How Automation Impacts Document Workflows: A Pilot Study

Executive Summary

Despite the ability to produce considerable quantifiable benefits for small to medium size businesses, initiatives geared towards automating document processes are often met with resistance from key stakeholders. Most companies that fall into this category have relied on the same manually-driven procedures for decades and are concerned that a new way of working will be difficult to implement or disrupt their organization. Quadient wanted to assess the labor time and error rates associated with employing three different levels of automation along with their impact on a company's operations. In turn, Quadient partnered with Dr. Robert Albright and his associates at AIM Consultants to conduct a study to compare the outcomes of using manual preparation and processing, partial process automation, and full process automation.

Key Findings:

- Study participants showed a tendency to become distracted and disengaged while performing manual mail prep, which resulted in avoidable errors. The repetitive nature was often highlighted even though participants only engaged in the task for 1.5 non-consecutive days.

- Three out of five participants were more concerned with finishing the task than ensuring what they processed was accurate, despite not having a time limit imposed and being given an opportunity to double check their work.

- It was anticipated that the error rate would decrease with each incremental layer of automation. However, in a partially automated scenario, the time to complete the task decreased by 34% while the error rate nearly tripled. The manual component of the task combined with the power of the automated component turned one simple human error into multiple errors – or compound errors. In this scenario, participants likely saw the act of searching for mistakes as overwhelming.

- Due to the complex nature of errors created through partial automation, error remediation efforts would erode any time savings gained.

- Full automation including an intelligent inserter had the most optimal outcome with negligible error impact when compared to manual or partial automation.

Recommendations:

In order to remain competitive and succeed in the long-term, businesses need to consider the benefits of adding automation to some or part of their outbound document processes

Business process automation enables companies to drastically improve their workflow by reducing errors, improving document integrity and security thereby increasing customer satisfaction while increasing employee engagement.

Over time if a task is not stimulating to employees, boredom, fatigue and lack of focus may detract from the level of attention needed to abide by business rules and sort documents correctly. This is especially true of incoming generations who are digital natives, quite comfortable with working with technology, and seek an engaging work environment.

Table of Contents

INTRODUCTION

Many small to medium-sized businesses still rely on repetitive manual processes to send critical transactional documents such as invoices, statements, notifications and contracts. In order to remain competitive, organizations must find ways to maximize their business velocity. An optimized mail workflow meets the needs and requirements of the business as well as its customers and makes the most of internal human resources. This white paper reports on the results of a **Time In Motion** study completed on behalf of Quadient to determine the outcomes related to applying these three different levels of business process automation into a company's outbound document workflow.

WHAT IS BUSINESS PROCESS AUTOMATION (BPA)?

A business process refers to a set of tasks, activities, or a chain of events that, when completed, result in the achievement of a business goal. Business Process Automation (BPA) is viewed as the automation of an entire business process - from the logical start of the process to its logical conclusion. The event triggers that indicate the start and finish of a business process are pre-defined to the requirements of the business environment. Appropriate logic or business rules may be built around internal entities such as work teams and departments, or even external stakeholders (such as customers, vendors, partners, and suppliers), to create a business operation. In sum, business processes connect to one another and the entire organization runs on a collection of business processes.

HOW BPA RELATES TO OUTBOUND MAIL PROCESSES

BPA captures a process workflow and uses appropriate technologies to automate and streamline the entire process, typically improving the speed and quality associated with that organizational process. Automating business processes also enables businesses to improve their product or service's competitiveness in the market via error and cost reduction, as well as enhanced efficiency.

When a customer considers their outbound mail process, multiple options currently exist. Businesses may choose to automate certain stages of a business process rather than automating an entire process. Industry experts have devised descriptors of varying 'levels of automation' based on the degree of human involvement in a business process. The methods used for outbound mail employ somewhat different processes, equipment, and technologies to achieve the same business objective.

