

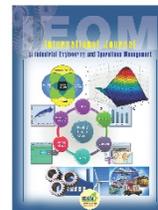


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**The Effect of Information sharing and Inventory
Management in the Supply Chain Practices on Firms'
Performance: Empirical Evidence from Some Selected
Companies of Ethiopia**

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ABSTRACT

The objective of this paper is to investigate empirically the effect of information sharing and inventory management practice on firms' performance. To achieve the stated objective the study targeted supply chain practices of some companies operating in Ethiopia. Data were collected from 170 respondents including employees, suppliers, and distributors of the companies under investigation. Before the analysis of data, the accuracy of data entry, the existence of missing values, normality of data distribution and outliers checked and proved the nonexistence of serious issues. The specified objective and proposed hypotheses in this study tested by structural equation modelling (SEM). The result shows information sharing and inventory management practices have a direct and significant effect on the firm's performance. Similarly, the higher share of information leads to better inventory management practice, which in turn leads to a greater performance of firms. The study concludes that information sharing has both direct and indirect effects on a firm's performance in the supply chain practices; whereas inventory management practices have a direct effect on the firm's performance. Generally, the results of the study have major theoretical and practical implications. Theoretically, it offers concrete evidence on the significant effects of information sharing and inventory management in the supply chain practices on firm's performance in developing countries; and hence contributes to the scarce body of literature and reduces the gaps of knowledge in the developing countries on the specified area of study. Besides the theoretical implication, practically the study allows the companies and industries under the considerations to recognize the significant effects of information sharing and inventory management practices on firm's performance and to use this information to develop and enhance culture of information sharing and usage of sound inventory management techniques in the supply chain practices for the enhancement of organizational performance.

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1. Introduction

For long time companies worked alone, to be profitable and competent assuming working and sharing information with supply chain partners erode their profitability by exposing their source of competitive advantage. These fault assumptions become a bottleneck on firms' performance. Especially, this time the success of every firm heavily depends on the extent to which the firm's share and use information. Particularly, in the supply chain practices sharing information is an essential tool for integration and effectiveness; and for continuous movement of materials and finance within the supply chain partners. Therefore, for effective and efficient supply practices, organizations need to adopt information sharing as a culture than as simple compulsory activities. A number of scholars (Andersen & Rask 2013; Revilla & Sáenz 2014) recognized the positive association between business performance and supply chain management. As a theory of supply chain management suggests, effective information sharing results in cost reductions through close organization and integration of partners (Harrison and Hoek, 2011; Ajay & Maharaj, 2010; and Mourtzis, 2011).

Further, the increased global competition and high accessibility of information at low cost created both opportunity and pressure on firms. Therefore, to overcome the threats an organization forced to build and expand information technology facilities to share accurate information at the right time than competitors. Organizations benefited from information technology by reducing transaction and processing costs, enhancing productivity, reducing inventory cost via JIT, increasing integration via ERP, immediate response to the market via agility, and increasing customer satisfaction and organization profit. Generally, information sharing significantly increase firm's performance in the supply chain (Cui et al. 2015); a cut level of inventory (Sun, Yen, 2005); and cut the bullwhip effect of inventory (Li, Gao, 2011; & Jauhari, 2009).

Inventory is all types of stock kept in an organization to be used or sold in the future, and its management is a crucial activity. The need for inventory management is critical and multi-purposes; mainly with the intentions of satisfying customers' orders besides minimizing the cost of a firm (Holloosi, et al. 2017); inventory decisions needs attention due to its significant association to holding cost of inventory (Ballon, 2000); effective and efficient inventory management can reduce the operating cost and enhance customers' services level (Cetinkaya and Lee, 2000); reduce inventory-related cost and minimizes capital to be occupied by inventory (Koumanakos, 2008); improve financial performance (Koumanakos, 2008); increase customer satisfaction by decreasing inventory to be disposed of as a result of holding optimal inventory (Mollenkopf et al., 2007); and increase customer satisfaction and quality by lowering inventory cost and operating costs, greater rate order fulfillment and smaller order cycle time (Li et al., 2006).

Numerous scholars empirically investigated the relationship among information sharing and organization's performance (Fawcett et al., 2007; Rashed, et al., 2010; Ajay & Maharaj, 2010; Yang & Maxwell, 2011; Lotfi et al., 2013; Kumar and Pugazhendhi, 2012; Marshal, 2015; Huo, et al. , 2015; and Sahin & Topal, 2018). Similarly, more research has been carried out on inventory management effects on firms' performance and resulted differently; positive effects (Pong & Mitchell, 2012; Luwumba, 2013; Prempeh, 2016; Mwangi, 2016; and Hung et al., 2014); and negative relationship (Hornbrinck, 2013; Sitienei & Memba, 2015, and Mensah, 2015).

The role of effective and efficient communication between supply chain partners is certain since the total success of supply chain partners based on the smooth flow of information within the supply chain practices. Information technology highly affects the nature and structure of supply chains due to its ability to integrate different processes within an organization and further its ability to integrate the company with its supply chain partners from an external environment. This integration with inside and outside an organization realized through enhanced information sharing that allows a manager to make better decisions and improve organizational performance. Nevertheless, the potential of sharing information within the supply chain practices highly dependent on the availability of information technology facility and infrastructure; and the extent to which a firm adopts and implements information technology within an organization. For effective information sharing, information technology facilities and infrastructure have been an essential tool for supply chain management (Ross 2016).

