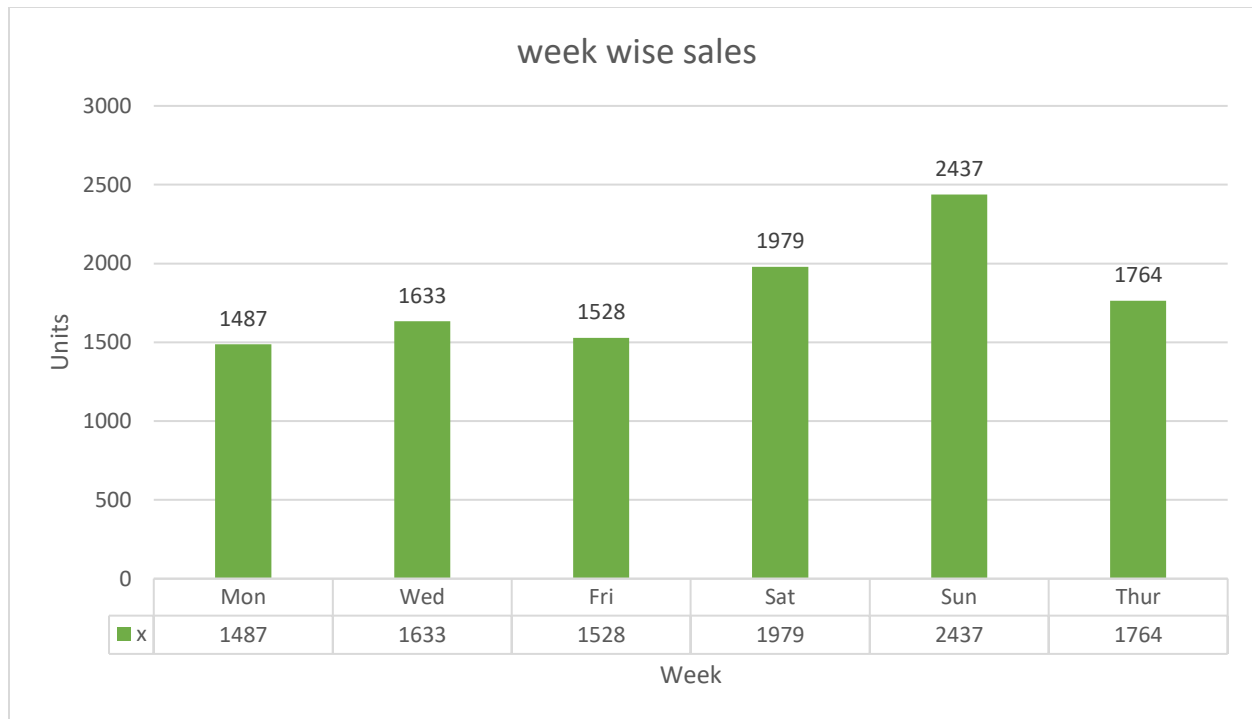


Figure: Week wise sales (Tuesday is off day for shopping complex)

Dataset-3

Given top 10 samples of the dataset given are part of more than 9,000 samples recorded from year 2015 to year 2018. This dataset will help to know about feedback for online delivery services. As in the current era, technology is playing a big role, so we can get an idea that how many customers are engaging with online services provided by 2K shopping complex.

Also, it helps to know how quickly customers are interested in getting their delivery. This dataset can be very intelligently used to know about future credit card acceptability of customers. For example, to know about customer spending, which customer segment is interested in shopping using cards and how many are interested in cardless shopping. It could be a new source of income by giving some online payment options like shop now pay later, Emi shopping, Cash on delivery etc.