Quadient was interested in fully exploring the outcomes associated with applying different levels of automation, as well as factors that promote or impede the adoption of such technology. Quadient-sponsored a study conducted by Dr. Robert Albright and his team at AIM Consultants designed to compare the labor time and error rates associated with the mail processes when using the following:

1. **Manual Document Process**

2. **Partial Process Automation**

3. **Attended Full Process Automation**

PILOT STUDY – METHODOLOGY & MATERIALS

The study compared these methods of completing the outbound mail process over 1.5 days. These three methods represent the processes used today by most small to medium-sized businesses. The task involved preparing and processing a set of customer invoices, since invoices are an essential part of maintaining a company's cash flow. Beyond assessing the level of productivity achieved under each scenario, such as tangible task-oriented outcomes (e.g., time to complete, the potential for error), the intention was also to assess if either scenario had an effect or influenced participant behavior.

Five temporary employees were engaged to participate. Two of the five reported they had sorted and stuffed mail at a prior time in their work-life. Three reported that they had not done work similar to this in the past.

Below is an outline of each process evaluated in this study in more detail along with parameters and business rules the participants had to follow.

MANUAL DOCUMENT PROCESS:

This method involved manual document preparation and manual document processing.

- **Manual document preparation** involved separating individual business documents from a set or stack of documents printed from an ordinary printer.

  » As each individual document was separated from the stack, the human mail processor needed to look at the document and apply a set of business rules.

» The application of the business rules resulted in creating different sets of documents according to business needs. The business rules included directives such as past-due invoices needing a "past due" sticker, multi-page invoices needing to be put in a larger envelope, etc.) See Appendix A for a detailed summary of the business rules used in this study.

- **Manual document processing** involved the following tasks.

    » Manually folding documents

    » Manually inserting the folded documents into envelopes

    » Manually depositing the stuffed envelopes into an appropriate mail carton or bin.

- **Partial Process Automation:**

    » This method involved manual document preparation (the same as Step 1(a) above, and then,

    » Separating documents into piles with the same number of pages (e.g., 2-page invoices, 3-page invoices, etc.) This step was then followed by -

    » An automated processing of the documents. This involved the use of a folder inserter machine. This equipment folded the document as well as inserted the document into the envelopes.

- **Attended Full Process Automation:**
Attended full process automation refers to cases where technology replaces the majority (90% or more) of the human tasks associated with a process.

    » This method involved a human operator selecting documents from a computer system or database for input into a software-guided machine for document preparation

    » An automated processing of the documents. This again involved a machine fold (of the document) and machine insert (into the envelope).

BUSINESS RULES

Each participant was provided with the necessary materials along with the parameters or typical business rules required to complete the job successfully. Much like in any business, the communications vary by customer especially if targeted inserts or messaging is included.

Materials and Methods

Materials associated with sorting, inserting, and processing a stack of invoices were provided to each participant. Each participant was seated at a separate table which had:

- A stack of 200 invoices

- An alphabetized list of VIP customers

- A set of special inserts/flyers to be included in any VIP invoice envelope

- An alphabetized list of customers who preferred their invoices e-mailed

- "Past due" stickers that were to be placed on any invoices that showed a past due amount.

- Additionally, cartons were placed on the participants' tables which were to receive the invoice envelopes based upon the invoice type. The cartons were labeled as follows:

    » Standard: for standard invoices with standard envelopes

    » Flats: for invoices requiring large envelopes (i.e., multi-page invoices and VIP invoices that also contain a special flyer)

    » Zero Balance: a carton for zero balance invoices that do not need to be mailed

    » e-Invoice: a carton for invoices for customers who have requested to receive their invoice electronically (e.g., via a scanned pdf document.)

