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Supply Chain Cost Estimation Model for Dashboard Management Design

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ABSTRACT

Supply chain management helps partners in the chain to justify internal costs. The pursuit of cost information through the supply chain is very important for controlling costs, which helps to establish and optimize activities in institutions in the value chain. In this research, we have tried to review the literature on Supply Chain Costing in order to predict a model of management dashboard design for supply chain cost estimation, focusing on quantitative models and prediction. For this purpose, after reviewing the supply chain cost literature and examining the scope and purpose of the dashboard design, using the mathematical models and applying actual production and sales data in Tehran Province in the Zamzam Iran Company and Zamzam Tehran Company 22 data courses From March 201۴ to December 201۷, the subject of this study, the design of the Supply Chain Cost Chain (CHCDM) model and the use of specialized software to prepare reports in the field of business intelligence, predicted the cost estimation dashboard model Supply chain and analysis reports were sensitive. Findings of the research are the best way to predict the combination method and regression method.

Keywords

model prediction, management dashboards, supply chain, costing.

1. Introduction

Supply chain custodians believe that there are four essential components for successful supply chain management: the supply chain of customers, distributors, transporters, warehousing facilities, Developers and implementers who participate in the sale,distribution and production of a particular product. The site Investor word.com defined the supply chain as a network of retailers, distributors, transporters, warehousing equipment and suppliers who sell, send and they have been developing a product
to participate (William.c.Copacina , 1997) . The supply chain simply defines the flow of materials and products from source to consumer.

The supply chain is the main focus of the competition at the global and local level. Therefore, the focus on connecting institutions in a supply chain is becoming more and more active in the current and current dynamics. This chain management aspects of the issues associated with the process. A lot of research is done about how the supply chain management is flexible and competitive. Researchers define supply chain management as a practice of establishing the flow of goods, services, information and assets, from raw material of suppliers to wholesaler to retailer and consumer. (Ellram, Cooper et al., 1997). This process involves creating orders, taking orders, feedback information, timely delivery and the effectiveness of goods and services. Although many research activities have been conducted on real-time information, there are many issues to discuss. Supply chain management helps partners in the chain to understand internal costs. It is important to track cost information through the supply chain to control costs, which helps to establish and optimize activities in the value chain. The exact cost information helps managers find out what useful services and products are and how they can advance future profits by creating newer strategies, not those in one organization, but all the partners who are part of a team. The goal is to work, expand and collaborate to form a system, and the information for a value chain to be effective. Knowing the process along the supply chain will define partners with poor performance that the chain will optionally replace the weak partner. Each partner in the cost chain creates for others, which can be reduced to improve overall costs. Most opportunities are available to improve and conserve cost in the chain. Which shows why more institutions are interested in building relationships with each other. Internal relations will provide the opportunity for information exchange and collaboration, but they will require commitment and acceptance of risk and participation bonuses (Goor, Dekker, 2000). More productive activities will be created in the supply chain and will provide better returns that will increase competition between chains and individuals in the chain (Cooper, Lambert et al., 1997).

2. Literature Review

Researchers are interested in supply chain analysis to determine different opportunities to save costs. Developing a good understanding of the basic concepts that affect product cost through the supply chain requires cost modeling that responds to new day-to-day issues. Cost analysis is very difficult and complex. Because of the variety of products on the market today, often scenarios related to product processes through the supply chain should be considered. Many factors affect the definition of product costs, such as labor productivity, taxes, facilities, environmental conditions and constraints, cost analysis. The prediction of the impact of all these factors on the cost associated with a product or service is difficult and complex. We can raise the quality of the product, but the cost increases, which will create a struggle with our main goal, in order to reduce costs. Balances and decisions must be made. Other complexities may be due to the dependence of most cost models on historical data, which makes it difficult to predict the cost associated with the processes of new products. When developing a new product, we do not have enough data to support cost estimation.

2.1. Costing

Costing methods are in fact methods and systems that lead to accounting records and reporting that help and assist management in controlling material costs, wages and overhead. In general, according to the type of activity of the manufacturing institutions, the costing methods that are used are of two types.

1) Cost of work order
2) Stage costing

Some manufacturing institutions are commissioned, in fact, their products and the costs they make are ordered by contract. Therefore, the costing method of ordering work is used for costing in these institutions.

The typical examples of these are contracting companies, shipbuilding factories, airplanes, hospitals and car repair shops. Some other manufacturing organizations, their products are complemented by different stages, and their products are massively produced, are using step-by-step costing methods. Textile factories, chemicals, oil industries and shoes are examples of these types of institutions, as outlined below. The following are commonly used to determine the costing methods of manufacturing companies, although these are not conclusive, and may also be exceptional, but basically institutions that operate in an order or whose products are large in volume and in a low number and their products have a high cost, they use the cost method of ordering work. And institutions whose products must pass through different stages and are massively, continuously, continuously and uniformly and homogeneously produced, and sometimes their products are low-cost, use a step-by-step method of costing. In this way, the cost price Production is determined at each stage of production.

