An Exploratory Framework of the Role of Handling Inventory and its Management

Vipul Chalotra

Assistant Professor, Dept. of Commerce, University of Jammu, Udhampur campus, Jammu, India.
Email: vipulchalotra@gmail.com

Abstract

Apt inventory holding and it distinguished management impart economy and efficiency in businesses with effective stablisation and utilisation of the inventories. Inventory conveys the stock held in by the business for sale in the normal course of the business. The paper focuses an exploratory framework of the role of handling inventory with its proper management. 152 wholesalers in district Udhampur of J&K State were contacted through snowball referral sampling. The research framework was examined by empirical analysis of primary data collected. Validity and reliability of the scales in the construct were assessed through BTS and Cronbach-alpha. The data after purification and validation through factor analysis were subjected to multivariate tools. The results of hierarchal regression model and ANOVA revealed reduction in costs, economy and efficiency, and inventory stablisation being the predictors of proper inventory management. Further, it was noticed that wholesalers with different qualification significantly differ with regard to handling inventory and their management; with different previous work experience do not significantly differ in handling inventory and their proper management; and wholesalers in different locations do not differ significantly with regard to inventory management and handling.

Keywords: Inventory, Planning, Management, Wholesalers. Supply Chain.

1. Introduction

Inventory is the stock held for sale in the normal course of the business. Inventories sometimes are used in producing goods for sale (inventories of raw-materials, work-in-progress). Inventories are also termed as current assets that can be converted into cash within one year i.e. either within one financial year or accounting year. Inventory of a business can be in the form of finished goods, raw materials, work-in-progress, merchandise held for sale etc. Inventory represents the financial strength of the business and acts as basis for determining income of the business as business success or failure depends upon the amount and type of inventory held in by the business. Therefore its proper planning and handling are required by the business or businessmen. Inventory acts as catalyst that can enhance the image, profitability, financial strength, business strength, diversification etc. Inventory management simply means controlling the business stock or controlling the flow of goods and services as per their demand. Controlling inventory is need of the hour as it formulates the business success/failure as competition is intense and up growing day-by-day. Knowledge about inventory management to academics, managers, wholesalers, retailers is vital for reducing costs (Min et al., 2007), enhancing product quality, service enhancement (Huang, 2006), improving competitive ability (Wong et al., 2006) and operational flexibility through pull systems (Forrester, 1961 and Suri, 1998). Several scholars and practitioners conveyed these approaches under different labels such as time-based competition (Stalk, 1988) and lean manufacturing (Womack et al., 1990). Lead time reduction is often described in the operations management literature as arising from initiatives such as JIT/lean production or agility (Naylor et al., 1999 and Bartezzaghi et al., 1995) rather than from identifying and reducing congestion at bottlenecks, reducing lot sizes and moving to a product layout from a functional one. Koufteros et al. (1998) claim time-based manufacturing is related to shop-floor employee involvement, setup time reduction, cellular manufacturing, quality improvement efforts, preventive maintenance, dependable suppliers, and pull production, but do not relate these constructs to the principles that drive lead time. Wholesalers play a vital role in equalizing the demand and supply position of the economy. They have repositories of inventories and their effective management and apt handling bring in smoothness in the economy i.e.

the economy keeps on working because of the crucial role played by wholesalers in the entire supply chain. They consolidate the inventories of different manufacturers and foster demand for each and every producing units. They encourage the retailers for proper and right supply of products in the markets. Ultimately they reduce the burden of manufacturer by taking his headache of selling the inventories and by assisting him through ensuring the sales of his products. So, wholesalers represents the dynamic role who assists both the upper channel partners (manufacturers, suppliers) and the lower channel partners (retailers, agents etc), thus creating and maintaining a strong supply chain.

