10th International Conference on Mass Customization and Personalization – Community of Europe (MCP - CE 2022)
Toward the Sustainable, User-Centric and Smart Industry 5.0
September 21-23, 2022, Novi Sad, Serbia

OPTIMIZING THE INTEGRATION PROCESS OF NEW CUSTOMERS IN A 3PL WAREHOUSE

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Abstract: *Third-Party Logistics (3PL) warehouses can handle different types of customers with a wide variety in product sizes and handling needs. Integrating a new customer in a 3PL warehouse is a complicated task with a long processing time. Streamlining the integration process is expected to decrease the processing time and ensure a more standardized set of available services for the customers. This paper focuses on a 3PL warehouse company case study, and it focuses on the current handling of furniture from six different customers. It includes an AS-IS analysis of the current processes from sales to integration. The AS-IS analysis will investigate the needed information in each step and how a different flow can shorten implementation time and ensure a more standardized integration. Based on the AS-IS analysis, the paper suggests a new TO-BE flow based on a configurator to implement new clients. The configurator is made from a service variant master which gives an overview of the services and the performed processes in the warehouses. The paper will investigate the possible use of a configurator to help the warehouse understand the customer's potential in the specific warehouse. The sales department can use the configurator to match the customer's needs and the services that the warehouse offers. The configurator can help to ensure that the offered services are aligned with the performed processes done by the warehouse operations. In the future, the sales department could also use a configurator on a bigger scale to identify which warehouses owned by the case company have the best fit for a specific customer based on location, available space, automation degree, etc.*

Key Words: ***Warehouse Services, 3PL Warehouse, Process Optimization, Service Modularity, Customer Implementation, Specification Process***

1. INTRODUCTION

This paper investigates the sales to integration specification process of new customers in several warehouses owned and run by a Third-Party Logistics (3PL) warehouse company. A 3PL warehouse company offers not just warehouse space but also a lot of Value Adding Services (VAS) and IT systems to keep track of the goods in the warehouse. [1] Using a 3PL warehouse can benefit companies that are specialized in production and decides to outsource their warehouse to ensure focus on their core competencies. [1] The focus of the 3PL warehouse is to provide great customer service that fulfills the needs of their customers. The customers storing their products in a 3PL warehouse can be very different, so the customer's needs vary greatly. This paper suggests a more standardized way to offer mass customization of warehouse services for the different customer types. This idea is inspired by the theory of mass customization of products. [2]

No integration process is the same. The sales to integration process depend on the customer's size, the type of goods, the required time until integration, etc. But this paper suggests that the integration process can be more standardized and more aligned with the actual services and processes currently offered and take place in the warehouses.

1.1. Case company: 3PL warehouses with furniture customers

A 3PL warehouse company offers their customers to store and handle goods for an amount of time until the goods are sent to either a store or the end customer. When *'customer'* is mentioned in the rest of the paper, it refers to the company that stores their products in the warehouse, as this is the customer of 3PL warehouses. A warehouse can handle multiple customers with their different flows based on the customer's. This paper is based on a case study analyzing the warehouse process flows of six furniture companies storing their products at three different warehouses. The limitation to only look at one customer type was done to limit the scope and to be able to compare the process flows as all the customers had similar products. The products of the furniture customers vary a lot in size as the furniture companies sell everything from couches, and coffee tables, to all kinds of accessories.

1.2. Process mapping of warehouse flow and integration flow

The paper is based on two types of process diagrams which map both the warehouse processes and the sales to integration process to integrate new customers. Both flows are essential to improve the integration of new customers. The diagrams focus on the processes of six

different furniture customers in warehouses operated by the case company.

The process flow maps the processes of the goods from the first notification of an inbound order arrives and till the end customer receives the outbound order. This flow will be investigated to understand the connection between the services and the processes executed in the warehouse. The flow is also used to get an overview of the services that can be performed in the warehouse.

The AS-IS integration flow will be made to understand how the communication between the different employees involved with the sales to integration process. It will also investigate the split of responsibility between the employees involved in the process.

1.3. Problem statement

Implementing new warehouse customers in a 3PL warehouse is a complicated task. Often the new customer is asked how they want the warehouse to handle their products. This increases the complexity as there is no standardized setup for new customers, and similar processes are often executed differently. The reason why the implementation is so complicated is that the warehouse can offer all kinds of services. Not just the services that ensure that the goods are going into the warehouse and out again, but also VAS that the customer can require while their goods are stored in the warehouse. Negotiating with a potential customer can be expensive, and it can take more than a year for the sales department to convince a new customer that the 3PL warehouse will be a good choice for their business.

