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IMPACTS OF INVENTORY MANAGEMENT FACTORS ON INVENTORY PERFORMANCE MEASURES: THE SRI LANKAN WHOLESALE SECTOR

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ABSTRACT

Inventory management is a crucial component of sustainability, enabling companies to reduce expenses, enhance cash flow, and increase profitability. Inventory makes up a majority of current assets in the wholesale sector, where inefficiencies are bound to happen, given the large-scale inventory. This research focuses on identifying the factors and performance measures of inventory management and evaluating their interrelationships focusing on the Sri Lankan wholesale sector. The factors identified through a systematic review and industry experts' interviews were then categorised into key areas with a thematic analysis. The 22 factors identified were grouped into the categories of organisation, facilities and equipment, and processes and practices. The 24 performance measures were grouped into operational, customer satisfaction, and environmental categories. A questionnaire survey was conducted with 126 managerial-level employees of wholesale organisations. The partial least squares structural equation modelling (PLS-SEM) method is used to validate the relationship between the variables and the moderation effect of firm size on these relationships. The findings reflect that factors of organisation and facilities and equipment, influence the performance measures. Organisational factors were the most significant in influencing all three performance categories. For most relationships, the firm size did not have a moderation effect. This research assists wholesale businesses in achieving excellence and a competitive edge in the Sri Lankan market while finding answers to the ongoing business issues in the wholesale sector.

Keywords: *Factors of inventory management, performance measures, wholesale sector, PLS-SEM*

1. INTRODUCTION

1.1. Sri Lankan Wholesale Industry

The wholesale sector bridges producers and retailers and is crucial in the supply chain. A typical wholesale operation includes the purchase of significant quantities of inventory, storing that inventory, and selling those goods to merchants and commercial or institutional users [1]. The global wholesale market is expected to grow from USD 49,371.76 billion in 2021 to USD 64,334.41 billion in 2025 at a Compound Annual Growth Rate of 7%, a significant growth rate [2]. In the Sri Lankan context, the percentage of GDP accounted for trade in 2021 was 43.04% as stated by the World Bank's collection of development statistics [2]. The wholesale and retail industry in Sri Lanka contributes about 11.0% of the country's GDP, which increased by 3.0% in 2019 [3]. The total number of business establishments under trade and services in 2017-2018 in Sri Lanka was 56,553; out of them, 23,519 were wholesale and retail organisations [4]. The total output is Rs Mn 3,059,613 from the trade activities. The wholesale industry is one of the most important economic activities and has been growing steadily over the past few years, adding value to the economy. The Sri Lankan wholesale industry comprises fast-moving consumer goods, durable consumer goods, raw materials, and equipment wholesales [5]. Competition in the wholesale sector encourages market players to focus on providing value-added services that are more complex or effective in the wholesale industry. A wide range of services, such as pre-and post-production tasks, fundamental bulk storage and breakdown, sorting, grading, and logistics, can be provided by wholesalers.

1.2. Inventory Management in the Wholesale Sector

Inventories are current assets that comprise a sizeable portion of a company's assets and have a resale value that generates profit for the specific company [6]. Inventory includes raw materials, work-in-progress products, finished items, maintenance repair and operation, and safety stocks that a business keeps on hand to support manufacturing or service activities. Inventory management is the control of materials utilised and stored in an organisation to supply exactly what is necessary, where and when it is required, using the least amount of excess stock and resulting in the lowest cost [7]. Inventory management is critical in the wholesale market because inventories are the working capital component of assets.

Inventory management comprises various techniques used to determine the right quantity of an inventory item at the right time and place [8]. A corporation will employ a variety of inventory management techniques, such as just-in-time (JIT) manufacturing, materials requirement planning (MRP), and economic order quantity

(EOQ), depending on the kind of business or product being examined. Inventory control techniques such as ABC analysis, Last In First Out (LIFO), and First In First Out (FIFO), batch tracking, and safety stock are widely used in the wholesale industry [9]. The inventory management process can vary among organisations, and inventory management factors can positively or negatively impact the organisation's performance. Inventory performance measures are indicators that assist you in keeping track of and making decisions regarding your stock in inventory management. They enable the identification of the areas in the wholesale industry that are not operating as expected and the discovery of solutions to the difficulties currently being experienced. Currently, the most common inventory performance measures used are inventory turnover, backorder rate, order fill rate, inventory days on hand, purchase order cycle time, etc.

Since inventory accounts for 20% to 30% of manufacturing, trading, retail, and wholesale companies' overall investments, it represents their highest costs. However, managing these inventories to achieve their goals has proven to be a significant challenge for businesses. Many businesses have yet to determine how much to invest in inventories and what inventory levels to maintain to satisfy customers. Too much inventory takes up physical space, adds to the financial burden, and increases the likelihood of damage, spoilage, and loss. On the other hand, insufficient inventory frequently disrupts manufacturing. Customers would have to wait long for their orders to be filled if there was no stock. Inventory is thus critical to the successful operation of wholesale firms and holds the most strategic position in the working capital structure.

Due to the increasing inflation rate and exchange rates in Sri Lanka, the costs of storage, ordering, purchasing, product damage, overheads, and inventory losses are increasing rapidly and becoming a burden and risk for the wholesale industry [10]. The worldwide cost of inventory distortion (including shrinkage, stockouts, and overstock) is an estimated USD 1.1 Trillion. Over the past few years, the epidemic has seriously harmed businesses' supply networks and order fulfilment procedures. Due to supply chain interruptions, businesses have dealt with stockouts and delayed orders. 34% of businesses have shipped an order late because they inadvertently sold a product that was not in stock [11]. The total annual imports of Sri Lanka spending for 2019 have fallen by 1.15%, and the import volume index of consumer products declined by 20.73% in 2019, according to the Central Bank of Sri Lanka's balance of payment statistics. As a result of these import restrictions, many wholesalers face stockout situations and inventory delays. Better inventory management would free up capital for more productive uses, increasing an organisation's productivity.

1.3. Problem Statement and Objectives of the Study

Although inventory management plays a significant role in the wholesale business, the effect of other disciplines and multiple changes that occurred in the operation process itself have increased complexity and required new forms of inventory management approaches. Inventory cost is a prominent dimension in the inventory management process, and it accounts for 20% to 30% of manufacturing, trading, retail, and wholesale companies' overall investments [6]. Due to current economic conditions in Sri Lanka, these costs are increasing rapidly, becoming a burden and risk for the wholesale sector. With the sharp increases in foreign exchange rates, the prices of imported goods have risen. Wholesalers must invest more to gain the same profit levels as previously due to the decrement of return on investment (ROI). For example, although the ROI of the global wholesale sector was 20.26% in the last quarter of 2021, the Sri Lankan wholesalers' unit profit/margin has not increased at the same rate as the increased product price; thus, ROI has declined. In such a situation, it is necessary to find inefficient inventory management practices, prioritise inventory management factors following the requirements, and exercise control over inefficient costs.

Moreover, due to recent import restrictions enforced by governments, many wholesalers face stockout situations and inventory delays. Because of shifting consumer preferences, stocks eventually become obsolete and are written off as trash. A stockout crisis could result if the safety stock is insufficient to satisfy the market demands. As a result, consumer satisfaction may suffer, which decreases sales [12]. The inventory discrepancy and store management practices that are not up to the standards can result in significant financial losses due to the large stocks maintained by wholesalers. Every business must know the harm that overstocking or understocking may do to its operations and bottom line. Reducing stockouts and overstocks can lower inventory costs by 10% [11].

Since the factors of inventory management would have positive and negative impacts on the overall organisation performance in different aspects; it is essential to have a thorough understanding of contributing factors to higher performance. Although numerous factors contribute to effective inventory management practices, limited previous studies analysed the effects of those factors on inventory management performance. Therefore, the main objectives of this study are listed as follows:

RO1: To identify the significant factors and performance measures of inventory management for the Sri Lankan Wholesale sector.

RO2: To develop a framework that describes the relationship between significant factors of inventory management and performance measures to provide recommendations for improving the Sri Lankan Wholesale sector.