From the survey of literature on the supply chain management, numerous researches has been conducted in different dimensions of supply chain management in developed countries but inadequate research in developing countries in supply chain management (Mafini et al. 2016). Even in the developed countries beside the number of research made there is still a gap even in developed countries. As Langen et al. (2007) described regardless of the number studies that had been made in developed countries, the studies neglected important issue as the effects of information sharing and inventory management in the supply chain that need investigation on firm's performance in the supply chain.

In addition to above facts, there is a huge difference in technology, infrastructure facility, business environment, and industry development between a developed country and developing one that limit the results of prior studies made in a

different developed country not to be totally applicable to developing countries; it needs covering heterogeneous business environments and managers' attitudes that would increase awareness on the performance of supply chain activities (Kwak, 2016). Also, earlier research carried out on the supply chain performance of firms limited to the firms in the same industry, and this limited the generalizability and applicability of the results to other sectors due to the difference in the nature and size of firms. Therefore, this paper will minimize the gap of the literature in the supply chain management; foster the theoretical and empirical literature in the field of supply chain management. It also enables the practitioners of the supply chain management in the areas of the study and others to follow and focus on the roles of information sharing, and inventory management activities on the firm's performance. Further, the result of the paper will broaden the generalization and application of the results by focusing on three diverse types of industries to overcome the previous researches' limitation that limited the results not to be generalized and applicable in different industries.

Additionally, given the possibility of the positive effects of information sharing to improve firm's performance, especially in least developed countries like Ethiopia, it is more challenging and questionable for an organization to be beneficiary from information sharing in the supply chain practices due to the facts that, there are low willingness and awareness for adoption and carrying out of information technology by firms, poor information technology infrastructures coupled with high discontinuity and slow internet service, but the high cost of internet and mobile service. Further, the study made by Fasika (2014) in Ethiopia concluded that poor understanding and perception about the importance of integration with supply chain partners, more usage of telephone, mobile, letters, and faxes than the internet to manage information flow along their supply chain partners hindered supply chain integration in Ethiopian manufacturing sectors. Therefore, taking the mentioned scenarios of the situations into consideration, this study focused on the effects of information sharing and inventory management practices on a firm's performance using a structural equation modelling to study the multifactorial nature of variables based on supply chain practices of some selected companies of Ethiopia.

Based on the above, the broad objective of this study is to analyse the effects of information sharing and inventory management in the supply chain practices on firm's performance. To achieve this broad objective, three specific objectives were designed, namely (1) to determine the effects of information sharing in the supply chain practices on firm's performance, (2) to determine the effects of inventory management in the supply chain on firm's performance, and (3) to analyse the intermediary effects of inventory management practices between information sharing and firm's performance. Broadly, this paper arranged in the five sections; where section 2 provides a theoretical review of the literature; section 3 formulates the theoretical framework of the study. Section 4 deals with results and discussion, and lastly section 5 present the conclusion, limitation, and future research direction.

2. Literature Review

2.1 Information Sharing

In the supply chain practices the importance of information sharing is indispensable to get the right suppliers, maintaining an optimal level of inventory, timely order fulfilling, offering full customers services, production and offering of the right quality and quantity of products, and to get continuous feedback for proper product adjustment or development to satisfy the real demand of consumers. As Lotfi et al., (2013) stated in the dynamic and uncertain global environment, the survival and competitiveness of the organizations strongly depend on a firm's capacity to share the up-to-date and right information.

Information sharing is a systematic and deliberate way of sharing of critical and proprietary information to supply chain partners (Li et al., 2005). Information sharing is important for an organization, and it is as important as blood circulation in human beings. Effective communication in the supply chain management is a key activity for integration and coordination, to get and secure a competitive advantage in supply chain activities (Ramayah and Omar, 2010); to act as a unified entity by full integration (Sukati et al. 2012) and enhance and secure competitive advantage and overall performance (Li et al., 2006); for better understanding of the needs of the end customer and to quickly respond to the change of the market (Childhouse and Towil, 2003); and to create sustainable competitive advantage Ketchen et al., (2008). Also, information sharing is important for managers, as a manager needs different types of information relating to operational, tactical or strategic issues of an organization for effective decision-making. To perform this activity well, and to achieve the desired goals, a manager needs right, adequate, and timely information (Moberg, et al. 2002).

The quantity of information is the amount of critical and proprietary information to be communicated within the supply chain partners (Monika, Petersen, Handfield, &, Ragatz; 1998). On the other hand, information quality shows the extent information communicated meets the desire of the organizations (Petersen, 1999); and the accuracy, adequacy, timeliness, and reliability of information (Li and Lin 2006). Generally, sharing the right quality and quantity of information with the supply chain partners has several benefits for all partners, and it results in a win-win strategy for supply chain partners from different points of view. For instance, sharing right quality and quantity of information

internally within different sections of organizations and externally with supply chain partners increase firms' productivity and efficiency & improve customer services (Mourtzis, 2011); an efficient information sharing can improve capacity utilization of firms (Lee & Whang, 2004); and information sharing can enable firms to detect and respond early to any problem along the chains; and enable firms to quickly respond to the customers' orders and request (Jauhari, 2009).

