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A model for wine list and wine inventory yield management

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ABSTRACT

Fine dining restaurants with extensive wine lists often have high-value wine inventories and low inventory turnover ratios that reduce the owner's return on investment. The restaurant management literature does not provide fine dining restaurant managers with the tools that enable them to evaluate and make changes to wine list selections, pricing and inventory levels in order to improve the returns from the investment in wine inventory. This paper contributes to the literature by drawing concepts from yield management, retail science and menu engineering to develop a yield statistic and analytical model for managing wine list and wine inventory productivity. WINSPID (wine sales per inventory dollar) is the product of wine mark-up and inventory turnover ratio. Graphs of wine sales and inventory data, mark-up and inventory turnover ratio enable the restaurant manager to analyse, improve and monitor the wine list, wine inventory and wine supplier performance.

1. Introduction

During the global recession of 2009, fine dining restaurant managers in North America were challenged due to steep reductions in demand. The recession focused managers' attention on ways to operate more efficiently. Some long-standing restaurants were being closed and experts predicted 12–15% sales reductions in the fine dining segment (McLaughlin, 2009). Restaurants that had been enjoying the pre-recession consumption boom suddenly had to evaluate their business model and develop new strategies. In response to customers that were reducing both the frequency of visits and the amount spent, fine dining restaurant managers changed menus and offered new promotions to defend against the reduction in revenues (Carter, 2009).

In particular, fine wine sales were affected as customers who were buying premium selections switched to lower priced options. In an industry-commissioned study of 300 restaurant industry professionals, Bell (2009) reported that 60% of restaurant managers observed a marked decrease in wine sales after the recession and 61% felt that customers purchased less expensive wines than in 2008. The study goes on to report that customers were more likely to purchase wine by the glass than previously and 75% of the respondents were making changes to their wine lists. Some managers of fine dining restaurants holding large inventories of fine wines reduced prices to improve sales (Frank, 2009).

Inventory management has always been an important component of obtaining good returns on invested capital, and the efficient use of assets. Managing inventories of wine is more complicated than reducing the investment because wine lists serve both as a menu and as a statement of a fine dining restaurant's quality and commitment to gastronomy at the highest levels (Gil et al., 2009).

In the hospitality field, substantial work has been done in the control of inventory (Green and Weaver, 2008), however very little has been done regarding inventory turnover and the productivity of capital invested in inventory. Academic research to assist fine dining managers with the construction of wine lists based on pairing with food (for example Harrington, 2007), wine menu characteristics (Yang and Lynn, 2009) and as a differentiation strategy (Berenguer et al., 2009) is available. No research has been done to assist restaurant managers with the task of managing the wine list, pricing and the financial return on the capital invested in wine inventory.

This article contributes to the restaurant management literature by developing a yield statistic and analytical model that helps fine dining managers improve turnover and the return on wine inventory investment.

2. Literature review

2.1. The role of inventory in manufacturing

Since the standardization of parts formed the basis of the Industrial Revolution, inventory has been recognized as an important field of study. Henry Ford, among other industrialists of the early

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20th century recognized that stocks of parts and materials were the buffer to enable efficient production despite time delays between demand, production and supply. Investment in inventory was as important to efficient mass production as the investment in plant and equipment.

Managers recognized that there was a trade-off between the holding cost of inventory, order costs, lead times and demand. The EOQ Model (Harris, 1913) became the basis for more sophisticated inventory optimization models that included stochastic demand, safety stock, variable lead times and other complications involved in the management of inventory (Wilson, 1934). More recently, the importance of inventory holding costs in the manufacturing process was highlighted by Toyota in the 1980s with the adoption of just-in-time production techniques whose goal was to minimise inventory throughout the entire supply chain. Inventory is central to the field of logistics, supply chain management and planning system architectures such as MRP (Materials Resource Planning) and MRPII (Manufacturing Resource Planning).

2.2. The role of inventory in services

While the study of inventory has its roots in manufacturing industries, it also has great impact in service industries. Pure services, such as airlines and car rentals define their capacity in terms of units of "perishable" inventory (for example rooms that are not rented are equivalent to tangible inventory items whose utility has expired), and much of the study of yield management deals with the joint optimization of perishable inventory utilization and pricing (Weatherford and Bodily, 1992; Chiang et al., 2007).

