The Impact of Block Chain and Smart Inventory System on Supply Chain Performance at Retail Industry

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Abstract

Blockchain is a trending topic and would be the most significant issue for all industries, manufacturing or services. This study aims to investigate the Impact of Block Chain and Smart Inventory System on Supply Chain Performance at Retail Industry in the UAE. A quantitative research was adapted, and a survey was designed and rolled out by email to all participants. A 202 valid questionnaires were used in the statistical process in order to find out the impact of blockchain technology and smart inventory on supply chain performance in retail industry. The hypotheses testing confirmed the direct impact of blockchain technology on supply chain performance side by side with the mediator role of smart inventory in the indirect impact. The results revealed that blockchain is becoming the real time need of the retail industry and has improved the efficiency of the retail industry.

Key Words: Blockchain, Smart inventory, Supply chain performance, Retail industry

1. Introduction

Most likely, we heard a significant term in business industry blockchain but we did not pay attention to it. Block chain is a buzzword that is using in information technology in order to use in business modules. This technology is going to be a most important functioning procedure of business industries. In coming recent years, block chain will be most significant use of all industries like business, health and other financial sectors. Block chain is a database functioning program (Chang, Katehakis, Melamed & Jim, 2018) that is connected with multiple sets of the

computers at the same time. It is an ongoing process of data recording and its blocks procedures. Each block contains its specific programming of the data and connect with other blocks and creating the chain of the blocks. The database of the entire program is not only managing one group, the entire process is connected with all departments and networks and every department can interlinked with whole database. Previous all blocks are safely preserved and new blocks are added in database for information. The block chain helps to create documents and files without any faking transaction and information.

In the modern world of business, the smart inventory management system in business operations is one of the smartest way of considering the objects that enhances the business efficiency and provide the detail information of the products and their availability before its finishing the stock (Zelbst, Green, Sower, & Bond, 2019). It is the procedure of smart integrating process of inventory and providing analytical approach of the management capability in which business industries create the relationship between available stock and remove stock. In the competitive environment it has become mandatory to have smart inventory management system to meet the demands in timely manner.

Supply chain management performance is the way how activities are designed to meet the end users requirements. It is all about the availability of the product to the safe delivery (Abdel-Basseta, Manogaranb & Mohamed, 2018). The assessment of performance of supply chain is based on the parameters like inventory turnover rate, timings of shipment and cash to cash cycle time etc. these indicators help the organizations to build and manage effective supply chain management system which is not only cost effective but smart enough to keep track of all activities.

In the retail industry it has become very important to have efficient system of supply chain to avoid delay in the shipment while meeting the demands of the customers. through the effective system of block chain advancement has made the retail industry more challenging and competitive because this is the resort where smart inventory system works better. In this report we have discussed the efficient use inventory management through smart inventory and block chain which has impact on overall performance of supply chain.

2. Theoretical Framework

2.1 Block Chain

Due to advancement in technology the operational nature of businesses also become advanced. Record maintaining and retrieving data has become very efficient and blockchain has made this task more easiest. Blockchain is the open distribution of ledge system where the transactions are recorded for the reference of future concerns (Hald, & Kinra, 2019). The recording of transaction is relatively permanent which has made verification trust worthy. In the retail industry on the daily basis hundreds of transactions are done and it has become very difficult to have them record simply in the computer because of the storage and also constraints specific to retrieve. Through the use of blockchain technology it has become relatively easy and easy to verified. This has improved the efficiency level of the overall supply chain because it has expedite the delivery time which is the basic requirement of the customers.

2.2 Smart Inventory

Inventory management is the challenging task for any organization because predicting demand can be tricky. It is also varied industry by industry. In the retail industry where there are many types of goods including convenience, shopping and luxury goods so the demand also varies which is all depend upon the purchasing power of the customers. in this regard smart inventory system is the need of time. Smart inventory system has the ability to keep track of inventory level, scalability with the provision of security and backups. In the retail industry smart inventory system is required for example through the concept of smart shelves real time inventory management has become possible (Liu, Wang, Lin, Xie & Zhang, 2020). Remote monitoring has become possible which helps the retailers to track the inventory level to refill shelves and meet the demands in real time.