Scenario 1 - Manual Preparation and Manual Processing

There were two Manual Preparation/Manual Processing trials conducted on the first day of the study. The same 200 invoice document stack was utilized in each trial. The stack was designed to emulate an average set of invoices that would be sent out monthly. As is typical, the invoices varied by size, amount due, past due, customer type, and customer preferences which contributed to the complexity of the overall assignment. AIM Consultants recorded the following output related to participant productivity:

Manual Prep and Processing	Average Time to Complete	Error Rate
Trial 1	119.25 Minutes	2.75 %
Trial 2	73.8 Minutes	5.00 %

SCENARIO 1
Qualitative Observations and Insights

Because of the requirement to accurately apply all business rules, participants' preparation time was expected to be higher than their processing time in order to avoid mistakes. However, during the manual preparation/manual processing scenario, it was observed that participants were either preparing invoices too quickly, without checking their work or multi-tasking during the preparation phase. This was especially true in the second trial run of Scenario 1. While the time to complete that set of documents decreased, it appears this speed came at the cost of an increased error rate.

In some cases, participants were looking at the next invoice while attempting to fold and insert the prior invoice. One participant kept repeatedly checking their cell phone for text messages while preparing the invoices. This created numerous, seemingly avoidable errors. In any case, it seemed that the participants' primary objective was speed, and not accuracy despite not having any time limits or efficiency objectives imposed on them. The lack of attention paid to quality or accuracy was surprising. "Much time was spent carefully explaining the different business rule requirements when describing the task to the participants. Yet, we observed the participants rushing to finish the task and then not check their work for accuracy," Dr. Albright stated. Consequently, every participant committed errors while completing the task.

AIM Consultants utilized scientific research to understand the participants' behavior. According to Hackman and Oldham's Job Characteristics Model employees are more likely to be engaged and motivated when tasks are varied and challenging (called 'Skill Variety') as well as feel that their job roles have some significance and meaning (called 'Task Significance').

One reason as to why study participants might have rushed to finish their tasks was due to a lack of skill variety. Document sorting is monotonous, not stimulating, and can be physically draining. In this study, the manual tasks performed by participants involved tedious and highly repetitive tasks like looking at lists containing customer names, sorting invoices into various piles after looking at lists, folding invoices, and inserting invoices in envelopes.

Therefore, participants were keen on finishing the tasks because they were more than likely bored and wanted to reduce their physical discomfort. It could be inferred that when employees perform monotonous tasks that are mundane and involve no intellectual stimulation, over time, it reduces their motivation thereby lowersing their productivity.

> "
> MUCH TIME WAS SPENT CAREFULLY EXPLAINING THE DIFFERENT BUSINESS RULE REQUIREMENTS WHEN DESCRIBING THE TASK TO THE PARTICIPANTS. YET, WE OBSERVED THE PARTICIPANTS RUSHING TO FINISH THE TASK AND THEN NOT CHECK THEIR WORK FOR ACCURACY.
> **— Dr. Robert Albright, AIM Consultants**

The second reason is the lack of task significance, in that employees may not see a clear association between how their sorting tasks might relate to the impact they have on the company's productivity or the end result of customer experience.

Even in situations where a participant knew they had made an error most did not stop to fix it and instead continued to the next task. Speed to finish seemed the primary concern, while accuracy seemed an important secondary concern for only two of the five participants.

Scenario 2 - Partial Process Automation (Manual Preparation and Automated Processing)

This scenario involved manual document preparation and the use of a machine to automate the folding and inserting process. Here, only certain tasks and not the entire process was automated. AIM Consultants recorded the following output related to participant productivity:

Partial Process Automation	Average Time to Complete	Error Rate
Trial 1	48 Minutes	10.2%

SCENARIO 2
Qualitative Observations and Insights -

The errors in this scenario stemmed from the manual document preparation phase. As mentioned earlier, even when participants realized that they had made an error, they chose not to correct it. Instead, they proceeded to the next task. Surprisingly, while the partially automated scenario cut completion time by 34% versus the purely manual scenario, the error rate tripled. This occurred due to the combination of manual and automated tasks. The document preparation phase (where participants sorted invoices into various piles) was manual and thus subject to human error. When the participant placed a customer invoice into the wrong pile during the preparation phase (e.g., a 2-page invoice into the pile of 3-page invoices) it set off a string of subsequent errors. As expected, the time to complete a typical outbound mail process decreased as the level of automation increased. However, a surprising finding was that the errors associated with each level of automation did not align in a monotonic fashion. **The team observed the potential for error increased when deploying partial automation – versus the fully manual scenario.** In a partially automated scenario, the manual component of the task combined with the power of the automated component of the task turns one simple human error into multiple associated errors. This type of error was defined as a "compounding error."