2.2. Supply Chain Management

A set of methods used to effectively and efficiently provide suppliers, manufacturers, warehouses, and vendors in such a way that in order to minimize system costs and satisfy service needs, the goods are delivered to the correct number at the right place at the right time. Supply chain management is the coordination of the production, inventory, location and transportation of the participants in a supply chain to achieve the best combination of responsiveness and efficiency for market success. Traditional Cost Accounting is a standard method in any organization, both public and virtual. Based on the history, culture and financial regulatory environment, such as financial accounting standards, traditional cost accounting, has a defined approach to obtaining and determining the costs and organizational design associated with them. In spite of the guidelines for common cost accounting, financial reports and, in some cases, financial management, traditional spending accounting has been studied in literature for several years, especially in terms of unequal allocation methods for common and indirect costs (Porri et al. 2001). Another problem with traditional accounting in terms of supply chain, it desires to focus on reducing costs in a situation without taking into account the global impact or the effects on the overall organizational strategy (Smith et al. 2000). Traditional costing techniques are needed for accounting purposes, but they are not recommended for different logic in supply chain management decisions. Cost management, in particular, within the supply chain framework, is a prerequisite for research (Sorini et al., 2002). Accounting that uses traditional cost accounting may be closer to the organization from the perspective of a foreign, so the production system is seen as a black box of categories (Deauw, 2001).

2.3. Activity based costing

Basically, Activity-based costing provides an appropriate picture of cost drivers (Collins, lin et al. 2007). There are challenges to price and cost drivers. Historically, wage costs have always provided cost-effective incentives. When production is directed toward more productive products and more automated production, wage costs do not necessarily provide the best incentives for a specific expense. In a study, for customer pricing model development, customers' comments were used to determine key cost drivers (2005wu). The subjects of interviews were high-level executives and managers. These interviews provide a summary of the results. Supply chain costs are complex because there are many variables. Therefore, costs should be considered as a massive expense, rather than specific costs. The inputs for the model should have a small number of factors. So that the model can be managed and provide usable output (2005wu). Activity-based costing cannot replace the traditional costing adjustment for costs, instead it is in search of more definition of data that is more useful in decision-making accounts for managers in the form of contracts (lin Collin et al. 2001). However, for a true cost-based costing model, cost and real-cost data should be allocated in a more specific way and for specific activities that occur at these prices (costs) (Lin, Collin et al., 2001).

Table 1: Costing Approach Overview

Costing Approach	Citations	General	Strengths	Weaknesses
Traditional Cost Accounting	(Lockamy and Smith 2000; Fernie, Freathy et al. 2001; Seuring and Goldbach 2002; Christopher 2005)	Standard approach to accounting for incurred costs	Consistent among organizations; follow GAAP and other guidelines	Costs in broad areas; has no association to process.
Activity Based Costing	(Deo 2001; Fernie, Freathy et al. 2001; Lin, Collins et al. 2001; Wu 2005; Varila, Seppanen et al. 2007)	Utilize a cost driver to account for costs related to a process	Allows for costs to be better aligned/associated with the relevant process that creates the cost	Has to change accounting system to capture the cost driver; driver may represent a subjective item, creating confusion.
Target Costing	(Lockamy and Smith 2000; Ellram 2002)	Determine the sell price, and work down from the sale price	A good tool for managing costs; allow for supporting primary Strategy	Does not work for estimating costs; centers around sell price; not costs.
Organizational Based Costing	(Lenz and Neitzel 1995; Deo 2001)	Adds every additional cost contribution to the base. product/service	Directly associates the costs with the process that uses them	Requires extensive knowledge of all costs associated with process; many costs may not be known.
Logistical Based Costing	(Kosior 2004)	Similar to Organizational based costing, tracks costs through material flow	Takes the entire pipeline into account	Breaking down activities costly and difficult
Total Cost of Ownership Models	(Ellram 1994; Ellram 2002; Ferrin and Plank 2002; Kosior 2004; Wu 2005)	Tiered approach for valuating all costs associated with the process	Provides ability to view all costs; acknowledges difficult to quantify costs	Can become complex very quickly; many costs difficult to estimate; or are "hidden"
Linear programming costing model	(Goetschalckx, Vidal et al. 2002; Kosior 2004)	Develop max/min model to determine cost based on constraints	Allows for true cost minimization based on all known conditions; allows for "what if" analyses	Changing variables problematic; all costs must be quantitative; confusing to explain
Resource Consumption Accounting	(International Federation of Accountants, 2009 A/B; White, 2009)	Estimate Costs by reviewing consumption of resources in processes	Enables cost Facilitates proactive approach to cost estimation/ management	Not intuitive; costs still "captured" additionally, to traditional cost methods

2.4. Supply chain costing

Generally, the goal of the supply chain is to add value to the product and service along the chain (lyenga 2005). There are costs associated with adding value throughout supply chains that cannot be neglected. Management may be interested at any time to be informed of the added cost to the supply chain in general. This information may lead to decisions being made to reduce specific costs by maintaining the value of the supply chain. A general framework is presented summarizing with regard to the cost of the supply chain, including different levels, cost theory and costing models.