2.3 Supply Chain Performance

Supply chain performance is highly dependent upon the block chain and smart inventory system (Sohel & Bin Osman, 2018). It is possible because through the advance implementation of technology it has become possible for the retailers to have transactions which should have the

ability of retrieving and can easily be verified to avoid errors. Smart inventory on the other hand helped the retailers to manage the inventory because if inventory is not managed adequately the firm will not be able to meet demands effectively. This shows that the performance of supply chain is not helping company to attain competitive edge in the market.

2.4 Operational Definitions

Blockchain

In the operational terms, blockchain is one type of distributed ledger which has the ability to maintain the transactional records on permanent basis (Cole, Stevenson, & Aitken, 2019). The blockchain is managed by the peer to peer networking and function as a decentralized database. Block chain process have several advantages in which it helps to create the transparent working conditions along with data security, transparency in transaction methods, and it is surely helps to industries to work on big levels. Block chain has surely benefitted in business operations especially it has competitive advantages against those companies who rely on Bitcoin trading tool or technology that is known for number of scam and mishaps in business transactions. Block chain clearly defined the situation of the real or fake. Firstly, the term block chain in business industries was introduced in 1978 in research papers and then published in newspaper. But initially it was declared as unsafe method of business transactions but later, business practitioners realized its importance especially for their trading transactions. The block chain system helps to make the access to data in secure methods. It is an independent and secure procedure of business operations that provide transparency in its processes. Block chain process have several advantages in which it helps to create the transparent working conditions along with data security, transparency in transaction methods, and it is surely helps to industries to work on big levels. Block chain has surely benefitted in business operations especially it has competitive advantages against those companies who relay on Bitcoin trading tool or technology that is known for number of scam and mishaps in business transactions. Block chain clearly defined the situation of the real or fake.

Smart Inventory

The operational definition of smart inventory can be defined as an inventory system which is highly innovative and base don high end technology to manage and control the flow of inventory

and accommodate to meet the demands of the customers (Liu, Wang, Lin, Xie & Zhang, 2020). It is always backed by powerful software where the aim is to improve the inefficiencies and sync the inventory across the channels to maximize the profit and reduce the cost.

Supply Chain Performance

The operational definition of supply chain performance states that it is the set of activities which are highly customer centric and the aim is to make the product availability possible through timely delivery (Wu,Yue, Jin, & Yen, 2016). The performance is always judged by the parameters of customer satisfaction which is only possible when they get the product on promised date and time.

2.5 Literature Review

Chang, Katehakis, Melamed & Jim (2018) stated that blockchain technology has made the existence of smart inventory system possible. Blockchain technology will be the most important functioning procedure of business industries. In coming recent years, block chain will be most significant use of all industries like business, health and other financial sectors. Block chain is a database functioning program that is connected with multiple sets of the computers at the same time. It is an ongoing process of data recording and its blocks procedures. Each block contains its specific programming of the data and connect with other blocks and creating the chain of the blocks. The database of the entire program is not only managing one group, the entire process is connected with all departments and networks and every department can interlinked with whole database. Previous all blocks are safely preserved and new blocks are added in database for information. The block chain helps to create documents and files without any faking transaction and information.

Abdel-Basseta, Manogaranb & Mohamed (2018) evaluated Blockchain helps improving the performance of supply chain management. Block chain is a useful and secure process of getting information in specific business details in which only concerned persons or departments can approach to database who have access of special cryptographic key to add information for new record in specific chains. The system is highly manipulated with secure features in which only one person can operate transaction with specific key and guaranteed with cryptography is used for copy of the record of the block chain in computers. In simple terms, block chain is a medical seeking

record system in which each block is connected to other blocks and stating the entire details of date, day and time of the happenings of the business measures and its entered information. The block chain process helps to business providers for detail and secure information process through management of the data base and providing specific required details according to need of the business holders and the customers. the system specified the errors and making the best possible solution of the errors on time on immediate basis.