This paper dives into the current process of implementing a new warehouse customer and, based on the findings, come up with a more standardized and automated way to implement a new customer. The new solution will decrease the time spent on winning over a new customer as it is more clear for the sales department what services the warehouse can offer. The automation integration can also ensure that less time is wasted on customers that do not end up choosing the warehouse as an initial quote can quickly be configured in the configurator.

2. LITERATURE

The literature studied for this paper focus on both the well-documented knowledge about product modularization and the process of building a product configurator. Furthermore, it investigates how the theory of product modularity can be transferred to service modularity. And how the knowledge of specification processes for products can be adopted to build a configurator for warehouse services.

2.1. Product modularity and mass customization

Product modularity is a well-documented concept. Already many years ago it was described how a platform also can be used for other business models than a physical product. [3] Product modularity is described as a grounded theory that has been tested in various cases in the MIT Press. [4] An article describing four case studies that successfully have implemented product modularity shows the extensive use of product modularity and evaluates the different levels of modularity. [5]

2.2. Service modularity

Not many articles are discussing the application of service modularity at a case company. But the concept and the possible benefits are well documented in several papers. A PhD project from 2011 states that modularity can be used to reduce complexity in services and that it can increase the flexibility of the offered services. It also states that the challenges with services modularity might be different from the product modularity. [6] A paper on service modularity based on literature research states that more and more companies rely on services as their main business case and that the well-known product modularization can be developed to also work to streamline services. [7] Focusing on the 3PL industry as this paper investigates a 3PL warehouse company. Another article describes how 3PL companies are based on services and how service modularity can increase the warehouse company's knowledge about what they can offer their customers. [8]

2.3. Specification processes

The specification process is the process from which the customer shows interest until they have decided on a product. The specification process can be assessed in many ways. The book *Product Customization* describes a step-by-step guide to how a specification process can be analyzed and improved. [9] It suggests that to improve the specification process both the product needs to be modularized based on a product variant master (PVM) and the AS-IS integration process needs to be clearer and module-based. A method to model the specification process is also suggested in a paper. The paper is based on case studies that test the redesigning process of the specification process. [10] A PhD project from 2009 suggests that the PVM can be adopted to be a service variant master that can give an overview of the services that the company can offer. The suggested views are the customer view, object view (hardware and software), and service view.[11]

2.4. Product configuration

Building a configurator to improve the mass customization of a product is a well-documented theory.[9], [10], [12] A configurator works as an expert system that contains the possible combinations of a specific product. A configurator is categorized as artificial intelligence (AI) tool that ensures that the system can make choices based on predefined requirements. For an expert system as a configurator, it is important to ensure that it is programmed intuitively as it will be used by several different people, and it should be easy to update when changes are made to the product.[9]

2.5. Service configurator

Limit amount of case studies have been done on service configuration. One article describes the use of a service configurator to set up a new call center. The configurator of services is used to increase the quality of the warehouse service, lower the cost, and speed up the process of implementing a new customer in the IT

systems. [13] This study is also based on a case study, and it concludes that a modular service architecture can help to meet the needs of individual customers. Based on a service variant master it was tested to build a proof of concept configurator for a case study. [11]

3. METHODOLOGY

This paper is based on a case study. The case study allows the researcher to understand the current situation and to come up with a possible solution. The solution consists of different steps to improve and standardize the implementation of new customers in a 3PL warehouse with the final result being a configurator. The data collection consisted of interviews with several different employees from the warehouse and employees involved in the sales to the integration process in the warehouse. For the warehouse mapping, each of the processes in the warehouse was mapped to understand the process flow of a specific customer type at a warehouse. Data from the warehouse management system (WMS) was analyzed to understand the process flows of the different customers. The process flows were then compared, and a generic process flow was made. For the mapping of all the possible services that the warehouse can offer old SOPs for the customers were studied. For the sales to the integration process, an employee from each step of the integration was interviewed. These interviews included sales, contract manager, project manager, and warehouse operations. Based on the interviews an AS-IS process diagram was made. The flows were used when applying the theory of mass customization [9] to increase the modularization of the offered services. A PVM adopted to services was made with three different views to get an overview of all the different services that the case company is currently offering their customers. Based on the service PVM the first version of a configurator to set up new customers was developed in Tacton.

4. ANALYSIS

The analysis is done based on data that was collected in interviews and data from the WMS. The analysis has focused on one type of customer and the services and processes that are currently performed for this type of customer. Based on interviews with the warehouse manager it is expected that the processes will be similar in other warehouses and at least 80 % of the processes will be the same for different types of customers.

