Caring Pharmacy

Business Process Management Design

[200014] BPM Project June, 2021

MASTER OF DATA SCIENCE AND ADVANCED ANALYTICS

Group E

Ahmadov, Emil (m20201004)

Aldesouky, Nadine (m20200568)

Godeiro, Pedro (m20200396)

Shin, Doyun (m20200565)

Tagiltseva, Anastasiia (m20200041)

NOVA Information Management School

Universidade Nova de Lisboa

Contents

1. Introduction

Factors of production (i.e., land, labor, capital, and entrepreneurship) are often the building blocks of a company, hence the economy. However, without a proper management of the interactions among these factors, we would only condone an inefficiency, waste of resources, lower and customer satisfaction mounting to loss of competitive advantage. Naturally, academia and competitive companies have long been dedicating themselves to a holistic discipline of managing business processes to ensure consistent outcome and take advantage of improvement opportunities, referred to as Business Process Management. Nonetheless, organizations continue to lack comprehensive BPM, follow outdated practices, or simply face the limitations of the traditional BPM (Vugec et al., 2018). Caring pharmacy being one, the managers have decided to re-engineer its current BPM surrounding the company's order-to-cash process (O2C), to overcome customer dissatisfaction and its inability to handle certain tasks.

2. Background

Regarding theoretical background used to assess the quality of the AS-IS process we need to understand that assessing the quality of a process is something that is done both qualitatively and quantitatively. Having that in consideration, we need to use literature from the two different sides, having both qualitative and quantitative analysis literature.

Our main reference for this analysis is the literature from Dumas, M., Rosa, M. L., Mendling, J., & Reijers, H. A. (2013) and second edition from (2017). It is a reference widely used on business process management and BPM classes from this course. It goes from the qualitative analysis on some charters all the way to quantitative on other ones.

3. Development

3.1 AS-IS Process

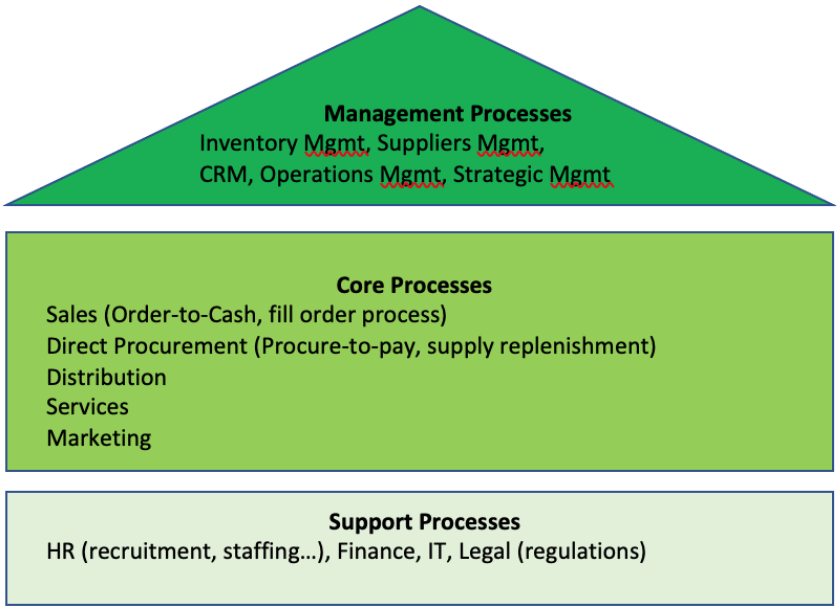
3.1.1 Process Identification

A business process is "a collection of inter-related events, activities and decision points that involve a number of actors and objects, and that collectively lead on an outcome that is of value to at least one customer" (Dumas et al., 2013).

Caring Pharmacy is looking to improve its OTC Process. By definition, the OTC process starts from the moment an order is received and ends when payment has been received and credited. This is a process as it includes several related events, activities, tasks, and decision points involving actors such as pharmacists and technicians which lead to outcomes including the delivery of ordered medicine to a customer.