Concerning the critical role of wholesalers in Sri Lankan product supply chains and the difficulties and challenges faced by Sri Lankan wholesalers, this study makes a significant contribution to practitioners and academia by bridging the knowledge gap on significant inventory management factors, performance measures, and their relationship. Through a thorough understanding of the significant factors and performance measures related to inventory management and their interrelationships, the wholesale sector can focus on the most influencing inventory management factors for its performance improvement. The outcomes of this research will assist wholesale businesses in achieving excellence and a competitive edge by overcoming ongoing economic challenges while enriching other connected industries. As described in Section 2, although limited previous studies addressed inventory management practices and performance measures separately in foreign contexts, such findings and implications would differ among countries due to the differences in their economic, technological, and operational practices in wholesale businesses. Moreover, previous studies in the Sri Lankan context focused on other sectors including government organisation, and the manufacturing sector, thus their findings could be specific to those sectors due to the differences in their operational practices. Besides, the relationship between inventory management factors and inventory performance measures in the Sri Lankan wholesale industry has not been studied in previous studies, which further highlights the contribution and originality of this study.

2. LITERATURE REVIEW

2.1. Inventory Management Factors

Past studies have extensively discussed the factors of inventory management. Some studies have highlighted the significance of a speedier and more effective purchasing process that encourages maintaining better operational cost control in inventory management [13-17]. As highlighted by [17], organisations experience lengthy bureaucratic procurement processes due to interdepartmental planning, communication, and decision-making processes, which result in a complex procurement system. Also, long administrative processes can have detrimental implications such as under or overstocking inventory, frequent stockouts, and poor inventory control. Factors that influence effective inventory management systems in government sector organisations in Sri Lanka are determined by [7] and highlighted the significant role of inventory record systems, storage systems, waste systems, procurement systems, security systems, and inventory-related investments.

According to the [17], inventory management of a focused company in Kenya was positively and significantly correlated with staff training, technological level, stock evaluation, and procurement rules. As stated by [12], planning, documentation/store records, knowledge of employee/staff skills, and financing have a major impact on inventory management in manufacturing small to medium firms. Moreover, competence or the staff's skills were highlighted as a significant factor in inventory management [15], [16], [18]. Moreover, the material handling equipment was identified as a factor of inventory management [16], [19].

The effectiveness of inventory management is also affected by the inventory control methods and techniques such as Just-in-time stocking (JIT), Economic Order Quantity (EOQ), Enterprise Resource Planning (ERP), and Material Requirement Planning (MRP) as highlighted by [20]. Furthermore, the forecasting procedure has been recognised as significant in inventory management by [14], [15], and [16]. Besides, the availability of sufficient funds is important for inventory management because organisations should purchase all material needs over the budgetary period [21].

According to [22], five factors, planning for inventory management, record keeping, procurement, personnel characteristics, and storage system were highlighted as elements affecting inventory management in Bangladesh's textile industry. Furthermore, [21] and [22] discussed the significance of storage systems for inventory management. The studies of [7], [18], [23] mentioned the importance of the security system in a warehouse for inventory management. Thus, to protect inventory, necessary precautions, such as purchasing insurance and filing claims for theft, hazards, and damages, coding inventory to minimise theft, and access controls, among others were discussed. Moreover, inventory cost categories such as storage, insurance, product damage, ordering, and purchasing costs are discussed as significant by [24] and [25]. Thus, previous studies discussed numerous inventory management factors that are varied based on their focused countries and industries.

2.2. Performance Measures in Inventory Management

To identify the key performance indicators (KPIs), [24] used structured questionnaire and in-person interviews in the Middle East market and identified several performance metrics including on-time delivery, cycle time, average days inventory level, inventory carrying cost, inventory turnover, and order fill rate. The relationship between the effectiveness of inventory management and financial success in Saudi Arabian businesses was analysed by [26] using a regression model. Accordingly, inventory turnover ratio, back-order rate, order fill rate, inventory conversion period, firm growth, and gross profit were considered as the performance metrics. Chae [27]

developed a set of KPIs such as the rate of obsolete inventory, total inventory days of supply, supplier fill rate, and order fill rate for supply chain management practitioners. As discussed by [28]; carrying, costs of inventory, inventory forecasting, inventory valuation, inventory visibility, future inventory price forecasting, available physical space for inventory, replenishment lead time, returns and defective goods, and demand forecasting can be considered as important operational performance measures of manufacturing firms.

Furthermore, Gunasekaran [29] highlighted supply chain cycle time, capacity utilisation, total inventory cost, and order lead time as leading KPIs for organisations. Space utilisation was recognised as a KPI in inventory management by several studies [27], [30-32]. As discussed by [27] and [33], labour productivity is still a crucial KPI for inventory management. Besides, the forecast accuracy was considered as a performance measure by [31], [34], and [35]. Accordingly, previous studies highlighted various performance measures of inventory management specific to different industries and countries.

2.3. Summary of Selected Studies and Research Gap

Since this study focuses on factors of inventory management and performance measures, an overview of selected previous studies is given in Table 1. Accordingly, several studies focused on inventory management techniques/practices, factors of inventory management, factors affecting the efficiency of inventory management, etc. Moreover, the performance areas, planning, finance, profitability, etc. were considered. Also, a few studies analysed the inventory management factors and performance relationships in different industries and to the overall supply chain focusing on different countries. Although a few studies are available in the Sri Lankan context, they are not related to the wholesale industry. Therefore, as highlighted in the last row of Table 1, the current study addresses a significant research gap by identifying the factors of inventory management and inventory management performance and by deriving the relationship between these inventory management factors to the performance measures in the Sri Lankan wholesale sector. As contributions, the findings of this study will be useful for the actors in the wholesale sector because they can enhance their performance by focusing on factors that have a significant relationship with performance measures. As an industry with huge potential for growth and improvement, there is an obvious need in the wholesale sector to determine such relationships, especially considering its critical role in the product supply chains of many other industries.

Table 1: Summary of Previous Studies

Study	Focus on Inventory Management				Performance Areas				Relationship (between selected areas)	Selected Industry/ Sector/ Domain	Context
	Inventory Management Techniques	Inventory Management Factors	Factors of Inventory Management	Efficiency of Inventory Management	Company Performance	Financial Performance	Inventory Management Performance	Operational Performance			
[7]			√							Government Organizations	Sri Lanka
[40]	√				√					Provincial Administration	Kenya
[13]	√									SMEs (Listed)	Sri Lanka
[43]	√				√				√	Construction	Nigeria
[17]				√						Agriculture	Kenya
[19]			√							Health Care	England
[15]				√						University	Nepal
[22]				√						Textile	Bangladesh
[12]				√						Manufacturing SMEs	Malaysia
[44]			√							Retail	Global
[16]				√						Heavy Equipment Spare parts	Indonesia
[46]					√					Milk processing	Kenya
[45]			√							Manufacturing	Nigeria
[18]			√							Manufacturing	UK
[35]				√	√				√	7 up (Bottling company)	Nigeria
[47]			√							Electricity Distribution	South Africa
[23]		√								Construction	Africa
[24]							√			Petroleum Projects	Middle East
[30]		√				√			√	Manufacturing (Listed)	Sri Lanka
[28]	√							√	√	Manufacturing	Nigeria
[39]							√			Overall	Global
[26]	√				√				√	Overall	Saudi Arabia
[48]							√			Overall	Global
[42]							√	√		Retail	US
[27]							√			Supply Chain	Global
[29]							√			Supply Chain	Global
[38]										Overall	Global
[37]								√		Supply Chain	
[36]								√		Supply Chain	
[41]							√	√		Supply Chain	
[31]							√			Construction	India
Current Research			√				√		√	Wholesale	Sri Lanka

3. METHODOLOGY

This study aims to identify the significant factors and performance measures of inventory management for the Sri Lankan Wholesale sector (RO1) and to develop a framework that describes the relationship between factors of inventory management and performance measures (RO2). This research is a mixed-method study combining both quantitative and qualitative elements. Initially, a list of factors of inventory management and performance measures were identified from the systematic literature review. Thereafter, the applicability of those identified factors and performance measures for the Sri Lankan wholesale industry context was validated from the interviews conducted with eight industry experts. Considering the industry experts' experience in the wholesale sector, two had over 30 years of experience, one with 20-30 years, four with 10-20 years, and one with 06 years of experience. Considering their qualification levels, seven experts have bachelor's degrees, and one has an HND qualification. Moreover, three experts have CIMA qualifications, and four have postgraduate qualifications including PG Diplomas and Masters.