2. Review of Literature

Lee (2002) particularly emphasizes the role of inventory in situations of supply uncertainty. There are thus widely varying views about the role of inventory in the literature and some of these views appear to have conflicting goals. For example, the goal of traditional inventory control theory has been the optimisation of inventory levels, whereas the goal discussed in more recent thinking, such as that on lean and agile supply chains, has concentrated more on the minimisation of inventory levels. However, the latter has been counteracted to some extent by the understanding of the role of decoupling points and the part that inventory may play in some risk mitigation strategies. Whilst the minimisation of inventory is widely discussed, this needs to be defined and there is a recognition that resources can be reduced too much, leading to terms such as "corporate anorexia" (Radnor and Boaden, 2004). This suggests that there is in fact an optimum level of inventory. However, the identification of this level needs to involve wider concepts than those just associated with traditional inventory control theory. Inventory holding plays an important role in modern supply chains. A survey of logistics costs in Europe identified the cost of inventory as being 13 percent of total logistics costs (Establish Inc/AT Kearney, 2004). A similar study in the USA, found inventory costs significantly higher at 24 percent (European Logistics Association/Herbert W. Davis and Co., 2005). The present research takes into purview the exploratory framework of the role of handling inventory and its management by wholesalers in Udhampur district of J&K State.

3. Testable Hypothesis

On the basis of in-depth analysis of existing review of literature and its meaningful conclusions, the following hypotheses had been emerged in order to make the study more reliable and responsive. The main hypotheses are:-

H1: Effective inventory handling and its proper management lead to cost reduction, economy and efficiency, and inventory stablisation.

H2: Wholesalers with different qualification significantly differ with regard to handling inventory and its management.

H3: Respondents differing with regard to previous work experience do not significantly differ in handling inventory and its proper management.

H4: Respondents in different locations do not differ significantly with regard to inventory management and handling.

4. Research Design and Methodology

Research design and methodology comprises area of research, nature of data/information (Primary or secondary), questionnaire/schedule, research tools applied etc. The research methodology adopted proceeds as follows:

4.1 Sampling and Data Collection

The primary data for the study were collected from 44 functional manufacturing SSIs out of 49 units registered under District Industries Centre (DIC), Udhampur of J&K State. Five units were found to be non-functional. The nature and number of downward members in supply chain included in the study were 152 wholesalers who were the main respondents of the present study, out of whom 127 responded representing an effective response rate of 83.55%. The manufacturing units were sub-divided into ten lines of operation comprising cement (8), pesticide (3), steel (3), battery/lead/alloy (5), menthol (2), guns (2), conduit pipes (2), gates/grills/varnish (5), maize/atta/dal mills (3) and miscellaneous (11). The miscellaneous category includes small scale units namely M/s Supertech Industry, M/s Luxmi Electronics Works, Shaj Nath Vanaspati Ltd., M/s Aditiya Cables, Poles and Transformers, Shankar Lime Industry, M/s Unique Carbon Industries, M/s B.S Traders, M/s Vijay Candles, Everest Health Care Products, M/s J.K Petro Chemicals, M/s Ajay Ice Factory.

4.2 Sampling Technique Applied

Snowball/ referral sampling was used for obtaining data from wholesalers. Only those wholesalers were contacted who were using/selling/dealing with the products manufactured by the above stated units. The number of wholesalers identified 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 of the major 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.

4.3 The Survey Instrument

Information was collected by administering self-developed questionnaire prepared after consulting experts and review of literature which comprised of general information and 12 statements of inventory planning and management. Statements in the questionnaire were in descriptive form, ranking, dichotomous, open ended and five -point Likert scale, where 1 stands for strongly disagree and 5 for strongly agree.

4.4 Collection of Data

The primary data were collected by making three to four visits for getting response from respondents. Snowball/ referral sampling method was applied for collecting data from the respective respondents. The secondary information was collected from various sources namely books, empirical papers from online and hard copies of journals. Various multivariate tools such as mean, standard deviation, regression, ANOVA were used to test hypotheses and for drawing meaningful inferences.