Sohel, & Bin Osman (2018) evaluated smart inventory system has improved the performance level of supply chain management. Inventory managing is one of the important business tools that is helps to manage entire business inventories in one unit. Without inventory management, businesses cannot do their functions properly and they cannot manage their huge data without it. In order to manage inventories of business products is a difficult procedure in those days when technology and data collection procedure were not as much able to handle the queries. Today, there are several smart procedures are introduced in market that helps to business industries to track their procurement and inventories and managing their huge supply chain of industries in more progressive direction. The smart inventory management system in business operations is one of the smartest way of considering the objects that enhances the business efficiency and provide the detail information of the products and their availability before its finishing the stock. It is the procedure of smart integrating process of inventory and providing analytical approach of the management capability in which business industries create the relationship between available stock and remove stock. There are few smart tracking inventory systems are practicing in business markets, such as:

1.   Inventory Tracking: it is the primary method of tracking and managing the inventories and monitoring the stock availability before its finishing. The inventory tracking system through smart inventory management procedures helps to business to locate their inventories in sufficient ways through tracking the filling record and your existing receipts. The smart system quickly retains the all information of the inventories with only one single of click.

2.   Security and Backups: we can not get business security features without knowing the inventory management system procedures of security and its backups information. The smart and latest inventory management system in business industry helps to create high secure features alert

to the businesses in order to create backups of the data for emergency purposes through double check and save database.

3.   Scalability: for inventory management system, all businesses are required the specific room or space to secure their inventories in proper way. The smart inventory management system provides the huge database space in their system in which business industries not only manage their inventories, they also record huge data information of the inventories in more adjustable and sustainable growth.

Kim, & Shin (2019) explained the impact of Block chain and smart inventory has improved the supply chain performance. Supply chain management and its performance measures in retail business industry is one of the business functioning process that create the linkages between the internal and external information and business relations through transparent and stable supply chain process. In retail business industry the role of supply chain management and its performing criteria is quite important. Number of companies are performing their business operations through digital supply chain process in order to meet global requirements and enhancing their supply chain performance in retail industry. The aim of the digital supply chain and enhancing its performance to determine the improvement of the business and managing the relationship of internal and external outcomes. In past times the entire business functioning process is totally different. They were managing their logistics, transportation, procurement separately. But currently, the global business industry establishes the huge and relevant sector the supply chain management in which all operational areas of the businesses logistics, transportation, procurement and ordering and delivery are emerged. The innovation in supply chain management performance through advance techniques and digitalization, the operations of the business strategies get potential and huge benefits.

3   Research Problem

Retailing industry is one of the business and financial sectors where business activities perform their functioning through selling and purchasing of the goods and finally customers get their oriented items. The retail is the final link of the supply chain performance. retail industry is one of the fastest growing business industries that is only possible with effective and efficient supply chain management performance. the fastest and dynamic retail industry only possible when

several efficient supply chain players comes in retail market that provide objectives on time through proper and sufficient period of time. The supply chain management performance in retail industry helps to grow the country's GDP rate high and create the position of the market in retail global business industry. The effective and manageable supply chain and its effective performance in business operations is one of the key procedures that is working as a back bone of the businesses. The advance digital method of supply chain management helps to industries to track their entire logistics record and connectivity with its business stakeholders in efficient ways. The effective supply chain management performance creates the significant growth of the retail industry and making possibility of the affordable prices for customer's demand. The efficient supply chain management performance offering various opportunities to business stakeholders and quickness in business response in retail business industry.
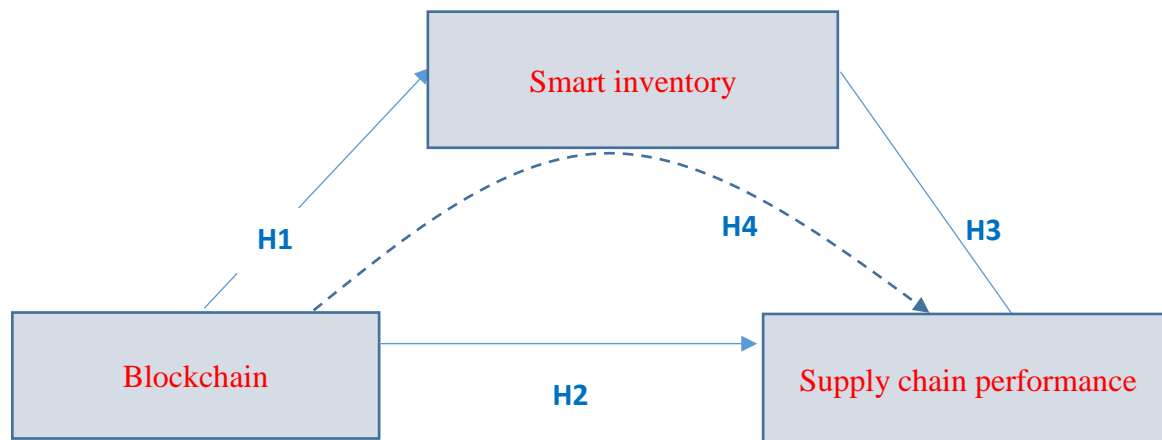
3.1 Research Model

