

The Impact of Smart-Warehousing on a Local Foodservice Equipment-company's External Customers.

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Abstract - This paper highlights the impact that smart-warehousing has on customer satisfaction and loyalty in the foodservice industry. The study follows an exploratory approach which uses quantitative means to analyze the information collected. The high products demand in the foodservice makes the industry complex to handle as the need to satisfy the customer is a priority, thus the reason behind this study which can benefit both the concerned industry and academia. 90 respondents (60 customers and 30 warehouse employees) participated in the study where a questionnaire was given to them to collect critical information about the study. The retrieved data were captured and analyzed using Microsoft Excel was used to help determine the sample size as well as random numbers to define the sample. SPSS 25 was also used to conduct the correlation analysis and assess the relationship between the warehouse activities and the customers' credit notes (which are linked to their satisfaction and loyalty). The study revealed that there is a positive relationship between the use of smart-warehousing and the satisfaction and loyalty of customers.

Keywords – Smart-warehousing Operations, Supply chain, Customer satisfaction

I. INTRODUCTION

Organizations exist for customers, failure to satisfy them will likely result in poor performance.[1] At the dawn of the fourth industrial revolution, new concepts such as smart warehousing have emerged which refers to the use of technology to manage warehousing operations efficiently to satisfy the customers. Organizations believe that smart warehousing operations can drive a positive impact on customer satisfaction since warehousing operations involve many functions namely the receiving of goods from suppliers, barcoding, and packaging of the items according to the warehouse storage and dispatching systems. In all the functions there is multiple human error possibility involved especially since warehouses mostly deal with large sum of stock items and delivering which makes “chasing numbers, the name of the game”. Damaged or faulty goods are bound to result from such pressures associated with warehousing operations which leads to extra costs for the business as the value of the product/goods decreases with an increase in its damage or fault and ultimately results in fewer chances of customer satisfaction and loyalty. This is where smart warehousing becomes more of a requirement than just being applicable especially for such industries as they support essential service companies such as a food service company [1]. The main

strategies that must be put in place to ensure customer satisfaction by the business are Total Quality Management (TQM), Six Sigma, and Supply Chain Management (SCM) which are factors that determine the failure or success of business regarding customer satisfaction alongside smart warehousing [2].

A. Problem statement

The constant need to deliver demanded products faster while minimizing waste is the main target for organizations. Knowing that every business needs warehouses to store their product, it is believed that proper operations should therefore start in the warehouse first as warehouses are key in the organization's performance.

B. Aim, objectives, and scope of the study

This research paper aimed at highlighting the impact of using equipment and systems requiring minimal human interaction for the day-to-day warehouse operations. The objectives of this study are as follows: (1) To understand the relationship between smart warehousing and consumer satisfaction and loyalty, (2) To identify warehousing practices that might affect the customers' commitment to the organization, and (3) Having a framework incorporating all capacities in the company that makes straightforwardness and simple access to data.

The scope of the study is centered on the impacts of smart warehousing in foodservice equipment providers located in Gauteng, South Africa. The research paper is organized to suit five sections from chapters one to five.

C. Significance of the Study

This study shows itself to be important as it will provide insight to business organizations as well as academia on the impact of smart warehousing on the customers' satisfaction and loyalty. The significance of the study lies in the fact the study attempts to link the different practices of the fourth industrial revolution with the customers' perspective of the organization in the foodservice equipment providers. Although numerous studies are being conducted on the impact of the fourth industrial revolution on businesses, only a few attempted to look at the South African foodservice providers' perspective. Thus, the novelty of the study.

D. Background and Rationale

Mechanization of procedures began back in the 1800s when steam and waterpower were presented and executed

in the business 1.0 ecosystem. A requirement emerged for large-scaled manufacturing in the 1900s, marking power and burning motors a design named the 2.0 industry [3]. As years went by, data turned into a requirement to help in increasing complex computerization of frameworks and procedures, offering space to the 3.0 business in the 1970s, the rapid growth of the population, the current era have an enormous interest on organizations. Organizations, therefore, needed to find quicker and progressively proficient approaches to deliver and provide products in enormous volumes, ruling out imperfections, wastage, and additionally non-similarities. With the help of advanced frameworks and plans of action, automation has been introduced. Big information and brilliant working manufacturing organizations and warehouses, the human contact will be kept to a base along these lines rule out human blunder. This will expand income, quality in items and administrations, decline costs and, increment consumer loyalty, and dependability [4][5].