There are three levels of supply chain costing: direct costs, operating costs, and transaction costs (seuring, 2008). Direct costs are typically considered by traditional cost accounting methods. Activity-based costs with completed activities (seuring, 2008). Finally, transaction costs show the cost of exchanging with other organizations in the supply chain (seuring, 2008). Most often, the rational costing models are complicated.

Although complexity may be a critical issue for high accuracy, it is the input of these models, as well as complex and complex calculations. In addition, if the model variables exceed the fingers, the input / output explanation for the models is challenged. In general, most of the proposed models may be able to accurately capture all necessary costs or cost drivers

for the supply chain, but there must be a balance in time and cost to obtain the outputs.

2.5. Supply chain in the drinking industry

The supply chain of the beverage industry is largely syrup dependent. This process is the main operation for other processes along the supply chain. The majority of the drinking industry includes carbonated soft drinks, juicy beverages, carbonated juices from the cycle including syrup producers, receiving packaging and sugar items, drinking bottles, distributor, retailer, and ultimately the ultimate customer. In this chain, due to high logistics costs, in the event of increased demand and in the case of drinking, the proximity of supply centers for higher-cost production, it seems necessary at the beginning of the drinking-chain industry, the raw materials necessary for the production of beverages from different suppliers, including Sugar and other sweeteners and other ingredients are purchased. For this purpose, different packaging options, including glass, aluminum cans, PET containers, will be purchased from suppliers for the packaging of beverages. After providing the necessary raw materials, inside the drinking plant, raw materials are obtained for making syrups for the desired beverages. Regarding the diet or absence of the desired beverage, different sweeteners are used. To fill drinking water, CO2 gas and other items, it is added to the syrup and filled in various packages. After the process of labeling and packaging, as well as quality control, it is shipped to the warehouses. If necessary, packages are divided into smaller packages and sent to the final customer. An operational production model in the drinking industry is defined as follows:

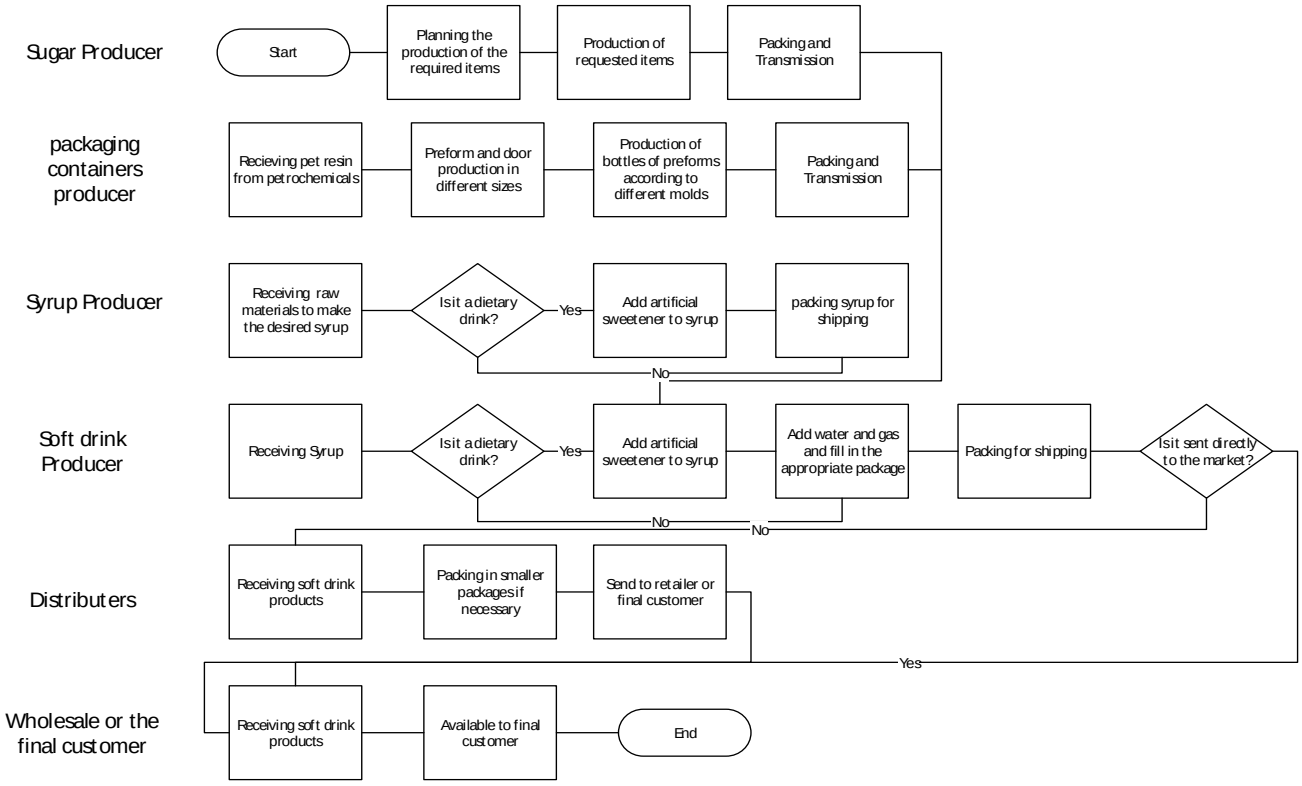

Figure 1 - Operational model of production in the drinking industry

Decker (2003) states that the interface between institutions creates new challenges for management accounting. One of these challenges is the provision of information for the consolidation and optimization of activities among institutions in the supply chain. He focuses on supply chain supply analysis (VCA) in supplier purchasing relationships to integrate the internal dependence of the supply chain. The importance of his review was drawn from the point where the implementation of the ABC model developed by a company to support the supply chain management with a group of suppliers was revised. In a study by Commisley (2008) on the subject of "Assessing the physical and financial mix for the logistics process and the tactical production planning: a case study in a supply chain", it proposes that operating costs (ABC), costs Driver and payment terms for the cash flow estimation generated by the tactical production planning of the supply chain. There is a link between financial and physical flows by assessing the impact of production planning on indirect costs. This assessment has been carried out using logistic activities. This type of cost model can be integrated into supply chain software such as advanced programming and scheduling (APS). Iscole et al. (2011) have identified business intelligence (BI) as a combination of commercial and technical elements that extract historical data from internal / external sources and transform it into meaningful information for management decision making. , Defines. Business intelligence (BI) is a tool that supports data analysis and decision-making. Negaia et al. (2011) examined the issue of business intelligence and supply chain agility using several case studies that the agility of the supply chain influences organizational performance effectively. Chang et al. (2011), studying competitiveness by studying the field method, concluded that the coherence of organizational information systems affects organizational performance. Hassan et al. (2012), studying empowerment as a case study, concluded that analytical network processing had a positive effect on production. Joseph et al. (2013) examined the business intelligence by reviewing the literature of the research and examined the literature on business intelligence and manufacturing processes. A lot of research has been done within the country on supply chain management, some of which have examined the cost of supply chain. In the study of Bagheri Dehnavi et al. (2012), with the purpose of "Assessing and determining the appropriate costing approach in the supply chain using the hierarchical analysis process", we examine different costing methods along the supply chain and have two traditional costing methods. Activity-based costing has been compared with each other and outlines the advantages and disadvantages of each one at the supply chain level. Also, Tarchon et al. (2012), in a research to "minimize the costs of multi-level supply chain distribution with a genetic algorithm approach and hybrid approach", is designed to minimize the cost of the distribution network in the multi-level supply chain. A complex integer programming is formulated for the model. Ansari et al. (1393) identified in their research, "Identifying, determining the relationships and leveling green supply chain management stimulus with structural interpretation modeling approach" to encourage the steel industry to implement green supply chain management, and identify and Determine the drivers of implementing Green Supply Chain Management, and then determine the relationship between them and their level. Their proposed model is derived using the Structural Interpretative Sah method. The results of the stimulus relationship model show that the "government, laws and regulations" as the most effective stimulus are the source of the implementation of green supply chain management in the Mobarakeh Steel Complex. In another study by World and others (1396) entitled "Cost-efficiency of closed loop supply chain in the presence of two-way and unfavorable factors", using the data envelopment analysis technique, the cost efficiency of supply chains with three components, the supplier, the producer and repair and recycling, as well as forward and backward flows, while the two factors and outcomes are observed in the system. A case study is also proposed to explain and analyze the proposed method. The results show that the correct identification of the role of agents and the consideration of undesirable and reversible factors in supply chain systems plays an important role in the correct calculation of cost efficiency in each of the components and supply chain. It is also suggested in the proposed method that the efficiency of the total cost can be expressed in terms of the total weight of the cost-effectiveness of the components.

3. Methodology

The present research, which seeks to design a model for estimating supply chain costs, is considered as fundamental research. In this research, considering that the researcher is trying to provide a model for the establishment of management, this research can be described quantitatively and with consideration of all its functions. The research includes designing a dashboard for estimating supply chain costs in the Zamzam Soft Drink Company (Zamzam Tehran and Zamzam Iran Company).