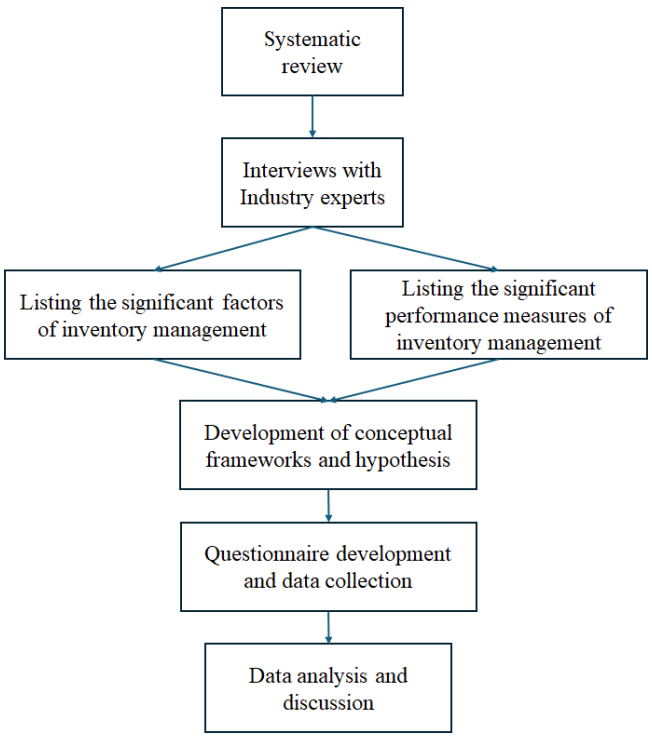

Figure 1: Research Design

After confirming the factors of inventory management and performance measures with industry experts, a conceptual model was developed to demonstrate the relationship between the factors of inventory management and performance

measures. Analysis was carried out using the partial least squares structural equation modelling (PLS-SEM) method to test the developed conceptual framework. Therefore, a questionnaire survey was conducted to gather primary data for the PLS-SEM analysis. Figure 1 illustrates the research design with its major stages.

To identify the significant factors of inventory management in the Sri Lankan context, both the literature review and industry experts' opinions were considered as summarised in Table 2. In conducting the systematic review, Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was used and studies were selected from Emerald Insight, Semantic Scholar, Science Direct, and Google Scholar. As the keyword structures, “Factors of Inventory Management," "Performance Measures AND Inventory," "Wholesale Industry AND Inventory Management" etc, were used. Following the PRISMA workflow, initially, 320 articles were identified. Articles published in languages other than English were excluded, and articles published in referred journals, and those with full papers were included. Thereafter, 85 articles were sorted after screening the titles of the papers, which was reduced to 58 articles after screening their abstract. Finally, factors and performance measures were identified with 44 articles.

In addition to the factors identified from the literature, a few factors were added based on the industry experts' opinions because previous studies were not mainly focused on the Sri Lankan context. After selecting factors, their categorisation was done using thematic analysis. Individual factors were coded and three themes of factors "Processes and practices", "Organisation" and "Facilities and Equipment" were identified. Using the same approach, performance measures were categorised into three themes "Operational", "Customer satisfaction" and Environmental". Hence, eight factors were identified for the processes and practice category, eight for the facilities and equipment category, and six for the organisation category. Although more factors were identified from previous studies, only the factors that were highlighted by over 20% of selected previous studies were considered for the analysis as summarised in Table 2.

Table 2: Factors of Inventory Management

	Factors	[7]	[13]	[40]	[43]	[14]	[18]	[19]	[15]	[22]	[23]	[16]	[17]	[23]	[24]	[29]	[35]	[25]	Percentage of Selected Factors	Suggested by Industry Experts
Processes and Practices	Purchasing Procedure		√		√	√			√			√	√						35%	
	Forecasting Procedure					√			√			√							18%	
	Inventory Management Practices				√			√						√				√	24%	
	Storage Procedure	√						√		√								√	24%	
	Safety Stock Maintenance					√							√					√	18%	
	Picking and Put away Methods																			√
	Back Order Policy							√					√					√	18%	
	Automated Processes																			√
Facilities and Equipment	Inventory Management System (IMS)	√					√		√	√	√								30%	
	Security System of Inventory	√					√				√		√						24%	
	IT Infrastructure																			√
	Inventory Handling Equipment							√				√		√					18%	
	Environmentally Friendly Sustainable Practices																			√
	Storage Facilities				√										√			√	18%	
	Capacity Facilities				√										√	√			18%	
	Occupational Health and Safety Procedure (OHS)																			√
Organisation	Extent of Local Competition				√		√					√							18%	
	Staff Competence	√	√	√	√	√	√	√	√	√		√	√	√					70%	
	Workforce Welfare and Motivation				√			√	√	√		√							30%	
	Financial Status of the Organization								√								√		12%	
	Financial Resources	√		√		√			√										24%	
	Top Management Support						√					√					√			√

Since we analyse the relationship between factors of inventory management and inventory management performance, a list of performance measures from previous studies is summarised in Table 3 along with the inputs given by industry experts. These performance measures were grouped into three categories: operational performance, customer satisfaction, and environmental performance. Hence, twelve, eight, and four performance measures were considered for operational, customer satisfaction, and environmental performances respectively.

Table 3: Performance Measures of Inventory Management

	Performance Measures	[24]	[27]	[30]	[29]	[26]	[38]	[31]	[39]	[33]	[49]	[34]	[35]	[37]	[36]	[41]	Percentage of Selected Factors	Suggested by Industry Experts
Operational Performance	Inventory Days on Hand	√	√	√	√			√	√	√	√		√				60%	
	Inventory Turnover	√	√	√		√		√	√	√		√					53%	
	Inventory to Sales Ratio				√			√	√		√	√	√				40%	
	Inventory Holding Cost per unit	√		√	√					√		√					33%	
	Product Damage Cost per line-per unit	√		√					√	√			√				33%	
	Ordering Costs per line	√		√	√				√		√	√					40%	
	Putaway Time						√			√			√				20%	
	Inventory Shrinkage																	√
	Inventory Count Accuracy by Rs per Unit				√	√		√			√						27%	
	Labor Cost Per Hour																	√
	Labour Cost Per Item																	√
	Number of Accidents per Year																	√
Customer Satisfaction	Backorder Rate					√	√		√				√				27%	
	Order Fill Rate	√	√					√	√		√	√					40%	
	Rate of Return					√	√		√		√		√				33%	
	Range of Products Available				√			√			√		√				27%	
	Lead Time		√					√			√		√				27%	

	Performance Measures	[24]	[27]	[30]	[29]	[26]	[38]	[31]	[39]	[33]	[49]	[34]	[35]	[37]	[36]	[41]	Percentage of Selected Factors	Suggested by Industry Experts
	On-Time Shipping Percentage																	√
	Lost Sales Ratio																	√
	Perfect Order Percentage																	√
Environmental Performance	Electricity Consumption per Unit							√						√	√		20%	
	Industrial Waste Generation per Year																	√
	Carbon Footprint													√	√	√	20%	
	Equipment Fuel Consumption per Handling Unit										√				√	√	20%	

Since we analysed the factors related to three performance areas (operational, customer satisfaction, and environmental), separate conceptual models were developed based on each dependent variable. Therefore, Figures 2, 3, and 4 illustrate the conceptual models considering customer satisfaction performance, operational performance, and environmental performance as the dependent variables, respectively, while the same factors of inventory management are considered for the independent variables of each model. Apart from the dependent and independent variables, the moderation effect is analysed, assuming firm size as the moderator for each conceptual model. Therefore, analysis with these three conceptual models helps to understand the significant factors related to each performance area and the moderation effect of firm size.

This study follows the PLS-SEM method for data analysis because it accommodates more complex model structures with complicated variables that are measured with multiple indicators. Moreover, this method enables handling data heterogeneity and non-normal data. Since we obtain perception-based analysis with ordinal data, and analyse more complex latent variables and their relationships, the PLS-SEM method is more suitable than alternative methodologies such as Multiple Regression Analysis and Ordinary Least Squares Regression which can analyse more simple models. Moreover, the PLS-SEM method can analyse the moderation effect and non-linear relationship more flexibly.

Since PLS-SEM analysis is conducted, multiple indicators represent each independent and dependent variable. Therefore, as the indicators of three independent

latent variables, the list of factors identified from the systematic review and industry expert opinions, summarised in Table 2 are used. Similarly, as the indicators of the dependent variable of each model, the list of factors summarised in Table 3 was used. The detailed descriptions of indicators relevant to each independent and dependent variable are summarised in the operationalisation table given in Table 4. Considering the nature variables, reflective-type indicators were used for each construct because they are a representative sample of all possible items available within the conceptual domain of the construct. In a reflective measure, since all indicator items are caused by the same construct (stem from the same domain), indicators should be highly correlated. Individual items should be interchangeable, and any single item can be left out without changing the meaning of the construct. Furthermore, Table 4 summarises all the questions associated with indicators of latent variables used for data collection.

