TEPPEI SYOKUDO – IMPROVING STORE PERFORMANCE THROUGH STAFF KPIS AND PRODUCT PORTFOLIO MIX

ANLY482 ANALYTICS PRACTICUM PROPOSAL

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APSPOILMARKET

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2 OVERVIEW

2.1 SPONSOR BACKGROUND

Teppei Syokudo is a Japanese Food and Beverage chain, under the umbrella of the famous Teppei Japanese Restaurant. Teppei Syokudo operates as a takeaway kiosk concept, and specializes in Kaisendon, a bowl of barachirashidon (rice with raw fish), that retails for SG$16. It offers other dons (rice bowls), tonkatsu cutlets (fried pork), tempura (fried dishes) and sashimi salads.

The takeaway kiosk mainly targets lunchtime crowds, especially upmarket businessmen and women who are looking to grab a quick, healthy, and quality lunch.

Teppei Syokudo currently has outlets in 3 locations - Millenia Walk, Takashimaya, and Republic Plaza. The chain is planning to open another outlet in Ion Orchard soon.

Each outlet has its own shop manager, one full-time staff, some part-time staff, and chef. The staff include cashiering and assistant roles. During peak hours, the outlets may have up to 5 staff to manage demand.

2.2 PROJECT BACKGROUND & MOTIVATION

Most F&B businesses measure their overall performance through number of customers, sales and profits. Since opening almost a year ago, Teppei Syokudo has accumulated sales data and is looking at Key Performance Indicators (KPIs) such as

- number of customers
- average customer spend

However, these may be easily affected by external factors such as time period, location, and weather.

In order to drive store performance through controllable factors, Teppei Syokudo is looking at focusing on staff performance. Most F&B businesses, including Teppei Syokudo, do not set detailed KPIs to evaluate how their staff are performing. If Teppei Syokudo is able to track the performance of their staff through relevant KPIs, they will be able to motivate staff to meet these KPIs, which will in turn boost the business' bottom line.

Teppei Syokudo has identified the following KPIs to assess their staff:

- Percentage of drinks sales (number of drinks sold / number of meals sold)
  - a measurement of how hard the staff are up-selling
- Labour Productivity (sales $ / working hours)
  - a measurement of how effective the shop manager is in staffing the shop

However, the business is uncertain if these are the right KPIs to set. Also, if they are the right ones, they are unsure as to what would be a good target to meet.

Another factor for driving store performance is through product portfolio mix. Even though the staff may be up-selling and cross-selling, they may not know the right products to cross-sell to increase the probability of the customer making additional purchases. For example, most customers may tend to purchase Drink X together with Don X. In this case, if a customer orders Don X and is about to make payment, the staff can suggest Drink X to the customer, hence prompting a higher probability for the customer to purchase Drink X.

To top it off, with changes to staff, menu and seasons, Teppei Syokudo would like to know that this is not a one-off analysis and that this project can be sustainable with the input of new data.

2.3 PROJECT OBJECTIVES

The aim of our project is to help Teppei Syokudo improve store performance through controllable factors such as staff performance and product portfolio mix.

Our project objectives are hence:

1. To evaluate the effectiveness of existing staff KPIs, so as to ensure that they are the right KPIs
2. To develop new staff KPIs, so as to have the right set of KPIs that would be relevant for evaluating both shop and staff performance (ideally separately between shop manager and staff)
3. To come up with the numerical targets that would motivate staff performance
4. To identify customer purchase trends so as to come up with a recommendation system that staff can use to cross-sell
5. To come up with a workable spreadsheet, where analyses can be drawn from the input of new data - a sustainable system to ensure continuity in the project's usefulness in the long run.

3 WORK SCOPE

The main aim of this practicum is two-dimensional; besides providing a workable solution and driving real-world impact for Teppei, the practicum serves to be the final learning environment for the team to apply and validate the analytics methodology acquired through their second major as well as explore further ideas and visions that the team may have beyond the boundaries of the classroom. With such, the project work scope will be broken down to the following stages to attain our project objectives:

1. Data Exploration: understanding of data
2. Data Preparation: cleaning of data and transforming into formats usable for analysis
3. Data Analysis Methods: evaluation of KPIs and customer purchase trends
4. Data Analysis Systems: for input of new data to generate insights
5. Recommendations & Insights : providing actionable insights based on our analysis

3.1 DATA EXPLORATION

In the very initial stages of the project, the problem is analysed and by looking at the available data and understanding the various aspects of the data. The main aim of this step is to ensure the following:

1. Maximize insight into a data set
2. Uncover underlying structure
3. Extract important variables
4. Detect outliers and anomalies
5. Test underlying assumptions
6. Develop parsimonious models
7. Determine optimal factor settings. ("e-Handbook of Statistical Methods", 2016)

Through these steps, ultimately the problem is determined and a solution model is developed with analysis methods identified and worked towards; necessary data preparation is also determined.