This BPM initiative is to improve the O2C process to ensure that it consistently results in only positive outcomes and runs efficiently while delivering the maximum value to its customers. Thus, the reputation of Care Pharmacy and its customer satisfaction will be restored both internally and externally.

Regarding the process designation phase, below is a diagram of the processes that exist within Care Pharmacy according to Porter's Value Chain Model:



As mentioned earlier, for this project we will focus on the narrow process of O2C as it will have an important positive impact on solving the issues of employee and customer satisfaction without changing/impacting much of the broader processes. Since we assume this minimum relationship and interaction between the different processes in the pharmacy, we can be sure to avoid causing problems in other departments or processes after changing the O2C one. Additionally, by only identifying this process we will be able to yield a larger impact.

Regarding the evaluation phase, the O2C process succeeds in getting prioritized as it is important to the pharmacy's strategic goals of profitability and continuity. Additionally, it is currently dysfunctional which is clear from the resulting complains from employees and customers. Finally, it is feasible given the resources currently available and the predicted benefits associated.

3.1.2 AS-IS Process Description

The issues at hand are customer dissatisfaction and employee overload which affect many other processes such as human resource management (i.e. hiring/staffing, number of employees which are pharmacists or technicians, paying employees more for overtime), operations management (I.e. scheduling of employees, working hours, work processes), customer relationship management (I.e. service provided to customer, efforts for retention and post-purchase), inventory management (I.e. inventory sourcing and optimization). Most of these processes have an indirect relationship as dealing with them would encompass many additional processes and unnecessary actors/stakeholders since they are very broad processes. Since these processes would incur a lot of time and costs which are resources we do not have, we assume that Care Pharmacy will deal with them in the future by devising a long-term plan. However, in order to solve this problem immediately, we will target the more specific and detailed processes. As a result, we limit our scope to the core and critical O2C process as we believe it will have a direct, immediate, and significant impact to the problems at hand.

This is an O2C process which means that it starts with a client requesting an order and ends with them paying for and receiving that order. In this case, the customer is both external and internal to the pharmacy. Since the purpose of redesigning this process is to solve the problems of customer

dissatisfaction as well as employees working overtime, we consider the customer of the process to be both the client/patient and the employee.

In general, a customer arrives to the pharmacy with an order which the technician in cooperation with the pharmacist try to fulfill. This involves checking whether the order requires a prescription, whether the associated prescription is valid, and whether the medicine or its alternative is available. The process involves a lot of back and forth between the pharmacist, the technician, the customer, and the prescribing doctor. The process also covers a pharmacy system which performs most checks such as DUR and documents everything such as justifications for selling the medicine.

3.1.3 AS-IS Process Discovery

The BPMN process model illustrating the AS-IS process in detail is included in the next section, *3.1.4 AS-IS Process Analysis*.

This O2C process comprises the following subprocesses:

- Order fulfillment
- Insurance check

For defining the time distribution for insurance check subprocess, expectation of the aggregated processes was found by multiplying the corresponding probability of the task with mean duration:

P(talking to customer)*mean of task “discuss with patient” + P(call doctor)*mean of task “call doctor” + P(discussing with doctor)*mean of task “discuss the situation with doctor” = 1.73 mins

It consists of the following events, activities, and tasks:

- Technician requests and receives the order prescription.
- Technician takes note of the order.
- Technician checks in the system if the ordered drug can be picked up by the client without a prescription.
- Technician fulfills the order*
- Technician receives payment and delivers the order.
- Pharmacy system performs an automated check DUR.
- Pharmacy system completes an insurance check*
- Pharmacist performs an exhaustive check of the prescription.
- Pharmacist makes a note in the system justifying why they proceeded with the prescription.
- Pharmacist calls the client’s doctor to discuss the situation and verify how to proceed with the given prescription.
- Doctor sends a new prescription electronically to the client’s phone.
- Technician checks the stock for the requested medicine.
- Technician goes to get the medicine from the stock room.
- Pharmacist check if it’s the right medicine.
- Technician packs the medicine.
- Pharmacist checks for alternative medicine options.
- Pharmacist informs the customer that the medicine is out of stock and orders from the supplier.
- Pharmacist calls the doctor to discuss an alternative medication.
- Client pays for the order.