2.2 Inventory Management

Inventories are stocks of different items at various stages of the production system and logistics channels (Ballon, 2004). Inventory is usually composed of initial basic materials, semi-finished goods, and finished goods (Cinnamon et al., 2010). In logistics activities having optimized inventory levels in the organization and through the entire supply chain are crucial decision since inventory management influence firm's basis of competitive advantage of quality and on-time delivery of orders (Gunasekaran, Williams, & Mc Gaughey, 2005; Wang & Zhang, 2010). As Palmer and Dean (2000), for effective inventory management, selection of the right inventory management practice is essential. Therefore, inventory management is a crucial activity for an improved supply chain performance.

As Koumanakos (2008) revealed in his analysis, inventory management can significantly improve the financial performance. His analysis shows that efficient inventory management leads to a reduction of inventory-related costs of purchasing, ordering, and holding, from economic ordering and minimize the amount of capital occupied by inventory. Similarly, Dong, Carter, and Dresser, (2001) argued the existence of a direct relationship between the performance of an organization and the inventories handling system of an organization. Several pieces of research also indicated the impacts of inventory management on customer satisfaction levels that in turn affect firms' performance levels.

The study made by Lieberman et al., (1999), revealed the impacts inventory management in supply chain practices overcoming the problem of excess or shortage of inventory over customer satisfaction levels and flexibility of services to meet predicted demand. The study made by Cetinkaya and Lee, (2000) similarly revealed the effects of inventory management in the supply chain as lower operating costs and improve customers' services level.

Glasserman and Wang, (1998) also discussed the relationship between the level of inventory, lead-time, and inventory cost. The result of Glasserman and Wang showed the more lead-time, the more level of inventory required, and the more inventory means the more holding cost, more capital becomes idle and locked up and more chance for depreciation and obsolescence of inventory. Therefore, an efficient system for inventory management proved for minimizing delivery time, improved customer satisfaction, and better financial performance (Bowers et al., 2007).

Inventory is the unused raw materials, working process inventory or finished good kept in storage or warehouse for future consumption, reselling or further processing. An inventory management technique is a set of strategies and controlling techniques that a firm follows to regulate and limit the level of inventory, and replenishment to be maintained (Prempeh, 2016). Inventory management needs to consider the trade-off between holding and ordering inventory cost and the opportunity cost of the stock out. For the optimum operation of supply chain performance the trade-off these costs needs consideration. The common inventory management techniques investigated by researchers are just in time (JIT), economic order quantity (EOQ), vendor managed inventory (VMI) and ABC analysis.

2.3 Supply Chain Performance Measures and Metrics

Performance and its measurement metrics are most often discussed the issue, but not yet defined accurately. Performance measurement is the systematic way of measuring the productivity of resources, and every organization can measure its performance from different perspectives for multiple motives. Some can measure to increase awareness, relationship and integration among supply chain participants (Cuthbertson & Piotrowicz, 2008); check whether attained planned goals or not, and to use it as advice for further control (Lohman, Fortuin, & Wouters, 2004); and supply the results as input for stakeholders of the organizations (Fawcett & Magnan, 1996).

Generally, some performance measurement and its metrics proposed by different scholars include cost, flexibility, customer responsiveness, and activity time (Beamon, 1998); customer service and flexibility (Beamon, 1999); cost reduction, delivery reliability, responsiveness, lead times, cost reduction, process improvements and time-to-markets (Panayides and Lun, 2009); quality uniformity, production time, sales costs, delivery time, productivity, flexibility, delivery security, market share, service quality, and customer loyalty (Morgan et al., 2009; & Aziz et al., 2010); quality, customer satisfaction and efficiency Azevedo et al., (2011); and profitability, cost savings and market share under economic performance (Giovanni, 2012; and Zailani et al., 2012). The summary of supply chain performance measurement metrics is given in Table 1.

Table 1. Summary of supply chain performance measurement metrics

Dimensions	Definitions	Literature support
Delivery time	the amount of time that a company takes to get goods ready for delivery	Morgan et al.(2009); Aziz et al., (2010), Ganga et al. (2011), Cho et al. (2012), Avelar-Sosa et al. (2014), Katiyar et al. (2015)
Customer service	Ability to meet the needs and desires of its customers.	Beamon, (1999; Frohlich and Westbrook (2002), & Hsu et al.(2008)
Cost	is the total price paid for resources used to produce a product	Beamon, (1999); Cooke (2003); & Panayides and Lun, (2009)
Quality	the degree to which the product or service meets customer's expectations	Bhatnagar and Sohal (2005); Morgan et al., (2009); Aziz et al., (2010), Azevedo et al., (2011); Giovanni, (2012); & Zailani et al., (2012).
Responsiveness	is willingness of an organization to help customers	Stewart (1995); Beamon,(1998); Cooke (2003); Bhatnagar and Sohal (2005); & Panayides and Lun, (2009).

2.4 Conceptual Framework and Hypothesis Development

The designed conceptual framework and developed hypothesis lays on the integration of resource-based view (RBV) and theory of resource constraints. RBV focused on resources within the organization to realize how organizations attain sustainable competitive advantage. In the supply chain activities firms will achieve sustainable competitive advantages if they integrate their resource than striving to be competitive alone. While the theory of resource constraints focus on a constraint hindering a given system from realizing a greater level of performance by concentrating on initiation and implementation of better system. From view of supply chain management, the strength of the supply chain link indicates the success of the supply chain activities and the effective ways of achieving the success are to apply the theory of constraints to supply chain management where the strength of the link between supply chain partners partly achieved through effective information sharing and elimination of poor inventory management. Therefore, this study built on the basis of concepts of RBV and theory of resource constraints.

