9

Inventory Management Practices of Hospitals with regard to Effective Service Delivery in Kamrup District of Assam

Subit Dutta & Amrita Dutta

Abstract

Effective inventory management is crucial for any organization's success. It aligns with the corporate strategy and contributes significantly to the value chain function. Increasing efficiency and effectiveness enhances service delivery and provides a competitive edge in the highly competitive market. Therefore, inventory management is vital in creating a good service delivery for the organization. Since different service-based companies use different inventory management systems, the objectives of inventory management are to maintain inventory at the lowest possible cost while adhering to target settings and securing a consistent supply of resources to support operations. The present study examines the inventory management practices currently followed by Government and Private Hospitals for effective service delivery.

Keywords: *Healthcare, Service, Optimum, Re-order level (ROL).*

Introduction

A service delivery system comprises of interdependent processes (Johnston & Clark, 2001). A service process is a series of activities and steps, including the flows and interactions between these

activities and the resources needed to produce and deliver the service outcome (Slack *et al.*, 2004). When creating a service delivery system, it is essential to outline the responsibilities of individuals, technology, facilities, equipment, layout, and processes that all contribute to the outcome. This process is known as service blueprinting and mapping.

The service delivery provider interacts with the public to gather or provide information and efficiently handle tasks in a reliable and customer-friendly way. According to the World Health Organization (WHO), the critical components of service delivery are accessibility, affordability, and acceptability. These factors are considered the foundation of successful service delivery. Hollyoake (2009) also identified four pillars crucial to customer management: trust, integrity, interdependence, and communication. These pillars are essential for creating strong, bonded relationships with customers for effective services. The National Service Delivery Survey (NSDS) conducted in 2000, focussed service delivery on four key attributes: availability, reliability, quality, and customer satisfaction. The independent variable studied is inventory management, which involves tracking and managing the movement of goods in and out of storage locations and balancing inventory levels. The study considers various inventory management processes, including procurement, record-keeping, receiving, storage, and control and measures their effectiveness in meeting demand for quality, quantity, time, and place.

Managing Services Delivery through Inventory Management:

The service delivery system refers to the facilities, equipment, infrastructure, job design, skills, and processes used for providing a service (Goldstein 2002). In order to gauge the efficiency of a delivery system, it is essential to have a clear understanding of what effectiveness entails. Effectiveness is the degree of success in carrying out a task. Service delivery systems usually produce several positive outcomes, ranging from reducing costs, increasing availability of efficient operations, improved service quality and optimum customer experience (Walley & Amin, 1994). The main objective of a service delivery system is to minimize the

gap between customers' expectations and their experience. The Service Delivery System is the channel that service employees use to try and meet the quality standards established by management. A successful Service Delivery System should result in high levels of service quality, both in technical aspects and in customers' perceptions.

The service delivery plays a significant role in the healthcare system, as patients receive care and essential supplies to support the abovementioned services. Hospital service encompasses a broad range of services received within a hospital setting and the associated costs incurred for delivering such professional services. From the perspective of patients and the wider public, healthcare provision stands out as the most easily recognizable facet of the healthcare system. The healthcare industry encompasses various crucial areas of service provision, namely public health, primary care, specialized care, urgent and emergency care services, pharmaceutical care, rehabilitation/intermediate care, long-term care, services catering to informal caregivers, palliative care, mental health care, and dental care. These services are essential in ensuring overall well-being and optimal health outcomes for the population they serve. The effective management of productive service delivery within hospitals relies upon various crucial factors. This perspective is articulated by Kols and Sherman (1998) and underscores the importance of quality in providing healthcare services**.** In healthcare establishments, inventory providers specialised in service delivery develop protocols and methodologies to provide access to such healthcare services. Adopting and applying inventory management strategies should provide favourable consequences, namely facilitating and enhancing service delivery.