3.2 DATA PREPARATION

After preliminary examination of the data, the team has identified that necessary data preparation is required specifically in the following areas:

1. Sales and labour data is currently stored separately; a joining of the data is required before the performance of staff can be analysed.
2. Analysing the productivity of staff requires sales data to be in an hourly format, where the current data only stores the staff start and end work timings – new variables have to be created to indicate if a staff is working on a particular day in a particular hour.
3. Before providing useful analysis that can ascertain the product portfolio mix, sales data has to be broken down to each order. This data is currently stored in a POS system and the team is in the midst of investigating if the data can be retrieved and used meaningfully.

3.3 DATA ANALYSIS METHODS

3.3.1 Evaluation of Existing KPIs

Correlation Analysis will be used to evaluate the effectiveness of existing KPIs. The team will then look at a particular KPI variable with sales (eg: drinks% and sales) to find out whether sales really is affected by that KPI.

3.3.2 Proposing New KPIs

The team will be using Clustering and Conjoint Analysis to identify the key variables that impact sales. Clustering sales data with labour data could help identify clusters with high sales, and the combination of variables leading to such sales values. Conjoint analysis would help identify the individual variables that are important for hitting sales values. In doing so, the team would be able to propose new KPIs based on those key variables.

3.3.3 Setting Numerical Targets

Through Clustering, the team will also be able to find out the right numerical targets to set for individual staff. For example, clustering of sales data and labour data could help determine who are the better salespersons who are able to make x # or $x of sales. This could be the numerical target that is set for the lower performing salespersons.

3.3.4 Product Portfolio Analysis

Last but not least, a Market Basket Analysis will be carried out to identify product pairings with high affinity. This will help Teppei to optimize its product portfolio to include only the most popular products. It will also identify suitable product pairings for cross-selling. Furthermore, it will also help to identify hidden trends that can spur new product development.

3.4 DELIVERABLES

Following the analysis that are carried out, the deliverables at the end of the project is two-pronged: systems and recommendations.

3.4.1 Data Analysis Systems

A series of spreadsheets or systems that will allow staff to update the date as an input and retrieve the performance information as output. The system should be able to carry out necessary analysis seamlessly and allow variables such as KPIs to be edited. Secondly, as more data is accumulated, there is another system that takes in sales order information and provides the staff with the product affinity of the products sold in the restaurant.

3.4.2 Recommendations and Insights

Actionable insights and recommendations based on the initial conception of the systems will allow the team to provide actionable insights and recommendations that can be carried out and tested immediately to ascertain impact of analysis.

3.5 UNCERTAINTY, LIMITATIONS & ASSUMPTIONS

The greatest limitation and assumption that the team is currently working on is the integration of the data from the POS system and the current data obtained. Another limitation that the team faces is the availability and format of which the data is stored. Ideally with data of sales made by each transaction, the person making the sales should be recorded. If that information can be aggregated then we'd be able to more efficiently analyse staff productivity.

3.6 SAMPLE DATA

The following is a sample of the data that has been provided. At the time of writing, a Non-disclosure Agreement (NDA) is pending and has not been signed, and the data provided is obfuscated. Teppei has provided us with a list of data that we can use including the following:

- Sales data: average spending, number of customers etc.
- Product information: the class (drinks, rice, snacks etc.), supply quantity and COGS (cost of goods sold)
- Daily Sales & Product Report: report of sales figures on a daily basis
- Labour data: time in, time out, total working hours per month, number of leaves taken etc.

Out of all the information provided, we believe there are 2 main sources of data that will be analysed:

3.6.1 Sales Data

The following shows the sales data on a particular day, with the amount of sales and customers per hour.

2015/6	Mon			Tue		
	1-Jun			2-Jun		
Hourly Sales	Sales	Customer #	Labor	Sales	Customer #	Labor
9:00 to 10:00						
10:00 to 11:00	$0.00					
11:00 to 12:00	$130.50	9		$292.40	16	
12:00 to 13:00	$336.90	18		$601.70	52	
13:00 to 14:00	$415.10	18		$413.10	29	
14:00 to 15:00	$285.50	14		$130.10	9	
15:00 to 16:00	$273.40	25		$80.90	11	
16:00 to 17:00	$315.90	22		$73.10	9	
17:00 to 18:00	$319.10	12		$53.10	7	
18:00 to 19:00	$221.60	8		$298.50	14	
19:00 to 20:00	$296.80	14		$173.00	14	
20:00 to 21:00	$133.90	12		$422.40	18	
21:00 to 22:00				$59.10	14	

The data will be cleaned to a table that has the following format:

Date - DD/MM/YY	Start Time - HH:MM AM/PM	Sales - Decimal(5,2)	Customer # - Int(2)
01/06/15	11:00AM	$130.50	9

3.6.2 Labour Data

The following shows labour data that states the time each staff starts and ends work on a particular day.