Figure 1: Source from author

3.2 Research Hypothesis

H1: There is positive relationship between blockchain and smart inventory at retail industry

H2: There is positive relationship between smart industry and supply chain performance at retail industry

H3: There is positive relationship between Blockchain and supply chain performance at retail industry

H4: There is positive relationship among Blockchain and smart inventory and the supply chain performance at retail industry.

3.3 Research Methodology

The proposed research methodology for this report and compilation is quantitative research design. Quantitative research design is the use of quantitative analysis to test the hypothesis. The main advantage of using quantitative analysis is that it helps in quantifying the data which is easy to validate. The reliability analysis helps the researcher to generalize the results and complex decisions can better be made.

3.4 Population and Sample

The population of the study is the overall retail industry of the UAE. The unit of analysis is LuLu Hyper market which has started its operations in 2000 from Abu Dhabi and within short span of time the group has been known by the UAE and GCC because of its wide range product availability and shelf placement. The company has added the home delivery system in its valued services which has increased the customer base and strong also. The sample size for the study was 202 and nonrandom convenient sampling size was used for the data collection. We found more convenient and easy to conduct because of this busy routine and pandemic situation also.

3.5 Data Collection Method

There are many ways of data collection in the research. We used mixed approach for the data collection.

For the secondary data source we used published articles and reviewed and extracted information and discussed under the head of literature review. Primary data was collected through self-administrative questionnaire survey design. It is primary source of data collection and highly popular among the research domain.

4. Data Analysis

Statistical tools used to test the validity of the study's model, are the Path analysis, ANOVA, Regression, Correlation analysis as well as descriptive analysis, in order to test the proposed relationship of Blockchain with Smart Inventory and its relationship to Supply chain performance.

4.1 Validity and Reliability

To examine Internal Consistency and as shown in table 1 the results of Cronbach's Alpha reliability showed that questionnaire items are closely related, since all values of Alpha are "high". To achieve content validity, a number of business management professors and some specialists were asked to review the questionnaire, and the questionnaire was amended in light of their suggestions.

Table 1: Cronbach's Alpha reliability for study's variables

Study Variables	Cronbach's Alpha
Blockchain	0.793
Smart Inventory	0.807
SUPPLY CHAIN PERFORMANCE	0.814

4.2 Descriptive Analysis

Descriptive analysis was used to describe the variables of study, and to show the perception of the respondents toward study variables and dimensions, and then rank the importance of variables regarding their perception. Table 2 shows that the "Blockchain" variable ranked to be the variable with highest importance with mean as 3.81 and Std. as 1.21, could be because they follow the formal structure. Then, the next variable in the level of importance is "Smart Inventory", with mean equal to 3.72 and Std. equal to 1.06, maybe because the excessive focus on the quality control. Then last variable is "Supply Chain Performance", with mean; 3.61, and Std. 1.19.