Statement of the Problem

There are different practices which are followed in inventory management practices with regard to effective service delivery. VMI is a useful system that can improve working capital by reducing inventory levels and delivering effective service, while also enhancing inventory turn and managing cash flow effectively. Optimal inventory model for obsolescence has continuous review and deterministic demand, providing user-friendly and cost-

effective results. Legacy policies can be improved for reduced yearly inventory costs. This study examines to find out the inventory management practices followed by the hospitals of Kamrup District of Assam to provide effective service delivery.

Review of Literature

Dumoulin & Flipo (1991) mentioned that a service is a localized and time-bound act or succession of actions performed to benefit an individual or collective customer using human and material resources. The process involves codified procedures and behaviors. Service management issues consist of broad organizational contexts like service business, which is the main activity that requires interaction with the customer to provide the service. These services include the functions like data processing, accounting, production and maintenance.

Gadrey (2000) found that when an economic agent purchases services from an organization, they essentially buy the right to use that organization's technical and human capacity for a specified period. This action aims to generate beneficial outcomes for the agent or their goods.

Giard and Balin (2006) mentioned that services can appear as a process. This process can involve delivering products to customers through human or automated operators, providing information upon request (even if it is not a physical report), or changing resources like equipment or personnel.

Lapierre and Ruiz (2007) found that a service is a mental picture that customer and employees hold about the service provided by the organization. It embraces the service experience, outcome, operation, and value of the service.

Research Gap

It is evident from the literature analysis above that a significant amount of research has been done on inventory management from a variety of angles. It is discovered that various businesses manage their inventory using a variety of methods. Similarly, all hospitals of Assam adhere to specific inventory management procedures. Above all, Kamrup District is the biggest hub in India's North Eastern Region (NER), and as a result of the superior

medical facilities, many patients from the entire NER travel there. In an effort to close the current research gap, the current study examines the inventory management procedures used by the hospitals of Kamrup District.

Objective of the study

To compare the inventory management practices currently followed by Government and Private Hospitals for effective service delivery.

Hypothesis of the study

There exists a difference of inventory management practices between Government Hospitals and Private Hospitals of Guwahati City leading to effective service delivery.

Nature of the Study

The character of the current study is both descriptive and analytical. All of the public and private hospitals located in Kamrup District of Assam forms the population of the study. The purpose of this study is to learn more about hospital inventory management procedures. Therefore, only people in charge of stock management were taken into consideration. Since information was gathered from 32 hospitals, the current study takes into account a sample of 32 hospitals in Kamrup District. Interview schedules have been used to gather primary data. Journals, magazines, periodicals, financial statements, newspapers, publications, government agencies, hospitals, websites used for secondary data.

Limitations of the study

1. The scope of the study is limited to exploring the practices followed by the hospitals. Therefore, effectiveness of the services is not measured in the present study.

2. The study focuses solely on central store department of the hospitals, and patient comments are not taken into consideration.

Analysis and Discussion

Variables considered for the Study:

A total of 12 variables were selected from different sources. Based on these variables, 12 statements were prepared. Various inventory management practices viz, Economic Ordering Quantity (EOQ), Re-order Level (ROL) Just-in-Time (JIT), Vendor Managed Inventory (VMI), Lean Inventory (LI) and Standard Automotive Tool Set (SATS) have been considered.

Reliability Test - The reliability test of the data was conducted and found to be 0.927 which is more than 0.5 and indicates an acceptable level of reliability.

Inventory Management practices in hospitals of Guwahati, Assam

The data have been collected from the people concerned (who are responsible for inventory management in hospital). It includes, Medical superintendent of hospital, stock/inventory manager, business processor, and Material / procurement officer. The findings are presented in table 1.