2.4.1 Information Sharing Practices and Firms' Performance

Information sharing is systematic ways of enhancing the firm's performance in supply chain. Information sharing can affect different functional units of an organization, such as financial performance, marketing performance, and economic performance of organizations, particularly in reducing operating costs, inventory cost, firms' flexibility, order processing and fulfillment, customers' responsiveness, better forecasting, resource use, and capacity optimization.

In the supply chain information sharing can benefit firms in various ways. To mention some benefits, information sharing can reduce the problems of bullwhip effect (Cachon and Fisher 2000); reduces supply chain costs (Tan 1999); improve firm's productivity and performance (Mourtzis, 2011); increase supply chain efficiency by inventory reduction and production balance (Kumar and Pugazhendhi 2012); improve the financial performance of firms by reducing inventory costs and using a higher quality of inputs from suppliers (Beduk 2009).

H1: Information sharing in the supply chain positively affects firms' performance

2.4.2 Inventory Management Practices and Firms' Performance

A study made in China by Lin et al. (2017) identified the positive impacts of inventory management on product quality. The study further added the positive effects of inventory performance on a productivity and efficiency. Also, the study made by Daniel & Assefa (2018) in Ethiopia on the effect of inventory treatment in micro and small scale enterprises' competitiveness and performance shows the positive and better firm's competitiveness and performance with higher levels of inventory handling practice results. A similar study made by Mankazana et al. (2018) in Johannesburg manufacturing industries, South Africa, on the effect of inventory management techniques in the supply chain management shows that an effective inventory management systems lead to high performances' of an organization.

In addition, the study made by Chen & Tan (2011) in Chinese firms on the effects of JIT on the performance of a firm's show significant positive result between the implementation of JIT technique and performance of a firm regardless of type and size of the firm. In addition, the finding of Kinyua (2016) in Kenya on performance of firms as a result of inventory management shows a significant positive relationship. The result further shows that the application of JIT, ABC analysis, VMI, EOQ, barcoding, and simulation increased the operational performance of consumer goods

manufacturing firms. A similar study in Kenya on effects of VMI technique on firm’s performance show that the technique’s influence quality control and minimize consumer complaints and create customer loyalty and boost organizational profit margins (Mwangi & Kitheka, 2018).

H2: Firms with high-level inventory management will have high organizational performance in the supply chain.

2.4.3 Information Sharing and Inventory Management Practices

As mentioned above, information sharing in supply chain practices have diverse benefits for both firms and customers. For example, information sharing can decrease the number of defective or wrong products to be delivered for customers due to the chance of instant feedback to producers or distributors. This can cut the cost of carrying and ordering inventory, collecting and transporting back defective or wrong products to producers in the reverse supply chain. Effective two-way communication in the supply chain also improves a firm's performance by enabling a firm to offer good customer services as a result of a low chance of inventory shortage from better demand forecasting.

The adoption and effective implementation of various inventory management techniques as JIT, VMI, Barcoding, and EOQ require the combination of supply chain partners through information systems.

H3: Information sharing in the supply chain positively influences inventory management.

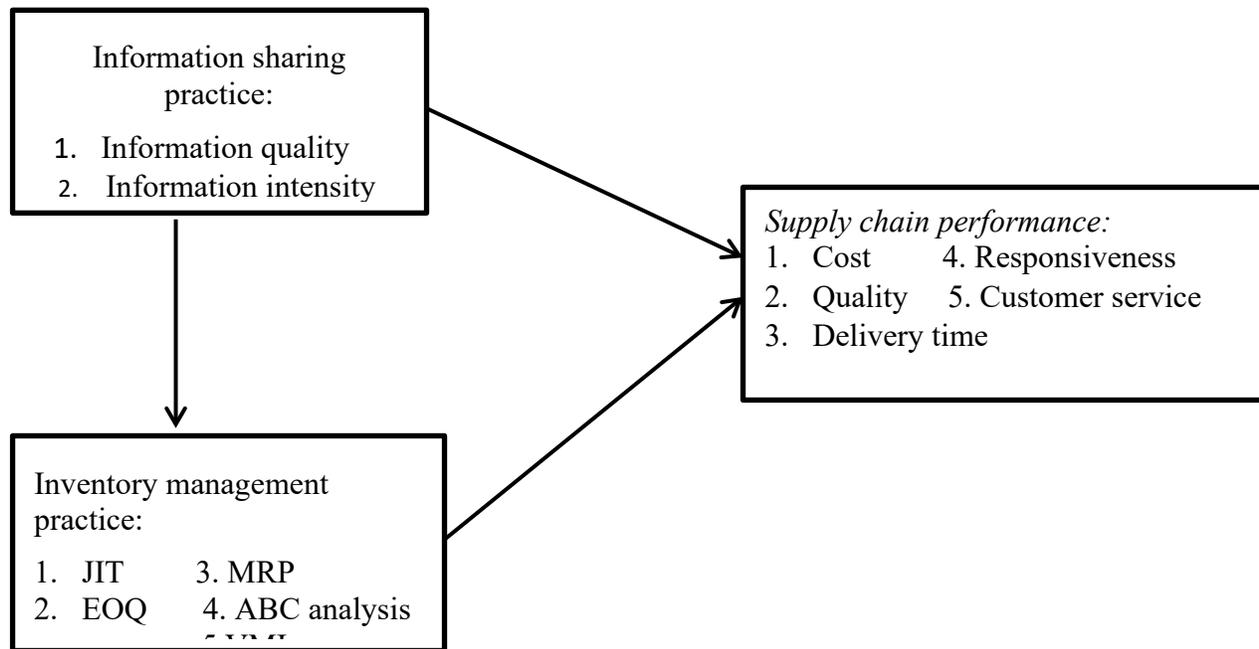


Figure 1. Conceptual framework of the study

3. Data and Methodology

3.1 Population, Sample Size and Sampling Technique

The population of the study includes all employees of the six companies, and their major suppliers and distributors. The selected companies were two beer companies, two cement companies; and two dairy processing industries. The companies and companies’ suppliers and distributors purposively selected by researchers based on their past relevant experience in practicing supply chain activities.