II. LITERATURE REVIEW

A warehouse is a capacity storehouse that allows units produced by organizations to be stored until they are sold to customers. Some warehouse might store finished products that are ready to be sold while others might store work in process (WIP) products that are yet to be sold [6]. Thus, they play a crucial role in upgrading the mission of an organization as one cannot sell what they do not have.

The significant activities of the warehouse include the capacity to store products, the security of products, financing, handling, reviewing, and transportation [6]. The warehouse has a significant role in the supply chain as it influences the procedures of the material stream from the providers to end purchasers for the completed merchandise. Production for crude materials, and accordingly the activities of the distribution center have been given high consideration as companies expect more results as the necessities on its capacity are evolving the traditional warehousing is viewed as a non-value process [7]. clients to stay faithful to an organization, they must remain satisfied with the nature of the administration they get. At the point when a client accepts that they are receiving valuable products and service, they will not excessively care of the cost to pay for the merchandise. Late research has exhibited that customer loyalty and satisfaction have five dimensions [8].

A. Customer Loyalty and Satisfaction

Customer loyalty is the relation that a particular customer can have with a specific organization that is generally built over time [9]. It plays a major role in the performance of an organization and is affected by the way the organization delivers its products: Customers that are happy with the way an organization delivers its products will be more like to commit to the organization leading them to be loyal [4]. The following dimensions affect the customer's loyalty and satisfaction [8][9]: (1) Reliability:

this is the ability of an organization to provide services/products the way they promised they would. (2) Assurance: Employees' information and graciousness and their capacity to move trust and certainty. (3) Empathy: Caring, individualized attention given to the customers when needed. (4) Tangibility: Appearance of a physical office, hardware, workforce, and composed materials. The factors enumerated above play an important role in building a relationship with customers.

B. Traditional Warehousing

Traditional warehousing includes over the handling of items in the warehouse where employees had to make sure that every product is on its place with basic methods of supervision such as visual control and observations. This method requires the operators (employees) to be very careful and pay attention to every movement in the warehouse since a lack of attention might result in breakage and damaging of products. Furthermore, ineffective material handling can be tedious as well as dangerous to the customers as a hazardous situation may occur and cause serious issues to the organization [10][11].

C. Smart Warehousing

Smarty warehousing refers to the use of technology to manage warehouse operations. In opposition to the traditional warehousing that uses manual work and basic ways to manage the warehouse, smart manufacturing uses computers that automatize the process and allow the warehouse supervisors to have total control that on the warehouse.

Information technology is a key tool in the application of smart warehousing, it allows managers to manage the warehouse even when they are not in the warehouse as they have total supervision. Different components of the smart warehousing are referred to components of the fourth industrial revolution such as [12]:

1) *The Internet of Things (IoT)*: this refers to the use of the internet to manage the warehouse. Since the warehouse is automatized, all machines are also connected to the internet where they can be easily commanded to what organizations refer to warehouse management systems (WMS). This system is more like a cloud that got all information on the products, shipping time, and handling process of every product in the warehouse.

2) *The Radio-frequency identification (RFID)*: Programmed identity (AutoID) is another term for Radio frequency ID (RFID) innovation. This is a programmed information assortment framework that depends on four components – labels, peruses, reception apparatus, and programming. The Radio-recurrence ID (RFID) fuses all the systems in the entire relationship concerning dissemination focus stock levels and stock tracing [11] [13]. This system allows products to be identified easily as they are allocated a barcode that provides all the necessary information on a product. This barcode can tell the manager how many products remain in the stock and when they should be reordered. X-beam is also used in the

screening machines to discard the human spot of opening boxes to count and check the stock, the stock will be screened and counted through the X-beam screen. This is a programmed information assortment framework that depends on four components – labels, peruses, reception apparatus, and programming.