The retail industry does not manufacture products but its capacity to supply demand is based on stock-in-trade. Managing stock-in-trade involves the efficient conversion of inventory into gross margins while providing both a sufficient number of items for selection and a sufficient quantity to meet variable customer demand (Sellers-Rubio and Más-Ruiz, 2009).

Other service industries such as restaurants have a mixed manufacturing and service function. Restaurants prepare meals from basic ingredients and serve them to customers. In the restaurant business, inventory is both units of capacity (seat hours, Kimes, 1999) and stocks of basic ingredients, partially prepared items and finished menu items ready for service. Among the items in inventory, wines are purchased ready to use, often in the same container in which it will be sold.

2.3. The importance of wine in restaurants

Wine plays a fundamental role in the enjoyment of the restaurant dining experience (Yuksel and Yuksel, 2002), consequently many types of restaurants offer wine selections to their customers. Wine lists have been identified as a factor that differentiates restaurants. Berenguer et al. (2009) found that the length of the wine list differentiated top-quality fine dining establishments from those focussed simply on providing excellent food. The style of the wine menu was also a significant factor in the categorization. In many instances, owners of restaurants express their own passion for wine by having wine lists that go well beyond what their customers require. National and regional awards recognize restaurants with exemplary wine menus, judged both on style and on selection.

Wine is an important component of restaurant sales. It has been reported that 31.5% of the average check in Valencia, Spain restaurants consists of wine sales (Gil et al., 2009). An informal poll of restaurant managers in the USA and Canada by the author revealed a range of wine sales percentages that are related to the type of restaurant and whether the property was open for lunch. Fine dining achieved wine sales of 29% (no lunch), and 22% for properties that were open for lunch and dinner. Casual fine dining (lunch and dinner) had wine sales of 18–20% of the total.

Restaurant operators promote wine sales to enhance their customer's enjoyment of the meal and to increase sales. Wansink et al. (2006) reported that wine sales can be increased substantially by suggesting wine with a meal (12%), assisting with wine and food pairings (7.6%) and offering tasting assortments (48%). It has been found that the number of repetitions of wait staff wine training programs is correlated to the amount of wine sold (Gultek et al., 2006). The sommelier increases wine sales using knowledge in combination with adaptive and persuasive selling techniques (Manske and Cordua, 2005). Some restaurants offer smaller bottles (splits), wines by the carafe and glass to patrons who wish to consume less than a standard (750 ml) bottle of wine. Smaller sizes of wine offerings provide options to customers who prefer more than one kind of wine with the meal. Some restaurants offer large format bottles such as magnums for patrons who wish to mark the importance of a special event or occasion.

Wine sales make a substantial contribution to profit due to menu price mark-up and several cost efficiencies. Restaurant managers use a variety of schemes and criteria to price their wine lists. Perhaps the most common method is to set the price equal to two or three times the cost (Chung, 2008). Restaurateurs call this a mark-up ratio, which is not the same as the retail definition of mark-up.

Some restaurant wine menus use a so-called "progressive" mark-up: higher mark-up ratios are applied to lower priced wines, and lower mark-ups used as the cost of the wine goes up (Chung, 2008). Higher mark-ups can be achieved by selling wine by the glass. A recent phenomenon is "bring your own" restaurants that charge a fixed "corkage" or "set-up" (typically $25) for customers who bring their own bottle (Elan, 2009). Other factors that are significant in the pricing of wines include the country of origin, age of the wine and wine rating scores (Arias-Bolzmann et al., 2003).

Restaurant operators are cognizant that wine consumers are concerned over the large differences between the prices charged in restaurants and the retail cost. A few, value-conscious operators choose a standard margin added to the price of a bottle (Wiegand, 1998), effectively the same price structure as "bring your own". To avoid direct customer price comparisons, some restaurateurs choose wines or vintages that are not ordinarily available for purchase, simultaneously presenting an exclusive selection to discriminating guests.

The sale of wine in restaurants has notable cost efficiencies over the sale of food menu items. Wine in restaurants has similarities to retail sales. Unlike food, which requires preparation in specialized facilities by skilled chefs, wine is ready to use and only needs to be drawn from the storage area. The direct cost of wine service is small in comparison to the cost to serve food items, which involve multiple trips to serve courses, fetch condiments and clear dishes over the course of a meal. Fine dining restaurants employ far more waiters and cooks than sommeliers.