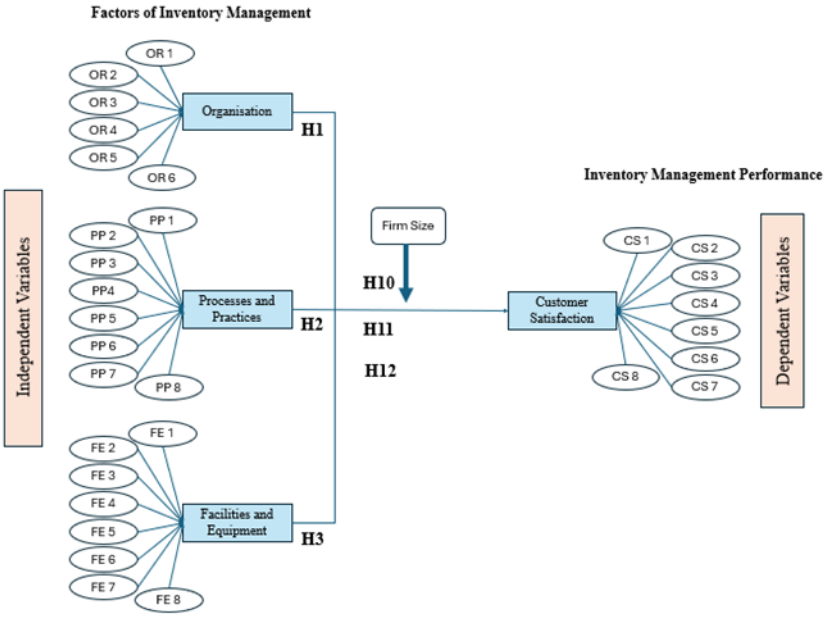

Figure 2: Model 1: Customer Satisfaction Performance

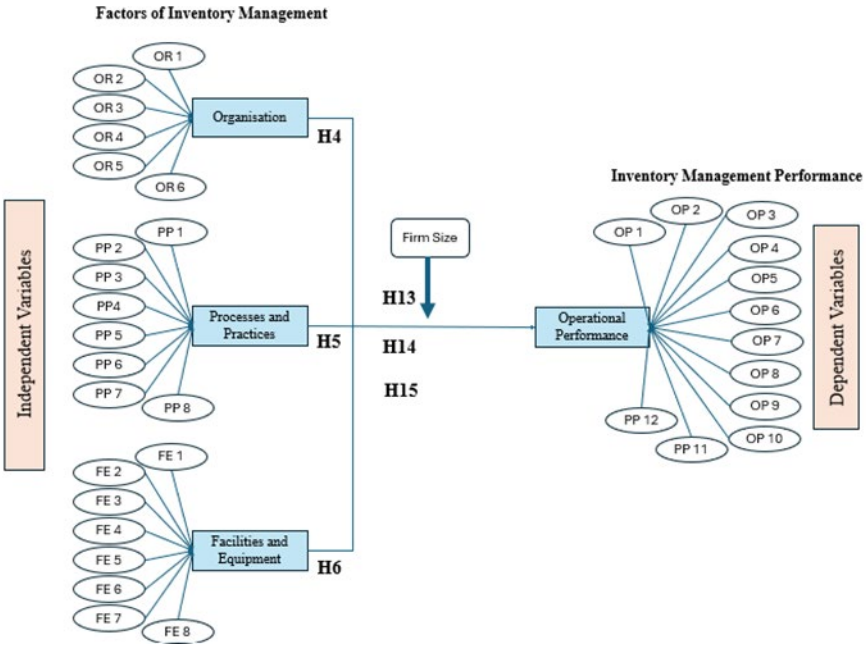

Figure 3: Model 2: Operational Performance

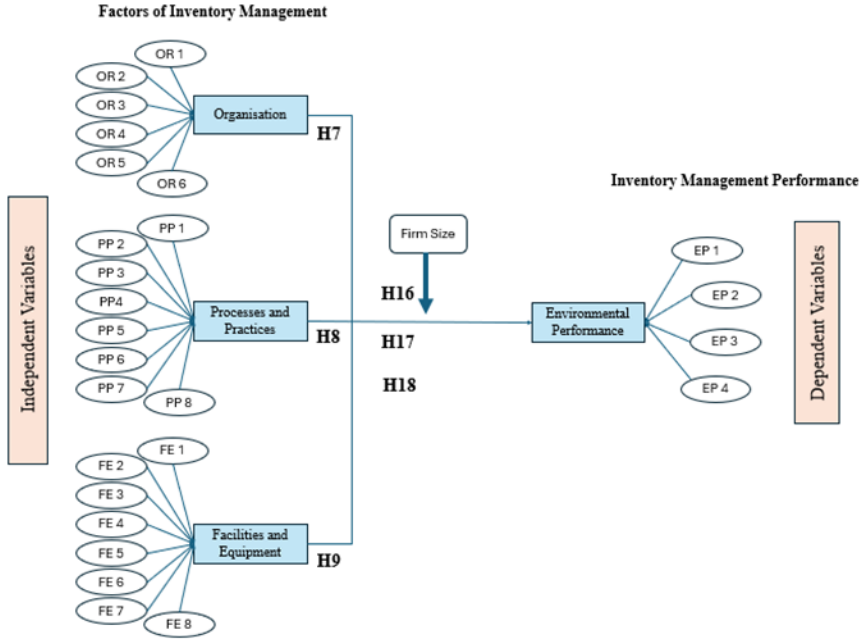

Figure 4: Model 3: Environmental Performance

Table 4: Operationalization of Variables

Factor/ Performance	Notation	Indicator	Statement
Organisation	OR 01	Staff Competence	Our staff members are competent in their corresponding business processes.
	OR 02	Work Force Welfare and Motivation	We have a good welfare system so the employees are motivated in fulfilling their duties and responsibilities.
	OR 03	Extend of local competition	We face strong competition from the local market competitors.
	OR 04	Financial Resources	We possess sufficient financial resources needed for inventory management.
	OR 05	Financial Status	Our organisation has a stable financial status (in terms of ROI, Cash flow, etc.)
	OR 06	Top Management Support	The support from the top management is satisfactory.
Processes and Practices	PP 01	Purchasing Procedure	We have a well-defined purchasing procedure that supports our operational activities.
	PP 02	Forecasting Procedure	We have an accurate forecasting procedure to predict future consumption.
	PP 03	Picking and Putaway Methods	We utilise effective methods for picking and putaway operations which reduce time and cost in operations.
	PP 04	Safety Stock Maintenance	We are maintaining a rational level of safety stock in our organisation to cater to short-term supply and demand variations.
	PP 05	Back Order Policy	We supply goods within a minimum waiting time to customers in a back-order situation.
	PP 06	Automated processes	We are frequently using fully functioning automated processes for inventory management functions in our organisation.
	PP 07	Inventory Management Practices	We are using efficient inventory management practices to streamline the operations of the organisation.
	PP 08	Storage Procedures	We are practising efficient storage procedures in our organisation.
Facilities and Equipment	FE 01	Inventory Handling Equipment	We have sufficient inventory handling equipment in our organisation (Ex: Trolleys, Forklifts, Reach trucks, Pushing carts, etc.)
	FE 02	Occupational Health and Safety Aspects (OHS)	We significantly consider the occupational health and safety aspect (OHS) in our organisation. (Maintaining restrooms, emergency exits, wearing personal protective equipment...)
	FE 03	IT Infrastructure	In our organisation, we use sufficient IT infrastructure to streamline business processes.
	FE 04	Security System of Inventory	We use an advanced security system for the inventory in our organisation. (Ex: Fire Alarms, Security Cameras, inventory audits).
	FE 05	Inventory Management System (IMS).	In our organisation, most operations related to inventory management are carried out by the Inventory Management System.

