Order-To-Delivery Process Architecture in Cement Factories: The Case of Derba Midroc Cement Factory

Ayda Gebru
HiLCoE, Computer Science Programme, Ethiopia
aydageb12@gmail.com

Berhanu Borena
HiLCoE, Ethiopia
berhanuborena@gmail.com

Abstract

Order-To-Delivery (OTD) in most general sense is a point of making request to the delivery of a product to customers. It has been a part of doing business for ages and has developed alongside technology to provide powerful means of accepting orders, shipping and delivering them. This paper focuses on developing a framework which can facilitate the order collection and the delivery of the product to customers in cement factory (F-OTD). The ability to take orders and deliver the right product, to the right place, at the right time is critical to any organization. Processing orders rapidly and accurately and on-time delivery has a direct impact on customer satisfaction. Transforming the order-to delivery process can determine an organization's survival, competitiveness and entire success in the market.

Keywords: Order-to-Delivery; Purchase Order; Order Delivery

1. Introduction

In the general sense Order-to-Delivery (OTD) is defined as sequence of steps involved in processing an order to the satisfaction of the customer and making the necessary changes in inventory records. It may also include processing of returns and re-adjustment of the records, also called order processing [1].

Customer satisfaction plays a significant role in the success of a company. Processing orders rapidly and on-time delivery has a direct impact on customer satisfaction. Currently in Derba Midroc Cement (DMC) factory, orders are taken through phone calls or in-person. While taking orders there is no centralized way of cross checking the level of production of cement in the factory with the amount of order that the sale office receives resulting in the customer not knowing the exact delivery date; also don't provide promise dates for the entire orders. This causes a time gap and customers not receiving what they need when they need it.

Once customers place orders, no confirmation about their order details is given including product and scheduled delivery date. Customers are not aware of either their orders go into production or not. In this case, poor customer services are experienced.

Considering the delivery stage, there is no proof of delivery that the product is being received by the delegated person due to the non-existence of a system which can verify the identity of a person receiving the products. Hence, it is difficult to track goods arrive at the designated address on time. So creating a framework to fill these gaps and improve the order to delivery process is what this paper is all about.

2. Related Work

Different researches are conducted regarding order to delivery process.

Order and delivery strategies was addressed by Wortmann [2] and continued by Mather [3] in a discussion of the P:D ration, where P is defined as the production lead-time (lead time is the latency between the initiation and execution of a process, i.e., how long it takes to manufacture a product) and D is the demand as lead-time. D can be viewed as:

i. The lead time quoted by the firm to the customer,
ii. The lead time the customer wishes, or

iii. The competitive lead time.

According to La Rosa [4], the process starts with the ordering task, where purchase orders can be created, modified, approved or rejected. If an order is rejected or not confirmed in time, the process terminates; otherwise the logistical arrangements can start in the task Carrier Appointment. This task deals with the preparation of the shipment quote, with delivery and pick-up arrangements and culminates in the actual pickup of the freight from the Carrier Department. If the quote is not prepared in time, the whole process terminates and the order is cancelled. If the freight was picked up, tasks Payment and Freight in Transit are started in parallel. The former deals with the processing of the payment for the freight and for the shipment. The latter allows the Order department to issue inquiries after the status of the freight in transit, and handles notifications of the shipment's progress from the Carrier Department. This task terminates with the actual delivery of the freight to the customer.

After completion of payment and delivery, Freight Delivered task handles loss or damage claims and requests for return of merchandise. If no claim or request is lodged within a certain time frame, the process terminates. A Return of Merchandise document contains the reasons for return and the line items to be returned, while a Loss or Damage Claim indicates the reason for claim. Both these documents are lodged into the system by a Client Liaison upon client’s request. If no client communications are received within a certain period after the delivery – the length of which is specified in the Shipment Notice – the Order fulfillment process is considered to be successfully completed.