Wine in sealed, unopened containers is a stable product with a shelf life that exceeds most other food products. A few, high quality wine selections improve with age and increase in value. They can sometimes be bought as futures (such as Bordeaux), providing savings. However the majority of wines are ready to drink when purchased. In the longer term, some wines can deteriorate (particularly white wines), and be refused by the customer due to perceived taints or faults. Faults may be due to poor storage conditions; however some wines are already faulted when purchased by the restaurant. Laube (2007) reports estimates of cork-tainted wines range from 1.2 to 15%, suggesting that customer refusal of wine served in restaurants may be a significant cost factor. Wine suppliers may replace recently acquired product that is faulted, however returned wines that have been in storage for a longer period are likely to be a loss to the restaurant.

Some customers may also refuse perfectly sound wines. These returns are a financial loss to the restaurant, sometimes sold off as house wine by the glass, consumed by staff or owners, or relegated for use in cooking (Wiegand, 1994). Despite these problems, the contribution margin of wine sales is much higher than that of preparing and serving food items.

2.4. Inventory turnover ratio

Inventory turnover is an important component of on-site restaurant management. Minimising the stock held in inventory reduces losses through theft and spoilage (Reynolds, 1999). Many managers are highly focussed on income statement line items such as sales, costs and profit, but may ignore balance sheet items like inventory. Measures of financial profitability (ROA, ROI) can be increased by improving net income; however these measures can also be increased by reductions in asset investments such as the value of inventory. Wine inventories are a substantial investment in many fine dining restaurants and managers must consider their wine inventory turnover with care in order to maximise the financial performance of the enterprise.

Reynolds (1999) reports that inventory turnover ratio (ITO), defined as the cost of goods sold divided by the average inventory for the period, for on-site foodservice is in the range of 1–5 "turns" per month (12–60 turns per year). The highest turnover ratios are reported in the healthcare and school cafeteria segments. Institutional foodservice operations have cyclical menus that minimise waste, enjoy more predictable demand and can negotiate more frequent deliveries in comparison to fine dining restaurants. All these factors allow on-site foodservice managers to achieve higher inventory turnover than fine dining establishments.

2.5. Wine cellar inventory turnover

Wine inventories are expensive, and turnover can be slow. The Pareto principle popularized by Juran (Phillips-Donaldson, 2004) suggests that 80% of the sales come from 20% of the items offered. A study by Coad (2009) which analysed the cross-sectional consumption behaviour on a sample of 486 wines concluded the resulting distributions are variants of the Pareto distribution. This suggests that extensive wine lists involve a high proportion of items that do not sell in significant quantities. The fine dining restaurant managers polled by the author confirm that this is true in their restaurants.

In addition to extensive wine lists, fine dining restaurants have unpredictable customer demand and irregular replenishment options in the case of many fine wines. Such wines have limited availability over time and must often be purchased by the case, resulting in large amounts of product on hand.

A heuristic guideline used by managers in some casual fine dining restaurants is "wine inventory should be equal to one month's wine sales". Using a mark-up ratio of two times the cost of the wine, this corresponds to a turnover ratio of 0.5 times per month (6 times per year); much lower than the turnover of food inventory items. Informal contacts with fine dining restaurant managers with award-winning wine lists report some wine list inventories valued at more than 1 year of wine sales.

3. The manager's problem

Provided that the wine list is a true representation of the inventory (all wines listed are available for sale), the restaurant manager's problem is a trade-off between a grand offering of wines which signal quality and prestige against the investment in inventory, replenishment options and the margins earned. Wine inventory can be decreased by eliminating items that do not sell well, however this has the simultaneous effect of reducing the wine menu and making the restaurant less attractive to discriminating customers. Reduced wine inventories sometimes require frequent replenishment in order to meet operational requirements, however many high quality wines are not readily available from suppliers in small quantities. Reducing margins by re-pricing some wines may improve turnover with a corresponding reduction in contribution margin. To this end, managers need a way to manage their wine inventories, and optimize the productivity of both capital and wine sales. Wine inventory turnover and the financial management of wine lists have not been studied previously.

Table 1
Comparison of selected yield statistic expansions.