Factor/ Performance	Notation	Indicator	Statement
	FE 06	Storage Facilities	We are using efficient storage facilities considering the nature of the product. (Ex: Racking system, cold storage area, etc).
	FE 07	Capacity of Facilities	We have sufficient capacity in our organisation to carry out operations.
	FE 08	Environmentally Friendly Sustainable Practices	We are using our facilities and equipment in a more sustainable and environmentally friendly manner. (Ex: Use of daylights effectively, solar panels and renewable energy sources, eco-friendly packaging)
Operation Performance	OP 01	Inventory Days on Hand	Within a short period of time, we can sell our inventory.
	OP 02	Inventory Turnover	We convert the inventory to sales more frequently in our organisation.
	OP 03	Inventory to Sales Ratio	Compared to the average inventory value, we have reasonable sales value in our organisation.
	OP 04	Inventory Holding Cost per Unit	We have reasonable inventory holding cost per unit in our organisation.
	OP 05	Product Damage Cost per Unit	The product damage cost per unit is bearable in our organisation.
	OP 06	Ordering Cost per Unit	The ordering cost per unit in our organisation is reasonable.
	OP 07	Putaway Time	In our organisation, the time taken to stow the inventory is less.
	OP 08	Inventory Shrinkage	We do not have losses in inventory due to theft, damages, fraud…etc.
	OP 09	Inventory count accuracy by value per unit	We do not have a difference between the system count and physical count values of inventory.
	OP 10	Labour cost per hour	The labour cost per hour is rational in comparison to the industry average.
	OP 11	Labour cost per item	The labour cost per item is reasonable in our organisation.
	OP 12	Number of accidents per year	We do not have a high number of accidents per year in terms of inventory handling (examples: Inventory Damages, Time lost…)
Customer Satisfaction Performance	CS 01	Back Order Rate	We have a much smaller number of back orders compared to the total number of orders completed.
	CS 02	Order Fill Rate	We successfully completed a high number of orders, out of total number of orders received.
	CS 03	Rate of Returns	We do not have significant problems with the sales returns from the customers compared to the total sales.
	CS 04	Range of Products Available	In our organisation, we have a wide range of selling products to cater different needs of our customers.
	CS 05	Lead time	We fulfil our customer orders within a short period of time.
	CS 06	On-time Shipping Percentage	We are shipping our customer orders on time.

Factor/ Performance	Notation	Indicator	Statement
	CS 07	Lost Sales Ratio	We have a minimum number of days that a specific product is out of stock in comparison to the expected sales of that product.
	CS 08	Perfect Order Percentage	We fulfil most of our customer orders with the correct documentation, free of damage, and on-time shipping.
Environment Performance	EN 01	Electricity Consumption per Unit	Our electricity consumption per unit is reasonable compared to the scale of the organisation.
	EN 02	Industrial Waste Generation per Year	The industrial waste generated by our company per year is under the maximum allowable limit.
	EN 03	Carbon Footprint	Our organisation generates less greenhouse gas than the maximum allowable level.
	EN 04	Equipment Fuel Consumption per Handling Unit	Fuel consumption by equipment per handling unit is reasonable compared to our throughput.

As discussed, three conceptual models are developed focusing on separate dependent variables, and three independent variables are used for each model. Therefore, considering the developed conceptual models, 18 hypotheses are defined for the analysis as listed in Table 5.

Table 5: Hypotheses Development

No	Description
H1	Organisation factors have a significant impact on customer satisfaction performance
H2	Processes and practices have a significant impact on customer satisfaction performance.
H3	Facilities and equipment have a significant impact on customer satisfaction performance.
H4	Organisation factors have a significant impact on operational performance.
H5	Processes and practices have a significant impact on operational performance.
H6	Facilities and equipment have a significant impact on operational performance measures.
H7	Organisation factors have a significant impact on environmental performance.
H8	Processes and practices have a significant impact on environmental performance.
H9	Facilities and equipment have a significant impact on environmental performance
H10	Firm size has a significant moderating effect on the relationship between organisational factors and customer satisfaction performance.
H11	Firm size has a significant moderating effect on the relationship between factors of processes and practices and customer satisfaction performance.
H12	Firm size has a significant moderating effect on the relationship between factors of facilities and equipment and customer satisfaction performance.
H13	Firm size has a significant moderating effect on the relationship between organisational factors and operational performance.
H14	Firm size has a significant moderating effect on the relationship between factors of processes and practices and operational performance.

No	Description
H15	Firm size has a significant moderating effect on the relationship between factors of facilities and equipment and operational performance measures.
H16	Firm size has a significant moderating effect on the relationship between organisational factors and environmental performance measures.
H17	Firm size has a significant moderating effect on the relationship between factors of processes and practices and environmental performance.
H18	Firm size has a significant moderating effect on the relationship between factors of facilities and equipment and environmental performance.

As the data collection method for the PLS-SEM analysis, this study utilises structured questionnaires. The convenience sampling method was used to access respondents due to the limited resources available. Industry experts were chosen based on their job titles and years of experience in the wholesale industry. Based on the model and data features, [50] suggested minimal sample size requirements to attain significant statistical significance. Since the proposed conceptual models consist of four independent variables and one moderator variable in the structural model, it requires 122 observations to satisfy 80% of statistical power for detecting an R2 value of at least 0.1, with a 5% probability error [50].

As the data collection instrument of primary data, a questionnaire with 51 questions is used covering indicators of each dependent and independent variable. The purpose of the questionnaire is to obtain information about the factors and performance measures of inventory management in the wholesale sector. Thus, Likert-scale responses were collected from most questions except for demographic-related ones. As the data analysis tool, Smart PLS which is a software that utilises the PLS path modelling method for variance-based SEM was utilised. This includes a graphical user interface and estimates path models with latent variables through the PLS-SEM algorithm. Also, this software includes standard measures to assess the quality of results including reflective and formative measurement models, structural models, and goodness of fit also supporting statistical analysis such as confirmatory tetrad analysis, importance-performance map analysis, segmentation, and multigroup analysis.

Before using the PLS-SEM method for testing the conceptual models, primary data analysis is done with SPSS software which includes, checking for missing data, identifying and eliminating suspicious response patterns like straight-liners and pattern responses/ visual inspection of the responses and response time, identifying and eliminating extreme outliers, assessing data distribution (skewness and kurtosis), common method bias analysis (Harman's single-factor test, common latent factor), and response rates assessment, among other. Then, PLS-SEM analysis consists of a multi-stage process that includes defining inner and outer models, collecting and

examining data, estimating the model, evaluating the results, etc. The initial review process consists of three main steps such as model specification, outer model evaluation, and inner model evaluation. There are two sub-models under the PLS-SEM model which are the measurement model, which establishes the associations between observed data and latent variables, and the structural model, which demonstrates the relationships between latent variables. The detailed tests and analysis of the PLS-SEM method are described in Section 4 with the analysis results for easy understanding.

4. ANALYSIS AND FINDINGS

Since this study aims to identify the significant factors and performance measures of inventory management for the Sri Lankan Wholesale sector (RO1) and to develop a framework that describes the relationship between factors of inventory management and performance measures (RO2), the following sub-sections described the results and findings.

4.1. Descriptive Analysis

To test the relationship between factors of inventory management and performance measures, a structured questionnaire survey was conducted with a sample of 122 experts in the Sri Lankan Wholesale sector. The sample including 42% from the executive level, 29.4% from the senior executive level, and 27.7% from the managerial level were considered for the questionnaire survey. As per their working experience, 26.1% of respondents have less than 1 year, 37% have 1-3 years, 20.2% have 3-5 years and 16.8% have more than five years of experience in the wholesale sector. Moreover, the firm size was measured in terms of the number of employees working in the firm. Accordingly, 43.7% of firms have less than 10 employees. 33.6% have 10-49 employees, 12.6% have 50-100 employees, and 10.1% have more than 100 employees.

4.2. Preliminary Data Analysis

A preliminary data analysis was conducted with the following steps before validating the measurement and structural models. As the first step, missing data was checked. To minimise this issue, all the Likert scale questions were designed to be mandatory in the online survey, thus no missing values were found in the critical data used for PLS-SEM analysis. Also, the dataset was visually inspected to detect any straight-line or other suspicious response patterns, which were not identified. Next, outliers were checked using boxplots with IBM SPSS Statistics 22 software and no outliers were found in the dataset. Since PLS-SEM is a nonparametric statistical method that

does not require data to be normally distributed [51], other data distribution assessments were not mandatory.

4.3. Measurement Models Assessment

The conceptual model of PLS-SEM can be interpreted with the measurement and structural models. In this measurement model, latent/ composite variables are measured based on a set of indicators as explained earlier and the structural model measures all dependencies based on path analysis [52]. When assessing the measurement model, internal consistency and reliability, convergent validity, and discriminant validity were measured as explained below.

