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An Empirical Analysis of Inventory Positioning for Pertinent Operations

Vipul Chalotra*

Abstract

Inventory positioning is a situation of a particular inventory item at a particular time. The paper presents an empirical analysis of inventory positioning for pertinent operations and its proper management and control. The study was conducted on 152 wholesalers, from whom primary data were collected, operating in district Udhampur (J&K State). The respondents were approached with the assistance of snowball referral sampling.Cronbach-alpha and BTS assisted out to justify the validity and reliability of the scales in the construct. Factor analysis was used for data purification, rectification, and validation. Multivariate tools such as mean, standard deviation, and hierarchal regression model were employed for drawing meaningful results. The results of hierarchal regression model revealed that inventory positioning and management leads to balancing of consumption and operations, inventory positioning and management results in facilitating purchase economies, inventory positioning and management fosters potential savings, and inventory positioning and management assists in avoiding costly interruptions in operations.

Keywords: Inventory, Positioning, Management, Wholesalers

Introduction

Inventory, simply stated as stock of any item or resource is essential for running of a business with its sustainable development used in an organisation. Inventory doesn't operate in isolation but with proper inventory system encompassed with set policies and controls that determine inventory levels i.e. the amount of inventory required to be maintained by a business, the inventory replenishment status, the nature and size of orders, the ordering inventory, the carrying inventory etc. Inventory generally refers to items/stock that is required to be sold to the end customers or that adds to a firms product output.Inventory can be classified on the basis of its finishing i.e. it could be in the form of raw materials, component parts, supplies, work-in-process and finished products. In distribution, inventory is classified as in-transit meaning that it is being moved in the system, and warehouse, which is inventory in a warehouse or distribution center. Retail sites carry inventory for immediate sale to customers. In services, inventory generally refers to the tangible goods to be sold and the supplies necessary to administer the service. All these things portray that the true essential rationale of inventory analysis in all sort of concerns i.e. manufacturing, allocation, retail etc is to identify the time of ordering of the items in the stock and the quantity an order should encompass with. Intact inventory positioning ensures long-term relationships with purveyors to supply them the required inventory according to their needs, especially for the entire year. This whole portrait modifies the "when" and "how many to order" with "when" and "how many to deliver."

Inventory positioning is a situation of stock held at a particular time with specific inventory. It generally determines the present inventory level that a firm or an organisation holds at particular or specific time. The intactness of items with a business can be contoured as inventory positioning. Sometimes inventory positioning determines the relationship between its expected demand, inventory in hand and outstanding orders subjected for its positioning. Further, inventory positioning is equal to the aggregate of current/present in hand inventory level accompanied with inventory ordersless backorders.

* Assistant Professor, Department of Commerce, University of Jammu, Udhampur Campus, Jammu & Kashmir, India.
Email: vipulchalotra@gmail.com

Inventory Costs

The following costs are the inventory costs:

Holding Costs or Carrying Costs

Holding costs are also known as carrying costs and count as the major costs in inventory holdings. The holding costs includes the main costs such as the costs for handling, insurance, storage facilities, pilferage, breakage, depreci ation,obsolescence,opportunity cost of capital, and taxes. The more or high holding costs leads to low inventory levels and numerous replacements.

Setup Costs / Production Change Costs

Making of each of the different products involves obtaining the necessary materials, arranging specific equipment setups, filling out the required papers, appropriately charging time and materials, and moving out the previous stock of material. If the cost implicated in shifting manufacturing from one product to another product is very squat or zero, the inventory lot size would be very miniature and many lots would be produced. This would reduce inventory levels, with a resulting savings in cost. One challenge today is to try to reduce these setup costs to permit smaller lot sizes. (This is the goal of a JIT system).

Ordering Costs

Ordering costs are associated with the managerial, clerical, and administrative costs which are used for setting up of the purchase/ production order. The ordering costs are mainly accompanied with all the niceties, such as counting items and calculating order quantities. The costs associated with maintaining the system needed to track orders are also included in ordering costs.