	A	B	C	D	E	F	G	H	I	J	K
1	Order Date	Customer ID	Customer Name	Segment	Region	Product ID	Category	Sub-Category	Product Name	Sales	Ship Mode
2		43047 CG-12520	Claire Gute	Consumer	South	FUR-BO-10001798	Furniture	Bookcases	Bush Somerset Collection Bookcase	261.96	less than 30 min
3		43047 CG-12520	Claire Gute	Consumer	South	FUR-CH-10000454	Furniture	Chairs	Hon Deluxe Fabric Upholstered Seating	731.94	less than 30 min
4		42898 DV-13045	Darrin Van Huff	Corporate	West	OFF-LA-10000240	Office Supplies	Labels	Self-Adhesive Address Labels for Shipping	14.62	less than 30 min
5		42654 SO-20335	Sean O'Donnell	Consumer	South	FUR-TA-10000577	Furniture	Tables	Bretford CR4500 Series Slim Rectangular Table	957.5775	less than 1 hour
6		42654 SO-20335	Sean O'Donnell	Consumer	South	OFF-ST-10000760	Office Supplies	Storage	Eldon Fold 'N Roll Cart System	22.368	less than 1 hour
7		42164 BH-11710	Brosina Hoffman	Consumer	West	FUR-FU-10001487	Furniture	Furnishings	Eldon Expressions Wood and Plastic Dining Chair	48.86	less than 1 hour
8		42164 BH-11710	Brosina Hoffman	Consumer	West	OFF-AR-10002833	Office Supplies	Art	Newell 322	7.28	less than 1 hour
9		42164 BH-11710	Brosina Hoffman	Consumer	West	TEC-PH-10002275	Technology	Phones	Mitel 5320 IP Phone VoIP phone	907.152	less than 1 hour
10		42164 BH-11710	Brosina Hoffman	Consumer	West	OFF-BI-10003910	Office Supplies	Binders	DXL Angle-View Binders with Locking Rings	18.504	less than 1 hour

If customer interested very fast online delivery for his/her online orders, like less than 15 min then customer must pay superfast delivery charge. If a customer is ready to wait for delivery till 1 hour from the point of online order placed, then superfast charges will be less.

In the plot below, it is shown that more customers are opting for “less than 1 hour” in delay for online delivery. Only a few customers are ordering very urgent delivery “less than 15 min”. Also, surprisingly west zone customers are offering more online delivery orders than any other zones.