3.1. Forecasting supply chain costs

Two types of analysis are presented as the output of this model, which was introduced as "Analysis A" and "Analysis B". Subsequently, each of these two analyzes is examined. In this case, the inputs of the forecast of production are forecast and the sales price is predicted, and the outputs are cost and profit and loss analysis. The steps of this analysis are followed as follows.

The first step is to predict the production of beverages (which will be sold in line with the assumptions of the same amount).

Step 2: Consider the line formula obtained for all costs and get the amount of each cost by putting the predicted value in these formulas.

Step Three: The total sum of the costs comes from the sum of the amounts of each category of cost.

Step Four: Divide the amount obtained from step three into the prediction value of the production, which is considered in step one, to obtain the cost of one liter of beverage.

Step Five: Estimate the sales price based on the sales forecast and the percentage of discounts and defaults defined for the following month. The formula below shows how to calculate sales prices.

$$\Pr ice = \frac{\Pr edicted\_Sale\_Rial * (1-\lambda)}{\Pr edicted\_Sale\_amount * (1+\theta)}$$

In this regard, λ the rate of cash discount and θ interest rate is set in the denominator of the fraction of homogeneous real sales, which is not in the interest of commission.

Step 6: The margin of profit is derived from the difference in the cost of one liter of beverage from the selling price of one liter of beverage.

Step 7: By multiplying the profit margin and the amount of production, the profit and loss can be achieved.

Step 8: Except for the sales price calculated in Step 5, another sales price is also calculated, which assumes that if the cash discount is zero and that the same amount was received, the sales price would be much higher. Was.

Step Nine: Using the price obtained in step eight, the amount of lost profits is calculated. To do this, the price of the fifth step of the price of the eighth step is reduced, and the product is multiplied by the amount of production that is considered in the first step. The result is a benefit that is obtained if the discount is less than zero.

In this case, the inputs are the expected profit and loss analysis and the forecast sales price, and the outputs are the amount of production required for the desired profit and the cost of one liter of the beverage. The steps of this analysis are followed as:

Step 1: Consider the derived formulas for each cost category and their total (ie, the total cost line formula based on the amount of beverage production)

Step Two: Enter the profit we want to achieve.

Step Three: We anticipate sales prices.

Step Four: The amount of production we need to achieve in order to achieve the intended profit; it is obtained in the following steps.

As we know, the difference between the total cost of the production chain and the sale of income equals profits. Rewrite this formula as follows.

Profit = Sales Cost - Supply Chain Cost - Income

This formula is rebuilt as follows.

$$\Pr ice * H - \alpha_T * H - \beta_T = P$$

Where the price forecast is the third step, the total variable coefficient for the total cost, the total origin for the total cost, P the amount of profit and the H production amount. The formula produces the following output.

$$H = \frac{P + \beta_T}{\Pr ice - \alpha_T}$$

Step Five: The amount of each category, as well as the total cost, is calculated according to the line formulas and the amount of production obtained in step four.

Step Six: The cost of a liter of beverage comes from dividing the total cost of the fifth step by the amount of production obtained from step four.

In this research, costs were measured by the amount of beverages produced at Zamzam Factory in Tehran during the monthly periods. It is assumed that any amount of soda produced by Tehran's Zamzam plant is sold entirely by the Tehran sales office, which is based on the sharing of sales and staff costs. The cost sharing is done in such a way that the cost of the operations performed for the amount of production of the beverage is eliminated in each period, and since it does not matter how much sales it sells a liter of juice, or water or any other product, by dividing The amount of beverage sold to the whole sale is based on reasonable and reasonable sharing. After the cost sharing and erasing of the error data that was reported during the reporting process, in order to obtain a rational solution, several models were considered that ultimately the model of the linear regression of costs is based on the amount of production of the beverage as The best solution was chosen. Costs were categorized according to the importance and purpose of management from analysis to the full details of the introduction of the data. Finally, with the data obtained, the linear regression fitting of each category was made with the production of beverages. Two types of analysis have been extracted from this model. Analysis A, which takes production forecast as an input and delivers a forecast of profit as an outlet, provides real-life forecasting of the expected situation to management, and shows that in the present situation without Exercising any plans to improve, in the next month, how much profit or loss is expected by the supply chain. Analysis B, which takes the amount of expected profits as inputs and generates the amount of production required to reach that level of profit as an outlet, is in fact a tool to help plan and target management. This kind of analysis acts as a decision support system and it decides on the basis of knowledge in the organization's data.

3.2. Methods used to predict

In general, we can divide the two major groups: quantitative methods and qualitative methods. The prediction methods are listed below.