Shortage Costs

On or at the time of depletion or finishing up of an item in the stock, that item has either to wait for the order unless & until the stock is replenished or is irrecoverable. When the demand is not met and the order is canceled, this is referred to as a stock out. A backorder is when the order is held and filled at a later date when the inventory for the item is replenished. There exists a swapping between carrying inventory/stock to gratify demand and the costs consequential from stock outs & backorders. Sometimes, this equilibrium becomes quite difficult to acquireas it becomes impossible to ballpark and figure out lost profits, delayed penalties, the special effects of gone customers. Frequently, the assumed shortage cost is little more than a guess, although it is usually possible to specify a range of such costs. Establishing the correct quantity to order from vendors or the size of lots submitted to the firm's productive facilities involves a search for the minimum total cost resulting from the combined effects of four individual costs: holding costs, setup costs, ordering costs, and shortage costs. Of course, the timing of these orders is a critical factor that may impact inventory cost.

Wholesaler

A wholesaler is a distributor or middleman who sells mainly to retailers and institutions rather than consumers. A wholesaler buys in bulk from the manufacturers or from other wholesalers and generally sells in parts to retailers, industrial, institutional or other proficient business users. Sometimes, a wholesaler is also known as value adder as he/she adds his/her brand name or trademark to the rotten/sub-standardised product purchased from the manufacturers thus ensuring his essentiality and creditworthiness. Generally, a wholesaler deals in selling the goods to everyone/anyone rather than an ultimate customer or to the end customer.

According to the United Nations Statistics Division, "wholesale"stands for reselling the goods again to the lower hierarchy in the supply chain i.e. to retailers, industrial businessmen, commercial traders, institutional or professional users, or sometimes even to other wholesalers except directly selling to the end customers. They are well known for converting the large bulk to small lots as they purchase in huge quantities from the upper hierarchy i.e. from manufacturers and sells in small quantities to the downward hierarchy i.e. to the retailers and other intermediaries involved. In other words, wholesalers are also known for assembling, sorting and grading the goods purchased in large lots, break this large lots/bulk, repack, advertise, adds value and redistribute it in smaller lots to the afore stated downward hierarchy. Experiences from China, Taiwan, and Southeast Asia reveal that contemporary wholesalers are found operating

nearby the manufacturing bases, this resulted out of the advent of internet, e-procurement, e-commerce etc, rather that the traditional wholesalers who were more closer to the field/open markets where they sell their products rather than they purchase their products (Chandler, 1994). The situation is altogether different today. Talking of banking industry even, "wholesale" generally refers to extensive banking, givingbespoke services to large customers, in disparity with retail/commercial banking, providing consistentand distinguished services to large numbers of smaller customers thus distinguishing themselves from wholesale banking business.

Literature Review

Inventory literature had been sparsely touched by all the dignitaries i.e. academicians, researchers, marketers, logisticians, scholars, other experts etc. But the contemporary world had gained interest in the subject and incessant research had been reported which highlights a debatable platform of inventory in supply chain flexibility, especially with the decrying of the business scenario chiefly known as the "leaning-down" of companies, besides an enhancement in global sourcing which in turn have augmented supply chain risks (Christopher & Peck, 2004). It's even documented that international supply chains may become fragile because of the important aspects such as the geographic quarter sheltered, the environmental factors, various transportation modes used and political/legal/social/economic factors etc. (Prater *et al*., 2001). The advent of inventory management as a tool is generally recognised to resolve risk mitigation with possible strategies. The examples portrayed by eminent authors lists "increase inventory" as a risk alleviation approach (Chopra & Sodhi, 2004), but on the contrary, others are also true when theystate that "the tactical temperament of additional capacity and/or inventory at potential 'smidgen points' can be awfully valuable in the design of elasticity within the supply chain"(Christopher & Peck, 2004). Lee (2002) further considers and takes into preview the significance of inventory inthe circumstances of supply ambiguity and its unknown reasons. Therefore, there exists a varied view of different authors relating to the role of inventory management in the offered literature among which some of these views seems to endorse contradictory objectives. A good example of the aforesaid statement is related to retention of inventory levels i.e. the basic objective of conventional inventory control and management theory was related to the optimisation/ maximization of inventory levels, but on the other hand, the contemporary objective divulged by modern thinkers & businesses that rests on lean and agile supply chains, emphasises strenuously on the minimisation/lessening of inventory levels. However, the latter view has been neutralised to a large degree from the viewpoint of the role and strategy of decoupling points and the fraction that inventory may hold for risk alleviation strategies. Further, its contoured that the minimisation or lessening of inventory is widely discussed and viewed by varied eminent authors which is required to be defined blatantly as it leads to too much reduction of resources, thereby enumerating on more new term known as "corporate anorexia" (Radnor & Boaden, 2004). Therefore, optimum inventory level emerges out to be strongest concept; the identification of which involves much wider and justifiable views/concepts than those which are mainly related with traditional inventory control theory and system. Inventory holding is pivotal in contemporary supply chains and businesses as it determines the major cost of business and defines the soundness/creditworthiness of the business. 13 percent of total logistics costs is acknowledged as inventory cost in European countries as per a survey of logistics costs conducted in Europe (Establish Inc/ AT Kearney, 2004) whilst, more than 24 percent of the total logistics costs mounted as inventory cost in studies conducted in USA, (European Logistics Association/ Herbert W. Davis & Co., 2005). The present research empirically analyses the impact of inventory positioning of 152 wholesalers in district Udhampur of J&K State.

