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E-COFS: An Order Fulfillment System and E-Commerce Website for Hem+Kontor

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Abstract: Order fulfillment services have been prominent, mainly in the manufacturing industry, as businesses started the trend of catering to customized products. Hem+Kontor, a furniture manufacturing company, produces customized furniture by fulfilling orders of businesses and residential units that require their services. Even as the company's current order fulfillment process allow them to keep close connections with their regulars and net new clients through word of mouth, there are instances wherein delays in fulfilling client requirements are happening. Problems such as difficulties in scheduling deliveries due to the lack of consideration of a truck's coding and not buying raw materials from the optimal supplier based on location and availability contribute to the order fulfillment delay. In addition, Hem+Kontor also identifies a marketing opportunity in expanding their customer base by developing an e-commerce website that allows end customers to order furniture directly and have various payment methods available. E-Commerce Website and Order Fulfillment System (E-COFS) aims to address the delays and make Hem+Kontor's order fulfillment process flow in a cycle while addressing the opportunity of creating a website. E-COFS will utilize the presence of a client interface that allows interaction with the company's order fulfillment process. The system will be implemented with Laravel, a PHP framework, along with MySQL database to display information to the web pages with HTML. Overall, the proposed system is able to address the delay in fulfilling client requirements because of the presence of a controlled order form, organized delivery schedule, and regulated supplier suggestions.

Key Words: E-commerce; IT; Manufacturing; Order Fulfillment;

1. Introduction

E-commerce sites have now been widespread as technology now brings the malls to the shoppers. There is now ample amount of currently implemented e-commerce sites for review such as Lazada, Metrodeals, Shopee, Zalora, and eBay PH (Yeo, 2017).

The aforementioned sites would be reviewed to find which has the best implementation of certain functions. The research would also include the security features and regulations needed, and currently implemented in the Philippines. Payment options will also be analyzed to find the best payment options available, such as alternatives to cash on delivery through a cash deposit slip and credit cards.

The company currently employs a site acting as a portfolio and a business card that provides information on what their services are, where they can be reached, and how to order from them. Though the current system works, the company is not able to fully promote their work to customers. Ordering now is done either by email or by appointment, as architects or interior designers would send specifications of the furniture to them for it to be manufactured and delivered back

(Timonera, personal communication, 2018).

1.1 Background of the Study

Hem+Kontor is currently having delays in fulfilling client requirements that can last up to a week depending on the cause of delay. These factors can range from the failure to consider delivery truck's coding, inefficient exchange of information through email, to the suboptimal choice of suppliers based on needed materials. The delays can affect the order fulfillment process as the process is done successively. Currently, Hem+Kontor has identified a concern that its customer base can be further expanded to end-customers through developing an e-commerce website that will also keep the company ahead of the competition (blueswitchwp, 2017).

1.2 Scope and Limitations

The proposed project is divided into the order fulfillment system and the e-commerce website. The e-commerce website will be developed to accept the clients' orders and will be integrated with the order fulfillment system by sending the order information acquired to the system. The order fulfillment system will be accessible by the company and will facilitate the whole order fulfillment process up until the products' delivery to the client. The system will be focusing on online transactions that allow clients to choose furniture and customize the colors, dimensions, materials to be used, and the like along with the choice to order premade furniture.

1.3 General Objective

This study aims to develop an order fulfillment system that will solve the problems encountered by Hem+Kontor regarding the delay in fulfilling their client's requirements while addressing the opportunity of expanding the company's customer base through the creation of an e-commerce website.

1.3.1 Specific Objectives

Specifically, the study aims to:

- Understand the business processes of Hem+Kontor;
- Identify the problems and opportunities of Hem+Kontor;
- Develop an order fulfillment system and an e-commerce website for Hem+Kontor.

2. METHODOLOGY

2.1 Development Method

The Rapid Application Development (RAD) methodology framework is utilized for the project. The RAD methodology attempts to break the project into smaller sections or phases, allowing the developers to go through repeated iterations of designing the requirements, developing the system, and having the client check the system. RAD methodology has four (4) phases, namely *Requirements Planning, User Design, Construction, and Implementation*.