Regarding the size of the sample taken for this study, the researchers were determined to collect data from 182 individuals selected by purposive sampling technique; however only 170 respondents or 94% of them filled and returned the dispatched questionnaires. Specifically, data were collected from companies’ executives, production managers, purchasing managers, logistics & supplies managers, and marketing managers, major distributors, and suppliers of the companies that served the organizations for more than two years. The researchers purposively included only these respondents to collect relevant and reliable data from those who are more familiar and directly involved in the supply chain practices of the organization.

3.2 Data Collection Technique

The source of the data used for this study is the primary source of data that has been fully filled and recollected from 170 respondents by structured questionnaires. The used structured questionnaires were prepared based on the relevant literature review to measure all the independent and dependent variables under the study. All the questionnaires used were measured using a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5), and disseminated to gather relevant data from the selected sample of respondents.

Data were gathered both for independent and dependent variables under the study. The structure questionnaires were prepared and collected data for independents variables of the study. The independent variables used were information sharing practices from two dimensions (information quality and information intensity) and inventory management practices from five dimensions (EOQ method, ABC analysis, JIT technique, MRP analysis, and VMI method); and the dependent variable is firm's performance that measured by five dimensions (quality, cost, customer responsiveness, delivery time and service level).

To assess the information quality effects on firm's performance five items were used in the survey; and for measurement of information intensity four items were employed. Accordingly, for inventory management practices twenty-three items categorized under five dimensions adapted. The items cover four questions under each of the ABC analysis and VMI technique: and five items under each technique of the JIT, MRP, and EOQ. Finally, twenty-five questions under the five dimensions of organizational performance, namely organization responsiveness, delivery time, customer service level, product quality and cost were used; and each of the five dimensions individually holds five items.

3.3 Data Analysis

To analyse the collected data, SPSS V 23 used for the analysis of the respondents' profile. Similarly, to test the proposed hypotheses and to study the relationship between the independent and dependent variables an Exploratory Factor Analysis (EFA) of a Structural Equation Modeling (SEM) was used and the AMOS software package version 23 employed in the proposed model testing.

The researchers used EFA because the questionnaire used was new and designed by researchers based on review literature and no knowledge of the extent to which the scale items used to meet the expectation is unknown. Before starting the analysis of collected data, the researchers checked the accuracy of data entry, the existence of missing values, normality of data distribution and outliers. The coefficients of skewness and kurtosis for the collected data were evaluated and revealed there were no issues to be concerned regarding the skewness and kurtosis of all items since the data were normally distributed, where the result of skewness and kurtosis ranged within ± 2 (Garson, 2012).

Also, the issue of the outliers, the standard score or Z values for all items range between ± 4 , indicating the none existence of the issue of extreme value for the data collected. As a result, the complete data were appropriate to advance for further analysis as there is no significant issue that hinders from further analysis.

Furthermore, to study the identified dimensions of this study and to identify the groups of items those having an acceptable ordinary variation to explain their grouping together as a factor EFA analysis was done. The result of EFA shown in Table 2 show all the items under the twelve dimensions had significant loading on their own aspects with Eigenvalues exceeding a value of 1, cumulative variance ranging between 33.21% and 54.53%, and with loading factors beyond 0.4.

Finally, the researchers checked the appropriateness of sample size, where the sample for the study is 182; as Hair et al. (2010) suggested that sample for SEM should exceed 100. Therefore, based on this argument the sample size for this study is suitable. Further, the KMO (Kaiser–Meyer–Olkin) results checked which is 0.8284 is beyond the acceptable minimum acceptable value of 0.50 and an acceptable value of Cronbach's alpha of 0.76, which is assumed to be suitable for the three constructs. Generally, all the constructs under the investigation proven relatively to have high factor loading.

4. Results and Discussion

Total, 182 questionnaires were dispatched to the targeted respondents of the study; of the total questionnaires distributed, nearly 94% or 170 were completed and returned the questionnaires. For this study, data were acquired from 170 respondents taken from six companies under three different industries of investigation. All three industries individually accounted for 33.33% of the companies under considerations, i.e. two companies were taken from the three types of the industry under the study.

Table 2. Industry and respondents' profile

Demographic profile of respondents	Frequency	Percentage
At least served for five year	124	72.94
At least ten years of business experience	158	92.94
At least Diploma level	142	83.53
Respondent's Department		
Corporate executive	6	3.53
Material management/Purchasing section	42	24.71
Production section/ Manufacturing	35	20.58
Distribution/ Marketing	36	21.17
Major suppliers	28	16.47
Major distributors/ wholesalers	11	6.47
Others	12	7.06
Sample of the industry		
Beverage	2	33.33
Cement	2	33.33
Dairy	2	33.33

The respondents' demographic characteristics show that 84% were male and the remaining percentage were female; and the educational status of the respondents' show 83.53 percent had at least own college diploma; while 92.94% of the respondents' participated had at least 5 years' experience within the company, and all the involved companies have at least ten years of business experience.