As a part of the supply chain, the order process plays an important role in connecting customer with supplier. A customer order serves as one of the information sources that makes logistics activities in operation. The key element included in the order process is information flow, which has a great impact on operation efficiency, total cost, and the level of customer service. Inefficient information flow may lead to loss of customers, high inventory level, and inaccurate production forecast.

As stated by Grant [5], information system and order processes are the foundations for logistics and corporate management information system, an area which has potential to improve logistics performance. Nowadays, organizations are equipped with information systems to support logistics activities. Several studies have shown that information systems have been the key to improve enterprises’ competitiveness. Nowadays, there are many third-party forwarders which are not carriers but agents that provide logistics services.

According to Ballou [6], Order process in sale includes five steps: order preparation, order transmittal, order entry, order filling, and order status reporting. The time needed for each step depends on the type of order. Overall, we can see that a good Order to delivery management system must fulfill and follow some steps in order to be successful.

Besides information systems, a number of other factors may affect order process, including processing priorities, order-filling accuracy and parallel or sequential processing [6]. Some companies process customers’ orders according to the receiving time while some others may prioritize their customers in order to satisfy the more profitable orders and customers.

The accuracy of order filling is another important factor. The fewer the errors the more order processing time can be saved. Order accuracy can be a key and a focused indicator to assess and improve order processing performance. In some cases, processing orders one by one or in parallel may greatly affect order processing efficiency, time, and customer service. So sometimes it is necessary to handle different orders or different steps of the processing order in parallel in order to reduce order processing time.

There are a number of ways for customers to place an order. Historically, customers book orders by hand and then sent, faxed, or mailed to suppliers

or a sales person. Nowadays, the orders are commonly booked through calling the suppliers' operations persons who are equipped with an Internet access directly connected to their own data warehouse and order booking system. The advantage of this booking method is obvious: the suppliers' operations person can check the availability of the order products automatically and reduce the order preparation time. By using this method, the company is almost able to improve its customer service by reducing the order cycle time [5].

The basic function of the order processing system is to provide a communication network between customer and supplier. Another key function is to link the sales information to marketing forecast, to production planning and to logistics operations.

Generally, manual methods are associated with a long waiting time and more communication errors while electronic ways mean a more efficient and a more accurate order process.

Businesses face several challenges throughout the order fulfillment process. These include challenges related to demand planning, inventory management, supply chain optimization, logistics planning, and several other complex concerns. However, at the risk of over-simplifying matters, what it really boils down to is knowing and being able to make effective decisions about what you have to sell, whether a customer is likely to buy it, and how are you going to get it to them if they do.

Businesses across the manufacturing, high-tech, and retail industry sectors face many of the same challenges in managing their supply chains [7]. All this is happening as order processing windows narrow and customer demands intensify. Complying with the heightened demands likely increases internal costs to meet these order fulfillment requirements.

When it comes to speeding up order to delivery process, there are many steps one can take to make a big impact. Start by looking at some of the "quick wins" that don't require a massive investment, but will make a quick difference, such as classifying inventory and ensuring that it is stored as logically as possible.

The next step is to make sure that you are making the most of the systems you already have in place. Many companies have the pieces in place that are needed to improve their order and delivery processes, but are unable to get the most from these systems. Finally, one can also look at making new investments in automation to speed up order handling times.

Reclassifying inventory from fastest moving to slowest will not only help save time in the order to delivery process, it will also save money in terms of labor costs in the warehouse. Systems integration will help to improve the order to delivery process but also provides better reporting and analytics that can aid decision making and profitability. Automating processes speeds order fulfillment but also provides more accurate data for future orders.

3. Research Methodology and Findings

3.1 Methodology

Methodology is the systematic and theoretical analysis of the methods applied to a field of study. This paper focuses on order to delivery process framework of a cement factory. Design science is the main research method employed due to the nature of the order process.