4.5 Reliability and Validity of the Instrument

Reliability: Three factors are obtained after scale purification falling within the domain of inventory management in supply chain management. As evident from the Table 1, the Cronbach's reliability coefficients for all 20 scale items underlying three factors ranges from 0.605 to 0.829. The alpha reliability coefficients for F_1 (0.973), F_2 (0.952), F_3 (0.835) is higher than the criteria of 0.77 obtained by Gordon and Narayanan (1984) indicating high internal consistency and reliability. However, the overall alpha reliability score for all factors is very much satisfactory at 0.925. Adequacy and reliability of sample size to yield distinct and reliable factors is further demonstrated through Kaiser-Meyer-Olkin Measure of Sampling Adequacy that is 0.791 and all factor loadings between items and their respective constructs being greater than equal to 0.55.

Validity: The three factors obtained alpha reliability higher and equal to 0.50 and satisfactory KMO value at 0.791, indicating significant construct validity of the construct (Hair et al., 1995).

5. Data Analysis and Interpretation

The suitability of raw data for factor analysis obtained from wholesalers is examined through anti-image, KMO value, Bartlett's Test of Sphercity and (p-value = 0.000), indicating sufficient common variance and correlation matrix (Dess et al., 1997 and Field, 2000). The process of R-Mode Principal Component Analysis (PSA) with Varimax Rotation educed 20 statements with no reduction in statements actually kept in the construct/domain of inventory management. The KMO value (0.791) and Bartlett Test of Sphercity (2246.614) indicates high acceptable and significant values. Therefore, factor loadings in the final factorial design are consistent with conservative criteria, thereby resulting into three-factor solution using Kaiser Criteria (i.e. eigen value ≥1) with 79.90% of the total variance explained. The communality for 20 items ranges from 0.31 to 0.94, indicating high degree of linear association among the variables. The factor loading ranges from 0.521 to 0.913 and the cumulative variance extracted ranges from 34.23 to 79.90 percent. The communalities and % of variance explained by each factor is displayed in the Table 1.1. A brief description of factors emerged is as follows:

Factor 1 (Cost reduction): It contained eight items namely, "Inventory planning improves service level", "Inventory planning and management reduces storage costs", "Inventory control paves for competitive ability", "You keep inventory in accordance to your firm size", "High inventory turnover affects revenue costs", "Sufficient inventory is build to minimise price fluctuation", "Effective inventory control enhances market share" and "SCM assists you to maintain adequate inventories". The mean values for all the items ranges from 4.56 to 4.63., factor loadings from .682 to .915 and communalities from .710 to .941. The statement

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

Factor-wise Dimensions	Mean	S.D	F.L	Eigen Value	Variance Explained %	Cumulative Variance %	Comm-unality	α
F1 Cost reduction	4.60	.519		11.854	34.233	34.233		.9730
1. Inventory planning improves service level	4.60	.491	.915				.941	
2. Inventory planning and management reduces storage costs	4.60	.518	.907				.931	
3. Inventory control paves for competitive ability	4.58	.496	.900				.884	
4. You keep inventory in accordance to your firm size	4.60	.518	.877				.870	
5. High inventory turnover affects revenue costs	4.56	.573	.867				.864	
6. Sufficient inventory is build to minimise price fluctuation	4.56	.590	.857				.859	
7. Effective inventory control enhances market share	4.63	.484	.809				.811	
8. SCM assists you to maintain adequate invento-ries	4.63	.484	.682				.710	
F2 Economy and efficiency	4.64	.543		2.672	26.640	60.863		.9525
1. Effective control balances consumption and 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 interruptions in operations	4.58	.573	.813				.933	
5. Effective inventory control brings potential savings	4.55	.576	.749				.924	
6. Results in effective utilization of human and equipment	4.56	.575	.748				.907	
7. Inventory control enhances product quality	4.79	.498	.521				.317	
F3 Inventory stablisation	4.63	1.05		1.434	18.938	79.901		.8358
1. Facilitates cost accounting activities	4.36	.973	.813				.768	
2. Consistent with safety and economic advantage	4.48	.815	.806				.813	
3. Inventory catalogue is maintained to influence inventory control	3.93	1.40	.764				.589	
4. Adequate warehousing facilities are there for stocking inventory	3.85	1.35	.734				.549	
5. Regular supply at reasonable prices builds cus-tomer confidence	4.52	.706	.684				.759	

"Inventory planning improves service level" gushed to be most important and strongest among all with high factor loading (.915) and communality (.941). Wholesalers are of the view that inventory planning, management and control improves service level, reduces costs and enhances market share.