	Statistic = Price efficiency × Volume efficiency
ROI	$\frac{\text{Net income}}{\text{Invested capital}} = \frac{\text{Net income}}{\text{Sales revenue}} \times \frac{\text{Sales revenue}}{\text{Invested capital}}$
REVPAR	$\frac{\text{Revenues}}{\#\text{ of rooms available}} = \frac{\text{Room revenue}}{\#\text{ of rooms sold}} \times \frac{\#\text{ of rooms sold}}{\#\text{ of rooms available}}$
REVPASH	$\frac{\text{Revenue}}{\text{Seat-hours available}} = \frac{\text{Revenue}}{\text{Seat hours used}} \times \frac{\text{Seat hours used}}{\text{Seat hours available}}$
GMROI	$\frac{\text{Gross margin}}{\text{Average Inventory}} = \frac{\text{Gross margin}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Average inventory}}$

Note: REVPASH was developed by Kimes (1999); ROI is attributed to Pierre Dupont, Guerard and Schwartz (2007).

4. Benchmarking with yield management

Yield management is a broad term describing various methods for managing capacity profitably. It has gained widespread acceptance in travel industries (airlines, car rentals, cruise lines and hotels) and there is substantial evidence that it is effective in improving revenues. Yield management methods are most commonly applied to situations where capacity is fixed, variable costs are low, demand is variable and sales can be made in advance (Kimes, 1989).

Given a downward sloping demand curve (more people will buy if the price is reduced) a trade-off develops between the desire to obtain the highest average price and sell all available units of capacity (rooms, seats, tee-offs, etc.). The manager's problem is to know which combination of prices and volume for the same product will optimize revenue. A yield statistic (for example REVPAR) is constructed to capture the joint effect of price efficiency (average price) and volume efficiency (capacity utilization). Hotel managers know they are making better price and volume decisions when REVPAR increases, and vice versa. Similarly, other yield statistics are constructed with a measure of price efficiency multiplied by a measure of utilization (Table 1).

The yield obtained from an investment in wine inventory has a conceptual similarity. Margins on wines are sufficiently large to permit discounting. Lower prices encourage guests to buy better quality wines, or come more often. Unlike hotels and aircraft with fixed capacity, inventory is variable. Inventories can be increased by purchasing more than is used, or reduced by purchasing less. If an item held in inventory can be replenished more frequently (for example, daily instead of weekly) the amount of that item kept in stock can be decreased substantially. This is not an option for some fine, rare wines that must be purchased for future delivery, but is possible for house wines and popular favourites available in good supply.

Pricing for restaurants is a longer term decision than the quick pricing response to demand predictions and quantity available for sale in the case of hotel rooms and airline seats. However, given that mark-ups do vary among wine list items, the restaurant manager can benefit from a yield statistic that captures the simultaneous effects of price and volume efficiency.

4.1. Benchmarking with retail management

As mentioned in Section 2.3, wine sales in restaurants share several similarities with retail. Retail managers spend a great deal of time managing sales volume, gross margins and stock turnover. A good example is furniture retail. Customers are attracted by a wide selection of different items with a range of prices. The inventory is not perishable, but is a major investment. The store becomes less attractive to customers as inventory declines. Margins are substantial, and discounting stimulates the sale of slow moving items, albeit at the expense of margin earned. Ultimately, every item is sold.

It is common for furniture store managers to walk through the store and discount items that have not been sold within a period of time after they were acquired. These managers are increasing stock turnover (defined as sales divided by average inventory) at the expense of reduced gross margin ratio (defined as gross margin divided by sales). Using the retail definition of gross margin makes sense for retailers, because every dollar discounted reduces the margin on the sale of that item by the same amount. Discounting may have the secondary effect of increasing sales, because shoppers who save money on a discounted item may be motivated to buy an additional item, or a more expensive item.

In order to jointly optimize gross margins and stock turnover, retail managers use a statistic called GMROI (gross margin return on inventory). GMROI is similar in construction to other yield statistics: the product of a measure of price efficiency (margin on sale) and a measure of volume efficiency (inventory turnover). If the retail manager's pricing and product line decisions are more effective, GMROI will increase. If these decisions are less effective, GMROI will decrease. The value of the statistic is easily calculated by busy managers: divide the gross margin by the average value of inventory.