3.2 Data Collection

Typically, the prime method of data collection is interviews. Other sources of data used are internal reports, through direct observation and documentation. Primary data was gathered from management and operational level employees from the same company located at different sites where secondary data was acquired from the document provided inside and outside of the organization so as to arrive at a conclusion for the study. In this section the data collection methods used are described.

i. *Interview*: Interview includes personal (face-to-face) and telephone interviews. In order to probe the ideas of the interviewees about the phenomenon of interest oral questioning of respondents is used. Interview has been made

with the staff and the person in charge of the current system environment. Interviewees that are relevant to the topics based on their position and oral questionnaires are selected to have a deeper understanding about the subject.

ii. *Documentation*: involves studying existing documents, either to understand their essential content or to lighten deeper meaning which may be revealed. Documents can be provided on paper or online resources.

iii. *Observation*: includes naturalistic (Field Note) observation by simply observing the subjects in the environment and arrive at a conclusion. It is simply observing people, activities, or physical aspects as they naturally exist and record the observation in narrative, expressive style as one notices or hear something of importance. The observations are recorded by taking field notes that are relevant to the research problem.

4. Empirical Findings

From the data that has been gathered and from the documents provided inside and outside the organization, Order-To-Delivery Process (ODP) is schematically described with a series of major processes. The ODP starts with the Sales Process in the branches, continuing with the Cement Order Process. The company handles the Material Supply Process, Production Process, Stock Process, Importation process and Delivery Process. The Head Office takes care of further transportation [8].

a. Order to Delivery Process at DMC

Customers' orders are registered into the database system through phone or in-person at sales office. After registration customers get payment slip print out that can be sent through fax, email or receive at the sales office in person and then the customers receive Purchase Order (PO) number. The payment is done either in cash or credit. After a bank payment is done, the customers get VAT receipt at the sales office and finally the delivery scheduling begins. All the customer orders that are being carried out are exported in Excel file and emailed to the factory.

Delivery of the products is carried out in two ways: Pickup sale (Non-transport) and delivery sale. Pickup sale is sale that is carried out by customers' truck and delivery sale is the one that is carried out by the organization's truck which is called Derba Transport (DT).

All the orders that the sales office received are sent to the manufacturing company via email to the concerned departments (Production department, and Technical manager). All the concerned departments receive the orders and then the dispatch supervisor prepares the materials. After preparing the materials, the orders are processed and assembled. Then the dispatchers prepare Delivery Note for the products. Based on the Delivery Note the carrier department prepares Freight Order (FO) for the trucks. Then the products are sent to the customers (delegated person). Finally the delegated person (customer) receives and makes a confirmation about the product received through signature or seal (for organization) in the delivery note and freight order form.

b. Analysis and Discussion

The first study concerns about the information flow between the sales office and the factory. Interviews and personal observation show that there is no link or a centralized information system between the sales office and the factory.

The second study concerns with the customer perspective towards the order to delivery process. Through observation, most of the customers had a complaint about the delivery of the product at the right time due to the fact that there is no centralized way of cross checking the level of the production with the amount of orders received.

The next study concerns about the delivery stage. In this stage there is no proof of delivery that the product is received by the delegated person. There is no tracking of every step of distribution to ensure that goods arrive at the designated address on time.

Further analysis is made about customer satisfaction and point of view in the process of order to delivery.

- Most customers are aware of the delivery date while they order but not the exact delivery date.
- Most customers are aware of the procedure of making an order when they need but not aware of the order status (Order Confirmation) via email, through phone or SMS.
- Dispatch supervisor and managers are not aware if the product is being received by the customer/their delegate on hand (proof of delivery).

Following a case study conducted by Derba Midroc Cement (DMC) Factory and from the data that have been gathered, the following are the new findings and the suggested practice for managing the order to delivery Process.