The use of the headways of business 4.0 in an organization can be costly in the fundamental strategy. On the splendid side of things, the new technology can convey positive change [14] and bring improvement [15] on the Profitability, Improved Efficiency, Increased Information Sharing and Synergistic Working, Flexibility, and Agility makes consistence simpler, Better customer experience, and Diminishes costs [16][17].

III. METHODOLOGY

A. Research Design

This research paper followed an exploratory approach that utilizes quantitative intends to assemble information. Quantitative approaches to research are numerical estimations of the parts of the investigation [18]. The estimation depended on watched reality and authentic occasions rather than feelings and decisions reliant on intuition.

B. Data Collection

In addition to the records audit of the organizations under study (secondary data) [19], primary data were also collected using a questionnaire that was distributed to respondents to get more detailed answers and provide a better perspective of the matter. The questionnaire used assessed the warehouse practices and the customer's satisfaction credits (factors that would make the customer satisfied with the warehouse performance)

C. Sampling

A simple sampling technique was used to eliminate any biased decision during the study. A total population of 300 business partners and customers were recorded while a sample size of 60 customers and 30 warehouse employees was used. Each respondent in the population was allocated a random generated by Toolpak on Microsoft Excel, 60 numbers were randomly drawn which allowed building the sample size.

D. Data analysis

Information got from the organization's database was measurably broken-down utilizing Microsoft excel information investigation Toolpak. SPSS 25 was used to generate the correlation coefficient used to assess the relationship between customer satisfaction and loyalty (dependant variables) with the smart warehousing practices (independent variable) used in the organizations.

E. Reliability and Validity

Reliability is used to determine the precision, consistency, or soundness of results procured from the assessment of the assembled information [20]. The Split-half reliability method was used to measure the reliability of the study. It is a strategy that targets deciding the internal consistency of the grades got from the information set [21].

Validity is definitely not a factual measure, but instead a judgmental intend to decide the pertinence of the data utilized in the investigation [22] this research supports the four types of validity or legitimacy as follows: face, substance, criterion, and construct validity.

Face legitimacy is how much an assessment or test appears to be appropriate to its aim. substance legitimacy is the degree to which an assessment or test speaks to all points in the substance as was required to. criterion legitimacy is how much an assessment or test addresses or is related to the outcome. construct legitimacy is the degree to which a test gauges what it maintains to quantify. With the ultimate objective of this examination, the tests used to measure what was proposed to be evaluated to close on the theory [23].

A. Hypothesis Testing

The following hypotheses were tested:

H_0 : There is a significant difference between the customer's satisfaction and loyalty with the warehouse practices.

H_A : There is a no significant difference between the customer's satisfaction and loyalty with the warehouse practices

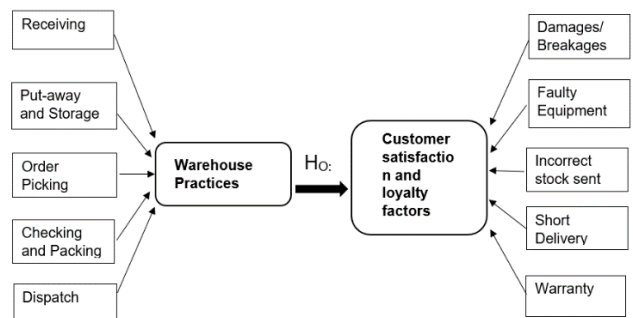


Fig. 1 Research theoretical framework

IV. RESULTS

The organization's database was used to retrieve the documents to review for the study. Of the 90 respondents, 66.67 % were males and 33.33% were females. Because of the aim and the structure of the research, there was no need for demographical data, thus the main analysis was conducted using correlation analysis and observations. Table 1 is a portrayal of the number of customer satisfaction and loyalty credit reasons. The table shows that 52 customers out of 62 complained about the faulty equipment received in July 2017 from the warehouse.