It goes through the following decision points:

- Decide whether the benefits of the treatment are higher than the problems that may arise for the situation of the client or not in order to proceed with the prescription.
- Decide on an alternative medication for the customer.
- Decide to order more of a specific medication.
- Client deciding whether to buy the medication replacement or not.
- Client
- Client deciding whether to pay for the medicine themselves or come again later.

For calculating the probabilities for decision points after the subprocesses, probabilities along each path are multiplied.

It involves the following actors and objects:

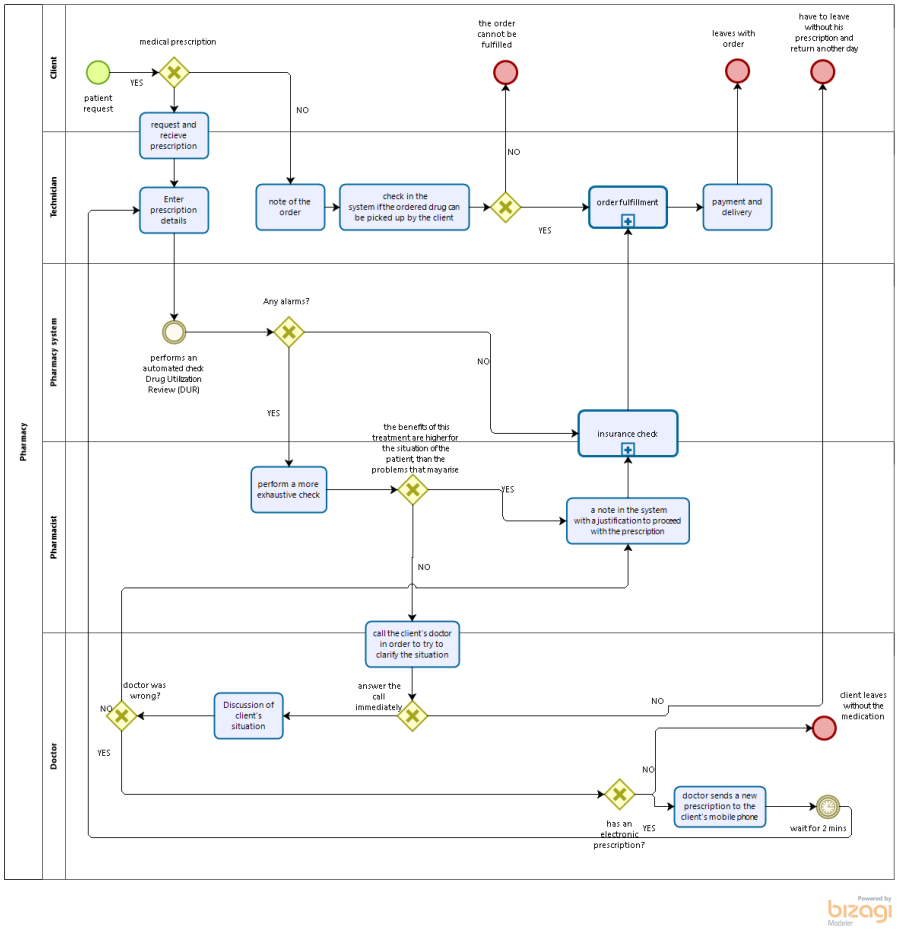
- Technician
- Pharmacist
- Doctor
- Client
- Pharmacy system

Finally delivering the following positive and/or negative outcomes:

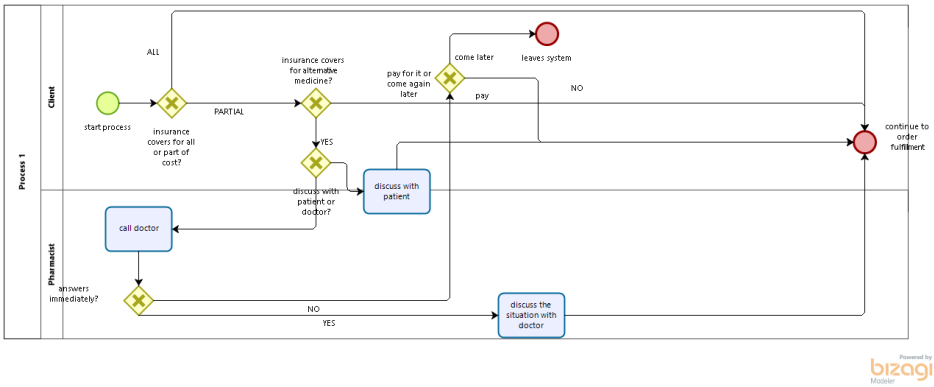
- Client leaves with the order and the insurance pays for a part of it.
- Client leaves with the order and the insurance pays all of it.
- Client leaves without the order because they do not have the required prescription.
- Client leaves without the order and must return another day because the doctor did not answer the phone immediately.
- Client leaves without the order because the doctor was wrong and could not send them a new prescription electronically since their initial one was not electronic.
- Client leaves without the order because it's out of stock and there are no alternative medications.
- Client leaves without the order because their insurance does not pay for it and there are no replacements.
- Client pays for their whole order and leaves.
- Client leaves without the order because their doctor did not pick up the phone to provide an insured medication replacement.

3.1.4 AS-IS Process Analysis

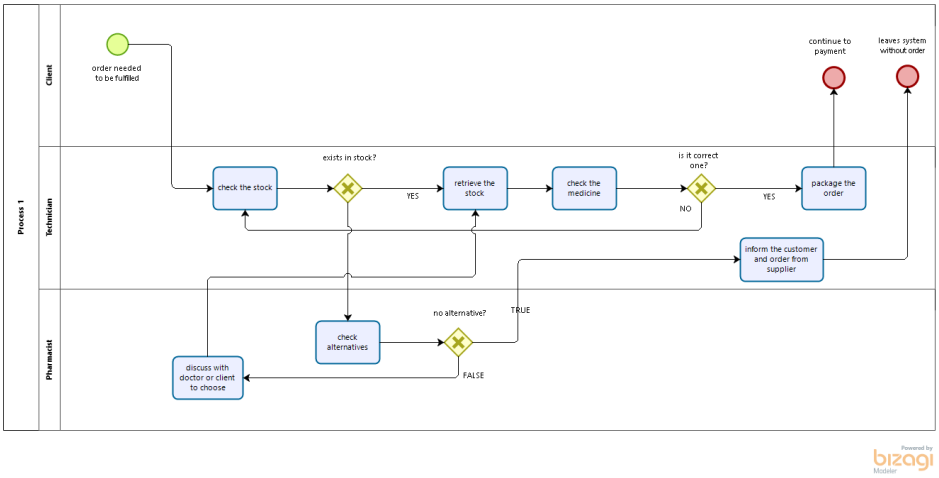
The pictures below show the simulation of the process using Bizagi



Pic 1. As-Is Process diagram in Bizagi



Pic 2. As-Is Insurance check sub-process diagram in Bizagi



Pic 3. As-Is fulfilment order sub-process diagram in Bizagi

Value-Added Analysis:

Value Adding (VA): Produces value or satisfaction to the customer
Business Value Adding (BVA): A step is required for the business to run efficiently, to collect revenue, or it is required due to the regulatory environment of the business
Non-Value Adding (NVA): Steps that do not fall into neither of the two previous categories.