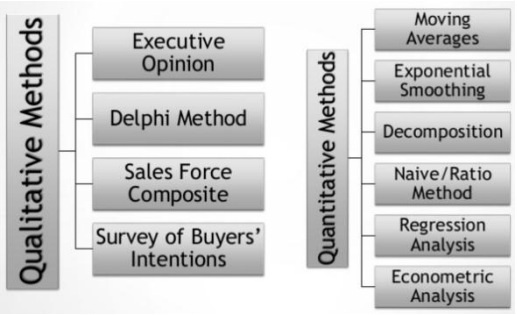

Figure 2 - Forecasting methods

Given the data structure of this supply chain and the fact that the goal of predicting supply chain costs, time series predictive methods, and causal method (regression) are appropriate to this problem. In order to identify the best model, a set of possible methods on the cost of production of beverages by the Zamzam plant in Tehran and sales by the Tehran Sales Branch has been applied and finally, using the prediction accuracy criterion, which is presented below. , The method that has the least error has been introduced.

Determine the accuracy of the prediction

Predictions are always associated with errors. It is important that the forecast error is kept to a minimum. The most important indicators of prediction error calculation are:

Average absolute magnitude of deviations

Based on this, you have to choose the method with the least error and predict it.

$$\mathrm{MAD} = \frac{\sum |A_t - Ft|}{n}$$

Where *At* is the actual cost of the period *t* and *Ft* is the forecast period *t*.

Average squared prediction error

The formula for calculating the mean squared of the forecast error is as follows.

$$\mathrm{MSE} = \frac{\sum (A_t - Ft)2}{n}$$

In this report, the first index is used to judge cost-forecasting methods.

3.2 Adjustment with seasonal factor

First, it is assumed that there is a correlation between cost and time (this assumption is not true for some possible cost, but in order to obtain a seasonal coefficient, it is assumed that costs change with time and correlate with each other). Then the following steps are followed in order to get the seasonal coefficient.

Step One: A single-variable linear regression relationship is obtained between time and cost.

Step Two: All 22 existing courses are predicted using the relationship obtained in the first step and displayed with Y '.

Step Three: The ratio of the actual cost to the expected cost is obtained in each period. (Ri = Yi / Yi ')

Step Four: The average coefficient of each month is calculated for the same months.

Step Five: The prediction value is multiplied by the matched method in the corresponding.

Table 4 shows the seasonal coefficients of supply chain of Zamzam factory in Tehran and Tehran sales office.

Table 1 - Seasonal coefficients of the months of the year

Month number	Seasonal factor
1	0.96
2	0.93
3	0.97
4	1.07
5	1.26
6	1.49
7	0.88
8	0.87
9	0.74
10	0.78
11	0.77
12	1.33

4. Results

After entering data on supply chain cost of Zamzam and Tehran sales departments, Table 2 shows the predicted results with each method.

Table 2 - Estimated Costs of Time Periods from 1395 to 1392

Course Number	Total original cost	Nemo is smooth	Nemo smoothly in the seasonal coefficient	regression	Nemo is smoothly adjusted	Regression - Nemo Smooth - Average
1	92,325,764,562	-	-	-	-	-
2	87,151,772,346	92,325,764,562	85,691,630,904	104,942,867,890	92,325,764,562	97,627,397,836
3	115,654,171,911	91,875,852,195	88,777,434,320	131,874,678,466	91,425,939,829	115,497,725,691
4	89,531,037,245	93,943,532,170	100,453,282,969	105,180,257,610	96,011,212,146	103,384,007,246
5	133,952,991,811	93,559,836,960	118,261,970,860	139,640,669,781	93,176,141,749	131,516,764,191
6	149,876,305,344	97,072,285,207	144,477,898,091	144.752.432.737	100,584,733,455	144,648,105,571
7	90,797,843,042	101,663,939,132	89,126,529,046	90,804,195,644	106,255,593,057	90,166,682,337
8	94,584,689,214	100,719,061,211	88,102,038,188	99,064,404,648	99,774,183,291	94,898,705,393
9	69,320,741,066	100,185,637,560	74,377,648,628	76,163,741,497	99,652,213,908	75,485,026,206
10	80,000,114,231	97,501,733,517	76,000,537,645	86,518,990,925	94,817,829,474	82,521,978,679
11	77,888,913,186	95,979,853,579	73,699,382,520	78,241,673,144	94.457.973.641	76,515,602,707
12	134,329,408,372	94,406,728,327	125,517,157,983	108,799,342,262	92,833,603,076	115,152,112,236
13	105,432,063,665	97,878,265,722	94,121,883,675	98,470,145,087	101,349,803,118	96,817,805,750
14	102,902,446,624	98,535,117,717	91,454,806,561	105,415,967,518	99,191,969,712	100,110,726,354
15	82,595,341,148	98,914,885,448	95,579,083,473	83,169,598,967	99,294,653,179	87,885,203,080
16	127,243,622,832	97,495,794,640	104,251,696,960	126,779,005,269	96,076,703,831	118,218,628,112
17	122,606,983,648	100,082,562,309	126,506,858,627	120,179,877,677	102,669,329,978	122,584,130,438
18	150,684,773,268	102,041,207,643	151,873,412,348	106,892,870,776	103,999,852,976	123,985,476,573
19th	85,670,432,208	106,271,082,914	93,165,510,199	77,598,774,951	110,500,958,186	83,514,134,345
20	80,993,401,278	104,479,721,983	91,391,602,992	79,709,763,464	102,688,361,052	84,148,862,485
21	78,598,636,834	102,437,433,226	76,049,377,939	82,086,828,016	100,395,144,469	79,792,596,987
22	75,036,650,034	100,364,494,410	78,231,999,171	76,734,846,983	98,291,555,593	77,303,764,814