Hypotheses Development

On the basis of profound analysis of the offered literature and its extensive study, the following hypotheses had been enumerated for making the research more consistent and receptive. The main hypotheses are:

H1: Inventory positioning and management leads to balancing of consumption and operations.

H2: Inventory positioning and management results in facilitating purchase economies.

H3: Inventory positioning and management fosters potential savings.

H4: Inventory positioning and management assists in avoiding costly interruptions in operations.

Obj: To analyse the impact of inventory positioning for pertinent operations.

The Research Framework (Methodology)

The research framework includes research design and methodology. It includes the area of research conducted, construction of data collection form and nature of information (primary or secondary) collected, statistical tools applied etc. The research methodology espoused in the research is detailed as follows:

Nature of Research

The present study is exploratory in nature thus offering viable andportable exemplary solutions.

Area of Research

The research was conducted in Udhampurdistrict (J&K State). Basically in Udhampur district, there are 47 small scale industries functioning under SIDCO & SICOP. These industries are selling their products directly to wholesalers operating in the district. The area is having dearth of research on various subject matters among which inventory positioning & management is one, which was chosen for research purpose.

Sampling and Data Collection

The study is evaluative in nature for which primary data were collected. 152 registered wholesalers were contacted who were distributing/selling the products of small scale industries operating under SIDCO & SICOP in district Udhampur of J&K State. The selected wholesalers were visited three to four times for collecting response and were interviewed for effectual study. 127 wholesalers responded out of 152 which represented asuccessful response rate of 83.55%.

Sampling Technique Applied in The Study

Sampling acts as the basic foundation of the study. In the present study, snowball/referral sampling was applied in order to detect raw data from the respondents i.e. wholesalers. As the study also identifies the nature of supply chain, so in this study only those wholesalers were approached and interviewed who were directly purchasing the products from the firms operating under SIDCO & SICOPand further selling the products of these small scale firms. The numbers of wholesalers identified & contacted are mentioned as: under cement (12), pesticide (12), steel (12), battery/lead/alloy (12), menthol (1), guns (3), conduit pipes (2), gates/grills/varnish (15), maize/ atta/dal mills (22) and miscellaneous (30). Some main & renowned wholesalers contacted were Surbhi enterprises, M/S Raj Battery Corporation, M/S DBN Traders, M/s Swastik Enterprises, M/S Binothia Hardwares, Allied Agencies, Devika Agencies, Samgam Automobiles, M/S Inder Medical, ESS ESS Traders etc.

The Survey Instrument/Data Collection Form

A self-developed questionnaire was prepared after consulting varied experts/academicians/marketers/ scholars and extensive review of literature for collection of the required data. The data collection form included general information and 11 statements of inventory positioning & management. The statements in the questionnaire were made in descriptive form, ranking, dichotomous, open ended and five-point Likert scale, where 1 stands for strongly disagree and 5 for strongly agree.