Table 2 also displays the detail distribution of the respondents' sections, where 3.53% is corporate executive, 24.71% is from material management/purchasing section, 20.58% from production/ manufacturing section, 21.17% from distribution/ marketing, 16.47% are major suppliers of the companies, 6.47% are major distributors/ wholesalers, and 7.06% is from others sections than the identified.

Structural equation modelling (SEM) is a pool of numerical models that describe associations between several variables. The aim of analysis by SEM is to select the level to which data can support theoretical model; if it supports the theoretical model, additional advanced models can be projected, otherwise, the first model needs to be revised and tested. The most important reason for the use of SEM is its ability to test the direct and indirect relationships among independent variables to be measured with a single model (Meydan & Şen, 2011).

Here the researcher selected SEM as a tool for data analysis for its unique ability to assess the associations among constructs with several dimension of items (Hair, et. al, 2006). Further, it enables to deal with powerful and rigorous numerical processes to handle difficult models (Tabachnick & Fidell, 2009). For this study, the researchers used the maximum likelihood (ML) for the evaluation of the measurement model using SPSS Version 23; and the summarized results of the projected model's goodness of fit test are given in Table 3.

Table 3 clearly illustrates the goodness-of-fit indices (GFIs) of the SEM model generated an adequate good fit in all the four measured indexes. The four models fit measured by chi-square, root mean squared error of approximation, comparative fit index and Tucker-Lewis Index/non-normed fit index.

The result of the fit of the normal chi-square (X^2/df) that resulted 1.76 is in the satisfactory range (Bollen, 1989). The result by non-normed fit index (NNFI) or the Tucker-Lewis index in this model is 0.96; showing acceptable model fit, as the value of NNFI that falls between 0 and 1 with at least limit 0.95 or more showing an acceptable model fit (Bentler, 1990). Similarly, the result of the root-mean-square error of approximation (RMSEA) for the model is 0.045, demonstrating the suitability of the fitness of the model, since the estimated value of RMSEA that ranges between 0 and 1, with lesser values specifying greater model fit, where a value of .06 or less is indicative of acceptable model fit (Brown & Timothy, 2015). Finally, the comparative fit index (CFI) values of the model is an indicator for good fit of the model with a measured value of 0.97, CFI ranges between 0 and 1, with higher results indicating well fit, where a value of .95 or larger was considered to show accepted as an indicator of good fit (Hu & Bentler, 1999).

Table 3. Goodness of fit test model

			CFA	RMSEA	NNFI/TLI
Criteria	X ²	DF	>0.95	<0.06	.95
Obtained model 1	34.24	45	0.97	0.045	0.96
Model 2	41.35	46	0.98	0.036	0.88
Model 3	67.65	46	0.97	0.044	0.98
Model 4	54.27	46	0.95	0.048	0.97

Where X² = Chi Square; DF = Degree of Freedom; CFI = comparative fit index; RMSEA = root mean squared error of approximation; NNFI = non-normed fit index

Table 4. Exploratory factor analysis

Construct	Dimensions	Factor 1	Factor 2	Factor 3
Information sharing	Information quality	0.71		
	Information intensity	0.58		
Inventory management practices	JIT		0.73	
	EOQ model		0.61	
	MRP		0.54	
	ABC Analysis		0.45	
	VMI		0.48	
Organizational performance	Responsiveness			0.7
	Delivery time			0.71
	Customer service			0.65
	Quality			0.52
	Cost			0.81
Eigenvalue		3.15	1.13	1.07
Variance		33.21	14.39	6.93
Variance cumulative		33.21	47.60	54.53

The overall value of Kaiser–Meyer–Olkin measure for adequacy of the sample is (KMO) test is 0.73; & the total value of Cronbach’s alpha is 0.76.

To check whether the model is given in Figure 1 best fits, the researchers evaluated three alternative models by reducing one connection among the constructs at a time on successive steps.

The straightforward relationship between firms’ performance and inventory management was reduced to see the effects of information sharing and firms performance. Then the path coefficient among information sharing and firms performance evaluated and became weaker than before. Similarly, information sharing practice and inventory management practices were investigated as independent constructs, and then the path coefficients for information sharing and inventory management practice on firms’ performance is both significant, but with a higher value for inventory management practice, demonstrating the independent effects of both inventory management and information-sharing on performance of firms.

Finally, the path coefficient for information sharing practice on inventory management practice and on firm’s performance tested by removing the relation between information sharing practice and firm’s performance; then coefficient for the path of information sharing and inventory management on firm’s performance is significant, suggesting a direct effect of information sharing on inventory controlling and firm’s performance. The fit statistics for the last model is slightly less than the fit statistics of the other three models.

The proposed and tested hypothesis by the structural equation model is given in Table 5 and on figure 1. The first hypothesis tested link information sharing with organizational performance and show that firms with high levels information sharing have better organizational performance. The outcome of the standardized coefficient for the first hypothesis is 0.615 and statistically significant for p value of less than 0.01(0.001). The statistical significance of the first hypothesis proved that information sharing practice within supply chain practices has a positive and direct effect on

organizational performance. The result of this tested hypothesis indicate the application of information sharing practice among the supply chain partners may directly enhance firm's operational performance of firms. Prior research done on the relationship between information sharing on firm's performance show that information sharing within an organization and externally with supply chain partners significantly influence performance in various forms as enhancement of productivity and customer services (Mourtzis, 2011); increase of capacity utilization of firms (Lee & Whang, 2004); and enable firms to detect and respond early to problem, customers' orders and request (Jauhari, 2009). Therefore, the finding of this study confirms the recent result of a study made in Turkey by Şahin & Topal (2018) that identified the existence of direct and indirect influence of information sharing on firms' performance. However, this study contradicts the finding of research conducted in Australia by Baihaqi & Sohal (2013) who identified lack of direct link between information sharing and organizational performance.