4.1. Data

The data gathered to make this paper is a combination of qualitative and quantitative data. The qualitative data consist of interviews with different employees in the warehouses. To make the generic process flows multiple interviews was made with the different managers for each of the six customers. The received information was validated by observing the actual processes in the warehouse for each of the six customers.

The sales to integration flow was mapped based on different interviews with each of the employees involved in the process. The interviews focused on the processes as-is but also on the employees suggestions on how to improve the sales to integration process in the future.

The quantitative data used for this paper is Standard Operating Procedure (SOP) for current customers, a Power BI overview of customers using data from the WMS, and a number of different internal Excel files used in the sales to integration process. The SOPs and the internal excel documents and templates were used to get an overview of the different services that the warehouse are currently performing for their customers. The Power BI overview was used to understand the differences between the warehouse customers and their products.

4.2. Generic process flow

The flow of six warehouse customers was mapped to understand which services and processes are performed for the different furniture customers. The flows were mapped based on observations and interviews in the warehouses. Based on the six process flows a generic process flow was made. The flow included all the processes that are necessary to perform the services that the customers require.

The process flows were split into inbound and outbound. Inbound goes from the first information is received about the order until the goods are stored at a destination in the warehouse. The outbound process goes from the outbound order is received until the order is received by the end customer. Figure 1 shows the generic inbound process flow. Each process contains sub-processes that can be either system-guided or non-system-guided. This generic flow with processes will ensure that the different customers in the warehouse are based on the same modules. For each customer, specific sub-processes can be added in each step when the customer chose to have a specific service.

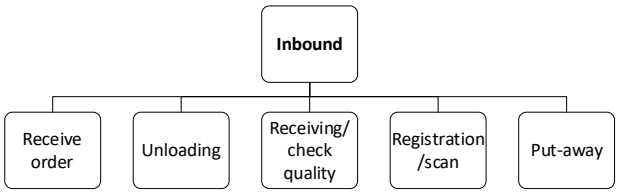

Fig. 1. *Generic inbound flow*

The generic outbound flow can be seen in figure 2. As with the inbound flow the outbound flow also consists of the most important overall processes and each process consist of sub-processes that can be enabled for customers with a specific service.

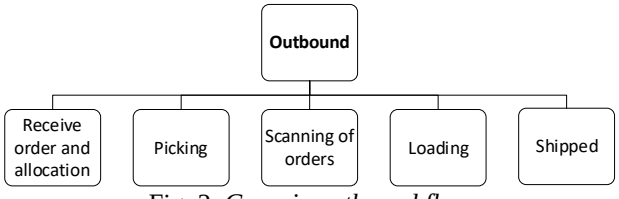

Fig. 2. *Generic outbound flow*

The generic process flows were made to get an overview of the different modules that the normal warehouse process consists of. Each of these modules and the customer-specific VAS will be part of the next

step to make a general overview of all the possible ways of handling goods in the warehouses.

4.3. Service variant master

This section will explain how the well-described concept of making a product variant master (PVM) has been adopted to map the possible services and the needed processes. The normal views in a PVM are customer view, engineering view, and part view.[9] For the service variant master (SVM) in this project, the three views have been changed to the customer view, engineering view, and service view. The customer view describes the overall requirements of the customer that should be part of the initial contract negotiations. It gives an indication of the type of customer and the possibilities in the different warehouses. The engineering view gives an overview of all the different processes that are executed to fulfill the offered service for different type of customers. The last view is the service view which describes all the different services that the warehouse can offer for different types of customers. Figure 3 gives an overview of the three views.

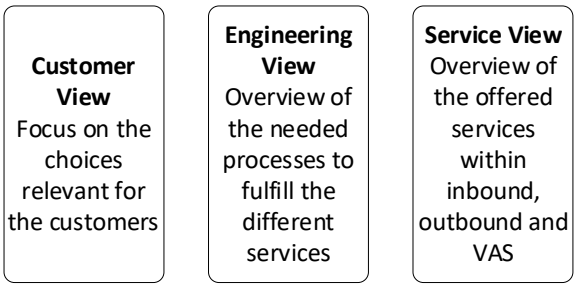

Fig. 3. *The three views in the service variant master*

The service view contains both the main services that are part of the inbound and outbound flow that was described earlier but it also contains all the VAS that can happen either in the inbound, outbound, or while the products are in the storage. To be able to map these services in a structured way they were split into system-guided and non-system-guided services. The case study showed that a big part of running a warehouse for furniture customers is to fulfill the customers' needs. Not all the customers' requests can be fulfilled by already known processes. Therefore, it is important to notice that the company can still perform services outside of the system that is not already described. Figure 4 shows an example of the service views in the SVM. As described in figure 3 the service view contains an overview of all the services that the warehouse can offer. Figure 4 shows an example of the services for each step in the inbound and outbound process. The split between system-guided and non-system-guided services is important, but it is not included in the example in figure 4. The full overview of all the offered services is kept by the author, as it contains confidential information about the case company.