Step	Performer	Classification
Patient request	Client	VA
Wait	Client	NVA
Request and receive prescription	Technician	BVA
Takes note of the order without prescription	Technician	NVA
Register/fulfill the order without prescription	Technician	VA
Enter prescription details	Technician	BVA
Review alarm from Drug Utilization Review (DUR)	Pharmacist	VA
Call the client's doctor in order to try to clarify the situation with alarm	Pharmacist	VA
Discuss replacement with the patient if insurance doesn't cover the medicine	Pharmacist	VA
Call the client's doctor if insurance doesn't cover the medicine	Pharmacist	BVA
Get the medicine if the pharmacy has it	Technician	BVA
Choose alternatives for the medicine with doc and client (call doc again)	Pharmacist	BVA
Receive the payment from the client	Technician	VA

KPI per segment (simulation for 30 replications, avg per replication)	Current situation
Customer performance	
Return Rate	dissatisfied
Time-related process performance:	
Process duration (avg time)	6 min 56 sec
Total time (m)	1517 min
Total time waiting resource (m)	113.53min
Cost-related process performance:	
Total cost	148.05
Technician	66.96
Pharmacist	81.09
Employee performance:	
Resource utilization	56.26%
Technician	50.18%
Pharmacist	62.34%

Issue register

Issue	Priority	Description	Data and assumptions	Qualitative impact	Quantitative impact
Employee overloading and customer dissatisfaction	1	the employee is unable to serve all customers during regular work hours, having to make more time to be able to serve customers or sometimes does not even attend them	Arrival rate (λ) - average number of new instances of the process that are created per time unit = 220 customers per day or 27.5 customers per hour, mean inter-arrival time = 1/27.5 it's about every 2.18min	The way the process is performed in terms of quality and efficiency affects the reputation and competitiveness of the organization.	The pharmacy has 4 technicians and 3 pharmacists, receiving each 1000€ and 1300€ respectively, it means 1h cost 5.42€ and 4.17€ accordingly

Considering all the AS-IS process modelled on Bizagi, there are improvements that could be made. The main problem with the time could be saved by changing the verification process - DUR control and insurance verification should take place at the same stage as if any incompatible products were observed in both cases, pharmacists should call the doctor and clients. Because pharmacists must call twice for a prescription, this is really time consuming and costly from a pharmacy's point of view. Therefore, in order to keep costs down and save process time, once both checks have been completed, pharmacists should start solving problems. This will allow pharmacists to make the necessary changes to the prescription for drugs in one call. Changing the process will help reduce the likelihood of misunderstandings with clients about changing medications and will also make communication effective.

3.2 TO-BE Process

3.2.1 TO-BE Process Proposal

In process redesign phase we considered different heuristics such as task elimination, re-sequencing, resource optimization and automation. However, since main problems of the current model were related to inefficiency and speed of processes, we mostly considered actions which decreased time. These actions might cause changes in other dimensions such as cost.

Our analysis shows that “insurance check”, “request and receive prescription” and “order fulfillment” tasks are main bottlenecks in the process. Other than bottlenecks, we can also see that resources are underutilized with 56 percent of utilization. We mainly focused on these processes and resource utilizations to improve the process.