5. WINSPID: a statistic for managing wine lists

Restaurant managers can use the GMROI statistic using gross margin as the numerator (sales less cost of goods sold) and average inventory value as the denominator. However, unlike the furniture retail manager who goes through a cycle of price setting followed by discounting, the restaurant manager tends to set prices, and optimize sales by promotional activity. Thus, a statistic with wine sales in the numerator is better suited to the restaurant manager. Furthermore, inventory turnover in the restaurant industry is defined as the cost of goods sold divided by average inventory. Given these differences, a new statistic that fits restaurant industry norms has been adapted from GMROI. The Wine Sales Per Inventory Dollar (WINSPID) statistic is provided in Table 2.

Table 2
The WINSPID statistic expansion.

		Price efficiency × Volume efficiency
WINSPID	$\frac{\text{Wine sales}}{\text{Avg. wine inventory}}$	$= \frac{\text{Wine sales}}{\text{Cost of wine sold}} \times \frac{\text{Cost of wine sold}}{\text{Avg. wine inventory}}$ = Mark-up ratio × Inventory turnover

WINSPID uses the mark-up ratio definition in common use among restaurant managers (sales divided by cost of goods sold) as the price efficiency factor, and inventory turnover ratio (cost of goods sold divided by average inventory) as the volume efficiency factor (Table 2.) A WINSPID example consisting of hypothetical wine list data and calculations is provided in Table 3.

5.1. WINSPID application

Three "levers" are available to manage a wine list and the return on wine inventory investment. Managers can (1) expand or reduce the size of the wine list, (2) increase or decrease the inventory, or (3) change the mark-up (prices). Making changes to one "lever" will affect one or more of the others. For example, changes to the wine list will eventually affect inventory value; changes to mark-up will affect sales, and thus inventory. WINSPID enables managers to evaluate the net effect of any combination of changes in this one statistic.

5.2. Wine list inventory performance

Higher values of WINSPID indicate good financial performance from the investment in inventory. WINSPID can be used to analyse the performance of the entire wine list on a periodic basis. Wine Sales, Cost of Goods Sold and Average Inventory are measured in dollars, and the user may choose any convenient time period for gathering these figures. Changes to a wine list can take some time to take effect, particularly in the case of items with low inventory turnover. Choosing a short time period (a week) exposes the user to fluctuations in values that may not be representative of the normal business situation. A longer period, such as a month or more, has a smoothing effect on the highs and lows that provide a better indication of wine list performance. The overall performance of the wines in Table 2 is WINSPID = $0.93, slightly below the "rule of thumb" target of $1.00.

Table 3
Hypothetical wine list data.

Wine name	Inventory value			Sales and costs		Ratio computation		
	This month	Last month	Average[a]	Sales	Cost of goods sold	ITO[b]	Mark-up[c]	WINSPID[d]
A	$300	$700	$500	$500	$300	0.60	1.67	$1.00
B	$500	$700	$600	$600	$400	0.67	1.50	$1.00
C	$700	$700	$700	$700	$400	0.57	1.75	$1.00
D	$,000	$600	$800	$800	$200	0.25	4.00	$1.00
E	$100	$100	$100	$100	$40	0.40	2.50	$1.00
F	$600	$1,200	$900	$900	$250	0.28	3.60	$1.00
G	$200	$100	$150	$150	$100	0.67	1.50	$1.00
Ch. XX	$1,000	$400	$700	$600	$300	0.43	2.00	$0.86
Ch. ZX	$864	$768	$816	$288	$96	0.12	3.00	$0.35
Ch. ZY	$800	$800	$800	$50	$25	0.03	2.00	$0.06
Ch. ZZ	$500	$500	$500	$1,400	$350	0.70	4.00	$2.80
Total	$6,564	$6,568	$6,566	$6,088	$2,461	0.37	2.47	$0.93

[a] Average = (this month + last month) ÷ 2. A more accurate value of inventory may be calculated using an n-period moving average, where n = the number of days in the period.
[b] ITO = inventory turnover = cost of goods sold ÷ average inventory.
[c] Mark-up = sales ÷ cost of goods sold.
[d] WINSPID = sales ÷ average inventory = mark-up × ITO.