During *requirements planning phase*, preliminary research and an interview was conducted to gather data on their order fulfillment process and to analyze it in order to identify problems. The order fulfillment process was illustrated using the Business Process Modeling Notation 2.0 (BPMN 2.0) and the problems were determined using an Ishikawa diagram. In *user design phase*, the proposed components of both the system and the website were created using BPMN 2.0, HTML, and image editing tools to be checked by the client. The *construction phase* was where the system was built through the proponents' preferred programming language and with the help of test data. The proponents repeatedly had the client and their adviser check the system and made changes to the system design accordingly. Once the client and the adviser approves of the system, the *implementation phase* followed where data conversion, testing, and conversion to the new system is emphasized. Tests by the future users of the system will be done to ensure that the system meets the client requirements. All data will be changed to fit the new system. Users in the company will be trained on how to use the system to be implemented.

2.2 Development Tools

The Laravel framework was applied to the development of the system. Laravel, a PHP framework, is used to process the information in the application to facilitate error handling, incorrect inputs and data conversion along with implementing a model-view-controller (MVC) architecture in the code.

APIs used in the system includes the PayMaya online

payment mainly used for handling online credit card payments. Captcha API used for checking the validity of the user when registering an account for the website.

2.3 Conceptual Framework

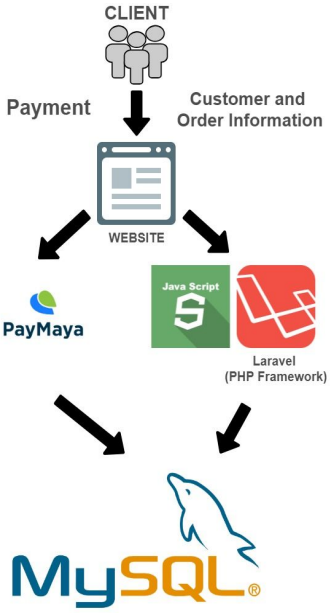

Figure 1 Conceptual Framework of E-COFS (E-Commerce Website)

The proponents utilized these development tools in order to create each feature of the e-commerce website and the order fulfillment system. The website enabled the user to order furnitures, both custom and pre-made. From there, the order information provided by the users is stored in the MySQL database and processed in the system.

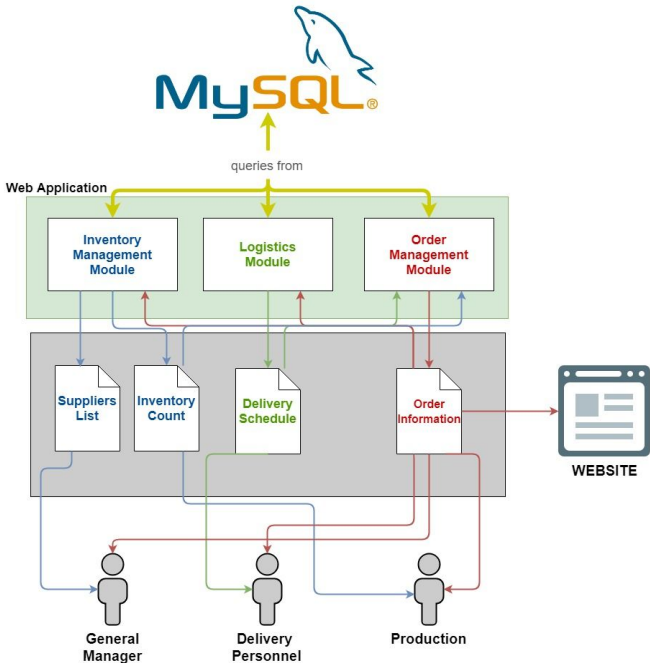

Figure 2 Conceptual Framework of E-COFS (Order Fulfillment System)

The said information is used in the system to calculate the sales accumulated per item, customer and time period (monthly, yearly, etc.). It is also the necessary component to update the inventory management module, in which the furnitures were replenished through job orders and purchase orders for raw materials. The said information is also used to schedule deliveries and create delivery receipts from the logistics module. Lastly, each order is further processed in the order management module by creating sales invoices that will serve as the official receipt of the customer, resulting in the end of order's lifecycle.