4.3.1. Measuring the Internal Consistency and Reliability

The internal consistency and reliability are checked to ensure the consistency of results across all the items in the test. This determines how closely a respondent's given score would approximate their true score if it were measured by a perfect instrument. Usually, Cronbach's Alpha and composite reliability of the constructs are used to assess the internal consistency of the measurement model which are used in this study as well. As the acceptable limit for Cronbach's alpha values, 0.7 is widely considered by previous studies. To ensure internal consistency and reliability, an alpha value between 0.5 - 0.9 is also considered acceptable. The acceptable range for composite reliability values varies between 0.6 to 0.7 for exploratory research and between 0.7 to 0.9 for more advanced research [51].

The estimated results of Cronbach's Alpha and Composite Reliability of three sub-models are summarised in Table 6. Accordingly, models 1 and 2 obtained acceptable values for Cronbach's Alpha within the range of 0.7- 0.9. Although in model 3, Cronbach's alpha of Environmental performance was 0.502, some previous studies considered it also as acceptable [53]. In terms of Composite Reliability, all values were obtained between 0.7 - 0.9, which is acceptable. These values were obtained with several analysis iterations to satisfy the outer loadings threshold for the indicators, which raised the model's internal consistency dependability. Therefore, all three models satisfy the internal consistency reliability of the constructs.

Table 6: Cronbach's Alpha and Composite Reliability Values

Construct	Cronbach's Alpha	Composite Reliability
Model 1: Customer Satisfaction Performance		
Customer Satisfaction (CS)	0.793	0.852
Facility and Equipment (FE)	0.791	0.858
Organisation (OR)	0.847	0.891
Processes and Practices (PP)	0.843	0.879
Model 2: Operational Performance		
Operational Performance (CS)	0.735	0.820
Facility and Equipment (FE)	0.873	0.898
Organisation (OR)	0.847	0.889
Processes and Practices (PP)	0.843	0.879
Model 3: Environmental Performance		
Environment Performance (EN)	0.502	0.799
Facility and Equipment (FE)	0.791	0.850
Organisation (OR)	0.847	0.890
Processes and Practices (PP)	0.843	0.876

4.3.2. Measuring Convergent Validity

The convergent validity measures the degree to which a measurement item correlates positively with other measurement items of the same construct [54]. To assess the convergent validity of reflect constructs, the outer loadings of indicators (i.e., indicator reliability) and the average variance extracted (AVE) can be measured [51]. Indicator reliability implies the absolute contribution of each indicator to its designated construct [51] and indicators with a factor loading of 0.7 or greater are acceptable. As per [55], indicators with factor loading of less than 0.4 or 0.5 should be discarded although factor loadings of 0.6 should be retained.

Table 7 summarises the estimated factor loadings of model 1 which considers customer satisfaction as the dependent variable. Since indicators with less than 0.6 of factor loading values should be removed, indicators CS04, CS06, FE01, FE07, FE08, and OR03 were removed. With that, it was able to achieve a higher degree of reliability for measurement items as summarised with the revised values.

Table 7: Factor Loadings Values of Model 1: Customer Satisfaction Performance

	Initial Values				Revised Values			
	CS	FE	OR	PP	CS	FE	OR	PP
CS 01	0.724				0.753			
CS 02	0.643				0.659			
CS 03	0.692				0.713			
CS 04	0.509							
CS 05	0.686				0.663			
CS 06	0.591							
CS 07	0.706				0.703			

	Initial Values				Revised Values			
	CS	**FE**	**OR**	**PP**	**CS**	**FE**	**OR**	**PP**
CS 08	0.706				0.705			
FE 01		0.421						
FE 02		0.680				0.688		
FE 03		0.786				0.830		
FE 04		0.735				0.710		
FE 05		0.806				0.848		
FE 06		0.621				0.606		
FE 07		0.351						
FE 08		0.474						
OR 01			0.752				0.755	
OR 02			0.714				0.717	
OR 03			-0.041					
OR 04			0.829				0.826	
OR 05			0.841				0.836	
OR 06			0.796				0.802	
PP01				0.629				0.634
PP02				0.768				0.770
PP 03				0.671				0.666
PP 04				0.663				0.665
PP 05				0.728				0.726
PP 06				0.659				0.658
PP 07				0.686				0.686
PP 08				0.705				0.705

Table 8 summarises the estimated factor loading of indicators used in model 2, where operational performance is the dependent variable. Considering 0.6 value as the minimum acceptable value, the indicators FE01, FE06, FE08, OP07, OP08, OR03, and OP12 were removed, and revised calculations obtained a higher degree of reliability of the remaining measurement items.

Table 8: Factor Loadings Values of Model 2: Operational Performance

	Initial Values				Revised Values			
	FE	OP	OR	PP	FE	OP	OR	PP
FE01	0.421							
FE02	0.711				0.751			
FE03	0.818				0.853			
FE04	0.745				0.747			
FE05	0.809				0.833			
FE06	0.564							
FE07	0.277				0.621			
FE08	0.438							
OP01		0.672				0.675		
OP02		0.770				0.780		
OP03		0.721				0.758		
OP04		0.685				0.686		
OP05		0.576				0.553		
OP06		0.753				0.771		
OP07		0.511						

	Initial Values				Revised Values			
	FE	OP	OR	PP	FE	OP	OR	PP
OP08		0.387						
OP09		0.614				0.617		
OP10		0.739				0.750		
OP11		0.718				0.718		
OP12		0.245						
OR01			0.730				0.728	
OR02			0.688				0.682	
OR03			-0.036					
OR04			0.856				0.857	
OR05			0.860				0.863	
OR06			0.784				0.787	
PP01				0.640				0.644
PP02				0.795				0.801
PP03				0.678				0.681
PP04				0.665				0.668
PP05				0.691				0.690
PP06				0.669				0.661
PP07				0.683				0.678
PP08				0.692				0.689

Next, factor loading values of model 3 where environmental performance is considered the dependent variable are summarised in Table 9. Accordingly, indicators EN02, EN03, FE01, FE07, FE08, and OR03 were removed as their values were less than 0.6 and the revised calculation highlights higher factor loading values for the remaining measurements.

Table 9: Factor Loadings Values of Model 3: Environmental Performance

	Initial Values				Revised Values			
	EN	FE	OR	PP	EN	FE	OR	PP
EN 01	0.767				0.775			
EN 02	0.533							
EN 03	0.334							
EN 04	0.824				0.855			
FE 01		0.448						
FE 02		0.610				0.621		
FE 03		0.788				0.817		
FE 04		0.629				0.638		
FE 05		0.853				0.893		
FE06		0.687				0.650		
FE 07		0.352						
FE 08		0.349						
OR 01			0.759				0.738	
OR 02			0.696				0.681	
OR 03			0.020					
OR 04			0.843				0.856	
OR 05			0.831				0.849	
OR 06			0.803				0.798	
PP 01				0.608				0.614

	Initial Values				Revised Values			
	EN	FE	OR	PP	EN	FE	OR	PP
PP 02				0.741				0.757
PP 03				0.739				0.752
PP 04				0.682				0.681
PP 05				0.740				0.733
PP 06				0.612				0.600
PP 07				0.681				0.667
PP 08				0.675				0.669

As another method to measure the convergent validity, AVE values were measured. AVE measures the extent to which the average variance of the items is accounted for by the variable and the values of 0.5 or greater indicate greater convergent validity of the indicators of the constructs [56]. The estimated AVE values of each model are given in Table 10, which confirms that most constructs have satisfied the convergent validity criteria. Since the remaining values are also very close to 0.5, all constructs were acceptable.

Table 10: Estimated AVE Values

Construct	Model 01	Model 02	Model 03
Facility and Equipment (FE)	0.551	0.513	0.536
Organization (OR)	0.622	0.619	0.620
Processes and Practices (PP)	0.476	0.477	0.471
Customer Satisfaction (CS)	0.490		
Operational (OP)		0.496	
Environmental (EN)			0.666

4.3.3. Measuring Discriminant Validity

Discriminant validity measures the degree to which a construct is distinct from other constructs in the model based on empirical standards [51]. If model constructs satisfy the discriminant validity, it means they are unique and not merely reflections of each other. As methods for testing discriminate validity, Cross loadings [57], Fornell-Larcker criterion [56], and Heterotrait Monotrait Ratio of Correlations (HTMT) are used following the previous studies. If cross-loading method, each measuring item's loading should be higher than all its cross-loadings to establish discriminant validity [58]. All three models in this study satisfy the cross-loading property because indicators' loading values are higher than their corresponding cross-loading as highlighted in Table 11.