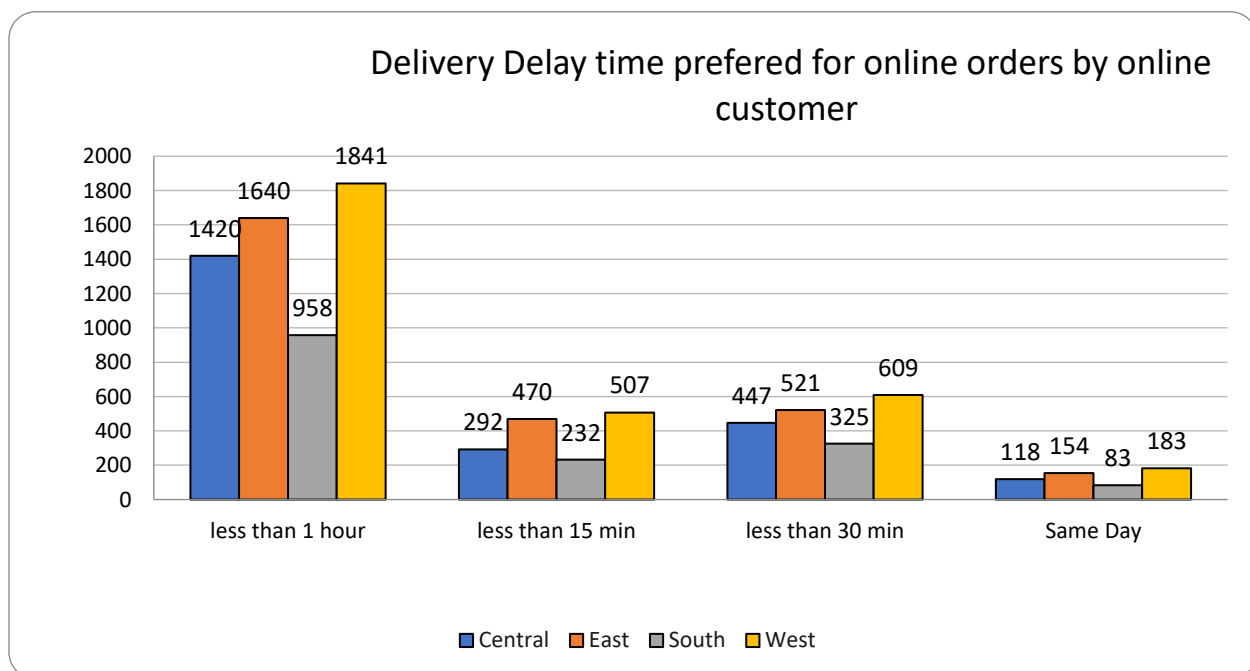


Figure: Plot showing how much quick online services requested by online customers

Dataset-4

Given top 10 samples of dataset is part of more than 900 samples recorded from year 2019 to year 2020. As “2K market” shopping complex have other branch in other colleges in city Tiruchirappalli. This dataset is used to analyze how other branches of the 2K market are performing in other campuses. It helps to know about different customer segments and their choices, their preferences and their expectations. It will help us to know why the other branch is performing better, and which services we can import from other branches to low performing branches to make more revenue and make our competitors out of business. It also helps to grow more as we will get more feedbacks time by time. It will also help to know different customer segments and their purchasing nature at the same time. Finally, this helps to predict customer loyalty and preferences more precisely.

Top revenue generating branch are in campus like nit Trichy, Sastra University, and St. Joseph's College. Here below graphs symbolizing as

A: St. Joseph's College

B: NIT Trichy

C: Sastra University

Here we are doing analysis like which campus generating more revenue in which product line, rating given by different customers for stores in different campuses, and average time of payment in different campuses.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Invoice ID	Branch	City	Customer	Gender	Product li	Unit price	Quantity	Tax 5%	Total	Date	Time	Payment	cogs	gross mar	gross inc	Rating	Branch
2	750-67-84	A	Yangon	Member	Female	Health an	74.69	7	26.1415	548.9715	43586	0.547222	Ewallet	522.83	4.761905	26.1415	9.1	St. Joseph's College
3	226-31-30	C	Naypyita	Normal	Female	Electronic	15.28	5	3.82	80.22	43680	0.436806	Cash	76.4	4.761905	3.82	9.6	Sastra University
4	631-41-31	A	Yangon	Normal	Male	Home an	46.33	7	16.2155	340.5255	43527	0.557639	Credit card	324.31	4.761905	16.2155	7.4	St. Joseph's College
5	123-19-11	A	Yangon	Member	Male	Health an	58.22	8	23.288	489.048	1/27/201	0.85625	Ewallet	465.76	4.761905	23.288	8.4	St. Joseph's College
6	373-73-79	A	Yangon	Normal	Male	Sports an	86.31	7	30.2085	634.3785	43679	0.442361	Ewallet	604.17	4.761905	30.2085	5.3	St. Joseph's College
7	699-14-30	C	Naypyita	Normal	Male	Electronic	85.39	7	29.8865	627.6165	3/25/201	0.770833	Ewallet	597.73	4.761905	29.8865	4.1	Sastra University
8	355-53-59	A	Yangon	Member	Female	Electronic	68.84	6	20.652	433.692	2/25/201	0.608333	Ewallet	413.04	4.761905	20.652	5.8	St. Joseph's College
9	315-22-56	C	Naypyita	Normal	Female	Home an	73.56	10	36.78	772.38	2/24/201	0.484722	Ewallet	735.6	4.761905	36.78	8	Sastra University
10	665-32-91	A	Yangon	Member	Female	Health an	36.26	2	3.626	76.146	43739	0.71875	Credit card	72.52	4.761905	3.626	7.2	St. Joseph's College
11	692-92-55	B	Mandalay	Member	Female	Food and	54.84	3	8.226	172.746	2/20/201	0.560417	Credit card	164.52	4.761905	8.226	5.9	NIT Trichy