Table 5. Results of proposed hypotheses

	Relationship	Total effect	Direct Effect	Indirect effect	Decision
H1	IS → OP	0.615	0.615	0	Accepted
	P- value	0.001	0.001	-	
H2	IS → IMP	0.764	0.525	0.239	Accepted
	P-value	0.001	0.002	0.011	
H3	IMP → OP	0.642	0.642	0	Accepted
	P-value	0.010	0.010	-	

The second hypothesis also proposed and tested the impacts of information sharing on inventory management practices in the supply chain practices. The result given in Table 5 indicates a direct impact of information sharing practice on inventory management. The standardized coefficient for the second hypothesis is 0.525, which is statistically significant at $p < .01(0.002)$. An effective information sharing practices among the supply chain practices is the base for implementation of some inventory management techniques as JIT, VMI, and MRP.

The outcome of this investigation shows the presence of an intermediary measure of inventory management practices between information sharing and firm's performance. The indirect impact of information sharing on firm's performance via inventory management is 0.227 and significant at 5% of p-value. This illustrates a direct and positive impact of information sharing on firms' performance; and an indirect one via inventory management practices. The results also show the more inventory management practices the greater firm's performance, hence confirming the third Hypothesis. Also the standardized coefficient for the third hypothesis is 0.382, which is statistically significant at $p < .01(0.009)$. The outcome confirmed with the results of Mentzer and Zacharia (2000); and Mankazana, Silase and Molefe, (2018). Similarly, earlier research made on the benefit of information sharing on firm's performance show that information sharing reduces cost associated to inventory (Lee et al., 2000); and if information sharing efficiently used, inventory costs are able to be reduced by 5 to 35 percent (Zhao et al. 2005).

Generally, based on the result of the standardized coefficients for all the hypotheses tested, information sharing practice have a direct and greater effect on inventory management practices with a 0.764 standardized coefficient relative to 0.525 on firm performance. This might be due to the firms' performance is usually influenced by many factors and it is hard to see whether cause such as inventory management practices will dominantly find the overall performance of an organization.

The result also indicates that firm's performance is less subjective to information sharing in the supply chain practices, which is 0.615 relative to inventory management practice with coefficient of 0.764. This shows that inventory management practices significantly related to firm's performance.

Table 5 shows the results of the three proposed and tested the hypothesis by the structural equation model. The first hypothesis tested is Hypothesis 1, which links information sharing directly with an organizational performance where a higher of information sharing practices has high levels of organizational performance. The outcome of the standardized coefficient for the first hypothesis is 0.615 and statistically significant at p value of less than 0.01(0.001). The significance of the first hypothesis proved information sharing within supply chain has a positive and direct effect on organizational performance. From the results of hypothesis tested, the application of information sharing between the supply chain partners may directly enhance performance of firms. The result confirms the recent results in Turkey by Şahin & Topal

(2018) that identified the existence of direct and indirect influence of information sharing on supply chain performance. However, the result contradicts the finding of research conducted in Australia by Baihaqi & Sohal (2013) who identified a lack of direct relationship between information sharing and organizational performance.

The second hypothesis also proposed and tested the impacts of information sharing in the supply chain practices on inventory management practices. The result given in Table 5 indicates that information sharing has a direct effect on inventory management practices. For the second hypothesis the standardized coefficient which is 0.525 is statistically significant at $p < .01(0.002)$. An effective information flow within all the supply chain partners is the ground for application of some inventory management techniques as JIT, MRP and VMI.

The outcomes of this investigation show the existence of an intermediary effect of inventory management practices between information sharing practices and the firm's performance within the supply chain practices. The indirect result of the information sharing from the standardized coefficient on organizational performance which is 0.227 is significant at .05 levels (0.012). This shows that the practices of information sharing have a direct and positive impact on organizational performance as well as an indirect one through inventory management practices. Similarly, the result shows the more inventory management practices the greater firm's performance, hence approving the third hypothesis. The result of its standardized coefficient which is 0.382 is statistically significant at $p < .01(0.009)$. The outcome confirms with the result obtained by (Mentzer and Zacharia, 2000; and Mankazana, et al., 2018).

Generally, based on the result of the standardized coefficients for the hypotheses tested, information sharing practice probably has a larger direct effect on inventory management practices which is 0.764 than on firm performance which is 0.525. This might be due to the fact that performance of firm's is influenced by several factors and difficult to realize accurately the reasons for information sharing to influence more inventory management than performance of an organization.

The result furthermore indicates a firm's performance in the supply chain practices is less subjective to information sharing which is 0.615 relative to inventory management activities with a coefficient of 0.764. This demonstrates that the activities of inventory management are significantly related to a firm's performance.