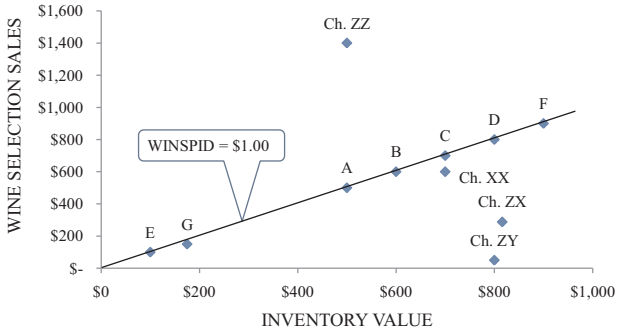

Fig. 1. Monthly wine selection sales by inventory value.

5.3. Individual wine item performance

Managers can improve the WINSPID value for a particular wine by finding ways to reduce inventory or by changing the mark-up. Price changes can either increase or reduce WINSPID depending on changes in volume. For example, offering a selection by the glass can improve both mark-up and sales volume.

Table 1 shows that Ch. ZZ is the top performer (WINSPID = $2.80), wines A, B, C, D, E, F and G are "on target", while Ch. ZX and ZY are poor performers (WINSPID = 0.35 and 0.06 respectively). A closer look at Ch. ZX shows that while mark-up and sales are good (3.0 and $288 respectively), the level of inventory is excessive (ITO = 0.12). Assuming no change in sales, a reduction in inventory to $250 would result in WINSPID equal to $1.15 for this product.

Examination of Ch. ZY shows that sales are low ($50) and mark-up (2.0) is below the average (2.47). Despite relatively low mark-up, customers do not find this wine appealing. Consequently, this wine should be eliminated from the list unless sales can be increased substantially through promotion.

5.4. Graphical wine list analysis

Fine dining restaurant wine lists can include hundreds of wines. Plotting wine sales against inventory value for each wine on the wine list provides a visual representation of the relationship between sales and inventory for each item (Fig. 1). By drawing a line with the slope equal to the target WINSPID (in Fig. 1, we choose a WINSPID equal to 1.0) we can immediately identify wines that warrant attention. For example, the inventory of Ch. ZX and Ch. ZY is in excess of the target amount. If sales can be increased to approximately $800 per month, the inventory can be justified. Otherwise, these wines should not be reordered until inventory falls to the $200 level.

The chart also reveals that Ch. ZZ has very high turnover, and we must ensure that we do not (and did not) run out of this item.

5.5. Gross profit analysis and evaluation of promotions

WINSPID can be used to calculate gross profit earned according to the following formula:

$$\$\text{Gross margin earned} = \frac{[\text{WINSPID}_{\text{period}} \times \text{Inventory}_{\text{period}} \times (\text{Mark-up} - 1)]}{\text{Mark-up}}$$

For example:

$$\text{If } \text{WINSPID}_{\text{Dec.}} = 1.00; \quad \text{Inventory}_{\text{Dec.}} = \$10,000; \quad \text{Mark-up}_{\text{Dec.}} = 2.5;$$

$$\text{Then,} \quad \$\text{Gross margin}_{\text{Dec.}} = \frac{[1.00 \times \$10,000 \times (2.5 - 1)]}{2.5} = \$6,667$$

The calculation of gross margin earned can be used to evaluate sales promotions. For example, suppose a 20% discount is offered on all wine purchases in the month of January. At the end of January, inventory was unchanged, but turnover was found to be 0.7. Was the promotion successful?

$$\begin{aligned} &\text{Average mark-up after discount} = 2.5 \times (100\% - 20\%) = 2.00. \\ &\text{WINSPID}_{\text{Jan.}} = \text{Mark-up} \times \text{inventory turnover} \\ &\qquad = 2.0 \times 0.7 \\ &\qquad = \$1.4 \\ &\$\text{Gross margin earned} = \frac{\$1.40 \times \$10,000 \times (2.0 - 1)}{2.0} \\ &\qquad = \$7000 \end{aligned}$$

The reader may conclude that the promotion was successful in increasing sales, gross margin and the return on wine inventory investment. This example also illustrates that WINSPID is higher when managerial actions are beneficial.