As stated above, the table above shows the predicted results using the introduced methods. In the next step, using the MAD index, judging between these methods is discussed and the method with the lowest MAD is introduced as the best method. In the following, the proposed method or method is presented briefly, and the forecast for the future period (February 2012) is earned and compared with the actual amount that is now available. In this regard, Table 3 shows the mean of absolute error in these methods.

Table 3 - MAD criteria Forecast methods to determine the accuracy of the forecast method

	Nemo is smooth	Nemo smoothly in the seasonal coefficient
MAD	22,492,984,983	8,477,174,916
	regression	**Nemo is smoothly adjusted**
MAD	8,356,102,419	22,079,550,499
	Regress - Nemo smooth - Average	
MAD	5,883,200,807	

In order to make it easier to judge between these numbers, the bar chart of this index is also drawn. Figure 4 shows this graph.

According to this diagram, the best predictive methods in the first stage are the method of "average outcomes of prediction using regression method and smoothly multiplied development method in seasonal coefficient". Also, the regression method in the second rank and the flat-nourished Nemo method are ranked third in the seasonal coefficient.

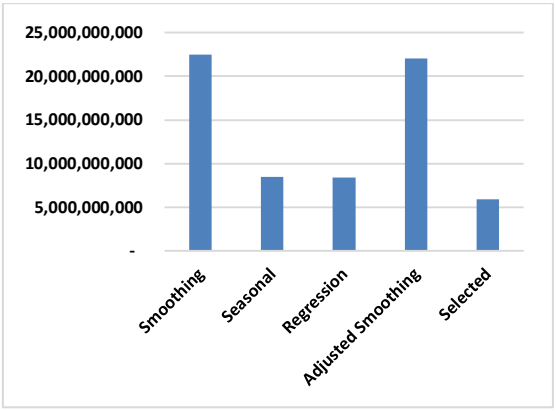

Figure 5 - Indicator bar graph MAD Cost estimation methods

4.1. Conclusion The best way to predict

The best way to predict the combination method and the regression method. Figure 5 shows the predictive results of these methods.

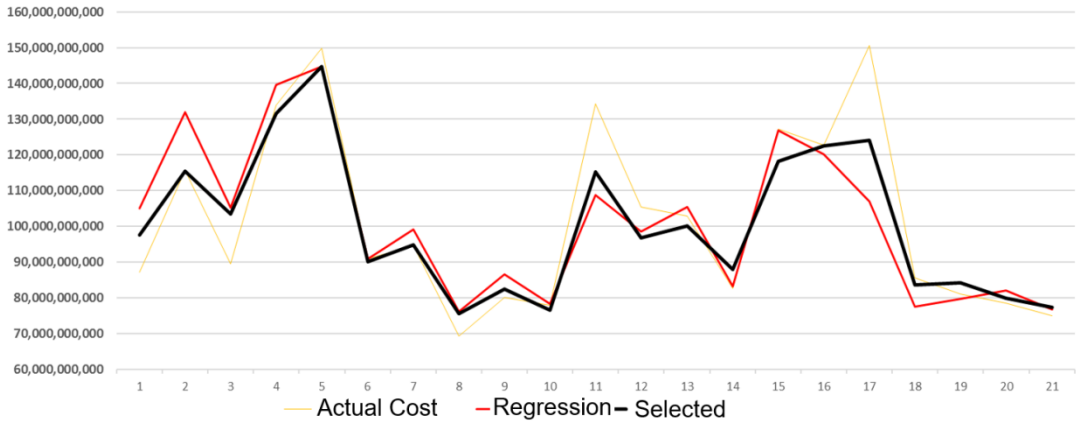

Figure 6 - Diagram of the comparison of trends in forecasting methods with the actual rates of costs in different time periods

Also according to this method, the cost projections for February Sa L 1396 for Table 5 Is.

Table 4 - Supply Chain Expectancy Estimates in February 1396

Nemo smoothly in the seasonal coefficient	regression	Regress - Nemo smooth - Average
75,375,028,289	81,964,387,986	79,460,431,302

Implementation and design of the dashboard Estimate supply chain costs

By tracking costs in this way in the production and sales chain, the following goals can be achieved.