Data Collection

The nature of the study took into consideration primary data collected from respective respondents. For collecting the data, as discussed above, snowball/referral sampling method was used. As far as secondary information was concerned, it was collected from eminent springs like supply chain management books, empirical papers from peer referred journals namely, International Journal of Supply Chain Management, Journal of Logistics and Management Systems, Academy of Marketing Science, International Journal of Marketing etc. Various multivariate tools such as mean, standard deviation, regression were used to test hypotheses and for illustrating momentous inferences.

Reliability and Validity of the Instrument

Reliability: The Cronbach's reliability is depicted with the assistance of alpha value. The alpha value calculated obtained from the coefficients of all 7 scale items appeared to be 0.952 which was higher than the criteria of 0.77 portrayed by Gordon and Narayanan (1984), thus, indicating high internal consistency & reliability.

Validity: The factor obtained alpha reliability higher to 0.50 and distinguished & significant KMO value of 0.902, thereby depicting significant construct validity (Hair *et al*., 1995).

Data Analysis and Interpretation

The data so gathered from the respondents i.e. from wholesalers were reduced and purified with the assistance of factor analysis. The suitability of data was assessed through Anti-image, KMO value, Bartlett's Test of Sphercity and (p-value = 0.000), revealing adequate common variance and correlation matrix (Dess et al., 1997 and Field, 2000). The process of R-Mode Principal Component Analysis (PSA) with Varimax Rotation was used to magnify the variables/items/statements in the construct. The result of Principal Component Analysis came up with 7 statements out of 11 statements formerly developedin the domain of inventory management. The KMO value (0.902) and Bartlett Test of Sphercity (2274.614) were highly acceptable and significant that enhanced the need & applicability of the study. Therefore, the factor loadings materialised with conformist criteria which manifested into good factor solution using Kaiser Criteria (i.e. eigen value ≥1) with 36.23% of the total variance explained. The communality for 7 items of the construct ranges from 0.617 to 0.933, indicating high degree and acceptable linear association among the variables. The factor loadings ranged from 0.621 to 0.847 and the cumulative variance hauled out is 36.23%. The factor and its statements emerged is displayed in the Table 1. A brief description of factor and its statements emerged are as under:

Factor (Inventory Positioning)

This factor comprised of seven items stated subsequently one after another i.e. "Effective control balances consumption & operations", "Inventory control facilitates purchase economies", "Required inventory is easily available from manufacturers", "Inventory control avoids

Table 1: Results Showing Factor Loadings and Variance Explained after Scale Purification (Rotated Component Method) for Inventory Positioning and Management (Wholesalers' Perceptions)

Factor-wise Dimensions	*Mean*	*S.D*	*FL*	*Eigen Value*	*Variance Explained %*	*Cumulative Variance %*	*Comm-unality*	*α*
Inventory Positioning	**4.64**	**.543**		12.854	36.233	36.233		.9525
1. Effective control balances consumption & operations	4.67	.499	.847				.869	
2. Facilitates purchase economies	4.60	.592	.839				.867	
3. Required inventory is easily available from manufacturers	4.70	.489	.822				.798	
4. Inventory control avoids costly interrup-tions in operations	4.58	.573	.813				.933	
5. Effective inventory control brings potential savings	4.55	.576	.749				.924	
6. Results in effective utilisation of human & equipment	4.56	.575	.748				.907	
7. Inventory control enhances product quality	4.79	.498	.621				.617	

Footnotes: KMO Value =.902; Bartlett's Test of Sphercity = 2274.614, df= 190, Sig. =.000; Extraction Method Principal Component Analysis; Varimax with Kaiser Normalisation; Rotation converged in 5 iterations; 'FL' stands for Factor Loadings, 'S.D' for Standard Deviation and 'α' for Alpha.