- *Make it simple by having a centralized information system*: Having a centralized information system helps to make a decision. Knowing what is in stock and being able to provide visibility on stock levels as the order is placed prevent customers from being disappointed with backorders and delays. Using this method, the company will improve its customer service by reducing the order cycle time. The company can also minimize the order processing time, reduce inventory and improve order accuracy.
- *Having a confirmation message*: Once customers place an order, they need to be aware of their orders and products through SMS or email. Customers must be confirmed about their order details which include the exact delivery date of the products and when their order goes into production. After it goes into production, customers must also be confirmed that the products are ready to be delivered. Using this method, the company can improve customer satisfaction.

5. The Proposed Solution

5.1 Overview of the System

From the literature review and empirical findings some important points have been discovered so as to come up with the process framework which facilities activities starting form order collection to the delivery of the product. Our focus is to have an Online Order-To-Delivery (O-OTD) system for cement factories which can determine a company's endurance, attractiveness and entire success in the market, improve its performance, and brings customer satisfaction.

The developed system (O-OTD) has different features to manage the order to delivery process. These features have been identified based on the literature review and from empirical findings.

Feature 1: The first feature is to have a centralized order entry that can crosscheck the level of production with the amount of orders received. Using this feature the system provides a communication network between sales office and the factory so as to link the sales information to production planning and provides visibility on stock levels as the order is placed. O-OTD is designed to schedule orders based on the production so as to monitor orders through production and provide the promised dates for the entire orders to the customers. It helps to meet customers' expectations, prevent delay, optimize service fulfillment through accurate scheduling, and track inventory.

Feature 2: Once a customer places an order, the second feature is receiving order and delivery confirmation messages through SMS. Using this feature the system confirms customers about their order details, when their order goes into production and when the product is ready to be delivered (delivery confirmation) so that customers can easily track their order status and their products which in turns makes customers satisfied. The SMS messages are sent to both the customers and their delegates.

Feature 3: The last feature is to confirm that the product is being received by customers or their

delegates on hand (proof of delivery). Using this feature of the system, while confirming customers that their product is ready to be delivered, it automatically generates a secret code on the Delivery Note form that can be sent through the driver who delivers the product. As soon as customers receive the product, it claims about the product received through inputting the secret code into the SMS message that is sent through his/her phone. Then users are able to see if it is received through delivery status report form on the system.

Table 1 explains the SMS message formats that will be sent to customers or their delegates about their orders and delivery.

Table 1: SMS Message Formats

No.	*Message*	*Possible plain SMS with Rules*
1.	Report order confirmation and Scheduled delivery date	The orders are being sent to the factory The scheduled delivery date of the product is dd/mm/yy. For more information contact us: +251-xxxxxxxxx
2.	Report delivery confirmation	The product is ready to be delivered by Driver name: Plate No: Please receive the secret code from the driver and insert the code and send it through the received message.

5.2 O-OTD Framework

The O-OTD involves five main elements that are important for managing the Order-To-Delivery process. Figure 1 shows the O-OTD framework.

5.3 System Architecture

Client server architecture with three-tier implementation is selected for O-OTD. Figure 2 shows the system architecture.

6. Conclusion

The purpose of this paper is to develop a process framework that can effectively and efficiently facilitate order collection in the delivery of products to customers. Only one case company is selected for the study. In the case analysis it is found that the company doesn't have a centralized order entry that can crosscheck the amount of orders with the level of production which doesn't allow to fulfill its commitments to customers or not providing the promised date for the entire customers' orders. This implies that sales information is not linked to production planning which doesn't allow it to schedule orders based on the production and not being visible on the stock level at the time of the order placed. It is also found that once customers place an order, they are not confirmed about their orders and products. Considering the delivery stage, there is no proof that the product is being delivered to the delegated person and being received properly.

In order to solve this problem, an Online Order-To-Delivery (O-OTD) system is proposed. In implementing the system, the core features of the system have a centralized order entry in which all the incoming orders are sent automatically to the factory and also product information is sent automatically to the sales office. The stock levels per day are visible at the time of the order. With this they can schedule and monitor their orders through production easily. Once customers place an order, they receive an order and delivery confirmation message through SMS so as to track their orders and products easily. In the delivery stage, there is a proof of delivery by the customers that respond through SMS as delivery confirmation message.

