

Cost of delay scenarios

Company: Dunder Mifflin Paper Company

Core Industry: Paper Production

Departments:

- Paper Production
- Logistics
- Tech
- Sales
- Compliance
- People (Benefits, HR, Talent and Learning)

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Scenario 1.1

Safety Problem: Water is used throughout all of our paper making process. Since we started the pilot of distinct paper creation, we've seen an increase in slip and fall incidents. Our incident rate has increased by 10%. Each incident costs us \$108 due to average lost time on the floor ($\$10/\text{hr} * 4\text{hrs}$), doctor's fees (\$50), administrative costs (\$16). 12% of all slip and falls are major incidents that instead have a direct cost of \$8,500 and indirect costs of \$34,000.

Last year our average number of incidents per week was 20.

The solution is to review the process of making the distinctive paper, and making it safer for individuals.

Scenario 1.2

During our standard mass production for traditional paper sheets, the quality of the sheets seems to be suffering. This has caused our returns from our corporate customers to increase by 6.3% of total sales.

For each pallet returned, here's the cost to us:

- Recycle the paper into the milling process, this has a predefined overhead cost of \$150 per pallet
- Additional shipping of 2nd delivery covered by us: \$90/pallet
- Extra time from sales to manage customer relationships: Estimated at 2hrs, and a blended rate of \$53 per year (\$109,586 median compensation, reduced to an hourly rate).

The root cause is likely due to one of the pressing machines not properly applying the correct tonnage of pressure and needs to be replaced. A new machine will cost \$30,000, by itself, with an additional \$1,000 in labor to get it set up and running.

If this lack of quality doesn't improve, we could start losing enterprise contracts in the next order cycle (3 months away). At first we may lose 1, but then every quarter after that we would likely lose 2 more per quarter. Marketing and sales agree that we are more likely to lose 3 medium clients before we lose 1 large client.

We also know these facts about our clients:

- We currently have 126 medium enterprise clients.
- Medium enterprise clients order on average 1 pallet per month.
- We currently have 63 large enterprise clients.
- Large enterprise clients order on average 4 pallets per month.

Each pallet sold is a profit of \$1,500 each.

Scenario 1.3

The COO of the company performs a monthly review of the operations and process of the production and logistics of the company. This review takes 2 teams 1 week to prepare and present: An 8 person Process Engineering team (at a rate of \$34/hour) and a 10 person Logistics engineering team (at a rate of \$31/hour).

This report is a status update, and rarely causes action to be taken that isn't already discussed to be taken. The COO wants to understand the value of switching to a continuously available dashboard to take action faster and free engineers up to focus on solving problems.

The lead Process and Logistics Engineers "are highly certain" that making decisions faster than monthly would allow the company to become more productive, saving the company \$15,000/mo in lost productivity.

Scenario 1.4

The lead Process Engineer proposes changes to the manufacturing process to give more control to the workers to call out defects and stop production to remove the defects instead of letting them get to the end of the process and then expecting them to be removed (which doesn't always happen).

The plant foreman says that the total downtime cost (TDC) is \$885 per stop due to overhead of involving quality control, and indirect hidden costs of upstream and downstream labor, and giving control to the workers will cause production stoppage to increase from 6 to "almost 100". The lead Process engineer is highly confident that stopping more frequently will decrease the total downtime cost by 66%. The plant foreman believes that the expected average number of stops per day will go from 6 to "almost 100"; however, the process engineer believes that it would only increase to half that amount.

After discussions around wear on machines, reduced defects released, and being able to have data for better metrics for improvements, all groups agree that \$22,000 per week is an accurate productivity and cost savings by stopping more frequently.

Marketing also believes they can capture 10% share of the \$21 Billion Dollar of custom-design-paper market within 3 years through the increase of quality control assurance. They're not highly confident in that time though.

The total time to implement is all in training, so it can be rapidly rolled out.

Scenario 2.1

The eastern USA warehouse is the primary location for outbound widgets. John Smith, the office manager, has been complaining that his team needs to double check the work on the floor to ensure customers don't call in angry. He has asked for a scanner to validate the loads automatically instead.

Based upon observation, currently a worker takes 4 trips out to confirm the right number of widgets every day. {Source: John Smith}

It takes them approximately 30 minutes to count the widgets. {Source: Floor workers}

Per John Smith, they catch an error with 1% of the loads. On average 20 loads leave the warehouse a day. {Source: Logistics}

The company ships 6 days a week.

Although the worker catches 1% of the errors with the loads, John Smith is still receiving calls of wrong orders. After 1 day of thorough checking by John, he thinks the error rate is closer to 3% of the loads. {Source: John Smith, Dunder Mifflin management}

John is afraid of losing customers because of the errors of the loads the worker isn't catching. The last 3 months John is guessing he has lost about a few customers each month. John doesn't want to lose any more of his loyal customers.