Table 2: Descriptive analysis for Blockchain, Smart Inventory & Supply Chain Performance

Construct	M	Std.	Sig rank	Sig level*
Blockchain	3.81	1.21	1	High
Smart Inventory	3.72	1.06	2	High
Supply Chain Performance	3.61	1.19	3	High

* 1-2.33: low, 2-.34-3.66: moderate, 3.67-5: high

4.3   Hypotheses Testing

The correlation analysis, ANOVA analysis and regression analysis were used to test the hypotheses are presented below.

Hypothesis 1:

Table 3 data illustrate a good relationship between Blockchain and Smart Inventory, where the value of r=0.401, determination coefficient=0.161 which indicate that 0.161 of change in Blockchain related to the change in Smart Inventory. Regression results and value of F=28.858 approve the effect of Blockchain on Smart Inventory, where the value of t=3.089 at the level of (0.05) are significant for Smart Inventory, and this supports the first hypothesis and confirm that the Blockchain impact on Smart Inventory.

Table 3: Correlation, ANOVA and Regression analysis to BLOCKCHAIN in Smart Inventory

	Correlation		ANOVA			Regression			
DV	**r**	**r²**	**F***	**DF**	**Sig***	**β**		**t****	**Sig***
Smart Inventory	0.401	0.161	28.857	1	.000	(Constant)	.0397	2.984	0.002
				201					
				202		BLOCKCHAIN	0.289	3.098	0.003

* level of significance (α≤0.05) ** Critical t (df/p)=1.64 *** Critical F=3.60

Hypothesis 2:

Data of Table 5 illustrate correlation results between Smart Inventory with Supply chain performance, where the value of r=0.501, determination coefficient=0.251 which indicate that 0.251 of changes in Supply chain performance related to the changes in Smart Inventory. Regression results and value of F=99.872 approve the effect of Smart Inventory on Supply chain

performance, where the value of t=2.952, 4.452 at the level of (0.05) are significant for smart Inventory respectively, and this supports the Second hypothesis and confirm that Smart Inventory impact on Supply chain performance.

Table 5: Correlation, ANOVA and Regression analysis to Supply chain performance in BLOCKCHAIN and Smart Inventory

	r	r2	F***	DF	Sig*	β		t**	Sig*
Supply chain performance	0.501	0.251	39.872	1	.000	(Constant)	.0428	3.108	0.001
				201					
				202		Smart Inventory	.0401	2.952	0.000

* level of significance (α≤0.05) ** Critical t (df/p)=1.64 *** Critical F=3.60

Hypothesis 3:

Data of Table 7 illustrate a good relationship between Blockchain with Supply chain performance, where the value of r=0.544, determination coefficient=0.296 which indicate that 0.296 of change in Supply chain performance related to the changed in Blockchain. Regression results and value of F=15.982 approve the effect of Blockchain on Supply chain performance, where the value of t=3.193 at the level of (0.05) is significant for Blockchain, and this supports the Third hypothesis and confirm the Blockchain impact on Supply chain performance.

Table 7: Correlation, ANOVA and Regression analysis to Supply chain performance in Blockchain

DV	r	r2	F***	DF	Sig*	β		t**	Sig*
Supply chain performance	0.544	0.296	15.982	1	.000	(Constant)	/	2.886	.0003
				201		Blockchain	0.419	3.193	.0001
				202					

* level of significance (α≤0.05) ** Critical t (df/p)=1.64 *** Critical F=3.60

Hypothesis 4:

Path Analysis is conducted to calculate the direct and indirect impact of the Blockchain and Smart Inventory on Supply chain performance with the mediating role of Quality. The results show that the value of Chi2 is (45.942) and it is significant at the level of (0.05). The quality fit indicator or The Goodness of Fit Index (GFI) is (0.821), which is close to the correct full fit value (=1).