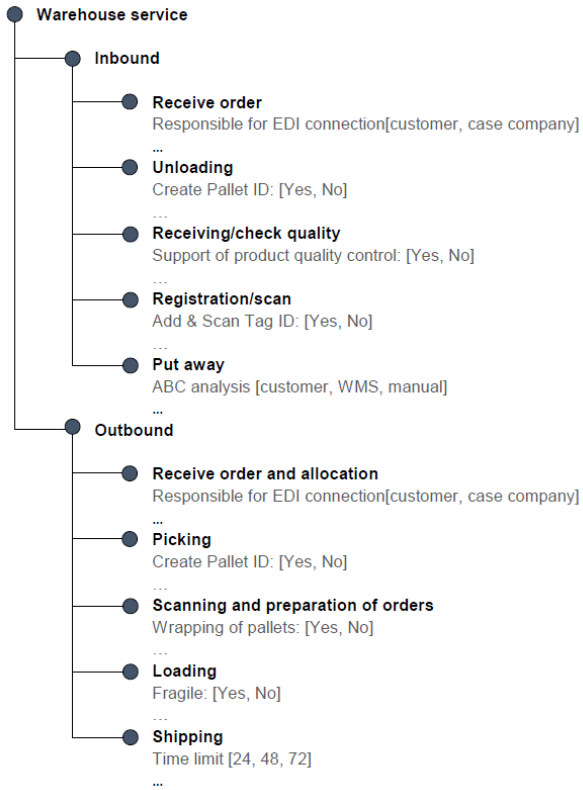

Fig. 4. *Example of simplified service view in the SVM.*

The overview in figure 4 helps to streamline and understand what services a warehouse owned by the case company should offer its customers. The example also shows how the service variant master can be used to get an overview of the services. There are many different types of customers and depending on the customer type a set of constraints should be added to the figure to ensure that only the relevant services are available for the specific customer type.

4.4. New customer AS-IS flow

The current flow for implementing new customers in the warehouses has been investigated and analyzed. The AS-IS flow is based on interviews with the sales department, a contract manager, a project manager, and different team leads that are responsible for daily operations and continuous contact with the customers. The flow can be seen in figure 5.

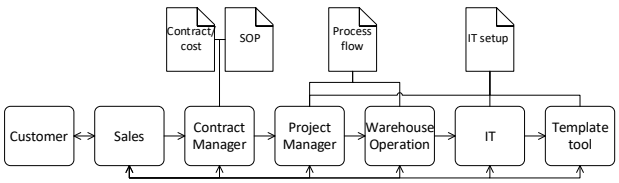

Fig. 5. *AS-IS integration process*

The flow starts with either the customer or the sales department that contacts the other. If the customer contacts the sales department, it is now the job of the sales department to understand the customer and figure out what the warehouse can offer that specific customer. If the sales department contacts the customer, they will most likely already have a big amount of information

about the company and have a suggested set of services lined up that the warehouse can offer the customer.

Based on knowledge about the warehouse the sales department will promise the customer a set of services and integrations with the warehouse. Once the customer agrees to collaborate with the warehouse the actual agreement of what the warehouse can offer and how it can fit into the customer's needs starts. This process includes both the sales department, contract manager, project manager, and warehouse operations. If the requirements also include the IT systems, the IT department will also be involved to evaluate the possibilities from an IT perspective. This process can be long as the sales and contract managers are not always aligned with the operations and possibilities in the warehouses. Building a new flow that controls what the sales department can offer the customer will be presented in the next section.

4.5. New customer TO-BE flow

The TO-BE flow is based on the implementation of a configurator that can be used by the sales team. The configurator will ensure that the sales team only sells the services that the specific warehouse can offer. It will also streamline the implementation of new customers and ensure that they are implemented in a more streamlined way. Based on the answers in the configurator it can produce the suggested process flow, the SOP, and the contract. In the future, it should also be able to suggest the needed IT setup for the specific customer. Figure 6 shows the sales to integration flow with a configurator.