Each load is worth around \$17,000 – \$20,000 in revenue. {Source: Logistics}

The average wage of a worker is \$15 per hour. {Source: HR}

Scenario 2.2

The Dunder Mifflin Company has made a HUGE sale of their paper products to a big company in Canada! Management is pretty excited about finally selling outside of the U.S. and thinks this could be the start of more recognition. In turn, for the recognition for a good product, they hope that means more sales will follow.

The company in Canada has ordered 400 loads to be delivered iteratively over the next 12 months. {Source: Sales / Legal}

Each load is worth around \$17,000 – \$20,000 in revenue. {Source: Finance} However, because of the large amount that is being ordered – management wants to give them a discount for the bulk order. The discount will be 6% on the 400 loads for the Canadian company. {Source: Sales / Legal}

However, the discount is contingent on the loads making to the Canadian warehouse at certain times over the 12-month period.

They are delivering just enough product and giving the Canadian company time to ship the paper products out to their stores they have within a 300-mile radius from the warehouse, which is where their headquarters is also located.

If the paper product doesn't make it to Canada's warehouse on the specified dates than the company has to give a 12% discount instead of 6% on the loads that were delivered.

{Source: Sales / Legal}

On average 20 loads leave the warehouse a day {Source: Logistics}, assumption can be made that shipments will be leaving weekly to the Canada Company from our Eastern Warehouse.

Dunder Mifflin Management is curious on what the impact would be to their bottom line if they have to give a 12% discount on every load.

Scenario 2.3

There have been new government laws recently passed that require the paper production companies to disclose the type of chemicals used in creating and treating of the paper they make.

On each box of paper there has to be a label indicating the chemicals used and the percentages of those chemicals.

The government law has indicated that all paper production companies must be compliant in 6 months.

Any box without a label listing the chemicals and percentages that is shipped out of the warehouse will be fined the \$.75 each box. {Source: US Government}

Currently management is pretty concerned about possibly being out of compliance with the law.

On average 20 loads leave the warehouse daily – shipping out 6 days a week. 1 load usually has 100 – 150 boxes. {Source: Logistics / Shipping}

This has never been done before so the paper production company doesn't know yet what the likelihood of labels missing would be.

The label must have all the chemicals used and their percentages listed – font to be used is Arial 8 font. Chemical name ##%, Chemical name1 #%, etc. {Source: US Government}

The paper production company knows they have to comply with the federal law but they aren't sure if they can get it done in 6 months. The management team's wants to know what the potential fines would be if they don't comply in 6 months and how pricey those fines could be every week.

Scenario 2.4

The new government laws that have been recently passed require the paper production companies to disclose the type of chemicals used in creating and treating of the paper.

On each box of paper there has to be a label indicating the chemicals used and the percentages of those chemicals.

The government is being very picky about how each label looks. Every label on every box has these specifications:

- All the chemicals used and their percentages listed
- Font to be used is Arial 8 font
- Separated by a comma and lists the chemicals in order from the largest amounts to the smallest amount. {Source: US Government}

For example: Chemical ABCF 33%, Chemical XYZD 25%, etc.

If each label on each box isn't exactly matching these specifications, each bad label could be fined \$.07. {Source: US Government}

On average 20 loads leave the warehouse daily – shipping out 6 days a week. 1 load usually has 100 – 150 boxes. {Source: Logistics}

Scenario 3.1

Currently there is a manual process of auditing and reconciling various systems, both internal and external.

By automating this process, the company will be able to stop using the manual system which involves employing two analysts at \$63,000 per year. The automation has a low cost of \$5,000 to develop. This sounds great. Everyone signs off on it.

When Finance management finds out, they notice holes in the plan. Full redundancy of both the manual and new automated process should occur for a period for 1 year to ensure accuracy and financial accountability. This means the full benefits will not be realized until after 1 year.

Scenario 3.2

The Marketing and Tech teams have figured out that the website isn't drawing as much traffic via search engines as it could. The writers and internal target audiences express that the content should be updated more frequently, including blogs and social media. This would involve bringing on another writer and a social media manager.

The conversion rate of traffic to the website to sales is 0.1% (0.1% of all visits results in a sale). The current traffic is 7,000 visits per week. And each sale on the website is an average of \$150 of profit.

Based on previous research of other e-commerce sites, making the changes to have more content and increase social engagement will increase website traffic by 40%.

Scenario 3.3

The company has been around since 1949. Over time, the company founded as a paper company has developed a lot of manual and paper based processes. It has become a joke amongst the IT department that they should build computers out of paper, as it's the only way the company will move into the technology age.