3. RESULTS AND DISCUSSION

The problems present in the order fulfillment process of Hem+Kontor regarding the delay in fulfilling their client's requirements is caused by factors such as difficulty in keeping track of their delivery schedules since all are clumped in one physical calendar, failure to consider truck's coding in assigning of delivery dates of

each personnel/truck, order details of custom orders being overlooked because of having lengthy discussion in emails which is caused by the first email containing missing details, supplier chosen may not be optimal since they contact their regular suppliers first instead of looking at all the possible suppliers, as well as having no record for possible suppliers and suppliers they have previously made a transaction with.

These problems were solved by E-COFS through the implementation of functions that solve each cause such as having a controlled order form that allows the customer and Hem+Kontor to communicate through the system regarding each data required for a product, which will require the customer to enter all the fields that is needed. On the other hand, Hem+Kontor can approve each field while giving suggestions to those that they decline. When each field is approved, the customer will pay through PayMaya, our third party payment gateway, which solves the problem of the first email containing missing details. An organized delivery scheduling is also implemented, Hem+Kontor is now required to enter the availability of their trucks, when scheduling an order, the system will only show the drivers and trucks that are available on that date and will also show the orders that are currently assigned to them to let them balance the load of each truck, while always considering the personnel and truck's availability. The choosing of the optimal supplier is solved by the improved version of creating a purchase order, wherein before creating the purchase order, the user will now see the raw materials that are below their restock point, and the raw materials will be filtered depending on the materials being offered by the selected supplier, then the purchase order can be generated which will automatically input the restock amount, set by Hem+Kontor, but can be changed based on the judgement of the manager. This function also allows Hem+Kontor to add new suppliers which becomes the record for both possible suppliers and suppliers with previous transactions. Through these functions, the problem regarding the delay in fulfilling client requirements is solved.

Along with the problem, an opportunity of expanding customer base by developing an e-commerce website was also proposed by the client. The problem and the opportunity was addressed by E-COFS through the implementation of controlled order forms, organized delivery scheduling, and regulated supplier suggestions.

A user acceptance test (UAT) was done to measure if the client requirements were met according to the client's inputs to various questions. The questions circled around the website and system's functionalities and user friendliness.

The results displayed that the client strongly agrees that the system can perform well according to the requirements set during the data gathering phase. She found the website and the system easy to use and navigate through. The results also showed a good experience of the client in processing deliveries of the ordered products to the customer.

Table 1. User Acceptance Test: Delivering Products to Customer

	Criteria	Answer
Is it easy to process deliveries for client orders?	Page / navigation design Information Provided	Strongly agree
Is it hard to track delivery receipts?	Page / navigation design Information provided	Disagree
Are all the information presented sufficient when processing / tracking deliveries for client orders?	Information provided	Strongly agree

4. CONCLUSIONS

The proponents discovered that Hem+Kontor's order fulfillment process had an underlying delay in fulfilling client orders. Along with the problem, an opportunity of expanding customer base by developing an e-commerce website was also proposed by the client. The problem and the opportunity was addressed by E-COFS through the implementation of controlled

order forms, organized delivery scheduling, and regulated supplier suggestions.

Further research can cover areas such as user interface, real-time simulations and additional functionalities that will contribute to a better experience of the customer when ordering a product. The system contains pages wherein user experience can be enhanced as the development for the system mostly focused on its functionality. The data used for the project is not optimal to fully test the system's capabilities. Real-time simulation of the system may be needed to see performance issues and system capacity. As for additional functionalities, product recommendations, more flexible location estimate for supplier recommendation and integrating promos for product discounts can ultimately help improve the features of the system and give a much more meaningful experience for the customer in interacting with the e-commerce website.

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