Table 8: Path analysis to direct and indirect impact of Blockchain and Smart Inventory on Supply chain performance with the mediating role of Quality

….	Chi2	GFI	CFI	Sig	Direct Impact		Indirect	Path	T	Sig
BLCH on SCPR with the mediating role of SMIN	45.942	0.821	0.614	.000	BLCH	.794	.575	BLCH/SMIN	12.791	.000
					SMIN on SCPR	.741		SCPR - SMIN	9.755	.000

GFI: Goodness of fit index
CFI: The comparative fit index
BLCH: Blockchain,
SMIN: Smart Inventory
SCPR: Supply chain performance

For the value of Comparative Fit Index (CFI) is (0.614), which is also close to the true full fit value (=1). On the other hand, the direct effect of Blockchain on Smart Inventory is (0.794), and the direct effect of Smart Inventory on Supply chain performance (0.741). While the indirect effect of Blockchain on the Supply chain performance with the mediating role of Smart Inventory is (0.575), and thus all direct and indirect effect are significant at the level of (0.05). Therefore, we can support the impact of Blockchain and Smart Inventory on the Supply chain performance with the mediating role of Quality.

5. Results and Discussions

Result of the study confirmed the direct impact of Blockchain on Supply chain performance and the direct impact of Blockchain on Smart Inventory. Meanwhile, the results confirmed the indirect impact of Blockchain on the Supply chain performance with the mediating role of Smart Inventory. Companies that fail to achieve the quality of their operations and supply chain would probably face additional costs as well as low customer satisfaction, which reflects on their competitiveness. Therefore, companies should seek to implement the Smart Inventory approach in order to improve quality and reduce costs of poor quality. This study was intended to highlight quality strategies and their linkage with costs in industrial companies. It has examined the requirements availability for Smart Inventory processes and its impact to Cost of Poor Quality at Plastic manufacturing companies in Dubai.

The study results proved the significance of the awareness of Smart Inventory requirements in enhancing the organizational performance. This result is consistent with the results of the study of (Idris, 2016), which showed that the implementation of Smart Inventory processes had a significant impact on improving the growth. Moreover, the results showed that Smart Inventory implantation contribute to reduce the mismanagement practices.

This finding is consistent with the results of the study of Thomasson, & Wallin (2013), which showed that applying new technologies in the inventory contributes to improve companies' competitiveness. The results show that awareness of Smart Inventory requirements and desire to identify errors, make companies to address and repair the defects, and this result is consistent with the results of the study (Dian, Rapi, & Nilda, 2010) which showed that Smart Inventory processes are an effective strategy of quality control, and contribute to the improvement and development of inventory and operations performance.

The factories are intent, on the participation of employees in administrative tasks and decision-making, with the aim of developing their leadership skills and acquiring new ideas. The factories authorize the authorities to increase the performance of the work, to emphasize the importance of employees and to meet their needs and requirements and to provide a comfortable work environment which reflects on their performance. To provide modern mechanisms and the use of modern technology, and keep pace with new technologies to develop performance.

They regularly review the operations policies and procedures, and clarify the methods and tactics to achieve the goals and objectives. Results show that top managements have some focus on quality, with their interest appearing to be in the vision, mission and objectives that included to enhance the quality targeting the customer satisfaction.

This result is consistent with the results of the study He & Goh (2015) which showed that the Smart Inventory applications have contributed significantly to improve their organizational performance. This result is consistent with the results of Mahmood, S., Shahrukh, S. & Sajid (2010) which showed that the cost of poor quality negatively affects the companies' competitiveness.

6. Conclusion and Recommendations

The smart inventory system helps to organizations to create optimistic approach in their resolutions and business management record the inventories through several technology analytic capabilities programs. Smart inventory management is directly working with the SAP and Asset Management system program Maximo and provide cloud solution inventory management system. The old and traditional working procedures of inventory management is quite lethargic and time taking procedures in which many persons were involved in the data entry procedure and sits for period of time to enter the entire inventory details and track the record manually. But Radio Frequency Identification (RFID) is one of the smartest solutions of the technology that replace the entire inventory system in one smart and quick method. RFID is one of the smart ways of technology that helps to track assets and inventory management in more easy and convenient ways. The supply chain performance management create the possibility of the detail information process in one unit and collect all data from various internal and external resources in order to track the inventories for supplying he logistics on time. The functioning of the advance supply chain management performance giving the opportunity to the management to get new insight regarding the supply On and immediately spit the error in the supply chain performance.

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