The CIO has challenged the IT department, based on these jokes, as to what they would spend 3 months of time getting rid of bureaucratic processes. After taking a week of conversations and research, the architects and IT leads came back with the following proposal:

- Removal of the most damaging technical debt to increase the speed of development. This will free up enough time to be the equivalent of 9 full time developers who are paid an average of \$102,160 per year. This would take 7 weeks of the 13.
- While removing the technical debt, services will be built out to allow independent applications to talk to each other. This will allow for 24 warehouses per warehouse workers to focus on shipping paper faster instead of transferring from a computer to paper, or from paper to the computer. This will free up 20% of the time of those warehouse workers. Warehouse workers are paid \$10/hr and are scheduled for 40 hours a week. There are 7 warehouses across the US.
- With services, given the time frame, certain approvals can instead be automated to generate error reports and stop bad transactions instead of trying to manually inspect each one. This will speed up delivery to customers by 2 days for larger shipments, and 1 day for smaller shipments. It will also free up 15% of the office managers' time (at an annual salary of \$74,650) to focus on growing and helping their direct reports. There are a total of 14 office managers.

All of these could be measured separately, but each is dependent on the next.

Scenario 3.4

The CEO has challenged the company to learn more about each different area to help bring a larger sense of purpose.

The Talent Development and Learning Management believes that implementing an employee driven video platform, similar to YouTube will help all 15,000 of the company's employees.

The Learning Management team pulled together the following information:

What's believed to be true about potential usage of the video platform:

- 10% of the users will create a majority of the effective videos. (Source: Standards of online communities).
- Initial interviews show that videos will apply to improving effectiveness of 1 hour per week. (A modest guess based on interviews).
- For ease of calculation, the average hourly rate per employee is \$32. (Source: HR)

What's known about effective videos from research:

- Effective videos typically range from 1 to 5 minutes.
- Effective videos increase the number of engaged employees that learn and apply from knowledge sharing by 43% more employees (from 22% to 65%).
- Retention of content from videos vs. other methods already implemented in the company increases from 10% to 65%. (Source: Media/Marketing studies)
- Productivity increases of actions and decisions from watching effective videos are 323%. (Source: Scientific studies)
- It will take approximately 6 months for the system to be rolled out and used to 80% potential.
- After 6 months, it will take a full year to reach 90% potential, and that's considered the peak for measurement.

Scenario 4.1

During our standard mass production for traditional paper sheets, the quality of the sheets seems to be suffering. This has caused our returns from our corporate customers to increase by 7% (Source: Finance Department).

When returns happen, here's what we have to do:

We have to pull up the existing order and print everything again from scratch. The order even though it is an existing order it has to be double checked by a sales associate with the corporate customer to verify all the information again. Because it's a return, more time is spent with the customer to ensure accuracy of information and to make the customer happy. This can take almost 1 full day to verify the information again before moving onto to the printing process. These delays sometimes getting to work on other incoming orders but returns take priority. Bob, a 4 year sales associate make \$22.50 (Source: HR) an hour and spends 6.5 hours, (Source: Bob) 1 day a week on returns. Lucy and Linus, who are Bob's coworkers, have been on the team for 1.25 & 2.8 years and report they spend 1 full day on returns. Bob's an expert and pretty awesome.

Next a worker on the floor will break up the printing into smaller batches and double checking each batch before printing the next batch. This manual intervention with the machinery and verification process triples the time normally spent with an order. Duke, a worker on the floor, makes around \$17.25 (Source: HR) an hour and dislikes doing returns as they take him a ½ day (Source: System logs) to babysit. No one on the floor likes doing returns because they are tedious to do. Duke has been working on the floor for 3.5 years now and makes more than the ½ the other floor workers. Duke wishes the sales associate could get the information right on the paper and the machines did a better job of printing.

If this lack of quality continues, we could start losing corporate contracts in the next order cycle (3 months away). The average corporate contract is worth 150,000, and at first we may lose 1, but then every quarter after that we would likely lose 2 more contracts per quarter in a year. There are 4 quarters in their Fiscal year.

Scenario 4.2

The whole process of getting an Ad to print often involved huge amounts of rework when the original writer saw the picture and complained that he had a completely different kind of girl in mind, or that the layout split the text in the wrong place. Even if each person patiently explained their ideas and what they wanted to the next person in the chain, all the explanation took a lot of time and ideas were still miscommunicated.

In fact, the idea of separation between these departments became so absurd that in 1950 Bill Bernbach decided to put artists and copywriters together in a 'creative team'. (Source: Google) Agencies hired 'teams', not two individuals, and both partners received awards together – or got fired for poor performance together!