> **Compounding Error:**
>
> When one manual error impacts downstream automated processes resulting in multiple errors.

Compounding Errors

'Compounding Errors' are multiple errors that subsequently stem from one single human error. For example, the participant needed to manually separate the sample stack of invoices into stacks or batches of 1-page invoices, 3-page invoices, 4- page invoices, and 5-page invoices. It was not uncommon for an operator to mistakenly co-mingle invoices.

In an office environment, this mistake would result in the customer who should have received a 5-page invoice to only receive 3 pages. Consequently, the next customer would receive the remaining 2 pages of the other customer's 5-page invoice and only 1-page of their invoice. Unfortunately, every subsequent customer invoice (in that 3-page stack) would be out of sequence as well. Each would receive portions of another customer's invoice instead of a complete version of their intended document. Each case is considered a High Impact Error due to its ability to cause heightened confusion and customer dissatisfaction.

ERROR TYPOLOGY AND POTENTIAL IMPACT
It is important to examine and understand that are different levels of errors that may be made. Different error types vary significantly in terms of the impact they are likely to have on the customer experience not to mention security and compliance risks. Below is a typology of three different error types as they pertain to customer dissatisfaction:

1. **High Impact Error** - An error likely to cause customer confusion, distress and/or dissatisfaction. It will likely necessitate additional correspondence to fix the situation. Such errors were most likely to occur with the partially automated process.

Example: Sending a customer another customer's invoice or sending a partial invoice.

2. **Medium Impact Error** – An error likely to cause some customer annoyance and dissatisfaction. The error may generate the need for additional correspondence. We expect this type of error to most likely occur in manual processing (Scenario 1).
   Example: Sending a paper invoice to a customer who has specified that they prefer their invoices to be delivered electronically.

3. **Low Impact Error** - An error that is unlikely to annoy or dissatisfy a customer. However, the error may add additional costs to the supplier of the invoice. This error is also likely to occur in manual processing (Scenario 1)
   Example: Using a large invoice/flat for an invoice that should have used a No. 10 envelope (thereby incurring extra postage and envelope cost); Sending a zero-balance customer a zero-balance invoice. This would also result in wasted paper stock and postage.

Therefore a partially automated process could lead to:

a) A higher number of errors,

b) More complex and higher impact errors (like co-mingled invoices)

c) A negative impact on the customer experience due to increased errors.

Scenario 3 - Attended Full Process Automation

The last scenario was completely automated and yielded the most successful results. Output Management Software was utilized in this phase for document preparation, and the folding and inserting was completed using in-house equipment. However, since the trial experiments were done on a much smaller scale, this experiment utilized a less-sophisticated piece of equipment that was capable of processing standard-size invoices and standard-sized envelopes only. The machines limitations still required manual folding and inserting of the invoices that required large envelopes.

The study results revealed **no errors** when the folder inserter was used along with automation software. These results were consistent with a repeat round completed outside of the study parameters. The only potential for error was in the manual folding and inserting stage (of the large envelopes.) (Recall that in the partial automation scenario, the manual phase was the document preparation stage, which has a higher likelihood of errors).

Full automation clearly reduced the time and manual labor required and led to optimal outcomes. The two figures below reflect the participant time and error data compiled from all scenarios. The first graph shows a reduction in time and error rates when business processes were fully automated.