costly interruptions in operations", "Effective inventory control brings potential savings", "Inventory planning results in effective utilisation of human & equipment", and "Inventory control enhances product quality". The mean values for the items fluctuates between 4.55 – 4.79 representing significant position. The factor loadings ranges between .621 - .847. The factor loadings for each statement is: Effective control balances consumption & operations (.847), Inventory control facilitates purchase economies (.839), Required inventory is easily available from manufacturers (.822), Inventory control avoids costly interruptions in operations (.813),Effective inventory control brings potential savings (.749),Inventory planning results in effective utilisation of human & equipment (.748) and Inventory control enhances product quality (.621). The statement "Effective control balances consumption & operations" emerged with highest factor loadings and the statement "Inventory control enhances product quality" emerged to be the weakest among all with low factor loading. The communalities varied from .617 - .933 indicating significant values and high degree of linear association among the variables. The communalities for each statement is: Effective control balances consumption & operations (.869), Inventory control facilitates purchase economies (.867), Required inventory is easily available from manufacturers (.798), Inventory control avoids costly

Interruptions in operations (.933), Effective inventory control brings potential savings (.924), Inventory planning results in effective utilisation of human & equipment (.907) The statement "Inventory control avoids costly interruptions in operations" enriched with highest communality and the statement "Inventory control enhances product quality" emerged to be the weakest. Overall, wholesalers perceive that pertinent inventory positioning, management & control facilitates purchase economies and brings potential savings.

Mean Response of Wholesalers Regarding Inventory Positioning and Management

Table 2 displays mean response of wholesalers with regard to inventory positioning and management. The wholesalers' mean perceptions regarding inventory positioning and management ranges between 4.55 – 4.79 signifying good response. The statement "Inventory control enhances product quality" emerges to be the strongest among all with mean value 4.79 and the statement "Effective inventory control brings potential savings" with least score but good response having mean value 4.55. The overall mean value for all statements is 4.63. Thus it can be concluded that wholesalers have high business turnover and focus more on optimal inventories to meet demands of scattered retailers.

Table 2: Mean Rating of Wholesalers' Regarding Inventory Positioning and Management

Statement	*Wholesalers*
Inventory Positioning and Management	**Mean**
1. Inventory control enhances product quality	4.79
2. Inventory holding results in effective utilisation of human and equipment	4.56
3. Effective inventory control brings potential savings	4.55
4. Inventory control avoids costly interruptions in operations	4.58
5. Inventory control strategy facilitates purchase economies	4.60
6. Effective control balances consumption and operations	4.67
7. Required inventory is easily available from manufacturers	4.70
Total	**4.63**

Regression Analysis

The first and foremost hypothesis was tested with the assistance of regression model. Regression analysis was done to analyse the impact of inventory positioning and management on consumption & operations. As portrayed in Table 3, result of linear regression analysis avowed that their existed strong association between inventory positioning and consumption as represented by the positive & significant value of R to be .786. The value R = .786 in the model indicates 78% correlation between inventory positioning and consumption. The value of R-Square in this model is .606 which quotes that 60% of difference in inventory can be elucidated from consumption & operations. The value of Adjusted R square (.574) contours that if, at times, another independent variable is added to model, the value of R-square will increase. Auxiliary, beta value connotes significant relationship among the variables. F-value was found to be significant at 5% level. Thus, the hypothesis "*Inventory positioning and management leads to balancing of consumption &*

Table 3: Regression Model Summary

Model	*R*	R^2	*Adjusted*R^2	*Std. Error of Estimate*	*Fvalue ANOVA*	*Sig. level*	*β*	*t*	*Sig. level*
1.	.786	.606	.574	.2764	45.109	.000	.267	13.876	.000

[a.] Predictors: (Constant), Balances consumption & operations
[b.] Dependent Variable: Inventory positioning

Table 4: Regression Model Summary

Model	*R*	R^2	*Adjusted*R^2	*Std. Error of Estimate*	*Fvalue ANOVA*	*Sig. level*	*β*	*t*	*Sig. level*
1.	.633	.416	.413	.3412	68.128	.000	.653	8.431	.002

[a.] Predictors: (Constant), Facilitates purchase economies
[b.] Dependent Variable: Inventory positioning

*operations"*is accepted as represented by its significance level p < .05.

Table 4 exposes output from regression analysis in order to elicit the impact of inventory positioning on purchase economies. The linear regression model summary depicted the values of R, R^2, Adjusted R^2, Standard error of estimate, ANOVA value, Beta value, t value and significance level. The model summary explained:

R = .633 i.e. 63% association between inventory positioning and purchase economies.