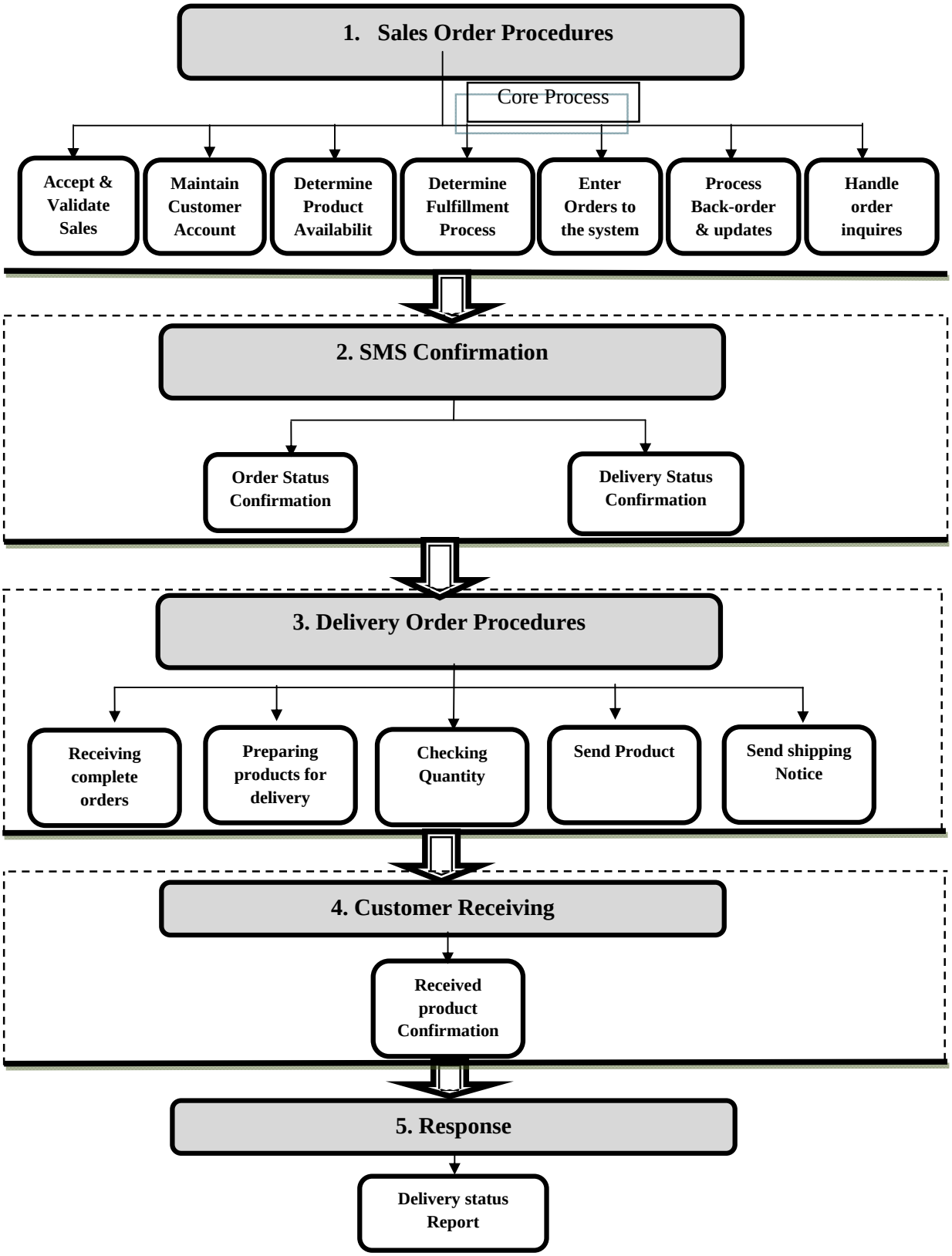

Figure 1: O-OTD Framework

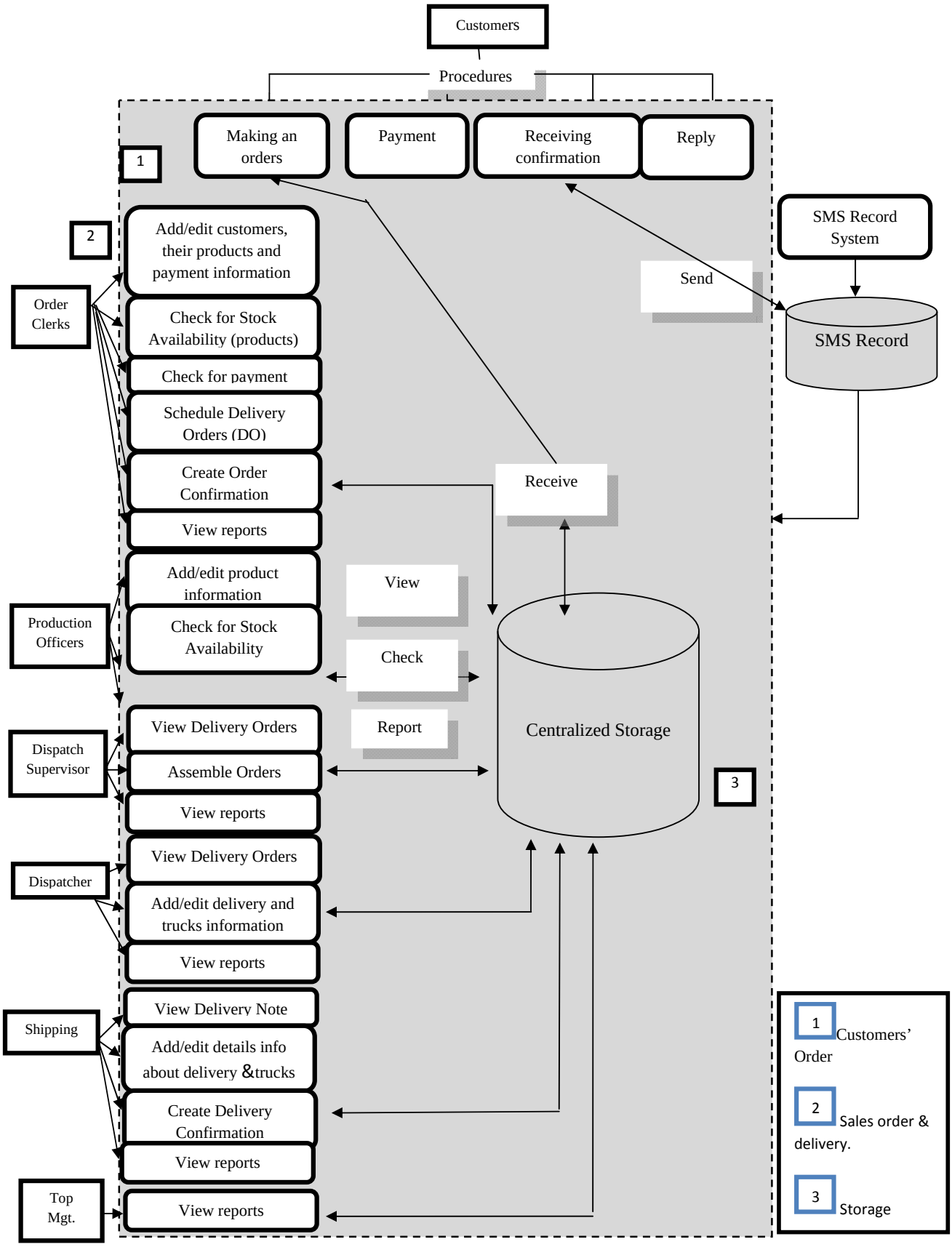

Figure 2: System Architecture

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