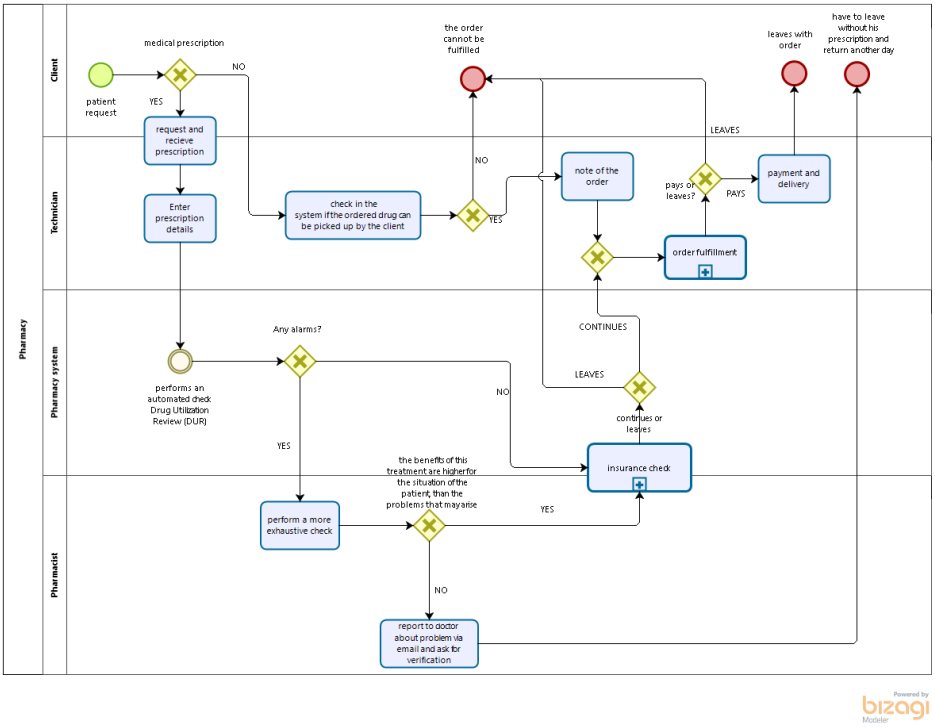
First proposed change is related to order fulfillment subprocess. When there is no stock of the given medicine in the pharmacy, pharmacist must check for alternatives of the special medicine. This is costly in terms of time, since it takes one minute on average to perform this task, and human resource since it requires one pharmacist to serve to the customer. To eliminate this waste of time and utilize resources better, we propose the creation of database with alternatives of the medicines. If needed, system automatically will automatically show if a medicine has an alternative or not.

Another proposed change is about re-sequencing “note of the order” task. This task is non-value adding task also can be done in the later phase of process. Since some of the medicines cannot be picked up without prescription it is unnecessary to keep notes of all the orders, even the ones which are not completed. We propose switching this task after it is decided if the medicine can be picked by a person without prescription. This will eliminate waste of time.

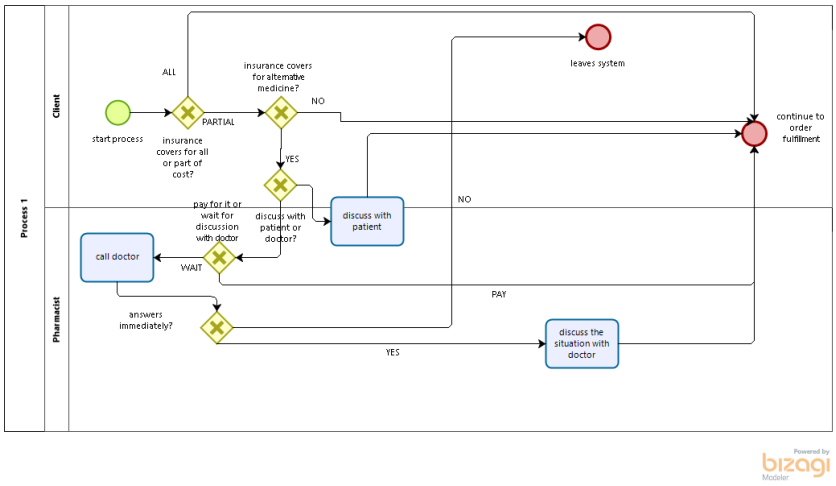
Third possible change is eliminating discussions with doctor. It requires a lot of time to reach doctor and discuss the situation. Instead of these tasks we offer changing mean of information exchange to e-mail from phone. In this case pharmacist will report the problem to doctor via e-mail and customer will leave the system. Customer can come back to the pharmacy next day with new prescription or doctor’s verification about the prescribed medicine. This will help eliminating long and unnecessary tasks from the process and speeding up the flow.