R^2 = .416 i.e. 41% of variation in inventory can be explained purchase economies.

Adjusted R^2= .413 i.e. if another independent variable is added, the value ofR^2 will enhance.

β = .653 i.e. significant relationship of independent variable with dependent variable.

F = 68.128 i.e. significant at 5% confidence level.

t = 8.431 i.e. acceptable & significant value.

Significance level = .002 i.e. p < .05.

Hypothesis = accepted i.e. "*Inventory positioning and management results in* facilitating purchase economies".

Table 5 also points out at acceptable figure on the basis of model divulged as p < .05 (.000) and the value of t is 10.876 which proved the hypothesis that "*Inventory positioning and management fosters potential savings"*. The value elicited in the table portrayed significant, acceptable values. R value i.e. .767 revealed 76% of association between inventory positioning and potential savings. R-Square value of .596 indicates that 59% of variation in inventory can be enlightened from the variable potential savings. Adjusted R square of the model is .474 which quotes that the R-square will increase if some variable is added. Beta valueis significant at .267. F-value is significant: 47.179 at 5% confidence level.

Further, in the study regression analysis was applied again to educe the impact of inventory positioning on avoiding costly interruptions. The result of linear regression analysis is quoted in Table6. The table represents acceptable significant value of p < .05 (.002) that made the hypothesis to be acceptable: "*Inventory positioning and management assists in avoiding costly interruptions in operations"*with value of t as 7.472. The relationship of the dependent and independent variable is defined by the value of R as .711, which qualifies that positive strong correlation exists between two as it indicates 71% association between variables. R-Square .461 mentions 46% of variation in inventory can be explicated from

Table 5: Regression Model Summary

Model	*R*	R^2	*Adjusted*R^2	*Std. Error of Estimate*	*Fvalue ANOVA*	*Sig. level*	*β*	*t*	*Sig. level*
1.	.767	.596	.474	.2434	47.179	.000	.267	10.876	.000

[a] Predictors: (Constant), Brings potential savings
[b] Dependent Variable: Inventory positioning

Table 6: Regression Model Summary

Model	*R*	R^2	*Adjusted* R^2	*Std. Error of Estimate*	*Fvalue ANOVA*	*Sig. level*	*β*	*t*	*Sig. level*
1.	.711	.461	.433	.3412	36.179	.000	.236	7.472	.002

[a.] Predictors: (Constant), Avoids costly interruptions

[b.] Dependent Variable: Inventory positioning

the independent variable. Beta valuestood at .236 that manifested good relationship among variables. F-valueis significant at 36.179 at 5% confidence level. Thus, the last hypothesis is also accepted.

Conclusion

The study provides substantive support for previous findings in the inventory control literature and fresh insights about inventory positioning and management that exists among wholesalers and is recognised as a vital tool in meeting demands, targeting customers & positioning products in diverse markets. The present study reveals that inventory positioning and management leads to balancing of consumption & operations, inventory positioning and management results in facilitating purchase economies, inventory positioning and management fosters potential savings and inventory positioning and management assists in avoiding costly interruptions in operations.

Practically, the government intermediaries and functionaries must come forward in order to provide substantive support to the business intermediaries by way of organising monitoring camps, trade shows, seminars, lectures, practical workshops, liberalized conferences to strengthen the morale and productivity of the business intermediaries and overall supply chain partners. Overall, the wholesalers as well as the retailers should be sensitised with the assistance of training, development, education, brainstorming, group discussions, key wholesalers strategies programmes so as to make them well aware of the changing and dynamic role the inventory is playing & would be playing in the near future. Moreover, support should also be provided to the wholesalers, by the government or DIC (District Industries Centre) for inventing dynamic strategies in order to have profitable inventory management & positioning and for encompassing effectual inventory management decisions in order to beat out the fear in this competitive contemporary world. As far as the limitations of this study are concerned, the study is conducted in District Udhampur of J&K State and results obtained are appropriate herein this district but cannot be generalised for the wholesalers operating in other parts of the country having divergent ecological selling environment. Future researches can also be undertaken regarding inventory positioning and management from the perspective of wholesalers and retailers for medium & large scale industries.

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