Factor 2 (Economy and efficiency): This factor comprised of seven items stated subsequently one after another i.e. "Effective control balances consumption and operations", "Inventory control facilitates purchase economies", "Required inventory is easily available from manufacturers", "Inventory control avoids costly interruptions in operations", "Effective inventory control brings potential savings", "Inventory planning results in effective utilization of human and equipment" and "Inventory control enhances product quality". The mean values for the items fluctuate between 4.55 – 4.79 representing significant position. The factor loadings range between .521 - .847 and communalities from .317 - .924. The statement "Inventory control enhances product

Table 2: A Brief Profile of Respondents (Wholesalers)

S.No.	Variables	Classification	Frequency	Percentage
1.	Qualification	Matriculation	39	30.7
		Higher secondary	33	25.9
		Graduation	35	27.5
		Post graduation	9	7.08
		Others	11	8.66
2.	Previous work experience	1 – 5 years	8	6.29
		5– 10 years	19	14.9
		10 – 15 years	25	19.6
		15 – 20 years	31	24.4
		Above 20 years	44	34.6
3	Location	Udhampur	81	63.7
		Ramnagar	27	21.2
		Others	19	14.9
	Total		127	100

quality" emerged to be the weakest among all with low factor loading and communality. Overall, wholesalers perceive that inventory management and control facilitates purchase economies and brings potential savings.

Factor 3 (Inventory stablisation): The five items underlying this factor consisted of "Inventory control facilitates cost accounting activities", "Inventory control is consistent with safety and economic advantage", "Inventory catalogue or directory is maintained to influence inventory control", "Adequate warehousing facilities are there for stocking inventory" and "Regular supply at reasonable prices builds customer confidence". The mean values range from 3.85 to 4.52. The factor loadings fluctuate within .684 to .813. and communalities .549 - .813 indicating significant values for the construct. Wholesalers opine that regular supply at reasonable prices build customer confidence, enhances SC relationships and invites business.

Footnotes: KMO Value =.791; Bartlett's Test of Sphercity = 2246.614, 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

Respondents' profile (Wholesalers)

It has been found that 27.5% (35) of the entrepreneurs (wholesalers) are graduates and 7.08% (9) entrepreneurs are post-graduates. 39 wholesalers (30.7%) were matriculation pass constituting larger chunk of the respondents contacted. Another group of wholesalers who were qualified upto higher secondary were 25.9% (33). Those who had done technical courses were just 11 out of total 127 respondents. Thus, it becomes clear that large proportion of wholesalers is enlightened and well-educated. Thus, qualification of entrepreneurs highlights the awakened nature of wholesalers representing well qualifies respondents (Table 2).

As far as owners (wholesalers) past experience is concerned, it was found that 14.9% (19) were having past working experience of 5 – 10 years. Eight respondents were found to have work experience of 1 – 5 years which contributed to 6.29% of the total respondents. Those having previous work experience between 10 – 15 years were 25 in number with 19.6% constitution. 24.4% (31) of the respondents were with rich experience of 15 – 20 years and 34.6% (44) of the respondents were with exorbitant experience and exposure of beyond 20 years.

As far as location of respondents was concerned it was found that 63.7% (81) of wholesalers hails from Udhampur district only. Further it was noticed that 27 representing 21.2% of the total respondents were from Ramnagar town and the remaining respondents were contacted in other neighboring areas such as Chennani, Batote, and other parts of district Udhampur representing 14.9% of respondents contacted.