- Sales targets in order to achieve a certain amount of profit
- Review fixed costs in the production and sales ranges
- Identify the high costs and definition of a recovery project to reduce costs and increase supply chain benefits
- Improve existing processes throughout the production and sales chain

As stated above, due to the use of the regression model, using the knowledge available within the company's data, the cost of the equation is extracted and more precisely allocated costs to the amount of sales. Implementing Estimation of Supply Chain Cost in the Business Intelligence System (BI)

Implementation of Supply Chain Cost Estimation in the Business Intelligence System (BI)

ETL: Summarize, transfer, load a set of operations in which data is extracted from several databases and systems, transmitted to the desired format and loaded in the target database.

Dashboard: A new conceptual management dashboard system for managing information with vital visual data tools that delivers a wealth of management-related analyzes to relevant people. The main application of the management dashboard system is not just reporting and reporting, but its main task is to provide updated timely information to qualified people for knowledge management, accurate decision making and rapid response to change.

4.2. Implementation of supply chain analysis in the system BI

Following the preliminary studies related to defining the problem and determining the final method for forecasting supply chain costs, the supply chain profitability analysis, and the supply chain cost accounting report, are the next steps in implementing these analyzes in the business intelligence system. By implementing these analyzes in the business intelligence system, these analyzes are made available to management in the management dashboard. In this regard, the implementation steps are as follows. All Table Data Required an analysis of the supply chain cost estimate from two data sources with the SQL Server database in the Data Warehouse of Zamzam, Iran's Oracle DB database.

Production and warehousing and accounting data of Zamzam Company in Tehran: Amount and amount of goods produced from beverages and production costs from the accounting program.

4.3. Data of the accountant of selling Zamzam Tehran

Calculation of Sales and Sales Discounts from the Sales Plan and Costs from the All Data Accounting Program with the logic of the company, branch, product, and date in the ETL phase using the python integration and integration tools that are collected and stored in a table. After analyzing the data and obtaining the final coefficients of the parameters, all actual data and constant and variable coefficients are stored in the new table. A new dashboard called Supply Chain Cost Estimation was designed using the Changing feature from the Oracle BI dashboard in the Data Warehouse, called Back Write, the user changes in input parameters such as the amount of homogeneous production and soft drinks and expected profits to calculate and predict Used. Ultimately, by following these steps, it's possible that any of the proposed analyzes can be easily implemented by the user himself. All organizations should have this sensitivity analysis as a key dashboard of the status of processes in the organization to provide a detailed picture of the forecast of supply chain costs at different levels of activity and goal, as well as the profitability of the organization.

5. Discussion and Conclusion

Considering the needs of supply chain managers to obtain up-to-date and fast information to decide on the results of created values and the competitive advantages created to maintain market share, a new model is utilized using mathematical models to enable To be used for supply chain costing. In this research, costs were measured by the amount of production of soft drinks at Zamzam Tehran Factory during the monthly periods. It is assumed that any amount of soda produced by Tehran's Zamzam plant is sold entirely by the Tehran sales office, which is based on the sharing of sales and staff costs. The cost sharing is done in such a way that the cost of the operations performed for the amount of production of the beverage is eliminated in each period, and since it does not differentiate for sales operations to sell one liter of liquor or water or any other product, by dividing the amount Drinks are the basis of reasonable and reasonable sharing. After the cost sharing and erasing of the error data that was reported during the reporting process, in order to obtain a rational solution, several models were considered that ultimately the model of the linear regression of costs is based on the amount of production of the beverage as The best solution was chosen. Costs were categorized according to the importance and purpose of management from analysis. Finally, with the data obtained, the linear regression fitting of each category was made with the production of beverages. After examining quantitative and qualitative methods of forecasting demand for products and calculating the deviation of each method, it was determined that the best method for predicting company products is the combined method and regression method. For this purpose, the supply chain of the drinking industry has been used by Zamzam Iran Company. Initially, with the interview of experts and experts in this supply chain in the country, a complete understanding of its processes was obtained. In the second stage, supply chain costs and sales prices (homogeneous) for different periods were obtained using the BI system and software solutions reports. In the next step, in order to understand the response of supply chain costs, the regression model was used. For all costs at a certain level, homogeneous sales in different periods, linear equation and variable and constant cost ratio were determined. At this stage, costs that did not directly and significantly relate to the sales variable were eliminated from the process. Then, with the use of hurricane technique, significant and significant costs of the supply chain of the drinking industry were identified. In the following, forecasting models predict supply chain costs and plan for the supply chain cost estimation at the end of the dashboard. A meta-innovative model was used to validate the predictions. Neural Networks inputs include inputs and outputs that include the true cost of the supply chain to the MATLAB software to interrelate inputs and outputs of the learning model. For this purpose, 70% of the data for learning, 15% of data for data testing and 15% for model validation were used. After the implementation of the model, there was no significant difference between the results of the first and second methods. The results of this study are consistent with studies by Iskel et al. (2011).

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