Below plot showing sales of different 5 accessories in 3 different branches in Trichy city. First branch of 2K market is referred as A: St. Joseph's College where second branch referred as B: NIT Trichy and third branch of 2K shopping complex is C: Sastra University. On analyzing below plot we can say that C branch is selling more goods than other branches A and B. But C branch has low revenue for accessories like Home and lifestyle, and sports and travel.

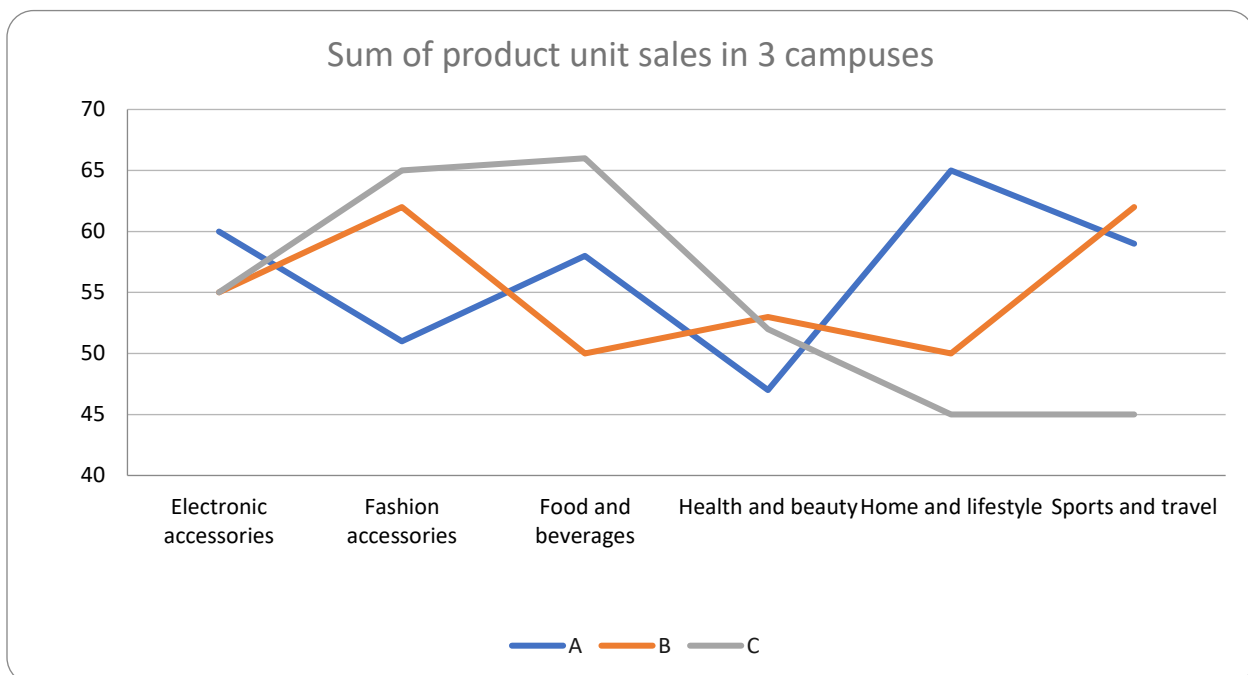


Figure 4a: It is showing sales of different accessories in 3 different branches of 2k market in Trichy where A: St. Joseph's College, B: NIT Trichy and C: Sastra University.

Now next plot for same data is given below, plot showing rating of different5 accessories in 3 different branches in Trichy city, where A is St. Joseph's College, second branch referred as B: NIT Trichy and third branch of 2K shopping complex is C: Sastra University.