2015/6 Public holiday				Mon 0 1-Jun		Tue 0 2-Jun		Wed 0 3-Jun	
Worker Break	**Total salary**	**Wage**	**Working hours**						
Staff A In Out Break	$0.00	$8.5	0	0	$0.00	0	$0.00	0	$0.00
Staff B In Out Break	$437.75	$8.5	51.5	6.5 5 21.5	$55.25	0	$0.00	0	$0.00
Staff C In Out Break	$482.38	$8.5	56.75	0	$0.00	8.5 12 21.5 1	$72.25	8.5 12 21.5 1	$72.25
Staff D In Out Break	$448.38	$8.5	52.75	6 11 17	$51.00	0	$0.00	6 11 17	$51.00
Staff E In Out Break	$289.00	$8.5	34	0	$0.00	0	$0.00	0	$0.00
Staff F In Out Break	$221.00	$8.5	26	0	$0.00	0	$0.00	0	$0.00

The data will be cleaned and formatted to the following:

Date - DD/MM/YY	Start Time - HH:MM AM/PM	Staff A - Boolean	Staff B - Boolean
01/06/15	11:00AM	1	0

The variables column for each staff represents whether a staff is at work at a particular date and time. In this example, Staff A is present at work on the 1st Jun 2015 at 11AM.

Once the above data has been cleaned to their respective format, we can then combine the data into a joined table which will allow us to carry out the Clustering and Conjoint Analysis.

Date - DD/MM/YY	Start Time - HH:MM AM/PM	Staff A - Boolean	Staff B - Boolean	Sales - Decimal(5,2)	Customer # - int(2)
01/06/15	11:00AM	1	0	$130.50	9

3.6.3 Sales Order Data

At the time of writing, the team does not have access to the sales order data, but believes that upon cleaning, the format of the data will be as such:

Date - DD/MM/YY	Start Time - HH:MM AM/PM	Order No. - int(3)	Product A - Boolean	Product B - Boolean	Product C - Boolean
01/06/15	11:00AM	12	0	1	1

Similar to the labour data, the Boolean variable for each Products represent if a particular product is bought in that product order. In this case, order #12 contains 1 order of product B and 1 order of product C.

Using the above information, we can carry out market basket analysis to find out the product affinity of each product to every other product, providing insights and customer purchasing behaviour to management.

4 TIMELINE

In order to achieve the project objectives by project end, we have come up with a Gantt chart for assigning tasks and keeping to schedule.

	Task	Week 0	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15
Project Confirmation	Understanding Client Requirements	PH, JB, YJ															
	Project Acceptance	PH, JB, YJ															
Project Proposal	Proposal in Word doc.		PH, JB, YJ														
(due 10 Jan, 2359)	Proposal in Wiki page		PH, YJ														
Data Cleaning	Data Exploration			PH, JB, YJ													
	Data Preparation				PH, JB, YJ	PH, JB, YJ											
	Client Meeting 1						PH, JB, YJ										
Data Analysis	Evaluation of Existing KPIs						JB	JB	JB	JB							
	Proposing New KPIs						YJ	YJ	YJ	YJ							
	Setting Numerical Targets						YJ	YJ	YJ	YJ							
	Product Portfolio Analysis						PH	PH	PH	PH							
	Client Meeting 2										PH, JB, YJ						
Mid Term Project Review (29 Feb - 6 Mar)	Mid Term Presentation Slides										YJ						
	Mid Term Report										JB						
	Mid Term Wiki Updates										PH						
Data Interpretation & Recommendations	Interpret Analysis of KPIs											JB, YJ	JB, YJ	JB, YJ	JB, YJ		
	Produce Recommendations for setting KPIs											JB, YJ	JB, YJ	JB, YJ	JB, YJ		
	Produce Recommendations for Numerical Targets											JB, YJ	JB, YJ	JB, YJ	JB, YJ		
	Produce Recommendations for Product Cross-Sell											PH	PH	PH	PH		
	Data Analysis Systems - KPIs											JB, YJ	JB, YJ	JB, YJ	JB, YJ		
	Data Analysis Systems - Product Cross-Sell											PH	PH	PH	PH		
	Client Meeting 3															PH, JB, YJ	
Final Presentation (11 Apr - 17 Apr)	Final Presentation Slides																YJ
	Final Wiki Updates																PH
	Ensure Data Analysis Spreadsheet works																PH, JB, YJ
	Poster																JB

Legend
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JB: Jhun Boon
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5 REFERENCES

NIST/SEMATECH e-Handbook of Statistical Methods, http://www.itl.nist.gov/div898/handbook/, 2016, January 6.