ATTENDED FULL PROCESS AUTOMATION YIELDS:

- ✔ a lower number of errors
- ✔ fewer complex errors
- ✔ lower impact errors,
- ✔ enhanced speed
- ✔ improved consistency

Process Analysis
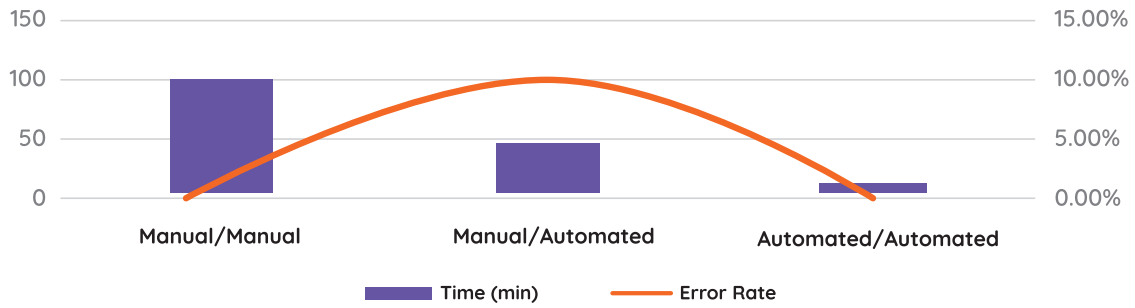
In the second graph, we see that partial automation ('Manual/Automated') error rate expands due to compounding nature of automation while error remediation efforts increase, which erodes overall time savings.

Error Correction Impact
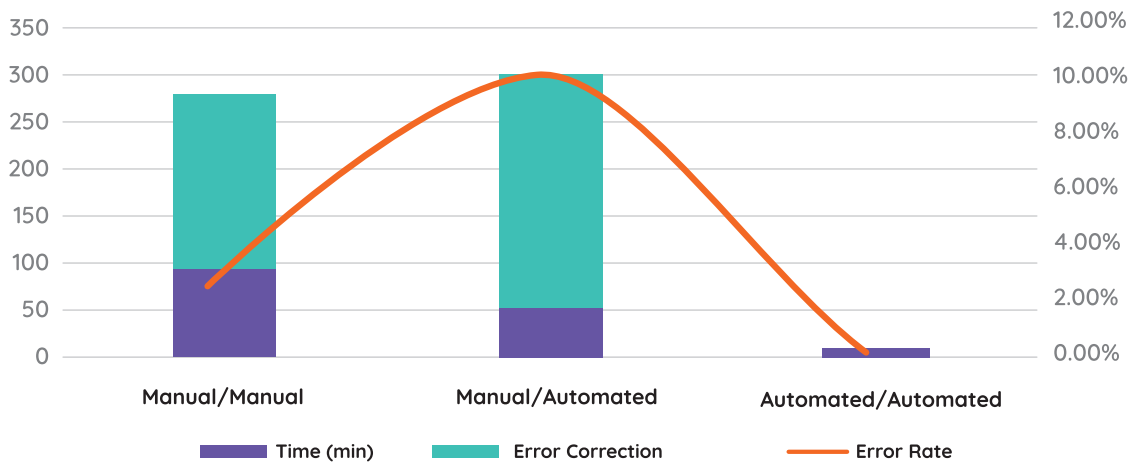
1. The amount of time taken to complete the task decreases as the process makes use of increased automation

2. Non-intelligent inserting (i.e., manual/automated or partial automation) increases the potential for high impact errors

ADDITIONAL AUTOMATION ALTERNATIVES

There are two more possibilities for automating outbound document processes that were not part of this pilot study but deserve mention and consideration.

1. **Unattended Full Process Automation**:

   This process involves technology replacing 100% of human tasks. People simply manage exceptions and expectations.

   » At the input stage, an ERP system passes files directly to Output Management Software without human intervention

   » At the Processing stage, a layer of software known as an Automated Insertion Management System is added which tracks each document through the inserting process and provides an audit trail. Employee involvement is needed only to manage exceptions and expectations (like customer rule updates).

Unattended Full Process Automation mitigates the potential for human error while enhancing speed. It would be even more likely than Attended Full Process Automation to produce better results while allowing for the redeployment of employee labor.