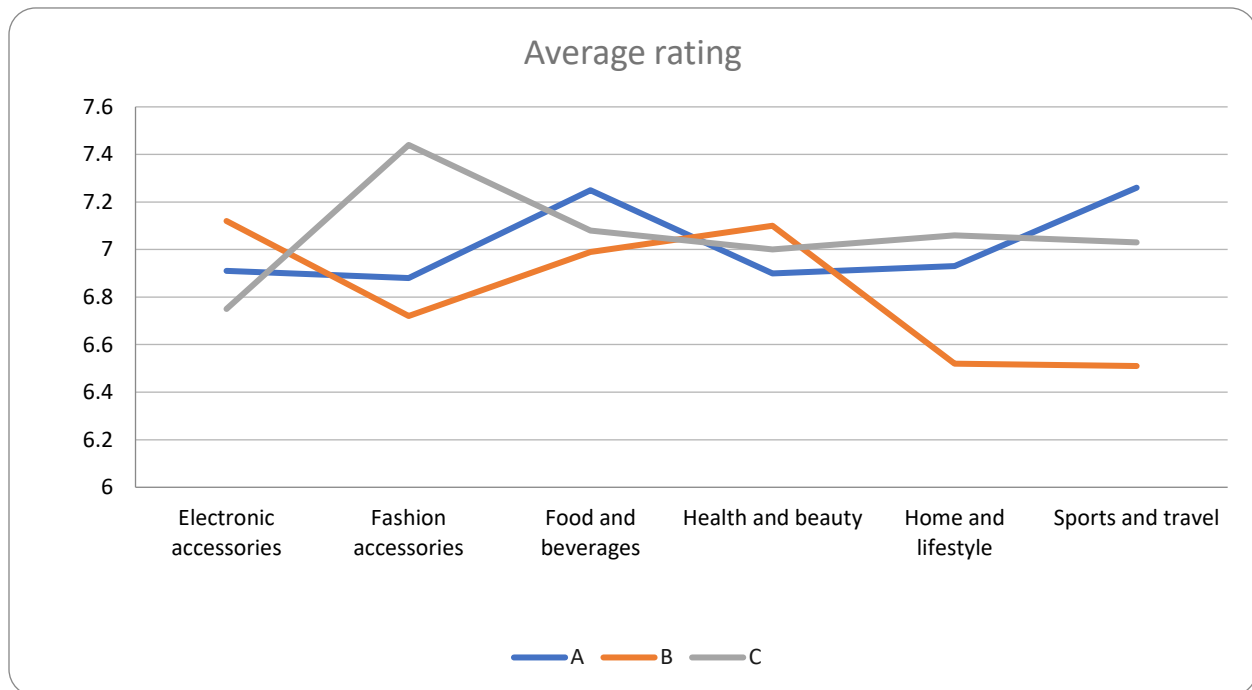


Figure 4b: Comparison of average rating given by users in different branches. A: St. Joseph's College, B: NIT Trichy and C: Sastra University.

Rating is given by users and data is based on survey data. On analyzing plot given below its clearly saying that customer experience is much better at branch C than branches A and B. it also supports that above graph as sales and revenue generation of Branch C is more than any other branches

Now we are analyzing the average time of payment in minutes experienced by customers in 3 different branches. This data is survey data. plot for same data is given below, plot showing rating of different5 accessories in 3 different branches in Trichy city, where A is St. Joseph's

College, second branch referred as B: NIT Trichy and third branch of 2K shopping complex is C: Sastra University002E

On analyzing the given plot, it's clearly said that customer experience is much better at branch A than branches C and B.