5.6. WINSPID and seasonality

Two factors influence seasonal variation in restaurant sales: business cycle changes (volume) and seasonal cycle (product preference) changes (Carpenter and Levy, 1998). Changes in customer counts during different time periods result in corresponding changes in the volume of business. Managers typically adjust the amounts of their inventory holdings to a level that is appropriate for the projected sales volume (chase strategy). Managers may also use "level" strategies such as increased promotion to improve volume during shoulder or slow seasons making changes in inventory quantities smaller, or unnecessary. While these strategies are useful for dealing with volume changes, they are not effective in addressing the second kind of seasonality experienced by restaurant managers.

Seasonal variation is the cyclical change in customer preferences (such as white wines in summer, sparkling wines at Christmas). Seasonal variations in sales mix require restaurant managers to adjust the composition of the inventory.

WINSPID provides managers a way to ensure that inventory levels are appropriate for both seasonal volume and sales mix variations. The overall target value of WINSPID will not change if the inventory is appropriate to demand. By forecasting changes in sales volume and seasonal customer preferences, managers can use the WINSPID statistic to calculate the target inventory level for individual, category, or overall inventory levels. For example, if the WINSPID target is $2, then a $10,000 reduction in wine sales volume would require a 10,000 ÷ 2 = $5000 reduction in inventory value in order to remain on target. Similarly, forecasting a $4000 increase in white wine sales justifies an increase in inventory of $2000.

5.7. Supplier selection and evaluation

Wine agents offer fine dining restaurants an array of wines they represent. A way to evaluate the performance of a wine merchant's selections on the wine list is to calculate WINSPID for those selections and compare this to the performance of the other wines on the menu. Higher WINSPID for the group indicates that these selections perform better than the others on the list. Wine merchants can help improve WINSPID by supporting smaller orders more frequently, or by providing discounts which reduce inventory value.

5.8. Wine list engineering

The WINSPID decomposition into margin and inventory turnover (Table 1) is similar to the gross margin and popularity constructs used in menu engineering (Kasavana and Smith, 1982).

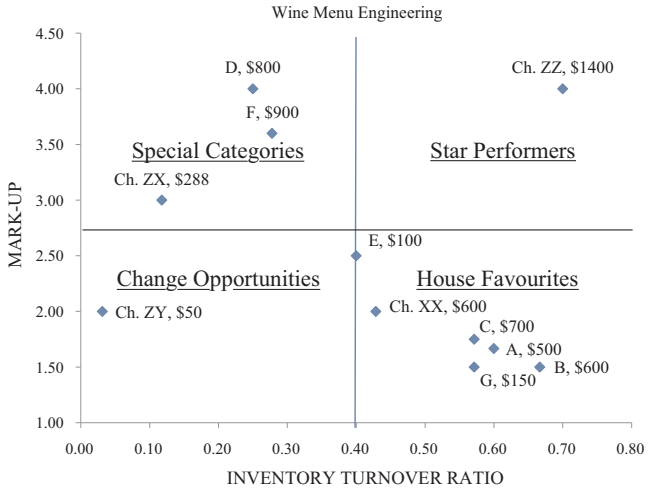

Fig. 2. Wine menu engineering.

By plotting mark-up and inventory turnover ratios for each item on the wine list, and labelling the points by name and sales volume, we can generate the matrix shown in Fig. 2.

5.8.1. Change opportunities

Wines that have both low turnover ratios and low mark-ups need immediate attention. WINSPID for these wines is substantially below the target. Managers have two options prior to eliminating these wines from their wine list. The first option is to increase the inventory turnover ratio by reducing the stock on hand. This shifts the wine selection to the right side of the chart (House Favourites). If this is not possible, the alternative is to re-price these wines to increase the margin, and/or promote the product to increase sales. If none of these options are effective, the wine should be removed from the list.

Restaurant operators may reduce excess wine inventory by organizing a wine tasting event, where several selections from this group are sold as a package with food accompaniments, or as a tasting assortment.

5.8.2. House favourites

Wines that have high turnover ratios and low mark-ups are customer favourites (House Favourites). WINSPID for these wines tends to be close to the WINSPID target. These wines have an attractive price point and present excellent value. Managers need to find ways to increase the margins on these wines without reducing volume. Possibilities are selling wines by the glass or carafe. Raising prices (mark-ups) cautiously is also a possibility for this category. High turnover ratios suggest that inventories are well managed, although care must be taken to avoid stock outs.

5.8.3. Star performers

Wines that have both high mark-ups and high inventory turnover ratios provide an excellent return on the investment in inventory through both margins and turnover. WINSPID values are substantially above the target value. Revenues from these selections must be protected by ensuring there are no stock outs.