The configurator will help to ensure that the sales department has a clear overview of what the specific warehouse can offer and how the most optimal process flow is for the specific customer based on their requirements. The configurator is updated and maintained by the contract manager, project manager, warehouse operations, and the IT department. An updated and functional version of the configurator is essential for the TO-BE flow to become a success in the long term.

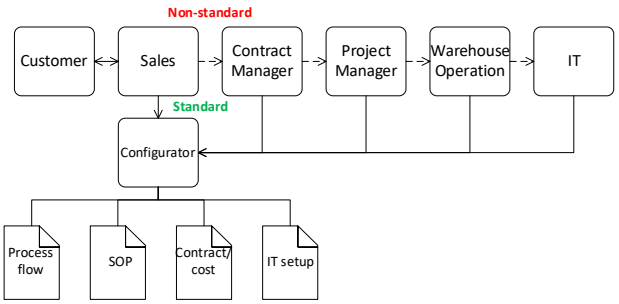

Fig. 6. *TO-BE integration process*

The TO-BE diagram in figure 6 has a clear split between the flow of standard customers and non-standard customers. The standard customers should be handled with the configurator and the non-standard customers will be handled with the old flow of going though each of the different employees. The configurator will help to make the split between standard and non-standard customers as the standard customers only have services that are already a part of the configurator. In the future this can also make it easier to differentiate the general price for a standard customer versus a non-standard customer.

4.6. Configurator for setting up a new customer

The idea of using a configurator to setup a new customer in a 3PL warehouse is based on the knowledge of how configurators are already used in product design and how they can reduce the complexity of a product. Following the principles of how a configurator can be made some of the methods had to be adopted before they could be applied to the case study where the focus was to streamline services. [9]

To set up the configurator the full SVM was used to add all the possible choices in the configurator. A simple configurator was set up in the configurator software tool called Tacton. The configurator was showcased to the case company to get their feedback on the idea of using such a configurator to set up new customers in the warehouses.

The warehouse managers of the case companies saw a big potential in the configurator and explained how it could be used to change the way the case company is currently setting up its customers. The company could change from asking their customers what they want to telling the customers what they can offer as a warehouse service provider. The warehouse managers also indicated that even though this case study was only based on furniture customers at least 80 % of the process would be the same for other types of customers.

5. DISCUSSION

The paper investigates the potential of streamlining and optimizing warehouse processes by using a configurator to implement new customers. Building the warehouse based on a configurator can assure that the company gets a clear overview of which services they can offer their customers. This case study is focused on warehouse customers with furniture, and it includes an analysis based on a limited number of warehouses. The potential of the project is much bigger as the processes inside a 3PL warehouse are similar even for different type of customers. It is expected that the output of this research will also apply to a lot of other warehouses in the 3PL industry. Setting up a configurator across multiple warehouses owned by the same company could be used to find the most optimal warehouse for a specific type of customer.

Warehouses in the Northern part of Europe are constantly looking for new warehouse workers. It is hard to find warehouse workers and automation of warehouses is becoming a necessity for many warehouses to live up to the demand. Implementing automation in a 3PL warehouse with multiple customers the streamlining of processes will be an advantage. [14]

Once more warehouses have been automated the configurator could also include a part where the optimal warehouse with the best fitting automation solution can be picked based on the type and size of the customer being implemented.

6. CONCLUSION

The analysis has concluded that there is a big potential to use modularization to understand the services and streamline the integration process. Implementing a configurator can help to integrate the customer in a more standardized way. It can also help the warehouse company to know what they can offer their customers and decide whether the customer will be a standard customer, or a non-standard customer based on the requirements of the customer. The configurator works as an AI tool that based on constraints for different types of customers ensure that the best possible service can be provided. Streamlining the integration process can increase help to aligning processes and services between multiple warehouses owned by the same company. This is important in the future if the case company invests in different automation solutions for their warehouses.

The next step in the research is to fully develop a functional configurator that can be tested by one of the warehouses. Furthermore, the process flow made for the furniture customers should be tested on other types of customers and the differences should be added to the flow, the SVM, and to the configurator. The next step in the process is also to include the IT setup in the configurator. To do this an understanding of the WMS and the process of setting up a new customer needs to be investigated.

7. ACKNOWLEDGEMENT

A big thank you to the master students Mads, Sofie, Maximilian, and Lydia who all helped to map the processes of the six furniture customers as part of their master thesis in Spring 2022. A special thanks to Lydia, who focused her master thesis on configurators for furniture customers. She developed a prototype that was used to showcase the idea for the case company and get their initial feedback on the idea.

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