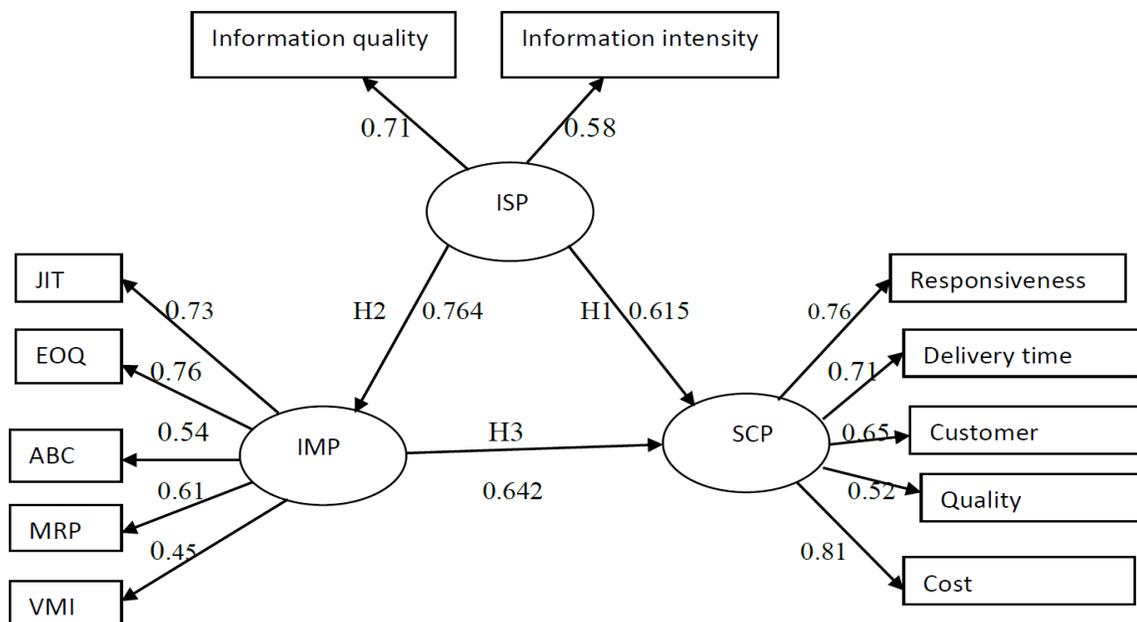


Figure 2. Results of the PLS analysis

5. Conclusions

This study provides an empirical justification for a conceptual framework developed between two independent variables and one dependent variable to see the effect of information sharing and inventory management on firms' performance. The two independent variables where information sharing from the dimensions of information quality and information intensity; and the other independent variable analysed is inventory management practices that measured by five dimensions of inventory management techniques, i.e. EOQ method, ABC analysis, JIT technique, MRP, and VMI. The

dependent variable for this study is firms' performance levels and measured by five dimensions of quality, cost, customer service, and delivery time and customer responsiveness.

The result of an EFA of a SEM shows there is a direct and positive relationship of inventory management and information sharing practices with firms' performance. Similarly, there is an indirect and positive association between organization's performance and information sharing, where inventory management practices act as an intermediary variable between firm's performance and information sharing in the supply chain activities. Generally, the results show that enhanced information sharing and inventory management practice increase firms' performance; and increased information sharing practice improve inventory management practices that in turn positively contribute to the firms' performance.

In the proposed model, the direct and indirect effects of information sharing and inventory management in the supply chain practices on firms' performance were analysed and most of the results were significant. However, if this model is really applied to the processing and manufacturing industries, the real problem of economic and commercial activities frequently facing society, and firms' as sudden price peak, inventory stock out, poor customer responsiveness and overall economic fluctuation can be minimized. However, effective application of this model demands well-developed information technology facilities that demand the support of government in developing countries like Ethiopia where the expansion and investment of this sector are totally in the hands of government.

The findings of the study have several theoretical and managerial implications. The theoretical implication of this result is that it provides more evidence on the effects of information sharing and inventory management in the supply chain practices on firm's performance in developing countries. Further, the results play significant roles in reducing the gap of literature mentioned in the introduction section on the effect of information sharing and inventory management practices in the field of supply chain management in developing countries. The result of the study also has several managerial implications in improving firm's performance by enhancing information sharing and inventory management practices. Specifically, some of the managerial implications of this result solve the real problem as sudden price peak as a result of inventory stock out, and production disruptions frequently facing society and firms' as a result of poor supply chain practices. To overcome problems facing firms' as a result of information and inventory management related issues, firms are advised to adopt, internalize and build information technology into all business operations to enhance information sharing and inventory management practices to remain competitive.

However, the limitations of this study primarily lie in the questionnaire used as an instrument of data collection, where the questionnaire used was not standardized items but designed only from the literature review. Therefore, it is suggested for the potential researcher to confirm the used measurement scales in this research under better representations. Second, data for this study were collected only from six organizations under three different industries operating in Ethiopia. Hence, it might be difficult to generalize the whole supply chain practices at the country level. The final limitation in this study is that the used organizational performance measurement constructs are open to be influenced by subjective evaluation of respondents in the performance measurement that might increase measurement error. Therefore, the future researcher needs to overcome the potential of this measurement error using secondary data in performance measurement besides the primary source.

The study has some implications for future research. First, related studies can be made in different locations because the views of respondents are bound to differ depending on their environment. Second, similar studies can be replicated in other industries apart from the beer, cement and dairy processing industry. Besides the two main factors, information sharing and inventory management practices in the supply chain management problems, similar studies could be conducted at a broader scope with the intention of exploring other factors influencing firm's performance in supply chain that were excluded in this study.

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