5.8.4. Special categories

Wines with high mark-ups and low turnover ratios (Special Categories) tend to be good niche performers. WINSPID for these selections are near or slightly below target. They will often be wines from within a specific region (for example, Burgundy) or types of wines that are purchased for special occasions (sparkling wines). They may also be wine selections that are traditional accompaniments to one or two food dishes on the menu. These wines should be promoted by the staff at every opportunity in order to increase volume, and inventories should be reduced to improve WINSPID.

6. Limitations

WINSPID has been developed from yield management and retail origins. In this paper we have used WINSPID as an analytical tool on its own, and also in a framework similar to menu engineering. The concepts have yet to be field tested. A single user may provide useful feedback regarding the utility of this analytical method; however a field test involving a number of users with a debriefing and presentation of results is an opportunity for future research. In the following section, several issues have been identified that would benefit from additional investigation.

6.1. Caveats when using WINSPID

The analyst must be wary of several issues when calculating the WINSPID statistic from its decomposition products of margin and turnover. It is important to use actual dollar sales, cost of goods sold and average inventory values. WINSPID values calculated from mark-up based price and item cost data misrepresent the true value of mark-up based on sales performance. Suppose a bottle of wine has a price of $300, and an item cost of $150, the margin ratio equals 2 ($300 divided by 150). The value of the WINSPID statistic will be biased upwards if no sale of the $300 wine took place, and consequently not reflect true wine sales per inventory dollar.

A second issue arises when calculating margin and inventory turnover ratios for individual items. If the wine described previously did not sell at all (revenue = 0; cost of goods sold = 0), then we have division by zero, and the mark-up is undefined. Consequently, for individual items that did not sell during the period, mark-up is defined as zero.

Items which have not been sold over a longer period of time have zero inventory turnovers, and should be disposed of in the most economic manner possible. For example, if these wines are older, hard-to-find vintages, collectors and specialty wine dealers may purchase them. Alternatively, they may be provided to auction houses that specialize in these kinds of products. Lower value selections that are idle can be promoted in the restaurant by the glass, or by advertising price savings.

Another situation where division by zero can occur is when average inventory is equal to zero. If an item is not in stock during the entire period (inventory = 0; ITO is undefined), it must be withheld from the analysis.

6.2. Common sense in use

While WINSPID provides the restaurant manager with a framework for analysis and action in optimizing the performance of the wine list, careful consideration of factors outside the model parameters will help avoid poor decisions. The trade-off between the attraction extensive wine lists have for discriminating customers must be balanced against the elimination of unproductive items from the list. Restaurant managers must find ways to minimise the size of the inventory without reducing the wine list's attractiveness to these customers. Inventory reduction without sacrificing the number of selections may be possible with the assistance of suppliers who will replenish wines in small quantities, perhaps in mixed case lots, and more frequently over time. Identifying very popular selections and finding ways to improve sales on these wines permit carrying other wines with lower turnover.

6.3. Axis determination in wine menu engineering graphs

Similar to menu engineering which presents particular challenges in determination of the axis parameters (Miller and Pavesic, 1996), setting the axes on the wine menu engineering graph is an important implementation issue. The vertical axis (inventory turnover) can be set at the target level for the restaurant. For example, if the restaurant follows the rule of thumb that inventory equals one month's sales, then the axis should be set as 0.5 turns per month. Similarly, if the target margin ratio is 2.75, the vertical axis can be set to that level. The wine menu engineering graph will always divide the space into quadrants. However, since turnover and margin ratio are seldom equal to a target level, and targets may be unreasonable, it remains to find alternative ways to set these axes.

7. Conclusions

Fine dining restaurant managers are making changes to their wine lists and wine cellar inventories in order to operate more efficiently. Prior to this paper, very little guidance has been available to analyse, make changes and monitor wine list and wine inventory performance. The popularity of wine selections on a wine menu is less important than their return on the amount invested in the inventory. Thus, managers can offer extensive wine lists, provided that each wine's WINSPID value is on or above the target. WINSPID is a yield statistic which has been developed from prior work in the areas of yield management, retail science and menu engineering. It uses ratios and terminology that is familiar to restaurant managers, and thus will be easy to understand, implement and utilize.

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