`Table 1: Practices followed by employees responsible for inventory management in different inventory management stages

SI No	Inventory Management stage		SD	D	Sm D	I	Sm A	A	SA	Total
Activity	Step 1: Initial data collection		(1)	(2)	(3)	(4)	(5)	(6)	(7)	
	The employee responsible for inventory management visits every department and checks every piece of equipment and drugs	Count	1	5	1	0	4	9	12	32
		%	3	16	3	0	12	28	37	100

2.	The employee responsible for inventory management records and compiles data of all equipments and drugs in the hospital	Count	0	4	3	0	1	13	11	32
		%	0	12	9	0	3	41	34	100
	Step 2: Information stage									
1	Whenever new piece of inventory is brought, before it is used, it is updated	Count	2	1	0	0	5	14	10	32
		%	6	3	0	0	16	44	31	100
2	Equipment borrowed or leased for an extended period of time is updated into the inventory record	Count	13	3	0	0	3	8	5	32
		%	41	9	0	0	9	25	16	100
3	Records of equipment which are already listed in the inventory is updated to show any changes of location , operating status, changes in service , and repair performed on the machine	Count	5	1	0	0	4	15	7	32
		%	16	3	0	0	12	47	22	100
	Step 3: Annual audit/review									

| 1 | A team of people visits every department and check the details of every piece of equipment and drugs to ensure that they are accurate | Count | 2 | 2 | 0 | 0 | 6 | 14 | 8 | 32 |
| | | % | 6 | 6 | 0 | 0 | 19 | 44 | 25 | 100 |

Source: compiled from field survey

NB. SD=strongly disagree, D= disagree, SmD= somewhat disagree, , I= indifferent, SmA= somewhat agree, A= Agree, SA = Strongly Agree

From table 1, it is revealed that 37 percent of the respondents strongly agree that 'the employee responsible for inventory management visits every department and checks every piece of equipment and drugs and 28 percent of the respondents agree on it. It indicates that in majority of the hospitals of the study area (65 percent) visits every department and checks every piece of equipment and drugs.

Again, it is revealed that 34 percent of the total respondents strongly agree that the employees responsible for inventory management records and compile data of all equipments and drugs and 41 percent of the respondents agree that. It indicates that in majority of the hospitals of the study area (78 percent), where the employees are responsible for inventory management records and compile data of all equipments and drugs.

It further reveals that 31 percent of the total respondents strongly agree that 'Whenever new piece of inventory is brought, before it is used, it is updated' and 44 percent of the respondents agree on it. It shows that whenever new piece of inventory is brought, before it is used, in majority of the hospitals of the study area (91 percent), it is updated.

16 percent of the total respondents strongly agree that 'Equipment borrowed or leased for an extended period of time is updated into the inventory record' and 25 percent of the respondents agree on it. It indicates that in most of the hospitals of the study area (50 percent), equipment borrowed or leased for an extended period of time is updated into the inventory record.

22 percent of the total respondents strongly agree that 'Records of equipment which are already listed in the inventory is updated to show any changes of location , operating status, changes in service , and repair performed on the machine' and 47 percent of the respondents agree on it. It indicates that in majority of the hospitals of the study area (81 percent), records of equipment's which are already listed in the inventory is updated to show any changes of location, operating status, changes in service, and repair performed on the machine.

It is also revealed that 25 percent of the total respondents strongly agree that 'A team of people visits every department and check the details of every piece of equipment and drugs to ensure they are accurate' and 44 percent of the respondents agree on it. It indicates that in majority of the hospitals of the study area (88 percent), a team of people visits every department and checks the details of every piece of equipment and drugs to ensure they are accurate.

Inventory Management Practices of Hospital with regard to Effective Service Delivery

In case of inventory management practices with regard to effective service delivery various factors have been taken into consideration.

Table 2: Activities performed by employees responsible for Inventory management practices with regard to effective service delivery