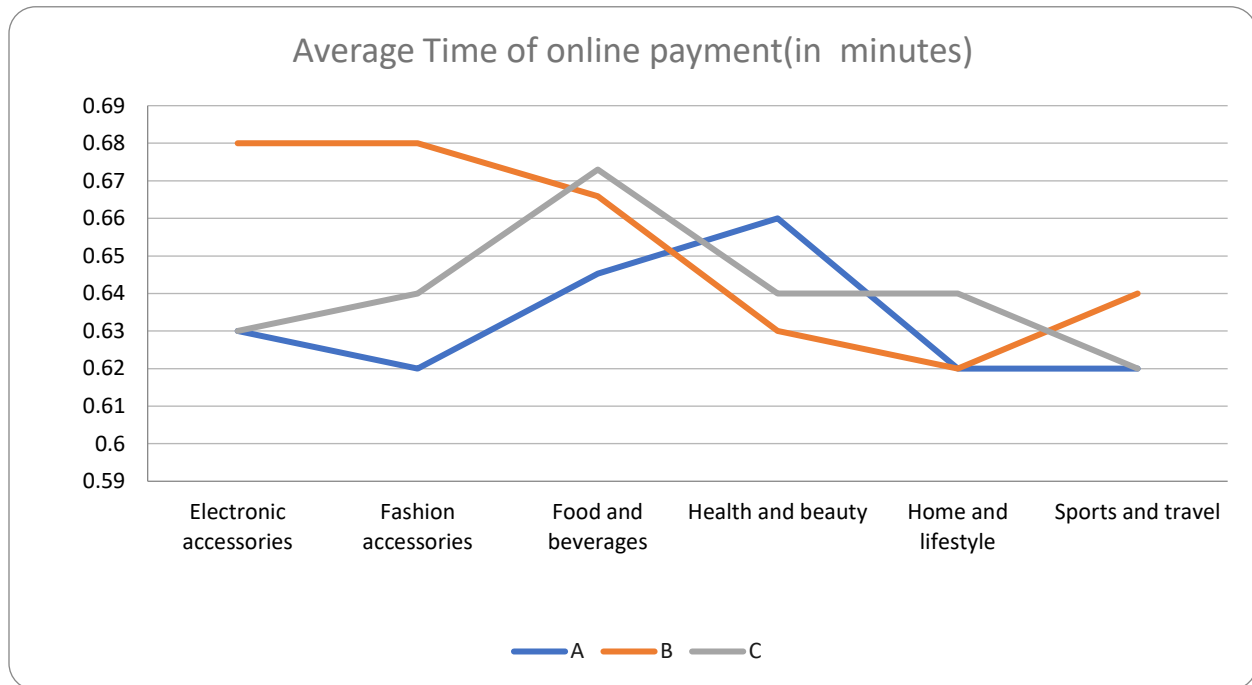


Figure 4c: average time of payment (in minutes) experienced by customer in different branches. A: St. Joseph's College, B: NIT Trichy and C: Sastra University.

On comparing below figure 4c with 4a and 4b, we can conclude that sales and times of payment are much higher in branch b, so justifying in figure 4b rating of branch b is poor. Additionally, branch C has a monopoly for fashion accessories that is why average rating and sales of fashion accessories if much higher than any other branches.

In conclusion, 2K market should analyses that why payment time is much higher in branch B and why sales of branch b are low. The solution may be is that because branch b is not offering desired product and quality product to the customer. Other causes may include a delay in customer order delivery as the customer rating for branch b is quite depressing that any other branch.

Dataset-5

Given top 10 samples of dataset are given are part of more than 38,000 samples recorded from year 2015 to year 2021. This data set is used to analyze products are are highly in demand throughout the year. The inventory and product qi=quality with safety is major concern especially for food and edibles products. We will get to know which group of products should have a proper inventory in the present and future. Smart inventory and management system will help to make availability of product to customer easy. Also the launching of new product segment will be easily decide on basis of previous performance of product.

Her we are analyzing sales of product category week wise and which product are in demand yearly.