Next proposed change is re-sequencing the decision point of where customer wants to pay all the cost or wants to discuss with doctor in “insurance check” subprocess. In current model this point comes late in the process. Moving this decision point to an earlier stage will save time for customers and resources. We moved this decision point to where pharmacist must call doctor. Before calling doctor, pharmacist asks if the client wants to pay for all as it is or wants pharmacist to discuss with doctor.

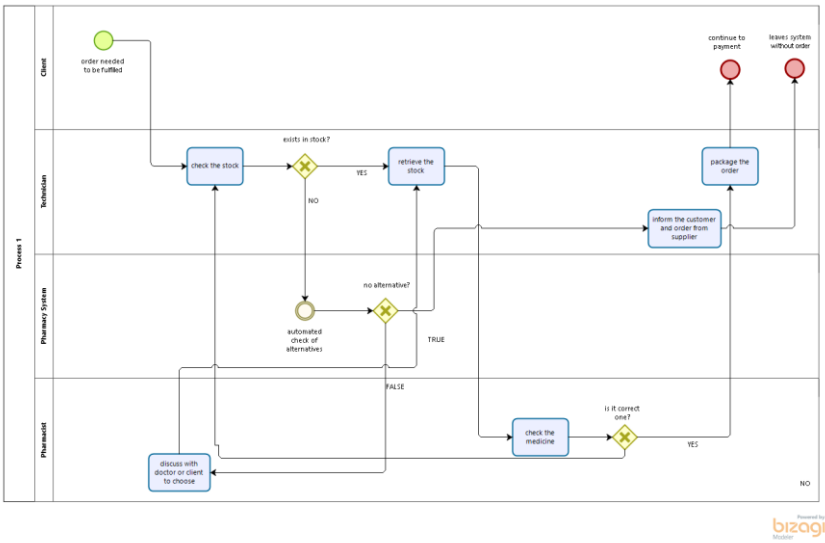
Another proposed change is about resource optimization. In the current model technicians and pharmacists have specific tasks. However, not all these tasks require specialization. For this purpose and considering that pharmacists are underutilized, and some workers are complaining about work overload, we decided to use resources interchangeably in the tasks. “request and receive prescription”, “payment and delivery” and “enter prescription details” tasks are assigned also pharmacists in order to speed up the tasks and flow. Other tasks which require specialization are not allocated extra resources. This change also balances the utilizations of the resources.



Pic 4. TO-BE Process diagram in Bizagi



Pic 5. TO-BE Insurance check sub-process diagram in Bizagi



Pic 6. TO-BE fulfilment order sub-process diagram in Bizagi

3.2.2 TO-BE Process Results

These improvements are expected to speed up the processes and decrease the time customers spend in the system. After making above mentioned changes to the model and replicating simulation for 30 times we achieved average processing time of 5.59 minutes, which is almost 1.5 minutes better than the current state of the model. Resource utilization is also decreased to 47% which prevents system getting overloaded.

4. Conclusion

4.1 Concluding Summary

For this BPM project, we have sought to improve Caring Pharmacy's O2C process to produce more consistent outcome and improve customer satisfaction. We started our study by designating difference business operations into management, core, and support processes following Porter's Value Chain Model, Caring Pharmacy's O2C process being an element of the core processes. We evaluated the O2C process to be one of the company's top priorities based on its importance to achieving strategic goals, dysfunctionality, and feasibility. Surely, the company's current issues (customer dissatisfaction and work overload for employees) are associated with other factors, such as HRM, operations management, CRM, and inventory management. Nonetheless, the scope of the project was limited to O2C process as the improvement in this area could produce significant results for the firm's current issues in both short term and long term.

The AS-IS O2C process, which includes order fulfillment and insurance check subprocesses, was found to be rather inefficient. It requires frequent communications among different parties (i.e., pharmacists, technicians, customers, and prescribing doctors) centered around the pharmacy system. To redesign the process, we analyzed value-adding, business-value-adding, and non-value-adding tasks conducted by these parties. It was found most of the tasks are, unsurprisingly, conducted by technicians and pharmacists. Of the two, pharmacists' responsibilities incurred more cost than technicians', although technician's responsibilities included a non-value-adding activity and pharmacists' performance rate was

higher. Furthermore, we discovered the verification process involving DUR control and insurance check were highly burdening Caring pharmacy's operation.