2. **Outsource/Process Elimination:**

   The final option available is outsourcing or hybrid mail. Instead of engaging in any of the process options in-house, businesses have the option to eliminate the entire workflow A company could outsource their entire outbound mail process to a secure facility who would use the technology referenced above to fully automate the customer's business process. The employee's involvement would be reduced to simply uploading documents to an intuitive cloud-based platform, for the mailing house to handle the remaining steps.

Outsourcing or Hybrid Mail is another way to gain operational efficiency and reallocate employee time to higher value tasks. This option is attractive as a business option when:

   » a. it is more **cost-effective to outsource** than to fully automate internally and/or

   » b. the business **lacks the time or technical ability to execute full automation** on their own.

Conclusion

The optimal automation scenario for your business is one that will maximize employee and operational efficiency and deliver the least amount of errors with the lowest impact. Despite the ability to produce considerable benefits for companies, initiatives aimed at automating business processes and digital transformation are often met with resistance from business owners. For some, it is because "we've always done it this way" while others fear it will be too expensive and difficult to integrate into their legacy systems. This resistance occurs even when process automation has the potential to free the workforce from engaging in mundane business processes, thereby allowing employees to utilize their work hours in more interesting and revenue-driving activities that add greater value for the organization.

AN EMPLOYEE'S POINT OF VIEW

Following each trial, participants were interviewed by the researchers to gain insight into their motivations and feelings about executing their assigned tasks. When asked what were the most challenging aspects of preparing and processing outbound mail/invoices manually, the consensus among the participants was "staying focused" and maintaining their attention on multiple business rules. While most participants hesitated to complain, they did recognizes aspects of the manual tasks that they did not enjoy or found "annoying."

The repetitive nature of the task was often highlighted even though the participants only engaged in the task over 1.5 non-consecutive days. When you apply these principles as a part of ongoing responsibilities in the workplace, consider the exponential impact in terms of employee engagement and compounding errors that are bound to occur over time.

As younger generations and digital natives begin to enter the workforce, traditional manual tasks must be transformed in a way that encourages career growth and developmental paths. Research has shown that millennials want meaningful work with value-adding responsibilities. A 2019 Gallup study on workplace engagement found that

millennials want meaning and purpose associated with their work; they expect to have opportunities to learn and grow in the organization. This generation is also more mobile and does not hesitate to switch companies. Hence, it is critical to focus on employee retention via enriched job design and enhanced employee engagement. Clearly, performing monotonous tasks that are not meaningful or stimulating, will inevitably lead to high turnover for those performing such tasks.

Moreover, studies have shown that millennials are in favor of automation. They believe that automation will improve productivity and efficiency for them as well as the company. It will allow them to spend their work time on more creative and complex tasks that add more value to the organization.

THE WAY FORWARD

With employee engagement and customer satisfaction as key contemporary organizational objectives, having employees perform document preparation and processing manually likely detracts from the achievement of these two business success drivers. Since such manual tasks are not stimulating, and require no specific knowledge or skills, they do little to keep employees engaged and motivated. This is worrisome, given the fact that this lack of engagement could likely lead to errors contributing to compliance risks and could have a negative impact on customer experience.

Clearly, the benefits of full automation outweigh partial automation and manual processing. Full automation allows businesses to successfully convert the negative employee outcomes associated with the manual scenario (such as the tasks being boring, repetitive, monotonous) into positive outcomes. When organizations fully automate their document preparation and processing, they make the most of their human resources reallocating employee time to more specialized tasks that require specific knowledge and skills.

Companies have the power to improve business outcomes drastically through BPA, which leads to improved productivity, accuracy, customer satisfaction. All of these contentions were supported by the results of this study. In addition, a company's ability to adapt to new technology and digitally transform will likely be perceived by its customers and its employees as a competitive strength and a sound investment in their future.

About Quadient

Quadient has facilitated the automation of outbound mail processes for many small to medium sized businesses helping them optimize how they prepare, process and deliver business critical documents. Quadient offers an array of intelligent digital solutions that easily integrate with your legacy systems. Count on Quadient to define and deliver a customer communications process that will best fit your needs and requirements today and scale with you as your business grows and evolves.