	A	B	C	D	E	F
1	Member_	Date	itemDescription	Date	week	day month No.
2	1808	7/21/2015	tropical fruit	July	3	7
3	2552	7/22/2015	whole milk	July	4	7
4	2300	7/23/2015	pip fruit	July	5	7
5	1187	7/24/2015	other vegetables	July	6	7
6	3037	7/25/2015	whole milk	July	7	7
7	4941	7/26/2015	rolls/buns	July	1	7
8	4501	7/27/2015	other vegetables	July	2	7
9	3803	7/28/2015	pot plants	July	3	7
10	2762	7/29/2015	whole milk	July	4	7
11	4119	7/30/2015	tropical fruit	July	5	7

Figure: Dataset showing top 11 samples.

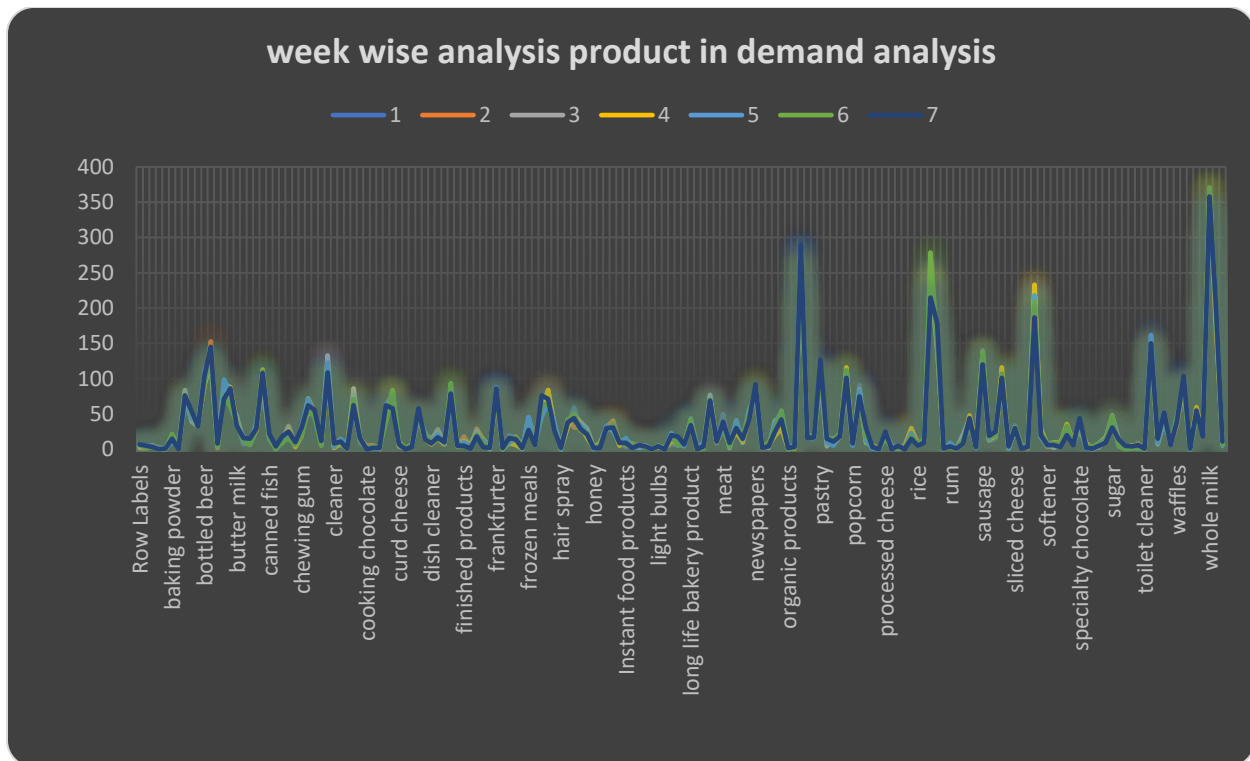


Figure: Plot showing products which are in high demand in respective ratios.