It was a concept that revolutionized advertising and working practices because the collaborative partnership achieved better creative results and significantly reduced waste.

Management wants to try this approach in the Marketing department. They want to pilot this approach for 3 months to see if the time it takes to get a finished product done. The pilot is to consist of 2 teams of 2 people each; 1 copywriter & 1 illustrator, to work together hand in hand on the same project at the same time. The experiment will take things to the extreme and even have the team share a computer.

The average time it takes currently using the current process to get a project finished is 8 weeks (Source: Management team). Management hopes the new experiment will decrease this time by at least 35% based on another company's success of 50%.

Today the current process is: The Copywriter spends around 3 weeks on their part and then moves onto the next project. The illustrator takes around 3 weeks as well for their part. Rework and redo's take around 2 weeks because of miscommunication and misaligned expectation. The 2 teams are very excited about this experiment and are huge supporters of making a change.

A copywriter makes on average, \$57,595 a year in income. An illustrator makes \$53,624 on average a year in income. (Source: HR).

Each finished project is revenue for the company of around 18,000 (Source: Finance department).

If the experiment goes as desired, then the rest of the department will use this method and the Marketing management team needs to know the financial benefit of this experiment. The rest of management in the company are skeptical of this experiment and doesn't think it will work.

Scenario 4.3

We waste time. We don't mean too but we risk this to ourselves when we switch from one task to another. You have probably had the experience of being in the middle of working on something when an email flashes up. You stop what you're doing to check the email and then can't remember how you were going to finish the sentence you were half-way through writing.

Gloria Mark, Professor of Informatics at the University of California, found about 82% of all interrupted work is resumed on the same day, but it takes an average of 23 minutes and 15 seconds to get back to the task. (Source: Google) Allowing interruptions, whether of email, phone calls, coffee with a colleague or another project – carries a heavy penalty for our productivity.

The management teams at Dunder Mifflin are experiencing the same problems and want to try and experiment to see if they can decrease some of the time it takes to get things done. John Smith has heard about Kanban and the Kanban mantra – 'Stop Starting and Start Finishing' and wants to give this way of working a try.

Today in the Billing department it's taking around 3 or 4 days to get the Invoices/Bills out to the customer with the details of what they ordered and how much it cost at the item level. {Source: Billing Department/Accounting} But in the middle of those 3 – 4 days the billing worker is also asked to fix bills, refund a bill and answer a variety of questions from customers calling about their bill.

There are 4 Billing workers and all of them can handle any of these types of requests. In Kanban you have a Work in Progress or WIP limit for the team or person. The 4 workers have decided that their Individual WIP limit will be 2. So at any point each billing worker can have 2 requests they are handling.

They ran an experiment for 4 weeks and set up the following:
Each person can only be working on 2 requests at any time.
Each person has a visual Kanban board of those 2 requests.
Phone duty will be split up each day so that not every person is answering phones.

The result was the Invoices would go out in 1-2 days, fixed bills were getting fixed in 1 day and refunds were still 3 days.

Because of the bills being sent out and fixed earlier, the company has seen an increase of revenue of 1% the last month. There was also a 10% reduction in Past Due accounts. Revenue each month is typically around 1.4 million. {Source: Finance}
Should Dunder Mifflin continue its Kanban approach?

Scenario 4.4

Dunder Mifflin produces many types of paper from lower quality to super high end, with glossy finishes. The glossy finish paper has a high gloss coating applied to the paper surface that yields a smooth, shiny finish, vivid colors, vibrant images and excellent reproduction. Certain chemicals used in the high gloss coating is starting to be tracked by the US EPA as their affects are becoming more known to harm the environment when thrown away and enter our water sources.

Dunder Mifflin's founder is an avid nature lover and wants their products to not leave a damaging footprint on the ecosystem. The EPA has not yet set a date on which every company and state will need to comply but has agreed on the following: Each flagged chemical will require the Company name or Name of the recipient who purchased the paper product to be registered including the chemicals in the item purchased with the EPA.

Although it hasn't been solidified, the law is saying \$.08 for every product sold that is not registered.

The law has not been made clear on who the responsible party will be for registering the information. It could either be the seller of the product or the purchaser. Dunder Mifflin's founder doesn't care about this detail and wants to electronically register the information on the purchaser's behalf.

On average 20 loads leave the warehouse daily – shipping out 6 days a week. 1 load usually has 100 – 150 boxes. {Source: Logistics}
Of the 100 – 150 boxes, only 25 boxes contain products that contain paper with glossy finishes. {Source: Logistics}

The founder wants to know what the fines could potentially be and is it worth getting ahead of the law. He might decide to do it anyway regardless – but wants the facts before making a decision.