Table 11: Estimated Cross-loading Values

Model 01				
	CS	FE	OR	PP
CS 01	0.753	0.417	0.5	0.473
CS 02	0.659	0.297	0.374	0.24
CS 03	0.713	0.496	0.459	0.458
CS 05	0.663	0.383	0.302	0.305
CS 07	0.703	0.399	0.475	0.445
CS 08	0.705	0.386	0.376	0.378
FE 02	0.416	0.688	0.479	0.53
FE 03	0.392	0.83	0.539	0.696
FE 04	0.329	0.71	0.417	0.52
FE 05	0.538	0.848	0.544	0.703
FE 06	0.406	0.606	0.525	0.508
OR 01	0.454	0.459	0.755	0.509
OR 02	0.435	0.503	0.717	0.422
OR 04	0.454	0.593	0.826	0.599
OR 05	0.557	0.649	0.836	0.681
OR 06	0.462	0.461	0.802	0.607
PP 01	0.277	0.521	0.554	0.634
PP 02	0.372	0.664	0.536	0.77
PP 03	0.302	0.435	0.489	0.666
PP 04	0.443	0.561	0.495	0.665
PP 05	0.479	0.507	0.482	0.726
PP 06	0.389	0.631	0.486	0.658
PP 07	0.343	0.503	0.477	0.686
PP 08	0.426	0.554	0.492	0.705

Model 02				
	FE	OP	OR	PP
FE02	0.751	0.516	0.482	0.538
FE03	0.853	0.514	0.548	0.696
FE04	0.747	0.418	0.427	0.536
FE05	0.833	0.558	0.549	0.702
FE07	0.153	0.007	0.218	0.217
OP01	0.441	0.675	0.598	0.527
OP02	0.54	0.78	0.599	0.586
OP03	0.455	0.758	0.596	0.529
OP04	0.368	0.686	0.334	0.464
OP05	0.359	0.553	0.278	0.26
OP06	0.404	0.771	0.41	0.44
OP09	0.528	0.617	0.248	0.467
OP10	0.444	0.75	0.404	0.409
OP11	0.444	0.718	0.351	0.351
OR01	0.406	0.415	0.728	0.512
OR02	0.465	0.333	0.682	0.419
OR04	0.555	0.582	0.857	0.607
OR05	0.62	0.638	0.863	0.681
OR06	0.4	0.408	0.787	0.602
PP01	0.484	0.337	0.558	0.644
PP02	0.672	0.582	0.546	0.801
PP03	0.426	0.441	0.498	0.681
PP04	0.55	0.467	0.49	0.668
PP05	0.465	0.414	0.483	0.69
PP06	0.678	0.478	0.495	0.661
PP07	0.484	0.4	0.479	0.678
PP08	0.506	0.442	0.501	0.689

Model 03				
	EN	FE	OR	PP
EN01	0.775	0.131	0.328	0.231
EN04	0.855	0.271	0.353	0.254
FE02	0.117	0.621	0.475	0.53
FE03	0.142	0.817	0.544	0.644
FE04	0.071	0.638	0.423	0.51
FE05	0.285	0.893	0.546	0.675
FE06	0.185	0.65	0.523	0.486
OR01	0.293	0.474	0.738	0.499
OR02	0.215	0.493	0.681	0.426
OR04	0.406	0.586	0.856	0.6
OR05	0.376	0.641	0.849	0.674
OR06	0.303	0.471	0.798	0.602
PP01	0.137	0.514	0.558	0.614
PP02	0.156	0.641	0.544	0.757
PP03	0.299	0.422	0.496	0.752
PP04	0.234	0.572	0.492	0.681
PP05	0.243	0.514	0.48	0.733
PP06	0.135	0.523	0.493	0.6
PP07	0.148	0.501	0.478	0.667
PP08	0.168	0.567	0.499	0.669

Next, the Fornell-Larcker criterion compares the AVE of each construct with the shared variance between the variable and all other variables in the model. To satisfy the discriminant validity property, the variable's AVE value should be higher than its shared variance with all other variables. As highlighted in Table 12, each model satisfies the Fornell-Larcker criterion as well.

Table 12: Fornell-Larcker Criterion Results

	Model 01				Model 02				Model 03			
	CS	**FE**	**OR**	**PP**	**FE**	**OP**	**OR**	**PP**	**EN**	**FE**	**OR**	**PP**
Customer Satisfaction (CS)	0.700											
Operational (OP)					0.634	0.705						
Environmental (EN)									0.816			
Facility and Equipment (FE)	0.575	0.742			0.786				0.254	0.732		
Organisation (OR)	0.603	0.681	0.789		0.634	0.629	0.787		0.417	0.682	0.787	
Processes and Practices (PP)	0.564	0.706	0.722	0.720	0.751	0.655	0.729	0.762	0.298	0.672	0.612	0.686

Finally, the HTMT method is used to evaluate the discriminant validity of constructs. The main criterion of this test is to examine whether the HTMT ratio which is calculated as the average correlation among variables divided by the geometric mean of the average correlations within the same variable items approaches 1.0. If HTMT ratio is close to or greater than 1.0, constructs violate the discriminant validity property. However, all three models receive HTMT ratios below 1.0 (Table 13), demonstrating their discriminant validity.

Table 13: HTMT Test Results

	Model 01				Model 02				Model 03			
	CS	**FE**	**OR**	**PP**	**FE**	**OP**	**OR**	**PP**	**EN**	**FE**	**OR**	**PP**
Customer Satisfaction (CS)												
Operational (OP)					0.746							
Environmental (EN)												
Facility and Equipment (FE)	0.699								0.351			
Organisation (OR)	0.717	0.823			0.800	0.671			0.619	0.823		
Processes and Practices (PP)	0.650	0.978	0.853		0.973	0.729	0.853		0.421	0.978	0.853	

4.4. Assessing the Structural Model

The structural model is used to test hypotheses H1 to H9 of this study while the direct impact of independent variables on the dependent variable is evaluated. To assess the direct relationships, Table 14 summarises related results with path coefficients,

confidence intervals, t-values, and p-values. The significant level of p-value is considered values less than 0.05. Accordingly, the hypothesis that processes and practices have a significant impact on customer satisfaction performance is rejected in model 1, and the other two relationships are accepted. In model 2, except for relationship between processes and practices and operational performance, other two relationships were accepted. According to Model 3 results, Processes and Practices, and Facility and Equipment have no significant impacts on environmental performance while organisation factors have significant impacts on environmental performance.

Table 14: Assessing the Structural Model

	Path Coefficients	95% CI	T values	P values	Hypothesis	Outcome
			Model 1			
Organization -> Customer Satisfaction	0.361	[0.149, 0.594]	3.183	0.001	H1: Organisation factors have a significant impact on customer satisfaction performance	Accepted
Processes and Practices -> Customer Satisfaction	0.108	[-0.073, 0.312]	1.113	0.266	H2: Processes and practices have a significant impact on customer satisfaction performance measures.	Rejected
Facility and Equipment -> Customer Satisfaction	0.241	[0.029, 0.428]	2.379	0.017	H3: Facilities and equipment have a significant impact on customer satisfaction performance measures.	Accepted
			Model 2			
Organization -> Operational Performance	0.289	[0.042, 0.488]	2.544	0.011	H4: Organizational factors have a significant impact on operational performance measures.	Accepted
Processes and Practices -> Operational Performance	0.236	[0.018, 0.514]	1.897	0.058	H5: Processes and practices have a significant impact on the operational performance measures.	Rejected
Facility and Equipment -> Operational Performance	0.266	[0.021, 0.5]	2.163	0.031	H6: Facilities and equipment have a significant impact on the operational performance measures.	Accepted

	Path Coefficients	95% CI	T values	P values	Hypothesis	Outcome
			Model 3			
Organisation -> Environmental Performance	0.444	[0.137, 0.642]	3.448	0.001	H7: Organizational factors have a significant impact on environmental performance measures.	Accepted
Processes and Practices -> Environmental Performance	0.053	[-0.230, 0.358]	0.354	0.724	H8: Processes and practices have a significant impact on environmental performance measures.	Rejected
Facility and Equipment -> Environmental Performance	-0.093	[-0.337, 0.265]	0.640	0.522	H9: Facilities and equipment have a significant impact on environmental performance measures.	Rejected

4.4.1. Assessing the Moderating Effect

A moderator effect occurs when the strength or direction of a relationship between two constructs is changed by the moderator variable [51]. This study investigates the moderating effect of firm size on three proposed models separately. In analysing the moderator effect, firm size was divided into 2 categories: small (less than 10 employees) and large scale (over 10 employees). The moderation effect was analysed with multigroup analysis, and the results are presented in Table 15. However, results showed that there is no significant moderation effect from firm size on three models by having a p-value of greater than 0.05. Therefore, all hypotheses (H10 – H18) related to moderation were rejected.