TABLE I
NUMBERS OF CUSTOMERS SATISFACTION AND LOYALTY CREDIT REASONS

		Credit Reasons									
		Damages		Faulty Equipment		Incorrect stock		Short Delivery		Warranty	
Time Period		1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
May	2016	0	0	29	30	14	5	22	29	2	1
	2017	0	1	25	32	8	10	21	13	6	3
	2018	196	225	45	74	14	20	58	34	59	36
	2019	38	27	21	18	2	2	35	39	20	12
Jun	2016	0	0	44	34	15	21	29	16	6	5
	2017	0	0	25	20	5	2	29	31	4	8
	2018	130	117	31	36	9	20	42	27	25	42
	2019	30	24	19	10	1	12	6	4	13	11
Jul	2016	0	0	46	36	16	28	18	6	0	9
	2017	0	0	23	52	1	3	24	24	10	10
	2018	28	45	5	10	3	3	17	9	6	5
	2019	26	26	15	17	7	5	6	9	23	20

This shows that the inventory in the warehouse is poorly monitored as they should be tested before being sold to customers. Table 2 on the other side assessed the relationship between the warehouse activities and the customer's satisfaction and loyalty credits notes between May 2019 and June 2019. The results showed that customers are mainly interested in the way their products are packed, their ability to easily access stored products, and the way they receive the products from the warehouse. Nevertheless, other important factors such as the picking, the receiving, and the dispatching of products from the warehouse are also critical to customers.

Table 2 is a quantitative portrayal of data assembled from the organization's credit records, the information was part into two sets for each month from 2016 May-July to 2019 May-July.

Measures of central tendencies depicted in Table 3 shows that on average 76.1% of the customers believe that the organization's warehousing style affects their satisfaction and loyalty while nearly 21.4% of the warehouse employees tend to ignore the relationship between the warehousing style and the customers' satisfaction and loyalty.

The speculative factors were additionally estimated utilizing the investigation Toolpak to test their significance. From the outcomes, it is deducted that, $t_{stat} > t_{critical}$ thus $2,316574555 > 2, 228138852$. Therefore, there is no noteworthy diverse between client credits and stockroom rehearses. H_0 : There is a significant difference

TABLE II
CORRELATION COEFFICIENTS

Period	Collecting	Stocking	Picking	Packing	Pressing dispatch
May	0.914940	0.817214	0.879655	0.775043	0.769166
June	0.860660	0.920360	0.771436	0.929553	0.815578
July	0.893095	0.903673	0.892857	0.911705	0.848581

between the customer satisfaction and loyalty with the warehouse practices. Thus, this Null speculation is dismissed. From the outcomes, there is evidence that brilliant warehousing would profit the image of the organization and retain clients since they will be progressively fulfilled by the administration conveyance.

V. CONCLUSION, RECOMMENDATIONS, AND LIMITATION

The study assessed the impact of smart warehousing on customer satisfaction and loyalty. Using a correlation coefficient and a T-test. The correlation coefficient assessed the two variables which revealed that there is a significant relationship between the customer's satisfaction and loyalty with the warehousing style of an organization. Customers tend to prioritize the way products are handled and delivered to them.

TABLE III
T-TEST: TWO-SAMPLE ASSUMING UNEQUAL VARIANCES

	Customers	Warehouse employees
Mean	76,1	21,4
Variance	5391,433333	184,0444444
Observations	10	10
Hypothesized Mean Difference	0	10
Df	2,316574555	
t Stat	0,021511519	
P(T<=t) one-tail	1,812461123	
t Critical one-tail	0,043023038	
P(T<=t) two-tail	2,228138852	
t Critical two-tail		

Since the handling and delivery of products to customers is important, the use of technological tools that go in hand with the fourth industrial revolution as suggested in the literature would be recommended. An example would be the use of the Radio Frequency Identification (RFID), which forms part of “smart-warehousing”, for automated stocktaking that brings in much advantage on warehousing efficiency rather than the old-fashioned way barcoding used by warehouses [24]. This technology reduces human touches and hence human errors and increases workforce and efficiency in these operations which then wastes in the form of damages, extra orders, and the associated costs.

A major limitation to the study has been the sample size used as a much bigger one would have been preferable for more reliable results. Nevertheless, the results presented in this study are still considered reliable since proper reliability and validity measures have been taken in the course of the study.

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