References

Albright, Robert, University of New Haven, AIM Consultants

Ansari, Wasique Ali, et al. "A Review on Robotic Process Automation-The Future of Business Organizations." Available at SSRN 3372171 (2019).

Appian. "What is a Business Process?" (2020). Retrieved from https://www.appian.com/bpm/definition-of-a-business-process/

Hesson, Mihyar. "Business process reengineering in UAE public sector." Business Process Management Journal (2007).

Krotov, Vlad, Serguei Boukhonine, and Blake Ives. "ERP Implementation Gone Terribly Wrong: The Case of Natural Springs." CAIS 28 (2011): 18.

Lyashok, A. " 6 Levels of Automation (Remastered). " (2017, June 1). Retrieved from https://www.gallup.com/workplace/248009/millennials-good-business.aspx

Oldham, Greg R., J. Richard Hackman, and Jone L. Pearce. "Conditions under which employees respond positively to enriched work." Journal of applied psychology 61.4 (1976): 395.

Robison, J. "What Millennials Want Is Good for Your Business. " (2019, March 22). Retrieved from https://www.gallup.com/workplace/248009/millennials-good-business.aspx

Rutaganda, Lambert, et al. "Avoiding pitfalls and unlocking real business value with RPA." Journal of Financial Transformation 46 (2017): 104-115.

Samaranayake, Premaratne. "Business process integration, automation, and optimization in ERP." Business Process Management Journal (2009).

Smartsheet. "Millennials Are Driving Workplace Automation—Here's Why." (2018, February 13). Retrieved from https://www.cio.com/article/3254647/millennials-are-driving-workplace-automation-here-s-why.html.

van der Aalst, Wil MP, Martin Bichler, and Armin Heinzl. "Robotic process automation." (2018): 269-272.

Appendix A

BUSINESS RULES

1. **ZERO BALANCE:** Pull out any invoices that have a "zero balance" and place them in the "zero balance" bin.

   » **Logic**: There is no need to waste postage or confuse a customer by sending a "zero-balance" invoice. Out of the 200 invoices processed in this study, there were 5 "zero-balance" invoices.

2. **PAST DUE:** Pull any invoices that were "past due".

   » **Logic**: It is beneficial to clearly point out to the customer that these invoices are "past due". To accomplish this, a "Past Due" sticker was to be applied to these invoices, prior to the invoice being inserted into the envelope. There were 3 "past due" invoices in the pile of 200 invoices.

3. **VIP CUSTOMERS:** Pull any "VIP Customer" Invoices. Include in each envelope containing a VIP invoice a brochure that specifically targets these customers.

    » **Logic:** These customers are more likely to respond to such a marketing initiative. There were 8 such customers found within the stack of 200 invoices.

4. **E-MAIL PREFERRED:** Pull out any "e-mail preferred" customers.

    » **Logic**: Some customers wish their invoices delivered electronically as opposed to hard copy. There were 10 such customers in the stack of 200 invoices.

5. **GROUPING INVOICES:** Group invoices going to the same customer into a single envelope.

    » **Logic**: Some customers have multiple invoices in the stack of printed invoices. Customers appreciate getting them all at once in the same envelope. Grouping multiple invoices into one envelope also saves postage. In this study there were 8 customers that had 3 invoices each.

quadient
Because connections matter.

About Quadient®

Quadient is the driving force behind the world's most meaningful customer experiences. By focusing on four key solution areas including Customer Experience Management, Business Process Automation, Mail-Related Solutions, and Parcel Locker Solutions, Quadient helps simplify the connection between people and what matters. Quadient supports hundreds of thousands of customers worldwide in their quest to create relevant, personalized connections and achieve customer experience excellence. Quadient is listed in compartment B of Euronext Paris (QDT) and belongs to the SBF 120 index.

For more information about Quadient, visit **www.quadient.com**