Table 3 shows output from multiple regression analysis using 20 items of inventory management to predict the dependent variable "Effective inventory handling and its proper management leads to inventory control". The result of step-wise linear regression analysis enticed three independent variables as significant in predicting the dependent variable. These are: "Cost reduction", "Economy and efficiency" and "Inventory stablisation".

Table 3: Regression Model Summary

Model	R	R2	AdjustedR2	Std. Error of Estimate	F value ANOVA	Sig. level	β	T	Sig. level	Durbin-Watson
1.	.631	.410	.403	.3412	68.128	.000	.653	8.431	.000	2.113
2.	.730	.534	.521	.3023	55.423	.000	.384	5.073	.000	
3.	.763	.596	.574	.2764	45.109	.000	.267	3.876	.003	

Table 4: ANOVA for Qualification

Description of Qualification	Nature of Variable	Sum of Squares	df	Mean Square	F	Sig.
Matriculation	Between Groups	11.577	4	.394	21.417	.010
Higher Sec.	Within Groups	10.855	123	.278		
Graduate	Total	21.432	127			
Post Graduate						
Others						

Table 5: ANOVA for Work Experience

Description of Work Experience	Nature of Variable	Sum of Squares	df	Mean Square	F	Sig.
1 – 5 yrs	Between Groups	.722	4	.180	.601	.629
5 – 10 yrs	Within Groups	11.710	123	.300		
10 – 15 yrs	Total	12.432	127			
15 – 20 yrs						
Above 20 yrs						

Table 6: ANOVA for Location

Description of Location	Nature of Variable	Sum of Squares	df	Mean Square	F	Sig.
Udhampur	Between Groups	.003	6	.001	.104	.901
Ramnagar	Within Groups	.984	121	.014		
Others	Total	.986	127			

The correlation between predictor and outcome is positive with values of R as .631, .730 and.763 which signifies high correlation between predictor and the outcome. In model 1, R is .638 which indicates 64% association between dependent and independent variables. R-Square for this model is .410 which means that 41% of variation in inventory management can be explained from the three independent variables. Adjusted R square (.403) indicates that if anytime another independent variable is added to model, the R-square will increase. Further beta values reveal significant relationship of independent variables with dependent variable. "Cost reduction" has emerged as the strongest predictor whereas "Inventory stablisation" is found to be the weakest as represented by relative t-values. Change in R square is also found to be significant with F-values significant at 5% confidence level. Errors in regression are independent as indicated by Durbin-Watson value (2.113). The aforesaid findings support the hypothesis "Effective inventory handling and its proper management leads to cost reduction, economy and efficiency and inventory stabilisation".

a. Predictor: (Constant), Cost reduction

b. Predictors: (Constant), Cost reduction, Economy and efficiency

c. Predictors: (Constant), Cost reduction, Economy and efficiency, Inventory stabilisation

d. Dependent variable: Effective inventory handling and management

To test the second hypothesis, the qualification of the respondents was classified into five categories viz., Matriculation, Higher secondary, Graduate, Post graduate and others (Technical courses etc). The results of ANOVA (Table 4) revealed that wholesalers with different qualification level do not differ significantly with regard to handling inventory and its management (Sig. 0.010) as the *p* value is less than .05. Therefore, the second hypothesis is also accepted.

The third hypothesis was analysed by taking into consideration the previous work experience of the respondents (wholesalers). The previous work experience was classified into five categories i.e. 1-5 yrs, 5-10 yrs, 10-15 yrs, 15-20 yrs, and above 20 yrs. The ANOVA results portrayed that wholesalers with different work experience donot differ significantly in handling inventory and its proper management as $p > .05$ i.e. 0.664. Therefore, the third hypothesis is also accepted (Table 5).

In order to test the last hypothesis, again one way ANOVA was applied. The location factor was divided into three parts i.e. Udhampur, Ramnagar, others. The results of test revealed that respondents in different locations do not differ significantly with regard to inventory management and handling as represented by effective p value (.901) which is more that 0.05. Thus, the last hypothesis is also accepted (Table 6).