On analyzing the above graphs, we can conclude that products like Milk (6%), vegetables (5%), rolls/buns (4%), soda (4%) and liqueur (2%) are demand in yearly throughout the year.

To increase the revenue, the shopping complex may add new products or maintain the quality and fresh supply of products which are in demand. It is very important that which products are in high demand must have a backup inventory and safety. Food products and other products which rotten easily must be in proper supply as it combines and supports major revenue of shopping complex.

Interpretation of Results

On combining all analysis of above analysis, there are some aspects where shopping complex needs to concern and yet to focus. As we analyze in first dataset that there is very less customers engagement from south region, it might be possible that customers from south region visiting other shopping complexes outside of campus for better discounts and more variety of products.

As external retailers like reliance mart and mangal and mangal shopping complex are advertising their products more than 2k market shopping complex.

From dataset 2 we concluded that mostly sales are on the weekend, so acquire more staff and have proper inventory before starting the weekend for smooth shopping experience by customer. Also Tuesday is an off day for shopping complex and it's not good as students are customer segment who purchase on demand. So, the 2K shopping complex should try to be operational on Tuesday also with services including online orders.

Analysis of dataset 3 suggested that most customers are comfortable for opting online delivery within hours. Optimize the delivery time to 30 min for smooth experience of customers. Also try to diminish the online delivery charges so as to attract more customers by charging cheap charges. Also, 2k market complex should try to offer a variety of products for online orders too.

in dataset4 analysis, we get to know about customer experiences and revenue of shopping complex in other campuses too. as nit Trichy store of 2k shopping complex is not performing good on generating revenue and customer rating. manager of shopping complex should consider this analysis and spend some time to know the exact reason and behavior of low revenue and bad customer experience cause in branch B: NIT Trichy, 2k market branch. Also, average time of payment for branch B: nit Trichy is higher than the other two branches St. Joseph's College, and Sastra University. The point of discussion is what is basis difference between operation management of the branches. staff behavior plays an important role in a customer's goods buying experience. It is much more important to consider that good things in other branches and apply it to poor performing branches.

On analysing dataset 5, we get to know that to increases the revenue, shopping complex may add new product or maintain the quality and fresh supply of products which are in demand. As competitor in the make offering more products with justify prices. It is much important that which products are in high demand must have a backup inventory and safety. Food products and other products which rotten easily must be in proper supply as it combines and supports major revenue of shopping complex.

For future growth of shopping complex, it is highly recommended that 2K shopping complex must consider its competitor in the market and online retailers like Amazon., Flipkart and others. It should try to accept new technology like smart inventory management system, new methods of payment, updated staff training programs etc.

Recommendations

“The thing is, I don’t want to be sold to when I walk into a store. I want to be welcomed”.

– Angela Ahrendts, Senior Vice President of Retail at Apple Inc.

1. 2k shopping complex should consider its customer segment and focus more than why customers of NIT Trichy in south region are less shop with shopping complex.
2. To increase revenue, shopping complex must advertise their products and other services time my time. They should promote sessional discounts, offers and new generation shopping card system, send reminders and spread new launches news through student WhatsApp group.
3. Shopping complex should add new affordable products category in its store to enjoy and maintain customer loyalty. Try to expand variety of products that can be ordered via online.
4. Ensure product safety and quality to win customer faith and loyalty, it will help to increase revenue as good brand of shopping complex will create in customer mind. Install CCTV cameras to avoid store safety which helps to stop unwanted product robbery.
5. If possible, try to be operational on Tuesday also which is currently a holiday of shopping complex.
6. Reduce online delivery time by training your staff with new generation methods and management knowledge. Hire staff who can delivery order as soon as possible safely.

7. Analyse competitor growth and hack it too grow spontaneously.
8. Improve Inventory methods, ensure product safety. Understand customer need and requirement by doing surveys timely and taking feedbacks from customers.

END