To redesign the current practice, we focused on the main bottlenecks, namely, *insurance check; request and receive prescription;* and *order fulfillment*. The low resource utilization level at 56% also indicated a room for improvement. The resulting TO-BE process proposal includes alternative medicine database for *order fulfillment* process, re-sequencing of *note of the order* and *insurance check*, minimizing interaction with prescribing doctors, and delegating tasks that does not require high level of specialization to more available entities. Our final TO-BE model resulted in about 1.5 minutes faster average processing time from the initial 7 minutes.

4.2 Limitations

Considering the limitations faced to create this project, one of the facts that reduced capacity of exploring in a more detailed level the failure in the process is the way on how the times are represented in the description of the model. When we have only the average time spent, we limit our analysis. Having the average, it means we cannot analyze specific cases in which the time spent in the whole process was big.

In general, we have limitations inherent in most of the simulated processes:

- Simulation results may differ from one run to another because of stochastic
- Simulation results are only as trustworthy as the input data
- Simplifying assumptions:
    - That the process model is always followed to the letter (No deviations, No workarounds)
    - That there is no multitasking (the same resource performs multiple tasks concurrently) nor batching (tasks being accumulated and performed in a single go)
    - That resources work constantly and non-stop.

4.3 Future work

For this project, we addressed the issues the company is experiencing and how she can change its processes to be more efficient and effective in delivering values to the customers. What we did not consider was a drastic change of technologies being used, as it may require a significant investment into restructuring of not only the processes, but the company data governance and other related departments. Online patient history being one, it is a newly pitched platform (called RoloDoc) where patients' medical history is securely transferred from one doctor to another at the patient's approval, and expires after certain amount of time or upon fulfilment of the patient's needs. The concept was met with a lot of criticism along with the startup's poor presentation of the technology; however, the core idea may show a promise in the future. Instead of doctor-to-doctor transfer, a patient's medical history along with the prescription could be sent to a specific pharmacy the customer wishes to visit. The pharmacist can then use the prescription to prepare the drugs much faster and check the medical history if an alternative must be used, contacting the prescribing doctor to become the last resort.

We also did not consider machineries and specialized techniques used by the pharmacists and technicians. Improvement in this area would require focus group with these individuals and bench marking of other pharmacies. Furthermore, the company can also look into making waiting time for the customers more pleasant. This was out of our scope, but it is something behavioral psychologists (to provide solutions) can work with Caring (to ensure the solution does not go against the company's brand or the safety measures). Admittedly, it would not remove the root cause of prolonged queue but may mitigate the customer dissatisfaction from a long waiting time.

5. References

[1] Suša Vugec, D., Tomičić-Pupek, K., & Vukšić, V. B. (2018). Social business process management in practice. International Journal of Engineering Business Management, 10. https://doi.org/10.1177/1847979017750927

[2] Dumas, M., La Rosa, M., Mendling, J. and Reijers, H.A. (2013) Fundamentals of Business Process Management. Springer, Berlin. https://doi.org/10.1007/978-3-642-33143-5

[3] Dumas, M., Rosa, M. L., Mendling, J., & Reijers, H. A. (2018). Fundamentals of Business Process Management 2nd Edition. Springer Berlin Heidelberg https://www.springer.com/gp/book/9783662565087

[4] Michael Glykas (Ed.) (2013). Business Process Management: Theory and Applications. Springer Berlin Heidelberg https://www.springer.com/gp/book/9783642284083

[5] vom Brocke, J., & Mending, J. (Ed.) (2018). Business Process Management Cases: Digital Innovation and Business Transformation in Practice. Springer Berlin Heidelberg https://www.springer.com/gp/book/9783319583068