SI No	Inventory management practices with regard to effective service delivery (1)		SD (2)	D (3)	SmD (4)	I (5)	SmA (6)	A (7)	SA	Total
1.EOQ	The hospital follows a logical approach in inventory management	Count	1	2	0	0	5	13	11	32
		%	3	6	0	0	16	41	34	100
2.EOQ	To make inventory always available, the hospital clearly forecasts the need for inventories	Count	1	5	3	0	3	8	12	32
		%	3	16	9	0	9	25	38	100
3.ROL	The hospital has full information about the re-order levels	Count	0	0	0	0	2	12	18	32
		%	0	0	0	0	6	38	56	100
4.ROL	The hospital has perfect knowledge on when to order and when not to order	Count	0	0	0	0	2	6	24	32
		%	0	0	0	0	6	19	75	100
5. JIT	The hospital does not have tolerance for late or early deliveries	Count	2	5	0	2	6	13	4	32
		%	6	16	0	6	19	41	12	100
6. JIT	The desired items always arrive in time for use in hospital	Count	3	4	1	0	13	9	2	32
		%	9	12	3	0	41	28	6	100

										Total
7. VMI	The inventories are delivered on time by use of Vendor Managed Inventory	Count	5	3	2	0	6	11	5	32
		%	16	9	6	0	19	34	16	100
8. VMI	The hospital keeps *communication channels open* to the suppliers	Count	5	3	0	0	2	16	6	32
		%	16	9	0	0	6	50	19	100
9. LI	The hospital has agreements with supplier for short-cycle deliveries which don't take longer time to deliver	Count	7	3	2	1	3	9	7	32
		%	22	9	6	3	9	28	22	100
10LI	The hospital has accurate prediction of supplier delivery dates	Count	5	3	4	0	5	10	5	32
		%	16	9	12	0	16	31	16	100
11SATS	The hospital maintains proper inventory records-keeping by use of Software Application Tracking System	Count	6	1	4	0	1	10	10	32
		%	19	3	12	0	3	31	31	100
12SATS	The hospital maintains proper material requirement planning by use of Software Application Tracking System	Count	6	2	2	2	4	7	9	32
		%	19	6	6	6	12	22	28	100

Source :compiled from field survey

Table 2 shows that majority of the hospitals of the study area (91%) follows the practice of logical approach in inventory management through EOQ practices. Further, 72% follows the practice of 'making inventory always available and clearly forecasts the need of inventories. All the hospitals of the study area (100 percent) keep full information about the re-order levels and have perfect knowledge of when to order and when not to order.

Majority of the hospitals of the study area (72 percent) agreed that 'The hospital does not have tolerance for late or early deliveries'. Further majority of the hospitals of the study area (75 percent) opined that the desired items always arrive in time for use in hospital. In most of the hospitals of the study area (69 percent), the inventories are delivered on time using Vendor Managed Inventory while in majority of the hospitals of the study area (75 percent), the hospital keep *communication channels open* to the suppliers.

Majority of the hospitals of the study area (78 percent) opined that the hospital has agreements with supplier for short cycle deliveries which don't take longer time to deliver. In majority of the hospitals of the study area (62 percent), the hospital has accurate prediction of supplier delivery dates. Further in majority of the hospitals of the study area (75 percent), the hospital maintains proper inventory records-keeping by use of Software Application Tracking System. Most of the hospitals of the study area (62 percent) agreed that the hospital maintains proper material requirement planning using Software Application Tracking System.

Table 3.Difference of inventory management practices between Government Hospitals and Private Hospitals of Guwahati City leading to effective service delivery

Attributes	Type	N = 32	Mean Difference
The hospital follows logical approach in inventory management	private hospital	27	16.22
	government hospital	5	18.00
To make inventory always available, the hospital clearly forecasts the need of inventories	private hospital	27	17.11
	government hospital	5	13.20

The hospital have full information about the re-order levels	private hospital	27	15.76
	government hospital	5	20.50
The hospital has perfect knowledge on when to order and when not to order	private hospital	27	16.87
	government hospital	5	14.50
The hospital does not have tolerance for late or early deliveries	private hospital	27	16.50
	government hospital	5	16.50
The desired items always arrive in time for use in hospital	private hospital	27	16.72
	government hospital	5	15.30
The inventories are delivered on time by use of Vendor Managed Inventory	private hospital	27	15.91
	government hospital	5	19.70
The hospital keep communication channels open to the suppliers	private hospital	27	17.74
	government hospital	5	9.80
The hospital has agreements with supplier for short cycle deliveries which don't take longer time to deliver	private hospital	27	17.37
	government hospital	5	11.80
The hospital has accurate prediction of supplier delivery dates	private hospital	27	16.96
	government hospital	5	14.00
The hospital maintains proper inventory records-keeping by use of Software Application Tracking System	private hospital	27	16.09
	government hospital	5	18.70
The hospital maintains proper material requirement planning by use of Software Application Tracking System	private hospital	27	17.02
	government hospital	5	13.70

Source: compiled from field survey.