6. Conclusion

Inventory holding and handling though differ from person to person, but only the differences in handling techniques and its management give one business more and objective chance to do better business than others. Only the difference counts and nothing else as difference is the only way to differentiate whole of the business. It is noticed that proper inventory planning and management is vital for reducing costs, enhancing product quality, enlarging sales, enhancing customer service/overall service, improving competitive ability and operational flexibility. The study provides substantive strut up for previous findings in the existing literature and fresh insights about the benefits of proper inventory planning and management. Proper inventory handling and its management assist in reducing overall costs of the business, bring in economy and efficiency, and result in inventory stabilisation in order to ensure the free flow of goods all the times, even in harsh and tough situations. Further, it was noticed that wholesalers with different qualification significantly differ with regard to handling inventory and its management, Wholesalers with regard to previous work experience do not significantly differ in handling inventory and its proper management and wholesalers in different locations do not differ significantly with regard to inventory management and handling. It's being inferred that wholesalers of this region must be sensitized through periodic training and education programmes in order to better implement the existing and latest inventory control techniques. The findings of the study is limited to small scale industries of district Udhampur of J&K State, so results drawn cannot be generalized for medium or large scale wholesalers functioning in other parts of country having dissimilar business environment.

References

Bartezzaghi, E., Spina, G., & Verganti, R. (1995). Lead-time models of business processes. *International Journal of Operations & Production Management, 14(5),* 5-20.

Dess, G. G., Lumpkin, G. T., & Covin, J. G. (1997). Entrepreneurial strategy making and firm performance: Tests of contingency and configurational model. *Strategic Management Journal, 18(9),* 677-695.

Establish Inc./Herbert W. Davis & Co. (2006). *Logistics cost and service 2005, Paper Presented at Council of Supply Chain Management Professionals Conference,* Retrieved from www. establishinc.com.

European Logistics Association/A.T. Kearney (2004). *Differentiation for Performance,* Deutscher Verkehrs-Verlag GmbH, Hamburg.

Field, A. P. (2004). *Discovering Statistics Using SPSS for Windows,* London, Sage Publications, 619-672.

Forrester, J. (1961). *Industrial Dynamics,* MIT Press, New York, NY.

Gordon, L. A. & Narayanan, (1984). Management accounting systems, perceived environmental uncertainty and organisational structure: An empirical investigation. *Accounting, Organisations and Society, 19(1),* 330-348.

Hair, J. F., Anderson, R. E., Tatham, R. L. & Black, W. C. (1995). *Multivariate Data Analysis*. NewJersey: Prentice Hall, 87-115.

Kakati, R. P., & Dhar, U. R. (2002). Competitive strategies and new venture performance. *Vikalpa, 27(3),* 13-24.

Koufteros, X. A., Vonderembse, M. A., & Doll, W. J. (1998). Developing measures of time-based manu-

facturing. *Journal of Operations Management, 16(1),* 21-41.

Lee, H. L. (2002). Aligning supply chain strategies with product uncertainties. *California Management Review,* 44(3), 105-119.

Min, S., Mentzer, T. J. & Ladd, T. R. (2007). A market orientation in supply chain management. *Journal of Academy of Marketing Science, 22,* 14-27.

Naylor, J. B., Naim, M.M. and Berry, D. (1999). Leagility: Integrating the lean and agile manufacturing paradigms in the total supply chain. *International Journal of Production Economics, 62,* 1/2, 107-118.

Radnor, J. Z. & Boaden, R. (2004). Developing an understanding of corporate Anorexia. *International Journal of Operations & Production Management*, 24(4), 424-440.

Suri, R. (1998). *Quick Response Manufacturing,* Productivity Press, Portland, OR.

Womack, J. P., Jones, D.T. & Roos, D. (1990). *The Machine that Changed the World*, Rawson Associates, New York, NY.

Wong, A., Tjosvold, D., & Zhang, P. (2005). Supply chain management for customer satisfaction in China: Interdependence and cooperative goals. *Asia Pacific Journal of Management, 22,* 179-199.