Table 15: Moderation Effect Analysis

	Difference (Group_1 Group_2)	1-tailed (Group_1 vs Group_2) p-value	2-tailed (Group_1 vs Group_2) p-value
Model 1			
Organization -> Customer Satisfaction	-0.087	0.639	0.722
Processes and Practices -> Customer Satisfaction	0.022	0.463	0.927
Facility and Equipment -> Customer Satisfaction	-0.076	0.606	0.789
Model 2			
Organization -> Operational Performance	-0.014	0.521	0.959

	Difference (Group_1 Group_2)	1-tailed (Group_1 vs Group_2) p-value	2-tailed (Group_1 vs Group_2) p-value
Processes and Practices -> Operational Performance	0.014	0.485	0.971
Facility and Equipment -> Operational Performance	0.055	0.403	0.807
Model 3			
Organisation -> Environmental Performance	0.180	0.224	0.447
Processes and Practices -> Environmental Performance	0.050	0.429	0.858
Facility and Equipment -> Environmental Performance	-0.267	0.802	0.396

5. DISCUSSIONS AND IMPLICATIONS

Focusing on the Sri Lankan wholesale sector, this study identified the significant factors and performance measures of inventory management and developed a framework that describes the relationship between factors of inventory management and performance measures. Since this study analysed the effect of three categories of inventory management factors (organisation, processes and practices, facilities and equipment) on the three performance areas (customer satisfaction, operational, and environmental), a summary of the main findings is given in Table 16.

Table 16: Summary of the Results

	Performance Categories		
	Customer Satisfaction	**Operational**	**Environmental**
Organisational factors	√	√	√
Processes and Practices	X	X	X
Facilities and Equipment	√	√	X

Accordingly, the organisational factors and facility and equipment have a significant impact on customer satisfaction and operations performance while processes and practices do not demonstrate a significant impact on those performance areas. The organisational factors include staff competence, workforce welfare, financial resources, etc., thus could have a significant impact on improving performance of bank order rate, order fill rate, lead time, on-time shipping, etc., which are used to measure the customer satisfaction. Moreover, organisation factors such as having competent and skilled staff in an organisation can improve communication with customers, leading to greater customer satisfaction. Besides, facilities and equipment have significant impact on customer satisfaction because factors such as well-developed inventory management system (IMS) can increase inventory accuracy, order fill rates, and perfect order percentages, which in turn contributes to customer

satisfaction. However, processes and practices, such as purchasing procedures, automated processes, storage procedures, and forecasting procedures, may not directly impact customer satisfaction although an organised and automated processes can benefit the firm by saving costs and time and increasing accuracy. Moreover, considering the Sri Lankan wholesale industry, companies do not utilise advanced technologies in processes and practices, thus no direct impacts on customer satisfaction and operation performance. Sri Lankan wholesalers mostly utilize traditional processes and practices with lengthier manual procedures which may not influence on customer satisfaction and operations performance.

Accordingly, considering the current status of Sri Lankan wholesale sector, higher customer satisfaction and operational performance are mainly derived through organisational factors and facilities and equipment while the inventory-related processes and practices still do not play a significant role. Although results imply a possibility of reaching a higher performance by focusing more on organisational factors and facilities and equipment, this also highlights a significant avenue for improving Sri Lankan wholesale sector by focusing more on advanced processes and practices than relying on conventional outdated processes. Moreover, a lower contribution of processes and practices on the performance areas could be one of the main reasons for the current inefficiency in the Sri Lankan wholesale sector. A higher contribution of organisational factors on the operational performance could be due to the possibility of reducing labour cost, accidents and other operational issues by employing skilled and competent labour when an organisation has better financial resources and top management support.

When considering the environmental performance, only the organisational factors was significant while the impacts of processes and practices and facilities and equipment were not significant. The environmental performance was evaluated with factors such as industrial waste generation, carbon footprint, etc., which may not be taken into a serious consideration by the wholesale sector without the support from top management, staff competency, and sufficient financial resources, etc., which are part of organisational factors. Moreover, processes and practices such as purchasing, forecasting may not influence on environmental performance indicators such as waste generation, carbon footprint, electricity consumption, etc. The facilities and equipment category includes factors such as Occupational Health and Safety Aspects, IT infrastructure, security system, inventory management systems, etc., which may not influence on environmental performance of the wholesale sector. For example, a security system may be maintained to prevent theft or calculation errors but not as an environmental protection strategy. However, the organisation factors such as

competition, staff competency, financial resources, top management support, etc., have a significant impact on environmental performance.

Accordingly, it seems that the processes, practices, facilities, and equipment related to inventory management of Sri Lankan wholesale sector are not yet developed concerning the environmental aspects. Being a major contributor to the many other industries and product supply chains, the wholesale sector could generate significant environmental emissions. Therefore, processes, practices, facilities, and equipment of wholesale sector should be developed with proper environmental standards. Since the organisational factors have a major contribution to the environmental performance, strengthening organisational factors such as top management support, staff competency, etc., would accelerate the progression of Sri Lankan wholesale sector to a more environmental-friendly sector.

Moreover, results implied that firm size has no significant impact on the relationship between factors of inventory management and inventory performance measures could be due to the similar level of practices used by both small- and large-scale wholesalers in Sri Lanka. Thus, according to the current status of Sri Lankan wholesale sector, all implications and recommendations discussed above can be similarly applicable for both small- and large-scale wholesalers.

Therefore, this study enables a discussion on significant implications and recommendations for the Sri Lankan wholesale sector. Above discussions provide a direction for improving customer satisfaction, operational and environmental performance of this sector. Due to the absence of previous studies on inventory management factors and performance measures on the Sri Lankan wholesale sector, this study makes a significant contribution to both academia and practitioners involved in this sector.

6. CONCLUSIONS

Considering the significant role of wholesale sector to the Sri Lanka, this study focused on identifying the significant factors and performance measures of inventory management and developing a framework for the relationships between factors of inventory management and performance measures. As the factors of inventory management, those related to organisation, processes and practices, and facility and equipment were considered while performance measures were discussed under customer satisfaction, operations, and environmental categories. To explore the relationship between factors and performance measures, the PLS-SEM method was used, and three conceptual models were tested considering customer satisfaction, operations, and environmental performances as the dependent variables separately.

As the main findings, organisation factors are found to be the most significant in enhancing performance of customer satisfaction, operations, and environmental categories. Moreover, factors related to facilities and equipment demonstrated significant impacts on customer satisfaction and operational performance although they have no significant impact on environmental performance. Although inventory-related processes and practices demonstrated little impacts on performance areas, their relationship was not statistically significant. Moreover, the relationship between factors of inventory management and performance measures were not changing based on the firm size (small and large firms).

According to these findings, to enhance the inventory management performance of Sri Lankan wholesale industry, significant improvement should be done to the factors related to organisation and facility and equipment. The currently inefficiency in inventory-related processes and practices may influence on their insignificant impacts on the performance areas of Sri Lankan wholesale sector. Therefore, a significant effort should be made to enhance these processes and practices to exploit their advantages in improving the customer satisfaction, operational and environmental performances. Considering the prevailing economic conditions in Sri Lanka, effective inventory management is of paramount importance, particularly in the wholesale context. Since the entire organisation performance is greatly influenced by the inventory management performance, the indicators which demonstrated significant contribution to the inventory management and performance measures should be given higher priority in decision making.

As the limitations of study, the subjective perception of respondents can be highlighted because results could be different based on their perceptions. Moreover, there are some firms involved in both wholesale and retail businesses, thus classification of sample was challenging. Hence, future research should consider a larger sample of well-established large-scale firms to enhance the generalizability of findings. The study could be extended further by considering additional moderators, such as the types of products sold, cash flow levels, and so on. Furthermore, it is essential to test all other possible hypotheses related to inventory management and moderators in future studies.

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