The differences of inventory management practices between Government Hospitals and Private Hospitals of Guwahati City, leading to effective service delivery are shown in table 3. Mean

rank of each and every attributes (practices) is computed to find out the degree of differences. The results clearly indicate that there are differences in the inventory management practices between Government Hospitals and Private Hospitals of Guwahati City, leading to effective service delivery. Hence, the working hypothesis '*H1: There exists a difference of inventory management practices between Government Hospitals and Private Hospitals of Guwahati City leading to effective service delivery*' is accepted.

Conclusion

Services are intangible economic activities that are sold or provided in conjunction with the sale of goods. Some definitions emphasize the level of satisfaction provided, while others concentrate on the interaction between the customer and the service provider. Services have the potential to impact a person's physical and mental well-being and require the use of both human and material resources. An Inventory management comprises of complex structures implied with critical elements. This study analysed the various stages of inventory management and a comparison has also made between the government and private hospitals taking selected determinants on such attributes to find out the differences/ similarities in the practices they follow.

Effective management requires understanding demand, supply, costs, and using the right tools. Without the use of proper and effective inventory management practices on service delivery, there will be poor management and there is differences between the selected determinants of service delivery with the selected inventory management practices based on private and government hospital. The findings clearly reveal that though majority of the hospitals follow the practice of EOQ, ROL, JIT, VMI, LI and SATS, there are differences in the number of private and government hospitals with regard to following of these practices.

References

Dumoulin & Flipo, (1991).Cited from Giard, Vincent & Balin, Savas. (2006). *A Process-Oriented Approach To The Service Concepts.* Université Paris-Dauphine. DOI: http://dx.doi.org/10.1109/ICSSSM.2006.320562.

Gadrey Jean (2000). The Characterization of Goods and Services: An Alternative Approach. *Review of Income and Wealth. 46*(3), 369:87.

Giard, Vincent & Balin, Savas. (2006). *A process-oriented approach to the service concepts*. Université Paris-Dauphine. DOI: http://dx.doi.org/10.1109/ICSSSM.2006.320562

Goldstein Meyer Susan, Johnston Robert, Duffy Joann & Rao Jay (2002). The Service Concept: The missing link in service design research?. *Journal of Operations Management. 20*(2), 121-134. DOI:10.1016/S0272-6963(01)00090-0

Hollyoake Mark (2009). The four pillars: Developing a 'bonded' business-to-business customer experience. *Palgrave Macmillan Journal, Database Marketing & Customer Strategy Management, 16*(2), 132-158.

Johnston Robert and Clark Graham (2001). *Service Operations Management*. Pearson Education Limited.

Kols Adrienne & Sherman Jill. (1998). Family planning programs: Improving quality. Population reports. *Series Jouranl: Family planning programs. 1*(47): 1-39.

Lapierre D. Lapierre & Ruiz Angel (2007).Scheduling Logistic Activities to Improve Hospital Supply Systems. *Computers & Operations Research.34*(3) pp. 624 – 641. DOI:10.1016/j.cor.2005.03.017.

Slack N, Chambers S, Johnston R. 2004. *Operations management* (4th ed.). Prentice Hall Financial Times: Harlow, England.

Walley P and Amin V (1994). Automation in a Customer Contact Environment. *International Journal of Operations & Production Management. 14* (5) 86-100, 1994.

World Health Organization. Health care delivery. Retrieved from, https://eurohealthobservatory.who.int/themes/health-system-functions/health-care-delivery,